European science review

№ 7–8 2018
July–August

PREMIER
Publishing

Vienna
2018

European Sciences review

Scientific journal

№ 7–8 2018 (July–August)

ISSN 2310-5577

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Typeset in Berling by Ziegler Buchdruckerei, Linz, Austria.
Printed by Premier Publishing s.r.o., Vienna, Austria on acid-free paper.

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CORRELATION BETWEEN SOME MORPHOLOGICAL AND ECONOMICAL TRAITS AT THE HYBRIDS F_4 OBTAINED ON THE BASE OF INTRASPECIFIC DIVERSITY OF SPECIES *G.BARBADENSE* L

Abstract: In this article was given the data on correlation relationship between some morphological and economical traits at the hybrids obtained on the base of intraspecific diversity of species *G. Barbadense* L. The correlation relationship in certain degree almost at the all hybridous populations between traits: "diameter of a boll" with "length of a fiber", "length of a boll" with "fiberlength", "diameter of a boll" with "fiber output" was determined. It in turn gives the opportunity effective carrying out the genetic and breeding research.

Keywords: cotton, correlation, subspecies, fiber length, fiber output, diameter of a boll, raw cotton weight per one boll, populations.

Introduction. One of the significant features of the inheritance of morphological characteristics of cotton is their mutual relationship (correlation). In this connection, it becomes necessary to study the degree of interrelation of each feature in the breeding of cotton. Correlation between morphological characteristics of cotton is reflected in the research of many scientists [1–7].

P. Sh. Ibragimov in his research [2] the method of covariance analysis between cotton varieties *G.barbadense* L. and in their F_1 generations genetic, phenotypic and paratypic correlation was studied. As a result of which, due to the valuable economic characteristics of cotton, it determined to a large extent the correlation between the length and yield of fiber and its productivity, as well as a violation of the usual correlation, among complex crossed high generations, identified a number of new lines with valuable economic characteristics.

N. E. Chorshanbiev [5] the correlation between the economic characteristics of fine-fibered new varieties of cotton and the forms of F_1 generations obtained with their participationwas studied. According to the analysis of the obtained research results, conclusions on the weak negative correlation between the length and the yield of the fiber, as well as the existing connections between the fiber length and the number of bollswere obtained. A significant strong negative correlation between the mass and the number of bolls has been determined, and a change in the phenotypic correlation between species in connection with the genotype has also been studied.

S. A. Usmanov, S. S. Alikhodjaeva, F. Abdiev, K. Khudarganov [4] the genetic correlation between some economically valuable traits of geographically distant forms of the species *G.barbadense* L. was studied.According to their analysis, the coefficient of variability up to the generations of F_8 did not differ practically by all the traits of the model varieties, fiber and raw cottonweight per one boll, a decrease in the fiberlength was observed, and with the increase of 1000 pieces of seed – fiber output.

P. Sh. Ibragimov, B. Urozov, F. Toreyev, B. Begymkulov, N. Holmatova, D. Turaev [3] the traits of providing new varieties of cotton and the volume of fiber lineswas studied. At the same time, such traits as fiber productivity, fiber yield, fiber output, and also the 1000 seed weight were studied. The correlation coefficient between the volume and 1000 seed weightwas determined (from 0.18 till 0.62). Correlation to the strongest degree in the lines of 'Javlon', 'L-403' and 'LBT'was observed. In other lines, the correlation between these traits was not thoroughly observed. The correlation between the seedvolume and fiberyield to varying degreeswas also examined. The highest correlation coefficient (0.53) for the 'L-116' line was determined and in other lines the correlation coefficient was 0.20–0.44%. A high positive relationship was

found between the fiber index and seedvolume of cotton. Also, studied all the lines have a high degree of correlation, that is, the number of fibers in large bolls and their weight directly leads to positive correlationwas defined.

In this connection, samples with large seeds by high productivityare represented. This, in turn, on a significant correlation between high yield and fiber productivityis based. When developing the highest yielding varieties, the seedweight of single breeding, the breeding of the index and yield of the fiber, as well as the need to accelerate the work on wastewas notedby authors.

Salahuddin Sh., Abro S., Rehman A., Iqba L. Kh. [7] Correlation and regression studies of cultivars of Gossypium hirsutum *L.*, were analysed for quantitative characters. Results revealed that highly significant positive correlation ($r = 0.567$) was displayed by sympodial branches with seed cotton yield, which showed that seed cotton yield was greatly influenced by sympodial branches. The coefficient of determination ($r_2 = 0.321$) revealed 32.1% variation in the seed cotton yield per plant, due to its relationship with sympodial branches per plant. Regression coefficient ($b = 5.66$) showed that a unit increase in sympodial branches per plant resulted into a proportional increase of 5.66 gms in seed cotton yield per plant, whereas bolls per plant exhibited strong positive association with seed cotton yield ($r = 0.959$). The coefficient of determination ($r_2 = 0.92$) revealed 92% of the total variation in seed cotton yield attributable to the variation in number of bolls per plant. The regression coefficient ($b = 3.37$) indicated that for a unit increase in bolls per plant, there would be a proportional increase of 3.37 gms in seed cotton yield per plant. Boll weight displayed a highly significant positive correlation ($r = 0.597$) with seed cotton yield per plant. The coefficient of determination ($r_2 = 0.356$) determined that boll weight was responsible for 35.6% variation in seed cotton yield per plant. The regression coefficient ($b = 53.479$) indicated that a unit increase in boll weight resulted into corresponding increase of 53.48 gms in seed cotton yield per plant. However, the plant height and monopodial branches per plant showed non significant association with the yield per plant.

Farias F.J., Carvalho L.P., Silva Filho J.L., Teodoro P.E. [6] however, for cotton, there have been few studies using this analysis, and all of these have used fiber productivity as the primary dependent variable. Therefore, the aim of the present study was to identify agronomic and technological properties that can be used as criteria for direct and indirect phenotypes in selecting cotton genotypes with better fibers. We evaluated 16 upland cotton genotypes in eight trials conducted during the harvest 2008/2009 in the State of Mato Grosso, using a randomized block design with four replicates. The evaluated traits were: plant height, average boll weight, percentage of fiber, cotton seed yield, fiber length, uniformity of fiber, short fiber index, fiber strength, elongation, maturity of the fibers, micronaire, reflectance, and the degree of yellowing. Phenotypic correlations between the traits and cotton fiber yield (main dependent variable) were unfolded in direct and indirect effects through path analysis. Fiber strength, uniformity of fiber, and reflectance were found to influence fiber length, and therefore, these traits are recommended for both direct and indirect selection of cotton genotypes.

Materials and methods. The object of the research was used the culturally tropical subspecies from different agroecosystem ssp.*vitifolium* (Brazil) and ssp.*eubarbadense* (variety "Karshi-8", Uzbekistan) selected on the base of crossing of the hybrids F_4 fine-staple cotton variety of *G.barbadense* L. stored in the cotton world genepool of the Cotton Systematics and Introduction Laboratory of the Institute of Genetics and Plant Experimental Biology of the Academy of Sciences Tashkent.

As a method of research practical results through correlation analysis was carried out.

Results. In our experiments, a close correlation between the morphological and economically valuable traits of the participating hybrido us populations $F_4$was studied, that is, between the "diameter of a boll" and "raw cotton weight per one boll", between the "length of a boll" and the "fiber length", between the "diameter of a boll" and "fiber output" (fig. 1).

Correlation of morphological traits of populations F_4 obtained on the base of crossing of intraspecies diversity *G.Barbadense* L.)

In our research, special attention was paid to the following traits: the 'diameter of a boll' and 'raw cotton weight per one boll' of the hybridous populations F_4. The obtained results that in the selected populations of "C-2" and "C-9" the correlation coefficient between these traits ranged from $r = 0.02$ till $r = 0.04$ in a weak positive degree, while the remaining groups of populations had an average positive correlation from $r = 0.15$ till $r = 0.33$was showed.

According to the analysis of the research results the correlation between the morphological and economically valuable traits of cotton "length of a boll" and "fiber length" in the selected populations "C-8", "C-2" ($r = 0.0004$, $r = 0.0008$), in the populations "C-3", "C-6", "C-7", "C-9" ($r = 0.02$) are weak and only in the population of "C-1" ($r = 0.15$) is a positive average correlation was observed.

In the hybridous populations F_4a rather weak positive correlation between the morphological and economically valuable traits "diameter of a boll" and "fiber output" of "C-7", while the correlation coefficient was equal to $r = 0.0001$was observed. Also in populations of "C-3", "C-4" a weak correlation (from $r = 0.010$ till $r = 0.11$) was noted.

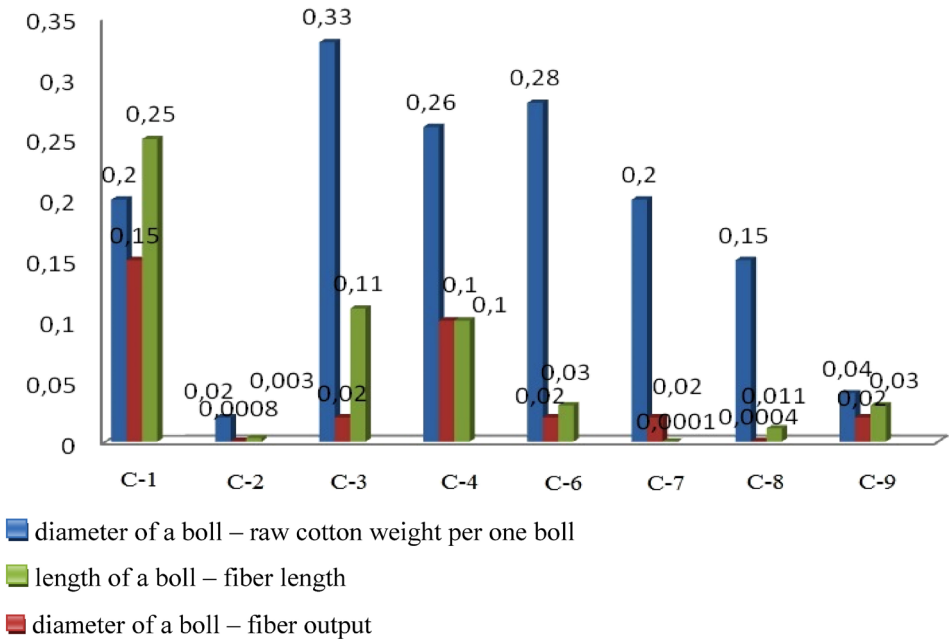

Figure 1.

It should be specially noted that in the selected populations of "C–1", "C–3", "C–8" a positive average correlation as follows ($r = 0.25$, $r = 0.11$, $r = 0.11$) was observed.

Conclusions. According to the analysis of the research results, there is a correlation between traits: "diameter of a boll" and "raw cotton weightper one boll", between "length of a boll" and "fiber length", between "diameter of a boll" and "fiber output", and this in turn, is a necessary basis for the implementation of genetic and breeding research programs.

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NEW DATA ON THE BIOLOGY AND LOCALISATION OF NEMATODE *SETARIA LABIATOPAPILLOSA* (ALESSANDRINI, 1838)

Abstract: The paper provides the results of research into some aspects of the biology of nematode *S. labiatopapillosa*, as well as its localisation, distribution and life cycles in Uzbekistan. Blood sucking Diptera, such as *Aedes caspius, Culex pipiens, Culex hortensis* and *Stomoxys calcitrans,* were identified as the nematode's intermediate hosts. *Cx. hortensis* was identified as the intermediate host of *S. labiatopapillosa* for the first time. The numbers of blood sucking Diptera are the highest in summer and early autumn. The rate of infection with larvae of *S. labiatopapillosa* in the biocoenoses of Uzbekistan is 0.3–1.3%. Populations of mature *S. labiatopapillosa* were for the first time recorded in the lymphatic system of cattle. This is the first recorded case of the presence of this Setaria species in animals' lymphatic system.

Keywords: Setaria, biology, distribution, localisation, lymph nodes, Uzbekistan.

1. Introduction

Nematodes *Setaria labiatopapillosa* (Alessandrini, 1838) are found on all continents except Antarctica. Populations of mature Setaria tend to parasitise cattle and many other animal species. The nematode has long since become a focus of researchers' attention, as *S. labiatopapillosa* causes chronic diseases in various animals. The circulation of the infection is fascilitated by various blood sucking Diptera, which take part in the nematode's life cycle as intermediate hosts [4; 8; 10; 11].

The growing interest in this nematode species in recent years has resulted in deeper research into the biology and life cycle of *S. labiatopapillosa* in Uzbekistan [2; 12]. These and other studies helped us broaden and deepen considerably our knowledge in this species and discover a number of interesting aspects in the biology and distribution of the nematode in question.

The currently available data on Setaria is highly insufficient. The best studied category is mature nematodes, which, however, also pose a number of questions. Very often this species is recorded in a wide range of animal species, which act as definitive hosts, but this issue has not been analysed properly yet [3, 14]. Nor is there a clear idea of where in the organism of a definitive host this nematode is localised.

This paper reports on the results of research into the biology and distribution of *S. labiatopapillosa* of cattle across the biogeocoenoses of Uzbekistan. Also the article discusses some issues about the localisation of mature nematodes in their definitive hosts.

2. Material and metods

This work is based on the material that resulted from long-term (2010–2018) and comprehensive faunistic and experimental research into *S. labiatopapillosa* in the biogeocenoses of Uzbekistan. During these years we studied many individuals of cattle at slaughterhouses and meat-packing plants in the Republic of Karakalpakstan and 12 provinces of Uzbekistan. Common helminthological methods [13] were used to collect Setaria from the abdominal cavities and lymph nodes. A total of 975 individuals of cattle were examined. Traditional parasitological identification methods were used to identify species of mature Setaria [14].

At the same time, we collected blood sucking Diptera from the familes Muscidae, Culicidae and Simulidae and examined them for larvae of Setaria. Dozens of thousands of Diptera individuals were examined in areas the animals concentrate in spring, summer and autumn. Common laboratory and experimental methods were used in the research [1; 6; 8; 10].

3. Results and discussion

One species of Setaria, *S. labiatopapillosa,* was recorded in cattle throughout Uzbekistan. The average infection rate in the studied animals was 35.8%. The prevalence ranged between 20.0 and 50.0%. The intensity was between 1 and 45 individuals.

In the biogeocoenoses of Uzbekistan *S. labiatopapillosa* was recorded in cattle in various altitudinal zones – flatlands, foothills and mountains. The infection rate is strongly dependent on the type of landscape. The highest rate was recorded on flatlands covering most of the north-western (Khorezm province and the Republic of Karakalpakstan) and north-eastern (Tashkent, Syrdarya and Jizakh provinces) parts of Uzbekistan, 50% and 45% respectively. The prevalence and intensity of infection in cattle drop considerably with altitude (20–25%). Mature nematodes were localised in different parts of the abdominal cavity in all 350 infected individuals. In 123 of the 350 infected individuals of cattle, that is, 30.5%, mature *S. labiatopapillosa* were recorded in the lymph nodes of the mesentery. This is the first case this Setaria species was recorded in the lymphatic system.

Most researchers consider that mature forms of *S. labiatopapillosa* parasitise most often in different parts of the abdominal cavity [3; 12; 14]. The reliability of records about this nematode species present in other organs, such as the intestine, eyes, brain and kidneys, is very doubtful [14]. The doubts are based, on the one hand, on the unclear identification of the existing species from the genus *Setaria*, on the other hand, on the methodological errors.

Nevertheless, the analysis of literary sources and the results of our research, in particular, those concerning the localisation of *S. labiatopapillosa* in the lymphatic system of cattle [2], helped us establish a number of tendencies and mechanisms allowing a different view on Setaria's life cycle and biology.

A comparative analysis of the occurrence of this Setaria species in various organs in cattle shows that the commonest localisation is the abdominal cavity. The nematodes can also concentrate in the lymph nodes of these animals.

Setaria males and females formed tangles in the lymph nodes of the mesentery. The intensity of the infection ranged between 3 and 7 individuals. Up to 19 individuals of the nematode were recorded in some lymph nodes. The lymph nodes affected by granulomatous lymphadenitis were much larger in size. The concentration of large numbers of nematode individuals in a node also affected the integrity of this node. In some cases the pathologically deformed nodes broke, letting the nematodes out into surrounding cavities. It is possible that microfilariae brought by females concentrate in cavities in lymph nodes and their vessels, and later get into blood vessels and accumulate in peripheral vessels. This quite accounts for the work of mechanisms dispersing micofilariae of *S. labiatopapillosa* across the organism of their definitive vertebrate hosts.

Morphologically, the populations of mature *S. labiatopapillosa* collected in the abdominal cavity and lymph nodes were almost identical (fig. 1, Table 1). The slight variations in the body length of male and female nematodes from the abdominal cavity and lymph nodes are negligible from the diagnostic aspect.

In its definitive host (cattle) *S. labiatopapillosa* is localised in both the abdominal cavity [5; 14] and the lymphatic system [2].

The fact that we discovered *S. labiatopapillosa* in cattle's lymphatic system is, probably, an indication of a successful completion of its life cycle by this nematode. The thing is that recently borne microfilariae are enwrapped in a case made of the thin and transparent eggshell 0.24–0.32 mm long and having a maximum width of 0.006–0.007 mm. In this condition microfilariae cannot penetrate into blood vessels directly from the abdominal cavity. They can free themselves from the case only when they have got into the stomach of a carrier (mosquito), after which they begin migrating most actively through the walls of the insect's stomach into its chest muscles [4; 7]. Based on these statements, we believe that microfilariae borne by female *S. labiatopapillosa* and localised in the lymphatic system of the definitive host play an important role. This conclusion is, obviously, relevant to the life cycles of other Setaria species localised in the same parts of the body.

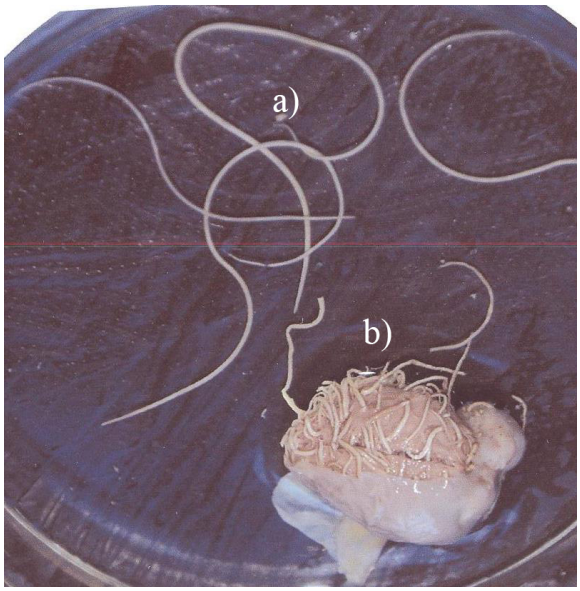

Figure 1. *Setaria labiatopapillosa* (Alessandrini, 1838): a – mature nematodes from the lymph nodes of the mesentery; b – lymph node of a domestic bovine animal infected with Setaria

Vertebrate animals become infected with *S. labiatopapillosa* transmissively, when mosquitoes – *Aedes caspius, Culex pipiens, Culex hortensis* and stable flies – *Stomoxys calcitrans*, the parasite's intermediate hosts in Uzbekistan, suck their blood. This usually takes place in warm seasons, from June to late October. Animals may be infected on pastures (*Stomoxys calcitrans*), in cattle farms and in pens (*Ae. caspius, Cx. pipiens, Cx. hortensis*).

The intermediate hosts – mosquitoes and flies – are quite common in natural biocoenoses and cattle farms. Their numbers are large in summer and early autumn. The rate of infection with *S. labiatopapillosa* in blood sucking Diptera in the biocoenoses of Uzbekistan is 0.3–1.3% (Table 2).

Table 1.– Size of *Setaria labiatopapillosa* from the abdominal cavity and lymph nodes of cattle (n = 10), mm

Признаки	**Abdominal cavity**			**Lymph nodes**		
	lim	**M ± m**	**C_v**	**lim**	**M ± m**	**C_v**
Males:						
Body length	46–51	48.53 ± 0.55	0.04	46–48	47.35 ± 0.27	0.02
Body width	0.44–0.50	0.473 ± 0.01	0.04	0.44–0.50	0.473 ± 0.007	0.04
Oesophagus length	7.8–10.4	9.06 ± 0.32	0.11	7.8–10.2	8.829 ± 0.29	0.10
Tail length	0.17–0.20	0.186 ± 0.003	0.06	0.17–0.20	0.186 ± 0.003	0.06
Spicule lenght: – left	0.36–0.38	0.371 ± 0.002	0.02	0.36–0.40	0.375 ± 0.005	0.04
– right	0.12–0.14	0.129 ± 0.002	0.07	0.12–0.14	0.129 ± 0.003	0.06
Lateral appendages on the rear end of the body	0.06–0.07	0.0653 ± 0.001	0.05	0.06–0.07	0.0653 ± 0.001	0.05
Females:						
Body length	60–92	76.3 ± 4.1	0.17	58–91	76 ± 4.1	0.17
Body width	0.44–0.70	0.558 ± 0.03	0.15	0.44–0.66	0.546 ± 0.02	0.12
Oesophagus length	7.8–9.8	8.7 ± 0.26	0.09	7.8–9.8	8.7 ± 0.26	0.09
Tail length	0.38–0.58	0.483 ± 0.02	0.15	0.38–0.58	0.483 ± 0.022	0.15
Vulva at the front end	0.46–0.76	0.619 ± 0.04	0.18	0.46–0.76	0.619 ± 0.04	0.19
Lateral appendages on the rear end of the body	0.09–0.12	0.1058 ± 0.003	0.10	0.09–0.12	0.106 ± 0.003	0.10

Table 2. – Rate of infection with larvae of *Setaria labiatopapillosa* in blood sucking Diptera in the biogeocoenoses of Uzbekistan

Species	Inds. studied, No.	Infected	
		No. of inds.	%
Muscidae			
Liperosia irritans	5639	–	–
Liperosia titillans	4010	–	–
Stomoxys calcitrans	989	8	0.9
Simulidae			
Simulium flavidum	5850	–	–
Odagmia ornata	7940	–	–
Freisia alajensis	5824	–	–
Culicidae			
Culex pipiens	5950	81	1.3
Culex modestus	4365	–	–
Culex pusillus	4145	–	–
Culex hortensis	2178	6	0.2
Aedes caspius	2030	7	0.3
Anopheles hyrcanus	2125	–	–

In flat areas between 0.3% and 1.3% of blood sucking insects are infected with larvae of *S. labiatopapillosa*, while in foothills (*Cx. hortensis*) their portion is 0.2% or less. Microfilariae are known to be sucked out of cattle together with blood by their intermediate host, get into the latter's stomach, free themselves from the case and migrate into the insect's chest muscles, where they grow into the infective stage. Further they migrate within a mosquito (or fly) from the muscles to the proboscis. The 3rd– stage invasive larvae have a body between 2.2 mm and 2.56 mm long and 0.040–0.044 mm wide (fig. 2). The invasive larvae penetrate into the blood of their definitive host through the skin damaged by the biting of blood sucking Diptera. They further migrate to the lymphatic system and abdominal cavity, where they evolve to maturity.

The most recent data obtained in the XXIst century have made great changes in our idea about the biology and localisation of the nematode under study based on the material collected during the long period since the beginning of the investigation into this nematode in the XIIIVth century until the late XXth century.

The group of this nematode's intermediate hosts in the biogeocoenoses of Uzbekistan comprises four Diptera species: *Stomoxys calcitrans* (Muscidae), *Culex pipiens, Culex hortensis* and *Aedes caspius* (Culicidae). The results of our research expand the well-known data [4; 5; 7; 8; 10; 11] on the intermediate hosts of *S. labiatopapillosa*. Thus, around 15 species of insects from the families Muscidae and Culicidae have been identified as the intermediate hosts of *S. labiatopapillosa*, whose 3rd–stage larvae develop in the organisms of the above-mentioned insects. The evolution from the microfilaria to the infective stage in mosquitoes (*Culex pipiens, Culex hortensis* and *Aedes caspius*) and flies (*Stomoxys calcitrans*) takes 10–12 days at a temperature of 28–30 °C. The infective larvae were up to 2.20–2.52 mm long, and males could be differentiated from females.

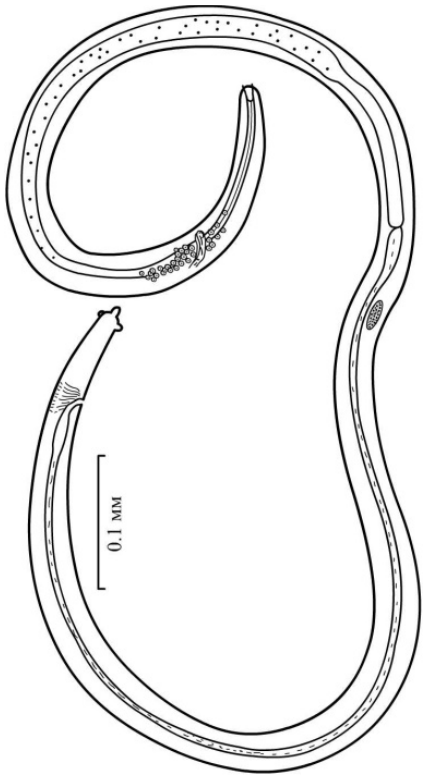

Figure 2. *Setaria labiatopapillosa* (Alessandrini, 1838): infective larva from the proboscis of *Culex hortensis* (original)

The study of the intermediate hosts of *S. labiatopapillosa* carried out herein confirmed the data [9] about flies – *Stomoxy scalcitrans* – participating in the life cycle of this nematode. We can confirm that within the range of *S. labiatopapillosa* both mosquitoes and stable flies may act as the parasite's intermediate hosts and facilitate the spread of Setaria under study.

4. Conclusion

According to the current research, cattle in the biogeocoenoses of Uzbekistan are infected with only one Setaria species – *S. labiatopapillosa*. Populations of mature Setaria were detected in 350 of 975 examined bovine animals, which is 35.8%. The intensity of the infection ranged between 1 and 45 individuals. The infection rate was between 20.0 and 50.0%, depending on the region.

Animals become infected with *S. labiatopapillosa* transmissively, when mosquitoes – *Aedes* and *Culex* – and flies – *Stomoxys calcitrans* are sucking their blood. The infection is

highest in warm seasons, between June and October. This is supported by the sporadic infection of intermediate hosts with the parasite's larvae.

In the definitive host *S. labiatopapillosa* are localised in the abdominal cavity and the lymph nodes of the mesentery. Newly born microfilariae easily get to the blood system and concentrate in peripheral vessels. This quite accounts for the work of mechanisms dispersing micofilariae across the organism of their definitive host.

The work was carried out within the framework of a fundamental project by the Academy of Sciences of the Republic of Uzbekistan – VA-FA-F-5–007.

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THE IMPACT OF STEROID NATURE COMPOUNDS ON THE MUTUAL CONNECTION LEVEL OF OVERALL INDICATORS OF WINTER WHEAT

Abstract: it was investigated the impact of monoammonium salt of glycyrrhizic acid (MASGA), Uchkun, Retkil on growth of winter wheat in weak and middle salinized soil. It was determined that low concentration of specimens affects positively to winter wheat and reduces the degree of correlative connection of overall indicators of plants at the effect of external environment stress factors.

Keywords: monoammonium salt of glycyrrhizic acid, wheat, Uchkun, correlation, salinized soil, fertility.

Introduction. Nowadays there are a large number of chemicals (stimulators, herbicides, retardants and others) used or experimented in agriculture throughout the world, their degree of impact to plants (genotypes) is considered to be one of the actual questions of present day.

Today the scientists who carry out investigation throughout the world are considering to be prior the idea of implementing natural banding depending on the impact management of exogene factors on the growth of plants. For this reason, the impact of steroid nature compounds on growth of autumn wheat is widely studied. The impact of physiologically active substances on the growth and development on plants has been investigated by researchers [1; 2; 3; 4]. Nevertheless, such investigations were rarely held with grain plants at the climate of soil inclined to salinity. The goal of holding the investigation is to determine the impact of steroid nature compounds on the mutual connection level of overall indicators of winter wheat breeds.

Methods and objects of the investigation

The object of the investigation is the breeds of wheat Dustlik, Chillaki, Vostorg, Tanya, Boyovut-1 and monoammonium salt of glycyrrhizic acid, Uchkun, Retkil specimens. The observations were carried out as an experiment in the field of in weak and middle salinized soil. All the phenological observations and calculations were compiled on the basis of the methodological recommendations developed by UzCSRI [5]. In order to calculate the coefficients of correlation (r), determination (r^2) and variation (cv, %) the program of statistics SPSS-14 was used. In order to define the determination of indicators R_2ch, R_2m formulae were used and to define the distance between them $d = 1–r$ formula was used [6].

Results and discussions

Fertility is considered as one of the important indicators of assessing and choosing agricultural plants. At the same time fertility is counted as one of the most complicated and polygenic indicators. Its complicity is explained with the dependence on external and hereditary factors. The degree of soil salinity is one of the factors that affects fertility. As it is noted in scientific sources in the condition of highly salinized soil fertility is less for 70–80 percent. One of the factors affecting fertility is biological specifications of breeds. This information is reflected in the table below. The fertility of Chillaki breed in weak salinized condition is 50.1 c/ha, and with the impact of steroid nature compounds is 54.5 c/ha, Retkil-52.7 c/ha, MASGA-54.6 c/ha and TGA 0.5%: MASGA with the impact of 10^{-6}– 55.1 c/ha. These data shows that fertility is for 5 c/ha more with the impact of steroid nature compounds. The results of calculations showed that little real difference (LRD) is 1.10 c/ha. *We shall remind that if the difference between the variants is more than* 1.10*, this difference is considered real.* The same results were noted with other breeds of autumn wheat. So with the influence of steroid nature compounds fertility of winter wheat breeds increased.

In middle salinized soil condition fertility was on average 45.4 c/ha and it was achieved to get additional 2–4.3 c/ha harvest with the impact of steroid nature compounds.

Obtained results showed that with the help of steroid nature compounds in salinized soil conditions on average 4–5.5 c/ha additional harvest of autumn wheat was taken.

The results of the investigation showed that the impact of steroid nature compounds on growth and development of autumn wheat breeds is different. It depends on the specifications of steroid nature compounds and it was noted that TGA (0.5%): MASGA (10^{-6}M) compounds of them are the most effective compounds. For this reason the impact of this compound on fertility, harvest elements of autumn wheat breeds has been analyzed more deeply (Table 2). According to the information from the table in weak salinized soil (in observation) the number of bushing was 2.56 pcs, and with the impact of steroid nature compounds ((0.5%) of TGA, 10^{-6} M of MASGA) this indicator will be 3.64 pcs. It is seen from these data steroid nature compounds affected autumn wheat breeds positively and it was known that the number of bushes became more for 1.08 pcs. In its turn, this caused to increase the amount of fertility and harvest elements. As the result in highly salinized soil in observation the harvest was

on average 51.05 c/ha, but with the impact of steroid nature compounds the indicator was 56.17 c/ha, in comparison with observation it was determined that the harvest was more for 5.12 c/ha.

Table 1.– The impact of monoammonium salt of glycyrrhizic acid (10–5M), TGA(0.5%): MASGA(10^{-6}M) Uchkun (0.01%), Retkil (0.01%) specimens on growth of winter wheat

Experimental variants (breeds)	Fertility, c/ha / additional harvest as regards observation									
	Chil-laki	addition-al harvest	Dustlik	addition-al harvest	Vostorg	addition-al harvest	Tanya	addition-al harvest	Boyovut –1–1	addition-al harvest
Weak salinized										
Observation	50.1	–	52.4	–	49.2	–	50.0	–	53.5	–
Uchkun	54.5	4.4	57.6	5.2	53.8	4.6	54.1	4.1	57.9	4.4
Retkil	52.7	2.6	55.7	3.3	51.9	2.7	52.5	2.5	56.7	3.2
MASGA10^{-6}M	54.6	4.5	57.4	5.0	53.7	4.5	54.6	4.6	57.7	4.2
TGA(0.5%): MASGA(10^{-6}M)	55.1	5.0	57.9	5.5	54.3	5.1	54.9	4.9	58.6	5.1
$LAD_{0.5}$=1.10										
Middle salinized										
Observation	45.4	–	47.8	–	44.2	–	44.0	–	46.4	–
Uchkun	49.6	4.2	52.3	4.5	48.8	4.6	48.0	4.0	50.8	4.4
Retkil	47.4	2.0	50.6	2.8	46.9	2.7	47.1	3.1	49.4	3.0
MASGA(10^{-6}M)	49.1	3.7	52.1	4.3	48.7	4.5	48.5	4.5	50.3	3.9
TGA(0.5%): MASGA(10^{-6}M)	49.7	4.3	52.4	4.6	48.8	4.6	48.2	4.2	50.9	4.5
$LAD_{0.5}$ = 1.14										

In middle salinized soil in observation, bushing was on average 2.22 pcs, but with the impact of steroid nature compounds, the indicator was 3.08 pcs. Fertility in observation was 45.56 c/ha, but with the impact of steroid nature compounds the indicator was 49.96 c/ha. So with the impact of steroid nature compounds in the condition of middle salinized soil additional harvest was 4.4 c/ha.

At this point, it should be underlined that in observation the weight of the head and a grain in the head was 0.89 g. but in the solution of steroid nature compounds the weight was 0.62 g. the same result was registered in the fields of middle salinized soil. Registering of this condition is natural. Because with the impact of steroid nature compounds the number of bushing, particularly the number of heads is a lot. It is known that increasing the number of heads leads to decreasing of its weight. For this reason because of the increase of the number of plant the weight of its head and grain is less.

The salinity degree of soil influences the length of the head of a plant. In weak salinized soil condition (in observation) the length of a head is 9.18 cm, in middle salinized soil condition this indicator if 8.82 cm. so soil salinity brings to the situation that the head of a plant is shorter for 0.36 cm. When plants were processed with steroid nature compounds in the condition of weak salinized soil the height was 9.77 cm, in middle salinized soil the height was 9.32 cm. This shows that with the impact of steroid nature compound the head was longer for 0.45 cm.

Table 2.– The impact of the degree of soil salinity TGA (0.5%): MASGA (10–6M) on the harvest elements of winter wheat (Mean value by types)

Statistic indicators	Bushing	Length of a bush. cm	Weight of a bush. g	Weight of a grain in a head. g	Growth degree. %	Fertility. c/ha
In weak salinized soil condition (observation)						
Mean value	2.56 ± 0.06	9.18 ± 0.11	0.89 ± 0.03	0.61 ± 0.02	66.60 ± 0.41	51.05 ± 0.39
In weak salinized soil condition 0.5% solution of TGA						
Mean value	3.64 ± 0.07	9.77 ± 0.16	0.62 ± 0.02	0.39 ± 0.01	78.81 ± 0.53	56.17 ± 0.34
In middle salinized soil condition (observation)						
Mean value	2.22 ± 0.06	8.82 ± 0.12	1.04 ± 0.03	0.71 ± 0.02	60.03 ±0.82	45.56±0.29
In middle salinized soil condition 0.5% solution of TGA						
Mean value	3.08 ± 0.06	9.32 ± 0.14	0.68 ± 0.02	0.46 ± 0.01	69.82± 0.81	49.96 ±0.33

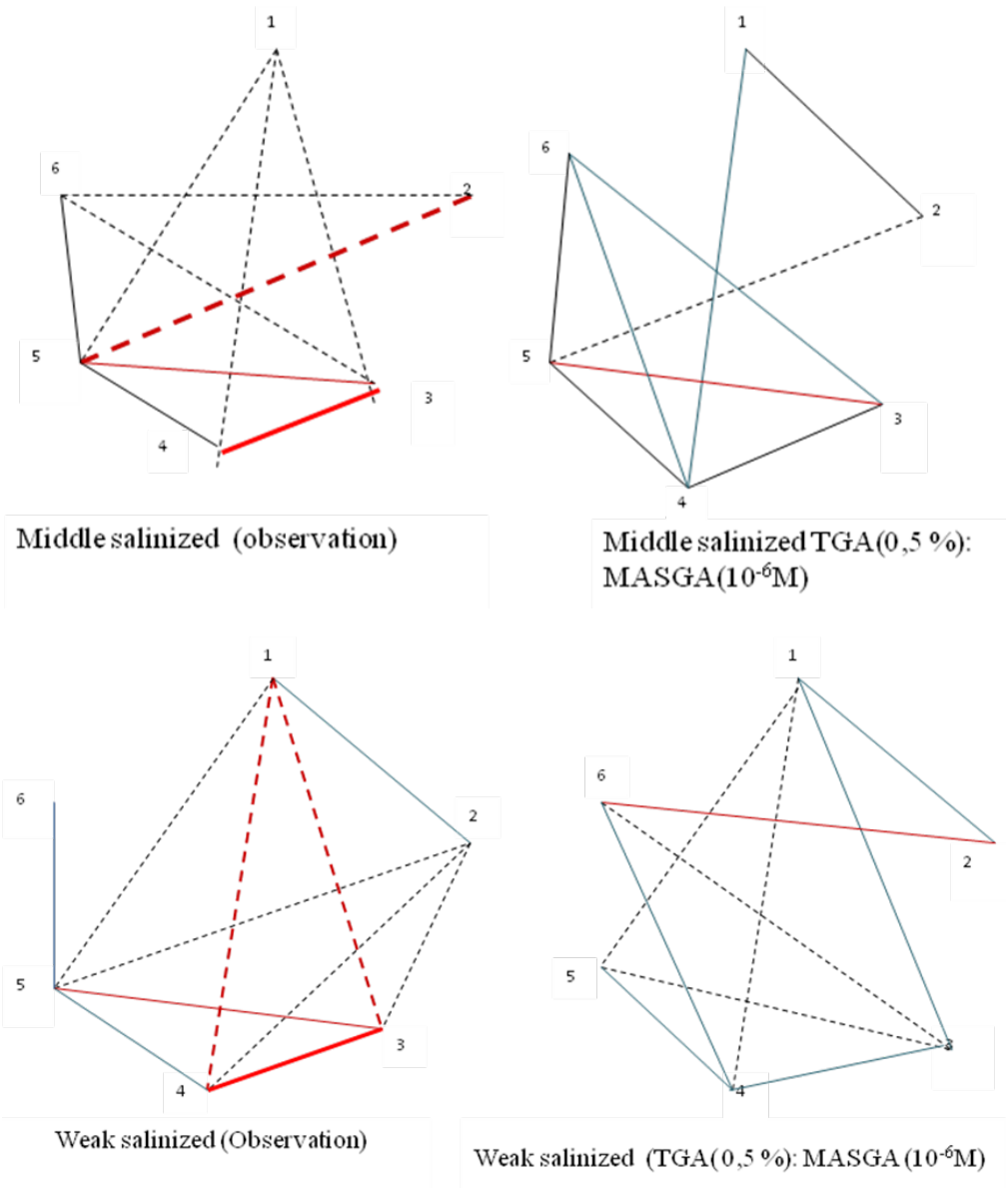

Figure 1. The impact of steroid nature compounds on the degree of correlative connections among quantitative indicators of autumn wheat

Note: Numbers mean indicators, here 1 – Bushing, 2 – head length, см 3 – weight of a head, g 4 – weight of a grain in a head, g 5 – Growth,%; 6 – Fertility, c/ha; r < 0.3: r = 0.3–0.5: r > 0.7 r = –0.3–0.5

For the last years introduction of modern informational technologies gives an opportunity to implement modern statistic methods in biologic research. The most important is the opportunities of completing complicated calculations with high quality and very quickly. As the result it was determined the degree and structure correlative connection among quantitative indicators of organism. It became known that in unfavourable condition the degree of correlative connections among quantitative indicators of an organism increases [7; 8; 9; 10]. Our presentation reflects this situation. It was determined that in weak salinized condition (in observation) degree of correlative connections among investigated quantitative indicators increased. In this situation average determination (*determination is square of correlative coefficient and determines limitation of delimit of quantitative indicators*) coefficient is 0.11 and with the impact of steroid nature compounds this indicator is –0.03. As it is seen when nature compounds are implemented, the degree of mutual correlative connections among indicators is low. This means that steroid nature compounds impacts the growth and development of autumn wheat positively and grants favourable condition. This makes the degree of mutual correlative connections among indica-

tors lower. Weak correlative connection between bushing (1) (*numbers and indicators, the lines between them mean the degree of correlative connections*) and head length (2) was determined. Here correlation coefficient is less than 0.3. Converse correlation among bushing (1) and weight of head (3) and weight of a grain in a head (4) was registered. This increase of bushing number causes the increase the quantity of head and it caused that the weight of a grain is little. For this reason, there was registered converse correlation among these indicators. It was registered strong correlation between weight of a head (3) and weight of a grain in a head (4). Registering of this condition is natural. If the quantity of grain is a lot, weight of a head increases. We have already mentioned that in weak salinized soil condition with the impact of steroid nature compounds the degree of correlative connections among indicators is little. According to the data in the table one can see that fertility (6) mostly depends on weight of a grain in a head (4) and head length (2). There was registered weak correlative connection among these indicators. In observation middle correlative connection between the number of bushing (1) and weight of a grain in a head (4), but with the impact of steroid nature compounds weak correlation was registered.

In middle salinized soil it was registered strong converse correlative connection between head length (2) and fertility (6). In middle salinized soil condition it was registered that fertility (6) depends on growth (5) and growth (5) depends on weight of a grain in a head (4).

In accordance with the obtained results, it should be noted that in salinized soil condition the degree of determination of winter wheat quantity indicators increased. This indicator is 0.8–0.11 in salinized soil, but with the impact of steroid nature compounds equals to 0.03–0.04. As for this information soil salinity was negative impact on growth and development of a plant. As the result, it caused to increase the degree of correlative connections among quantitative connections of autumn wheat breeds. In its turn, the impact of steroid nature compounds made favourable condition for growth and development of autumn wheat breeds in salinized soil conditions. This brought out decreasing the degree of correlative connections among quantitative connections of winter wheat.

Conclusion

The following conclusion could be made in accordance with the results of the research:

1. Steroid nature compounds impacts the fertility and harvest elements of autumn wheat breeds. In weak salinized soil condition the harvest of autumn wheat breeds was more for 5.12 c/ha in comparison with observation, and in middle salinized soil condition for 4.40 c/ha correspondingly.

2. It was registered that TGA (0.5%): MASGA(10^{-6}M) solution of steroid nature compounds has positive impact on winter wheat breeds.

3. Steroid nature compounds impacts the degree of correlative connections among quantitative indicators of winter wheat breeds. It was determined that with the impact of TGA (0.5%): MASGA(10^{-6}M) solution the of correlative connections among quantitative indicators of winter wheat breeds decreased. This indicates that this solution has positive impact on the growth and development of wheat breeds.

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VARIATION OF QUANTITATIVE TRAITS IN F_2 HYBRIDS RECEIVED IN CROSSES OF GEOGRAPHICALLY DISTANT WHEAT FORMS

Abstract: This paper presents results of analyses of inheritance and variability of yield components in geographically distant hybrids, where one of the parents was a wheat landrace. Parameters analyzed were main stem height, spike length, number of grains per spike, 1000 kernel weight and weight of seeds in one spike. The dominant inheritance of the studied traits was identified in all reciprocal hybrid combinations where one of the parents was landrace "Kayraktash". Segregation has been observed in all hybrid combinations in the second generation, and both left-side and right-side transgression has been recorded.

Keywords: wheat, landrace, hybridization, inheritance, variability, quantitative characteristics.

Introduction: Many modern varieties of wheat and other crops are often genetically similar and have narrow genetic base. In this connection, the sources of new diversity must be used in crop breeding programs. Local varieties that have emerged on the basis of combination of natural selection and traditional breeding [1; 2], as a rule, have broader genetic base and therefore, can provide valuable and important characteristics for the breeding programs [3]. They have tolerance to the local stress factors [4] and stable yield. During the last decades studying, conservation and use of landrace of wheat as a donors in the breeding process, in particular to improve the bakery qualities of the commercial varieties, become increasingly important.

The main features of the quantitative traits such as productivity and its elements, grain quality and resistance to stresses, are their significant dependence on the environment, the large group of linked genes, and the presence of significant interactions of genetic and environmental factors in their formation [5]. Therefore, studying of the features of the formation of traits of productivity in different growing conditions is very important for selecting of the initial material of wheat in adaptive breeding [6].

Materials and methods of research: As a material of the research were selected bread wheat varieties of the different geographical origins. Varieties "Kroshka" and "Tanya", widely cultivating in the Republic of Uzbekistan since 2000 year, belong to the Russian breeding, the bread wheat variety "Bardosh" was selected from the collection material of CIMMYT (Mexico), the variety "Saykhun" belongs to the local breeding, and the variety "Kayraktash" is one of the landraces of Uzbekistan. These varieties also differ in their biological characteristics. Varieties "Kroshka", "Tanya" and "Saykhun" are biologically winter type, and the varieties "Kayraktash" and "Bardosh" – is spring type.

The recipient varieties (Kroshka, Tanya, Saykhun and Bardosh) were crossed with the landrace "Kayraktash" to obtain hybrid populations. Seeds of F_2 hybrid populations were sown at the end of October, at the experimental plots of the Institute, in the 5 meter plots. Seeds were sown separately, leaving distance of 5 cm between them. For the structural analysis of the traits of the spike productivity, 30 spikes from the parental forms and 100 randomly selected spikes from each F_2 hybrid population were selected. Conducted analyzing of height of the main stem and productivity elements – length of the spike and the grain number in a spike.

Results of research and their discussion: Analyzed productivity components of the parental forms and hybrids of the first generation and estimated inheritance of the traits

such as length of the spike, grain number in a spike, 1000 kernel weight and grain weight of a spike. Established that main yield traits in the first generation inherited dominantly and in many combinations observed heterosis. Conducted hybridologic analysis of the inheritance of these traits in the second generation. In the hybrid populations analyzed such traits as height of the main stem, length of the spike, grain number in a spike, 1000 kernel weight and grain weight in a spike of the hybrid plants, where the parents "Bardosh" and "Saykhun" were relatively resistant to wheat rust diseases, varieties "Tanya", "Kroshka" and old local variety "Kayraktash" were susceptible.

One of the widely studied quantitative traits of wheat is the height of the main stem. Creation of intensive wheat varieties led to increase in stem density and to decrease in plant height. Almost all commercial varieties cultivating in Uzbekistan are dwarf with the height not exceeding 85–90 cm. Increasing the density of the wheat stem leads to deterioration in the feed quality of the straw obtained from stems of plants. On the other hand, the discrepancy between the spike weight and the stem density leads to lodging.

In the table-1 shown the average indexes of the parental forms and reciprocal hybrids F_2. It can be seen from the table that according to the plant height, the average indexes of the hybrids in the second generation are higher in all combinations than parent forms. The average height of the main stem in the reciprocal hybrids of "Tanya x Kayraktash" is 90.78 ± ± 0.83 and 89.72 ± 0.74 cm, and in the parent forms – variety "Tanya" – 79.30 ± 0.83 cm and in the variety "Kayraktash" – 85.13 ± 0.75 cm, while the coefficient of variation in the parental forms was 4.66 and 3.95, and in their F_2 hybrids – 9.18 and 8.27, respectively.

The same picture could be observed in the reciprocal hybrids of "Kroshka x Kayraktash". In parent forms, the height of the main stem was 81.60 ± 0.78 cm in the variety "Kroshka" and 85.13 ± 0.75 cm in the second parent, variety "Kayraktash", and their F_2 hybrids had 84.90 ± 0.67 cm and 90.56 ± 0.82 cm.

Table 1.– Mean values of the productivity traits in the parental and F_2 hybrid forms

Varieties and hybrids	**Height of the main stem. cm**			**Spike length. cm**		
	x ± Sx	**V%**	**h^2**	**x ± Sx**	**V%**	**h^2**
Tanya	79.30 ± 0.83	4.66		9.58 ± 0.14	6.72	
Kposhka	81.60 ± 0.78	4.28		9.20 ± 0.13	6.32	
Bardosh	83.30 ± 0.76	4.08		10.17 ± 0.14	6.24	
Sayhun	74.00 ± 0.70	4.23		8.87 ± 0.10	4.9	
Kayraktash	85.13 ± 0.75	3.95		11.48 ± 0.18	7	
Tanya x Kayraktash	90.78 ± 0.83	9.18	0.83	10.86 ± 0.11	10.85	0.7
Kayraktash x Tanya	89.72 ± 0.74	8.27	0.71	11.19 ± 0.11	9.61	0.58
Kayraktash x Kposhka	84.90 ± 0.67	8.01	0.79	11.97 ± 0.09	8.27	0.68
Kposhka x Kayraktash	90.56 ± 0.82	9.13	0.84	11.18 ± 0.10	9.18	0.6
Bardosh x Kayraktash	86.08 ± 0.54	6.35	0.56	10.66 ± 0.10	9.93	0.55
Kayraktash x Bardosh	89.07 ± 0.66	7.51	0.8	11.15 ± 0.10	9.46	0.68
Bardosh x Sayhun	88.43 ± 1.10	12.47	0.9	10.33 ± 0.11	10.77	0.73
Sayhun x Bardosh	86.08 ± 1.15	13.39	0.89	10.33 ± 0.12	11.16	0.66
Varieties and hybrids	Grain number in per spike			1000 kernel weight. g		
Tanya	52.40 ± 1.14	9.76		46.60 ± 0.27	2.6	
Kposhka	54.63 ± 1.06	8.71		47.54 ± 0.44	4.19	
Bardosh	56.83 ± 1.25	9.85		48.83 ± 0.31	2.83	
Sayhun	56.27 ± 0.98	7.75		48.74 ± 0.34	3.17	
Kayraktash	52.50 ± 1.08	9.19		45.41 ± 0.39	3.89	
Tanya x Kayraktash	62.82 ± 0.98	15.6	0.75	45.91 ± 0.34	7.61	0.81
Kayraktash x Tanya	59.99 ± 0.99	16.58	0.76	46.65 ± 0.37	7.96	0.7
Kayraktash x Kposhka	67.17 ± 0.77	11.51	0.53	44.84 ± 0.36	7.93	0.68
Kposhka x Kayraktash	66.40 ± 0.99	14.91	0.61	45.03 ± 0.37	8.31	0.55
Bardosh x Kayraktash	63.68 ± 1.01	15.81	0.59	42.79 ± 0.32	7.67	0.55
Kayraktash x Bardosh	62.49 ± 0.95	15.24	0.6	45.07 ± 0.77	7.68	0.74
Bardosh x Sayhun	58.56 ± 1.05	18.04	0.65	49.32 ± 0.47	9.52	0.88
Sayhun x Bardosh	57.41 ± 1.00	17.44	0.54	48.22 ± 0.41	8.62	0.82

By the height of the main stem, F_2 hybrids showed high degree of segregation in all combinations. The percentage of the variation ranged from 8.01 to 13.39%. The highest variation was observed in the hybrid combination of the reciprocal hybrid "Bardos x Sayhun" – 12.47 and 13.39%, respectively. While assessing 100 plants among them observed examples with main stem height from 60 cm to 110 cm. In this case, the transgression was both left-sided and right-sided. When hybrids were divided into 8 classes, deviation in 5 of them consisted between 15–20%, and in three classes – less than 10%.

All varieties in our experiments, although they were short type, differed with each other by in their heights. It can be seen from the table that all parents had average height – from 74 cm in the "Saykhun" variety to 85 cm in the "Kayraktash" variety, the variation in all varieties were no more than 4–5%. Segregation according to this characteristic in the second generation shows increasing of the variation by two times, and in the combination of "Bardosh x Sayhun" by three times. Hybridological analysis shows that almost in all combinations have classes with stem height above 90 cm, that presents great interest with its tolerance to lodging, plants increase growth and give additional biomass, which is very important for livestock. Selection in the following generations will give the opportunity to create such varieties.

Another quantitative trait of wheat, widely used in the breeding process as a marker for selection is the length and density of the spike. In our hybridological studies, analyzed inheritance of the trait of spike length in the varieties under study.

In the varieties "Saykhun", "Kroshka" and "Tanya" the average length of the spike is 8.87, 9.20 and 9.58 cm, respectively, and in the varieties "Bardosh" and "Kayraktash" is – 10.17 and 11.48 cm. It can be seen from the table that all parental forms are different by this trait. The longest spike has in the landrace "Kayraktash", relatively short form – in the variety "Saykhun", although in terms of the spike density, all the landraces are inferior than new commercial varieties, as one of the directions of breeding for yield was increasing of the spike density.

It was revealed that in all combinations, where variety "Kayraktash" was involved as one of the parents, spike length was average between the parameters of two parents and ranged from 10.66 to 11.19 cm. Only in one combination, where paternal form was variety "Tanya", the average spike length was longer than that of the parental forms. In the reciprocal hybrid combination "Bardosh x Saykhun", in both combinations spikes were longer than in both parents. Hence it can be concluded that the trait of the spike length in all combinations inherits dominantly.

In all parental forms, spike length was polymorphic, and the most polymorphic was in the variety "Kayraktash", where, despite the fact that the mean value was 11.48 ± 0.18, in 40% of the studied plants spike length varied between 12.0 and 12. 9 cm, and in 70% of plants of the variety "Saykhun" it was within 9.0–9.9 cm. In all hybrid combinations of the second generation, was observed segregation with both left-sided and right-sided transgression. In three hybrid combinations, where one of the parents was landrace "Kayraktash", spikes with the length of more than 13 cm were found about 10% of the plants.

The average values for all parental forms belonged to the fourth class, where grain number was from 52.5 to 59.9. By this trait also revealed dominant inheritance and wide variability in the second generation. It can be seen from(fig. 4) that in all hybrid combinations the frequency of the occurrence (grain number 60.0–67.9) concerned to the fifth class or was larger than in both parental forms.

The grain number in a spike and the weight of the grain in a spike are the main trait of the yield of wheat crop. The distribution of classes in the second generation corresponds to the normal distribution. There are also classes that exceed the parent forms according to the traits studied, which makes it possible to select in the following generations in order to increase the yield without increasing the density of standing (the number of plants per unit area).

1000 kernel weight is one of the main quantitative traits that characterizes the productivity of the variety, its seed and technological qualities. Seeds with high 1000 kernel contain more nutrients, which contributes to rapid germination. This trait in the parental forms varied from 45.4 to 48.8 g. In the landrace "Kayraktash" it was 45.4 g. Basically, all the parental forms selected by us formed large grains weighing more than 45 g.

The grain size is little affected by environmental conditions and is in fact one of the most accessible structural traits for individual selection in early generations. Also, the 1000 kernel weight is characterized by high values of the heritability coefficient and is controlled in most cases by the domination type and overdomination, therefore this trait presents in the productivity breeding [7].

In our experiments, it was revealed that the share of genotypic variability in many combinations was high and varied from 0.70 to 0.88, and only in two combinations, this index was 0.55. In these combinations, 1000 kernel weight was less than that of both parental forms, the transgression was mainly left-sided. In reciprocal hybrids of "Bardosh x Saykhun" grain size was at the level of the best parent and more, the coefficient of the heritability h^2 = 0.88 (table 1). These hybrid combinations present interest in the breeding aspect, since gives possibility of selection of transgressiv forms that exceed the original parent varieties according to the quantitative traits that determine the yield.

Conclusions: Thus, in the second generation, segregation of the quantitative traits was observed in all combina-

tions, and in all combinations where used landrace, the mean values exceeded those of the parental forms and the share of genotypic variability was high. This shows that using of the landraces and geographically distant forms in hybridization to create new varieties is more useful.

In the hybridization of the geographically distant forms, all combinations have classes with stem height above 90 cm, which presents interest because plants preserve capability of tolerance to lodging, and, at the same time, produce an additional biomass, which is very important for livestock feeding.

Using landrace of wheat and accessions in crosses with commercial varieties increases the share of genotypic variability in quantitative traits that gives possible selecting of the transgressiv forms exceeding the original parent varieties by quantitative traits which determine the yield.

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NEW RECORDS OF RUST FUNGI OF TREES AND SHRUBS FROM UZBEKISTAN

Abstract: The paper contains preliminary results of rust fungal research conducted during 2015–2018 years in Nuratau, Boysun and Turkistan mountain ranges in Uzbekistan. During our study, rusted and non-rusted specimens were collected and we identified 13 species of rust fungi and 18 host plant species from the study area. The rust species belong to 5 genera and 4 families. Among the studied taxa, *Puccinia rhamni* Kuprev. on *Rhamnus coriaceae* (Regel) Kom. is newly reported for rust mycobiota of Uzbekistan.

Keywords: Nuratau, Boysun and Turkistan mountain ranges, Rust fungi, Basidiomycota, Pucciniales, new records, host plants.

Introduction

Among the a lot of fungal pathogens of plant diseases, rust fungi are very widespread and often, under favorable conditions can be cause severe damage to many herbaceous, shrubby and woody plants, which leads to decrease the productivity of them, as well as to the loss of decorative qualities [1; 3].

Currently, around 7,000 rust fungi from 168 genus distributed in the world, more than half of them belong to the genus Puccinia [2; 4].

At the moment, more than 261 species of rust fungi have been recorded on the territory of Uzbekistan. They are registered on 511 species of host plants belonging to 43 families of vascular plants [3; 5].

Materials and methods

The material for the present study was samples of the herbarium of affected plants harvested on the territory of the Nuratau, Boysun and Turkistan mauntain ranges. During the intensive study of rust fungi samples were collected from various woody and shruby host plants in 2015–2018 from the study area. Samples were dried at room temperature in paper bags and were deposited in Tashkent mycological herbarium (TASM) of the Institute of Botany (IB). The main method of identifying the species of fungi was light microscopy, carried out according to standard procedures. Measurements were made from slide stained preparations observed under the Motic BA 410 light microscope in the laboratory of Mycology and algalogy of the IB. Species identification was performed according to Kuprevich [4, 5–308], Ulyanischev [5, 5–324], Ramazanova et al. [3, 17–190], Minkevicius [6, 8–270], Azbukina [7, 1–615]. Fungal names are given in according with www.mycobank.org [8]. Host plants are given with www.theplantlist.org. [9].

Results

13 species of rust fungi (Pucciniales) of trees and shrubs were reported from Boysun, Nuratau and Turkiston mauntain ranges from 2015 to 2018. The rust species belong to 5 genera and 4 families (Table 1). Among the rusts recorded, *Gymnosporangium* (3 species), *Phragmidium* (4 species), *Puccinia* (3 species), *Melampsora* (2 species), *Tranzschelia* (1 species).

Table 1. – Taxonomic analysis of rust fungi of trees and shrubs

Class	Order	Family	Genus	Num. of species
Puccinio-mycetes	Pucciniales	Pucciniaceae	Gymnosporangium	3
			Puccinia	3
		Phragmidiaceae	Phragmidium	4
		Melampsoraceae	Melampsora	2
		Uropyxidaceae	Tranzschelia	1
1	1	4	5	13

From the facts in (Table 1), it can be seen that the largest number of species of rust fungi of tree and shrub species belongs to the genus *Phragmidium*, *Gymnosporangium*, *Puccinia*.

List of 13 species of rust fungi from study area Pucciniaceae

Gymnosporangium Hedw.

Gymnosporangium fuscum DC. on *Pyrus korschinskyi* Litv., Boysun mountians, village Kyzyl-naur, May 14, 2016, on *Pyrus communis* L. Boysun mountians, village Machay, 26.08.2016. The fungus affects leaves of *Pyrus* spp.

Gymnosporangium confusum Plowr. On *Crataegus pseudoheterophylla* Pojark., Boysun mountian, Machay village, 11.08.2015. This fungus affects leaves, branches and fruits of the species of *Crataegus* L.

Note: This fungus is widespread on the territory of the Boysun forestry and it is the main pathogenic of *Crataegus* L.

Gymnosporangium fusisporum E. Fisch. on *Cotoneaster* sp., Boysun mountian, village Kyzyl-naur, 14.05.2016. Turkiston mountain, Irg`aylisoy, 26.07.2018. The fungus affects the leaves and fruits of *Cotoneaster* species. It is widely distributed in Boysun and Turkistan mountain ranges.

Puccinia Pers.

Puccinia longirostris Kom. on *Lonicera* sp. Boysun mountian, village Omonkhona, 13.08.2015, Turkiston mountain, Uriklisoy, 27.05.2018, on *Lonicera humilis* Kar. & Kir., Boysun mountian, Machay village, Gurbulok tract, 11.08.2015. The fungus infects the leaves and fruits of the species *Lonicera* L.

Puccinia pygmae Eriks. on *Berberis integerrima* Bunge, Turkiston mountain, Uriklisoy, 25.05.2018. on *Berberis oblonga*, Turkiston mountain, Irg`aylisoy, 25.05.2018. The fungus infects the leaves of the species *Berberis* L.

Puccinia rhamni Kuprev. On *Rhamnus coriaceae* (Regel) Kom. Boysun mountian, village Omonkhona, 13.05.2016.

Note: *Puccinia rhamni* is newly reported for rust mycobiota of Uzbekistan and *Rhamnus coriaceae* is recorded as a new host plant for this fungus.

Phragmidiaceae

Phragmidium Link.

*Phragmidium mucronatum*Wallr. On *Rosa canina* L. Nuratau mountain, Hayatsoy, May 19, 2015, Boysun mountian, village Omonkhona, 13.05.2016., on Rosa sp. Boysun mountian, village Machay, 26.08.2016.

Phragmidium kamtschatkae (H. W. Anderson) Arthur & Cummins on *Rosa ecae* Aitch. Boysun mountian, Qizil-naur village, 14.05.2016, *Rosa maracandica* Bunge, Boysun mountian, Omonkhona village, 15.05.2016. Turkiston mountain, Zaamin national nature park, Uriklisoy, 26.05.2018.

Phragmidium bulbosum Ann. on *Rubus caesius* L. Nuratau mountain, Hayatsoy, 15.07.2017

Phragmidium tuberculatum Jul. Müll. on Rosa canina L. Boysun mountian, village Machay, Gurbulok tract, 11.08.2015, Nuratau mountain, Hayatsoy, 16.07.2016, Turkiston mountain, Zaamin national nature park, Uriklisoy, 26.07.2018.

Melampsoraceae

Melampsora Castagne

Melampsora laricis-tremulae Kleb. On *Populus alba* L., Boysun mountian, Darband village, 11.08.2015. This fungus affects the leaves.

Melampsora caprearum Thüm on *Salix alba* L. Boysun mountian, village Machay, Gurbulok tract, 11.08.2015, village Machay, Gurbulok tract, 26.08.2016, Boysun mountian, village Kyzyl-naur, 14.05.2016, Turkiston mountain, Zaamin national nature park, Uriklisoy, 26.07.2018.

This fungus affects the leaves.

Uropyxidaceae

Tranzschelia Arth.

Tranzschelia pruni-spinosae (Pers.) Dietel on *Amygdalus bucharica* Korsh. Nuratau mountain, Hayatsoy, 27.07.2016, Boysun mountian, village Machay, Gurbulok tract, 11.08.2015. The fungus affects the leaves.

It is known, that rust fungi are found almost on all continents, almost everywhere, where vascular plants grow. The distribution of rust fungi in the families of vascular plants is uneven. Rust fungi were discovered on 18 species of vascular plants, belonging to 5 families and 11 genera. The host families with the greatest number of rust species were Rosaceae with 8 species (61.5%), Salicaceae with 2 species (15.4%) representing 75,9% of all rust species present in the study area (Tab. 2). The highest number of rust species is reported in the genus *Rosa* L.

Table 1.– Distribution of rust fungi by families of host plants

Rust genera	Family of host plants					Total
	Caprifoliaceae	Rosaceae	Rhamnaceae	Salicaceae	Berberidaceae	
Gymnosporangium		3				3
Puccinia	1		1		1	3
Phragmidium		4				4
Melampsora				2		2
Tranzschelia		1				1
Total: 5	1	8	1	2	1	13

Thus, in Nuratau, Boysun and Turkiston mauntain ranges on trees and shrubs were recorded 13 species of rust fungi. From them *Puccinia rhamni* is recorded as a new species for mycobiota of Uzbekistan and *Rhamnuscoriaceae* is recorded as a new host plant. In the analysis of rust fungi relationship with host plants, it is revealed that they parasitize on 18 species of vascular plants belonging to 4 families. More than half to the rust species found in the area live on host species belonging to Rosaceae.

Herbarium materials are persisting in the mycological collection of the Institute of the Botany of the Academy of Sciences of Uzbekistan.

Acknowledgments

This work was supported by Committee for coordination science and technology development under the Cabinet of Ministers of Uzbekistan (Project No. PZ-2014–0830174425) and Ministry of innovation development of Uzbekistan (Project No. PZ-2017–0921183). The first autor thanks to Turginov O. T. and Beshko N. Yu. staffs of Central Herbarium (TASH) at the Institute of Botany, Uzbek Academy of Sciences for identification of some host plants.

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THE PHENOTYPIC CORRELATION OF FIBER LENGTH WITH VALUABLE ECONOMIC SIGNS IN THE FIRST F_1, SECOND F_2 AND ORDINARY-GENERATION HYBRIDS OF COTTON GENETIC COLLECTING LINE

Abstract: The article examines the problems of changing the hybrids of the genetic lines of the collection of cotton economic signs Ghirsutum LF_1 and F_2 to the best side during their crossing.

Keywords: variational changes, combination, introgressive lines, recombinant.

Cotton-plant is one of the most important agricultural crops for humanity, because the product of cotton – fibers and seeds provides a very large number of secondary products. Increasing the productivity of cabbage is a very complex task and requires a complex approach to solving it. It is well known that the proper selection of the method of coagulation, taking into account the genetic variation of the marks in achieving good success in the selection of plants. The correct choice of the method of chatting is one of the most important features of the type of cotton that is related to the fact that the primary parent forms used by breeders contain high positive signs.

The relevance of the topic. The quality of cotton fiber is characterized by its length, elasticity, thinness (metric number), elasticity, elasticity, and flexibility. Generating varieties of this kind is fundamental in genetically and selectively. The genetic expression of the character correlation is a subtropic effect of genes or their agility. The polygens that control the quantitative characteristic may be present in the same group of combinations and in most cases act in opposite grafts. Therefore, selection of only one character may lead to a decline in the characteristic characteristic of the population and, in some cases, to a halt [1; 2].

The analysis of correlation relationships with fibers of fiber length, index and 1000 seed weight in the first F_1, second F_2 generations (Table-1) shows that interconnectedness of fibers with glucose was different at baseline. Correlation of fiber length with glucose output at line *L*-620, *L*-4112 and *L*-39 was found to be significant (r = 0.33; –0.24 and –0.39 respectively).

Table 1.– The normal lengths of the hybrids are the length of fiber in the parents, F_1 and F_2 relationships with some valuable trademarks

Lines	Fiber length and fiber output		Fiber length and fiber index		Fiber length and fiber 1000 pounds of seeds	
	$r \pm st$	tr	$r \pm s_t$	t_r	$r \pm s_t$	t_r
1	*2*	*3*	*4*	*5*	*6*	*7*
L-489	0.15 ± 0.3	0.4	0.34 ± 0.3	1.1	0.50 ± 0.3	1.7
L-608	–0.14 ± 0.1	–0.9	0.04 ± 0.2	0.3	0.32 ± 0.1	2.3
L-607	0.01 ± 0.2	0.1	0.03 ± 0.2	0.2	–0.20 ± 0.2	–1.3
L-620	0.33 ± 0.2	1.8	0.35 ± 0.2	1.9	0.20 ± 0.2	1.3
L-4112	–0.24 ± 0.1	–1.8	–0.15 ± 0.1	–1.1	0.19 ± 0.1	1.4
L-39	–0.38 ± 0.2	–1.7	– 0.36 ±0.2	–1.6	0.21 ± 0 .2	0.9
F_1 *L*-489 × *L*-608	–0.14 ± 0.2	–0.9	–0.09 ± 0.2	–0.1	0.10 ± 0.2	0.6
F_2 *L*-489 × *L*-608	–0.28 ± 0.1	–3.1	–0.07 ± 0.1	–0.8	0.18 ± 0.1	2.0
F_1 *L*-489 × *L*-607	0.03 ± 0.2	0.2	–0.22 ±0.2	1.3	–0.37 ± 0.2	2.3

1	*2*	*3*	*4*	*5*	*6*	*7*
F_2 *L*-489 × *L*-607	–0.16 ± 0.1	–1.7	–0.23 ± 0.1	–2.5	–0.08 ± 0.1	–0.8
F_1 *L*-489 × *L*-15	0.10 ± 0.2	0.5	0.04 ± 0.2	0.2	0.08 ± 0.2	0.4
F_2 *L*-489 × *L*-15	–0.10 ± 0.1	–0.9	0.01 ± 0.1	0.1	0.13 ± 0.1	1.2
F_1 *L*-608 × *L*-4112	–0.15 ± 0.1	–1.2	0.03 ± 0.1	0.2	0.13 ± 0.1	1.0
F_2 *L*-608 × *L*-4112	–0.17 ± 0.1	–1.7	–0.00 ± 0.1	–0.0	0.21 ± 0.1	2.1
F_1 *L*-608 × *L*-39	–0.08 ± 0.2	–0.5	–0.14 ± 0.2	–0.9	–0.12 ± 0.2	–0.7
F_2 *L*-608 × *L*-39	–0.33 ± 0.1	–3.2	–0.11 ± 0.1	–1.0	0.37 ± 0.1	3.6
F_1 *L*-620 × *L*-39	–0.19 ± 0.5	–1.1	–0.25 ± 0.2	–1.4	0.05 ± 0.2	0.3
F_1 *L*-4112 × *L*-39	0.06 ± 0.1	0.4	0.01 ± 0.1	0.0	–0.13 ± 0.1	–0.9
F_2 *L*-4112 × *L*-39	–0.36 ± 0.1	–3.6	–0.22 ± 0.1	–2.1	0.08 ± 0.1	0.8
F_1 *L*-607 × *L*-608	0.00 ± 0.2	0.0	0.07 ± 0.2	0.4	–0.03 ± 0.2	–0.2
F_2 *L*-607 × *L*-608	–0.13 ± 0.1	–1.3	–0.06 ± 0.1	–0.6	0.05 ±0.1	0.1
F_1 *L*-607 × *L*-620	0.20 ± 0.2	1.2	0.01 ± 0.2	0.0	–0.08 ±0.2	–0.5
F_2 *L*-607 × *L*-620	–0.22 ± 0.1	–1.7	–0.30 ± 0.1	–2.5	–0.09 ± 0.1	–0.7
F_1 *L*-607 × *L*-4112	–0.15 ± 0.2	–1.0	–0.20 ± 0.2	–1.3	0.07 ± 0.2	0.4
F_2 *L*-607 × *L*-4112	–0.10 ± 0.1	–1.1	–0.18 ± 0.1	–1.9	–0.08 ± 0.1	–0.9
F_1 *L*-607 × *L*-39	–0.17 ± 0.5	–0.4	0.09 ±0.5	0.2	0.15 ± 0.5	0.3
F_2 *L*-607 × *L*-39	0.24 ± 0.1	2.5	0.12 ± 0.1	1.2	–0.12 ± 0.1	–1.2
F_1 *L*-15 × *L*-607	0.10 ± 0.2	0.5	0.04 ± 0.2	0.2	0.08 ± 0.2	0.4
F_2 *L*-15 × *L*-607	–0.15 ± 0.1	–1.4	0.13 ± 0.1	1.2	0.33 ± 0.1	3.2

The correlation coefficient *L*-39 showed a negative correlation between the mean (Table 6), and the t-criterion (–) of 1.7 was equal to that of Table (2.11), which indicates that the connection between the fiber length of the fiber length in the line at the 0.95 probability is unscrupulous. However, the index value (–) at the 0.1-magnitude level is 1.74, there is a weak negative link at the 0.9-point range and the coefficient of determinate (*R*-square) is 0.152. This means that the length of the fiber length on line *L*-39 is about 15% depending on the gum index (Table-2).

Table 2.– Line L-39 correction of fiber length and output regression statistics

Multiple *R*	–0.390				
R–square	0.152				
The normalize *R*– square	0.099				
Standard mistake	1.508				
Observation	18				
Dispersion analysis					
	df	*SS*	*MS*	*F*	Significance *F*
Regression	1	6.558	6.558	2.884	0.108
Vestiges	16	36.386	2.274		
Total	17	42.945			
	Coefficient	Standard mistake	*t–statistics*	*P–Significance*	*Lower 95%*
Y–intersection	46.719	6.547	7.135	2.36398E-06	32.839
x	–0.311	0.183	–1.698	0.108	–0.701

L-489 × *L*-608 combination correlation between gallblad output is equivalent to the first F_1, second F_2 generations –0.14 and –0.28 (their *t*-criteria = –0.9; –3.1), the effect of line *L*-489 on the second F_2 generation in the hybrids [3].

The combination of *L*-489 × *L*-607 is the first F_1, and the second F_2 generation is correlated with correlation coefficients of 0.03; –0.16 was appropriate.

The combination of *L*-608 and *L*-4112 in the first F_1 and second F_2 generation hybrids is corrosive, correlation coefficients –0.15; –0.17 was equally good.

The combination of *L*-608 × *L*-39 in the first F_1 and second F_2 generations corresponds to –0.08 and –0.33 (their *t*-criteria = –0.5; –3.2), the effect of line *L*-39 on the second F_2 generation hybrids, (Table 1).

In the combination of *L*-608 and *L*-39, the correlation coefficient in the maternal line was *r* = –0.14 and in the paternity, *r* = –0.39. Correlation of these markers in the first pair of F_1 generations of this combination is insignificant and the coefficient r is 0.08. Secondary F_2 generation hypertension showed moderate negative correlation (*r*= –0.33). The t-criterion of Student was equal to –3.2, indicating that the interdependence between the fiber length of the line fiber was 0.95 in the range of 0.05 (–) 2.11 and the determinant coefficient (R square) was 0.110 that the length of the fiber length depends on the glucose output of about 11%.

The combination of *L*-4112 × *L*-39 in the first F_1 and second F_2 generations corresponded to 0.06 and –0.36 (their *t*-criteria = 0.4; –3.6), and the effect of the line *L*-39 was significantly lower than the second F_2 generation hybrids.

The coefficient of correlation coefficient *L*-39 of this combination is *r* = –0.39, indicating a moderate negative attitude and its analysis is given above. The correlation of these markers in the first F_1 generation hybrids of this combination is insignificant and the coefficient r is 0.06.

Secondary F_2 generation hypertension showed moderate negative correlation (*r* = –0.36). Stuudent's t-criterion (–) was equal to 3.6, indicating that the value of the table (–) at the point of 0.05 (–) greater than 2.00 indicates that the relationship between the fiber length of the line fiber was 0.95 and the coefficient of determining (*R*-squared) was 0.128 that the length of the fiber structure is about 13% of the gum emission mark. In the combinations with lines *L*-608, *L*-620 and *L*-4112 of the line 607, the correlation coefficient between the fiber length and fiber output of the first F_1, second F_2 generation hybrids was impractical and ranged from –0.22 to 0.20.

The combination of *L*-607 and *L*-39 is the first correlation coefficient of F_1, second F_2 generation hybrids (–) 0.17; 0.24, their *t*-criteria (–) 0.4; 2.5 is equally equally valid, and the impact of the *L*-39 line has been shown to be strong even in the second F_2 generation hybrids.

Thus, the analysis of the correlation counts with the glucose output signal indicates that the *L*-489 linear interconnect line has a positive intermediate level of 0.05, ie the probability of 95%, and *L*-39 and *L*-620, 0.1 at a critical level, ie, a median negative response of 90%.

Correlation of fiber length with fibrillation marks in almost all first F_1 generation hybrids was unreliably negatively negative or positive. But in the second F_2 generation hybrids, this connection was negative and the correlative relationships of the starting line had its effect. Of the 10 combinations studied, four of the second F_2 generation hybrids were found to have a moderate correlation. It should be noted that among these four combinations there were lines with significant correlation indicators, and their effect was in the second F_2 generation hybrids. For example, F_2 *L*-489 × *L*-608, F_2 *L*-608 × × *L*-39, F_2 *L*-4112 × *L*-39 and F_2 *L*-607 × *L*-39, the length and output correlation of the fiber length is 0.05, A moderate negative correlation was found to be 95%. The correlational correlation between fiber length and fiber output in all remaining lines and hybrids was negative.

The relationship between fiber length and fiber index marks in normal hybrids. The correlation of the correlation counts with the fiber index index of the fiber length in the first F_1, second F_2 genera of normal hybrids indicates that (5), the association of the fiber length with the index of fiber was different in the baseline. Correlation of fiber length to fiber index in line *L*-489, *L*-620 and *L*-39 was found to be moderate (*r* = 0.56; 0.35 and –0.36 respectively).

Similar to the interdependence between signs of femur length and fiber output, the correlation between the fiber length and the fiber index in almost all first F_1 generation hybrids was unreliably negatively negative or positive. But in the second F_2 generation hybrids, this connection was negative and the correlative relationships of the starting line had its effect. Although three of the 10 combinations studied were reliable in the second F_2 generation hybrids, significant correlation was also observed (Table 1). For example, the correlation coefficients in the second hybrid hybrids F_2 *L*-489 × × *L*-607, F_2 *L*-4112 × *L*-39 and F_2 *L*-607 × *L*-620 (–) 0.23; (–) 0.22 and (–) 0.30, their t-criteria are (–) 2.5; (–) 2.1va (–) 2.5 is equivalent.

The link between the length of the fiber and the weights of 1,000 pounds in normal hybrids. The analysis of correlational correlation indicators with the index of fiber size 1000 pounds in the first F_1, second F_2 generic normal hybrids shows that (5 tables), the interconnection of the fiber length signage to 1000 pounds of seeds varied in the baseline. The correlation between fiber lines in the line *L*-489 and *L*-608 at the line 6 of the parent 6 lines was reliably moderate (*r* = 0.58 and 0.32, corresponding to *T*-criteria 2.1 and 2.3).

In the first F_1, second F_2 generations of normal hybrids, the correlation relation with the value of the fiber length of 1,000 pounds was extremely weak. This correlation was fairly moderate ($r = -0.37$ and 0.37, according to T-criteria 2.3 and 3.6) in hybrids of F_1 L-489 × L-607 and F_2 L-608 × L-39 exceptional.

The combination of L-15 and L-607 showed that the correlation coefficients between fiber length and fiber index in parent, first F_1, second F_2 generation hybrids were negligible and ranged from 0.03 to 0.13.

L-489 and L-15 combination correlation coefficients between fiber length and fiber index in the first F_1, second F_2 generation hybrids 0.04; 0.01 is in good condition. In the L-489 line only, this correlation is 0.56 and its t-clause is 2.0 and the coefficient of determination (R-square) is 0.314, which means that the length of the fiber is about 31% of the fiber index.

Thus, the third group – the analysis of correlation relations with normal fertility, index fertility and index of 1.000 seeds in normal parents, first F_1, second F_2 generations, shows that correlation with fibers with glucose and index indices is almost equal to all first F_1 in the hybrids of the generation unreliable or negative or positive. However, these dependencies were negative in the second F_2 generation hybrids and in some combinations there was a relatively moderate correlation. It is possible to assume that the correlation of the starting line has been influenced by this.

The coagulation of the length of the fibers with a sign of 1000 pounds of cotton is characterized by the fact that the correlation of the fiber length to the fiber and the index indices was very low and insignificant compared to the 1000 pound weight. This phenomenon can be explained by negative or negative correlation, known to the marker of the gum output, of 1.000 pounds of weight.

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STRUCTURE AND TAXONOMIC ANALYSIS OF SOIL ALGAE STEEP AREAS OF NORTHERN FERGHANA IN WINTER

Abstract: The article analyzes the distribution of soil algae in winter soils in tropical regions of northern Fergana. The first 77 species of soil algae were detected and their taxonomic analysis was performed. Algoflorada contains 4 species of algae (Syanophyta, Xanthophyta, Bacillariophyta, Chlorophyta).

Keywords: algoflora, taxon, tour, northern Ferghana valley.

Introduction

The northern Ferghana valley extends from west to east 130 km, from north to south, from 35 km to 80 km. The area is 7.4 thousand km^2. The region ranks first among the Ferghana Valley regions. The north and northeast are bordered by the Jalal-Abad and southern-western regions of the Republic of Tajikistan from the southern Khujand region of the Fergana region of the Republic of Tajikistan and the Andijan region to the east.

A. M. Muzafarov (1965), A. E. Ergashev (1974), M. A. Kuchkarova, S. X. Halilov (1976), A. E. Elmuratov (1991), X. A. Alimjanova (2008) and others have been devoted to the study of water basins algae and research on soil algae has not been carried out so far.

At present, one of the pressing issues is stabilization of the balance between nature and society, the identification of soil conditions, the study of soil microorganisms, detection and distribution of soil microorganisms, and the assessment of their ecological and sanitary condition. First of all, it is important to identify and analyze the current composition of soil algae in the northeastern Fergana valley, to make a general list of soil algae of Uzbekistan, as well as to evaluate local biodiversity objects and conduct monitoring studies.

Research area and methods

During the research, laboratory analyzes were carried out, statistical methods and methods were used in general algorithm. The low plain of the western and eastern regions of the northern Ferghana Valley received soil samples from 10 monitoring points at altitudes ranging from 400–450 m to 1700–2800 m above sea level. A total of 20 soil samples were obtained for taxonomic and quantitative study of soil algae. Samples of soil samples were obtained from 0–3 cm of the surface and 3–30 cm deep. Algorithmic detectors, monographs, and Gollerbax M. M., Polyanskiy V. I. [1] (1951) was used. The composition of the types of the collected algorithms was determined and analyzed in the Laboratory of Microbiology and Algaology of the Botanical Institute of the Academy of Sciences of the Republic of Uzbekistan.

Analysis of the results

During the winter months of the northern Ferghana valley, 77 species and species (51 varieties of 2 varieties and 24 forms) were detected in the soil algae. They consist of 8 classes of 12 classes in 4th grade families with 32 families (Table 1).

Table 1.– Taxonomic composition of the soil algae in the winter season of the northern Ferghana valley (2016–2018)

Departments	The number of taxa							
	class	order	Family	Category	tour	variety of varieties		total:
						variation	form	
Cyanophyta	2	4	8	13	27	–	23	50
Xanthophyta	2	3	5	6	6	–	–	6
Bacillariophyta	2	3	6	7	11	1	1	13
Chlorophyta	2	2	5	6	7	1	–	8
total:	**8**	**12**	**24**	**32**	**51**	**2**	**24**	**77**

Syanophyta – 50 species (64.9% of total species), Xanthophyta-6 species (7.8%), Bacillariophyta-13 species (16.9%), Chlorophyta-8 species (10.4%). According to the results of the analysis, the blue-green algae branch has shown superiority in the number of species.

The Syanophyta department consists of 2 class, 4 students, 8 families, 13 categories (Table 2).

The Chroococcophyceae Class of the Syanophyta Division consists of 2 layers, 4 families, 4 families, 11 species and species. Chroocosales sequence was identified in 10 species: Soccobactreaseae, Synechococcus Naeg turkum 2 species from Elenk family, Microcystis Kuetzing family from Microcystidaceae Elenk family, Gloeocapsaceae Elenk, Holloch Gloeocapsa (Kuetz.) From the Hollerb family. 4 species of Emendium: Entophysalidales Geography Chlorogloeaceae Geligli family Chlorogloea species has been composed of 1 species.

Table 2.– Taxonomic composition of syanophyta species species

class	order	Family	Category	variety of varieties the number
Chroococcophyceae	Chroococales Geitler	*Coccobactreaceae* Elenk	Synechococcus Naeg	2
		Microcystidaceae Elenk	Microcystis Kuetzing.	4
		Gloeocapsaceae Elenk., et Hollerb	Gloeocapsa (Kuetz.) Hollerb. Emend	4
	Entophysalidales Geitler	Chlorogloeaceae Geitl.	Chlorogloea Wille.	1
Hormogoniophyceae	Nostocales (Geitl.) Elenk	Nostocaceae Kuetz. emend. (Kirehner) emend Elenk.	Nostoc Adanson	7
	Oscillatoriales Elenk	Oscillatoriaceae (Kirchn.) Elenk	Oscillatoria Vauch..	8
			Phormidium Kuetz.	8
			Symploca Kuetz	1
			Lyngbya Ag	3
		Schizothrichaceae Elenk	Schizothrix (Kuetz.) Gom.	5
			Hydrocoleus Kuetz	2
			Microcoleus Desmaz.	3
		Plectonemataceae Elenk	Plectonema Thur.	2
total:2	**4**	**8**	**13**	**50**

Hystogoniophyceae Class of the Syanophyta Division Nostocales (Geitl.) Elenk Mode Nostocaseae Kuetz. emend (Kirehner) emend Elenk. The Nostoc Adanson family consisted of 7 species.

The Oscillatoriales Elenk was the most common Oscillatoriaceae (Kirchn.) And algoflorada from the family of Elenk 8 species of Oscillatoria Wow, Phormidium Kuetz 8, Symploca Kuetz 1 and Lyngbya Ag 3 species.

Schizothrixaceae Ezenk family Schizothrix (Kuetz.) Gum Series 5, Hydrocoleus Kuetz 2 rounds, Microcoleus Desmaz 3 species. Plectonemataceae Elenk family of Plectonema Thur has been identified in 2 species.

Taxonomic analysis of species of Xanthophyta revealed 6 (7.8%) species: class 2, 3, 5 families, 6 families and 6 species (Table 3).

Table 3.– Taxonomic composition of species of Xanthophyta

class	order	Family	Category	variety of varieties the number
Heterococcophyceae Elenk	Heterococcales	Pleurochloridaceae Pasch	Botrydiopsis Borzi	1
			Chlorocloster Pasch	1
		Botryochloridaceae Pasch	Botryochloris Pasch	1
		Centritractaceae	Bumilleriopsis Printz	1
Heterotrichophyceae	Tribonematales	Heterotrichaceae Pasch	Bumilleria Borzi	1
	Heteroclonialeles	Heterocloniaceae Pasch	Heterococcus Chod	1
total: 2	**3**	**5**	**6**	**6**

Heterococcophyteae Elenk Class of Xanthophyta Division consists of 3 families, 4 families, 4 species and species varieties. They include: Boturdiopsis Borzis family of Pleurochloridaceae Pasch family, 1 species of Chlorocloster Pasch, 1 Botryochloridaceae, Botryochloris Pasch family from Pasch family, 1 species of Centrimractaceae family, Bumilleriopsis Printz.

Heterotrichophyceae Class 2 consists of 2 families, 2 families and 2 species. Tribonematales Mode, Heterotrichaceae Pasch Family, Bumilleria Borese Series 1, Heterocloniales Mode, Heterocloniaceae Pasch Family, Heterococcus Chod Dose 1.

Taxonomic analysis of the Bacillilarophyta division revealed 13 (16.9%) species, consisting of 2 classes, 3 modes, 6 families, 7 families, 13 species and species varieties (Table 4).

Table 4.– Taxonomic composition of Bacillilarophyta branch species

class	order	Family	Category	variety of varieties the number
Centricae	Discoidales	Coscinodiscaceae	Melosira Ag	3
Pennatae	Araphinales Schùtt	Fragilariaceae (Kuetz.) D.T.	Fragilaria Lyngb	1
	Raphinales	Achnanthaceae (Kuetz.) Grun	Achnanthes Bory	3
		Naviculaceae West	Frustulia Ag Amphora Ehr	1 1
		Nitzschiaceae Hass	Nitzschia Hass	3
		Surirellaceae	Surirella Turp	1
total: 2	**3**	**6**	**7**	**13**

The Bacillariophyta department consists of 2 classrooms, 2 families, 5 families, 6 families, 13 species and species. They are: Discoidales Order from the Centricae Class, Coscinodiscaceae Family, Melosira Ag Category 3 rounds, Pennatae Class Araphinales Schbrett Mode Fragilariaceae (Kuetz.) D. T. Fragilaria Lyngb family, Family of Raphinales Achnanthaceae (Kuetz.) Achnanthes Bory family of Grun family 3 rounds, Frustulia Ag of Naviculaceae West. category 1 tour, Amphora Ehr turkum 1 tour, Nitzschiaceae Hass. family Nitzschia Hass. 3 rounds, Surirella Turp from the Surirellaceae family. The category is 1 species.

The taxonomic analysis of the species of chlorophyta was 8 (10.4%), which consisted of 2 classes, 2 modes, 5 families, 6 families and 8 species and species varieties (Table 5).

Table 5.– Taxonomic analysis of species of chlorophyta

class	order	Family	Category	variety of varieties the number
Protococcophyceae	Chlorococcales	Chlorococcaceae Black	Dictyococcus Gerneck Em. Korschik	2
		Protococcaceae Wille	Protococcus Agardh	1
		Scenedesmaceae Oltmans	Scenedesmus Meyen	1
		Ankistrodesmaceae Korschh	Chlorolobion Korschh Ankistrodesmus Corda	1 1
Euchlorophyceae	Ulothrichales	Oedogoniaceae	Oedogonium Link	2
total:2	2	5	6	8

Chlorophyta division Protococcophyceae class Chlorococcales sequence Chlorococcaceae Black family Dictyococcus Gerneck Em. 2 species of Korchik species, Protococcus Agardh family of Protococcaceae Wille family, Scenedesmus family of Scenedesmaceae Oltmans family 1 species, 1 species of Ankistrodesmaceae Korschh family and Chlorolobion Korschh and Ankistrodesmus Corda species were identified.

Euclorophyceae class Ulotrichales mode The Oedogoniaceae family, Oedogonium Link, has been composed of 2 species

Summary

1. In the winter season 77 species and species (4 divisions, 8 classes, 12 categories, 23 families, 32 families) of soil algae of the rocks of the northern Ferghana valley have been identified.

2. The most part of the soil algae in the winter was Syanophyta (50 species, ie 64.9%), Xanthophyta (6 rounds 7.8%), Bacillariophyta (13 species 16.9%) and Chlorophyta (8 rounds 10.4% species).

3. In the winter months of the northern Ferghana valley, the most part of the soil algae was formed by the Syanophyta division. According to literature data, the types of Syanophyta are flexible to all environmental conditions and maintain their livelihood during the hottest and coldest months of the year, and are widely shared not only in reservoirs, but also in all water basins, with other types of species [6; 7].

4. In the winter months of the northern Ferghana valley, at least a small part of the soil algae was formed by the Xanthophyta division. According to the literature: Types of Xanthophyta are not flexible to all environmental conditions, and quickly stop living in the hottest and coldest months of the year.

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ANALYSIS OF IMPACTS OF SOIL SALINITY ON WINTER WHEAT DEVELOPMENT WITH SPECTRAL VEGETATION INDICES

Abstract: Relationship between the condition of agricultural crops and stress factors are studied with the application of modern technologies in the article. Herein, correlation relationship between Normalized Difference Vegetation Index (NDVI) and Leaf Area Index (LAI) spectral vegetation indices, which represent winter wheat plant condition and salinity stress are highlighted in details.

Keywords: winter wheat, Khorezm region, spectral vegetation indices, NDVI, LAI, soil salinity.

Introduction

The application of new technologies is one of the most important issues in increasing agricultural crop harvest, making soil characteristics more acceptable, as well as in saving the costs for land cultivation, machinery, manpower, fertilizers and fuel materials.

Many researches were carried out by many scientists on the impacts of different factors on the growth, development and crop harvest of winter wheat in irrigated soil conditions of Uzbekistan. But, many of them were conducted by using traditional methods, and technologies, based on modern methods, is not widely used in studying vegetation cover and plant physiology in Uzbekistan. Therefore, we decided to apply methods of modern information technologies, as the methods of remote sensing, spectral vegetation indices and geoinformation systems.

Remote sensing data are considered a convenient source to perform several vegetation indices in either simple or complicated band ratio combinations. Satellite images offer a large amount of data that could be analyzed, processed and stored to better understand several vegetation indices based on the type of the satellite sensor used. Hypothetical backgrounds have been implemented to improve and enhance the optimization of particular satellite sensors to support certain vegetation indices [1; 2; 3].

Spectral vegetation indices are mathematical combinations of different spectral bands mostly in the visible and near-infrared regions of the electromagnetic spectrum. Vegetation activities can be measured comprehensively through semi-analytical methods of spectral band ratios that have been extensively used to detect not only seasonal variability of the vegetation cover but also local scale spatial variability [4; 5].

Research objectives and methods

The object of the research is winter wheat, cultivated in different districts of Khorezm region in Uzbekistan.

Khorezm region is situated in the northwest of Uzbekistan, on the left bank of the Amudarya River, the area of the region covers 6800 km^2. According to hydro-geological, soil and climatic conditions, Khorezm differs from other regions of Uzbekistan. The entire irrigated area in the region shows secondary salinization problems, and 81% of the area has problems with waterlogging [6]. Shallow groundwater level between 0.5 m and 2.0 m causes secondary soil salinization and waterlogging.

The climate of the region can be described as "typically arid continental" with considerable seasonal and daily temperature fluctuations: long hot dry summers, sporadic rains or snow in autumn-spring and very cold temperatures in winter [6; 7]. Cotton, winter wheat and rice are the main agricultural crops of Khorezm region.

In determining NDVI, one of the spectral vegetation indices, hand-held GreenSeeker was used, and in determining the leaf area index AccuPAR Ceptometer LP-80 was used. In assessing soil salinity Digital Meter Hanna Instruments pH/EC/°C -mod. Combo was used. The analyses of the obtained data from these instruments are carried out based on the manuals of these instruments. Field observations are carried out according to traditional methods based on generally accepted guides in Uzbekistan.

Research works were carried out in six farms in different parts of Khorezm region. They are "Farrukh" and "Bakhtiyor shofyor" farms in Urgench district on the bank of the Amudarya River; "Qadam Jigildak" and "Khushnud Nodirbek" farms in Khiva district on the Polvon channel; "Yuldosh majid" and "Khorazm giyohlari" farm also in Khiva district near desert, at the end of irrigation channels. These farms differ according to the level of irrigation water supply. As the farms in Urgench district are on the river, irrigation water is always available for them, the farms on Polvon channel is supplied with irrigation in middle level. And the least supplied farms are near the desert. As they are situated at the end of irrigation system, they always faced with the irrigation problems.

Results of the research

1) NDVI

NDVI is one of the most-used vegetation indices (VI):

$$NDVI = (\rho NIR - \rho Red)/(\rho NIR + \rho Red)$$

where ρNIR and ρRed are reflectance values of Red and Near Infrared light received at the sensors. The Simple Ratio (*SR*) and *NDVI* are built on the observation that chlorophylls a and b in green leaves strongly absorb light in the Red, with maximum absorption at about 690 nm, while the cell walls strongly scatter (reflect and transmit) light in the *NIR* region (about 850 nm). This results in a strong absorption contrast across a narrow wavelength band of 650–850 nm, captured by the *NDVI* and other *VIs*. *NDVI* and related *VI*s are functional variants of the *SR*. *NDVI* normalizes values between –1 to +1; dense vegetation has a high *NDVI*, while soil values are low but positive, and water is negative due to its strong absorption of *NIR*.

Statistical analyses of the results of *NDVI* are shown in (Table 1). According to the table, the values of *NDVI* for the selected areas vary between 0.21 and 0.727. Its arithmetical mean value is 0.43 and median value is 0.382. Variance of these values makes up 0.03 and the average error is 0.012.

2) LAI

LAI is a mathematical construct that does not have a direct relationship to photosynthetically active radiation (*PAR*) or processes that depend on *PAR*. *LAI* is usually defined as the one-sided area of leaves in a canopy per unit ground area of canopy cover but non-flat leaves complicate the definition. *LAI* is related to light interception by a canopy (R_i) by:

$$R_i = Rs\,(1 - \exp^{-kLAI})$$

where k is a factor that accounts for leaf angles and other factors that affect absorption of R_s within a canopy. Plants with relatively vertical leaves (erectophiles) typically absorb less light per unit leaf area than plants with relatively horizontal leaves (planophiles). The coefficient k also depends on the arrangement of plants within a stand, because isolated plants receive light from all sides of their canopy whereas a dense stand of plants is only illuminated at the top of the canopy. The fraction of light absorbed by the canopy (*PAR*) depends not only on R_i but also on the spectral properties of the leaves. Some leaves have reflective surfaces to minimize heat gain while others absorb nearly all of the incident radiation between 400 and 700 nm.

According to the statistical analyses of the results, the values of *LAI* for the selected areas vary between 1.42 and 6.29. Its arithmetical mean is 3.41 and median value is 2.99. Variance of these values makes up 2.37 and the average error is 0.86 (Table 1).

3) Soil salinity (EC)

Soil salinity is an important issue constraining the productivity of irrigation agriculture around the world. The standard method for soil salinity assessment is based on a laboratory method that is cumbersome and gives rise to limitations for data-intensive works. The use of sensors for the assessment of the apparent electrical conductivity (*EC*) of soils offers a way to overcome these constraints. These sensors are based on three electromagnetic phenomena, namely, electrical resistivity, electromagnetic induction, and reflectometry.

Electrical conductivity (*EC*) is a numerical expression of the inherent ability of a medium to carry an electric current. Because the *EC* and total salt concentration of an aqueous solution are closely related, *EC* is commonly used as an expression of the total dissolved salt concentration of an aqueous sample, even though it is also affected by the temperature of the sample and by the mobility, valences and relative concentrations of the individual ions comprising the solution (water itself is a very poor conductor of electricity). Furthermore, not all dissolved solutes exist as charged-species; some are non-ionic and some of the ions combine to form ion-pairs which are less charged (they may even be neutral) and, thus, contribute proportionately less to electrical conduction than when fully dissociated.

Table 1.– Statistical analyses of the results on the studied indicators

№	Indexes	Min.	Max.	Arithmetical mean	Median	Variance	Average error
1.	NDVI	0.21	0.727	0.430	0.382	0.03	0.01
2.	LAI	1.42	6.29	3.41	2.99	2.37	0.86
3.	EC	1.84	17.72	6.91	6.12	0.60	0.57

Relationship between soil salinity and vegetation indexes

Analyses on soil salinity were carried out on the base of the values of *EC* meter by Hanna instruments. Results of statistical analyses on soil salinity are shown in (Table 1). According to the table, the values of salinity vary between 1.84 and 17.72. Its arithmetical mean is 6.91 and median value is 6.12. Variance of these values is 0.6 and the average error is 0.57. In the observed points the values of salinity increases to the lower layers on the soil profile.

On the next step of the research, relationship between soil salinity and spectral vegetation indices, those define condition of vegetation, were studied. Here statistical analyses were carried out on correlation of EC values of soil salinity and the values of NDVI and LAI. The correlation matrix of the results is shown in (Table 2).

Table 2. – Matrix of correlation relationship between soil salinity and spectral vegetation indices

Correlation matrix (Pearson):

Variables	LAI	NDVI	EC
LAI	1	0.892	0.902
NDVI	0.892	1	0.808
EC	0.902	0.808	1

The obtained results show that there is a significant relationship between soil salinity and spectral vegetation indices, and it makes up 78–82%. The relationship between these values is shown in the following diagram:

Scatter plots:

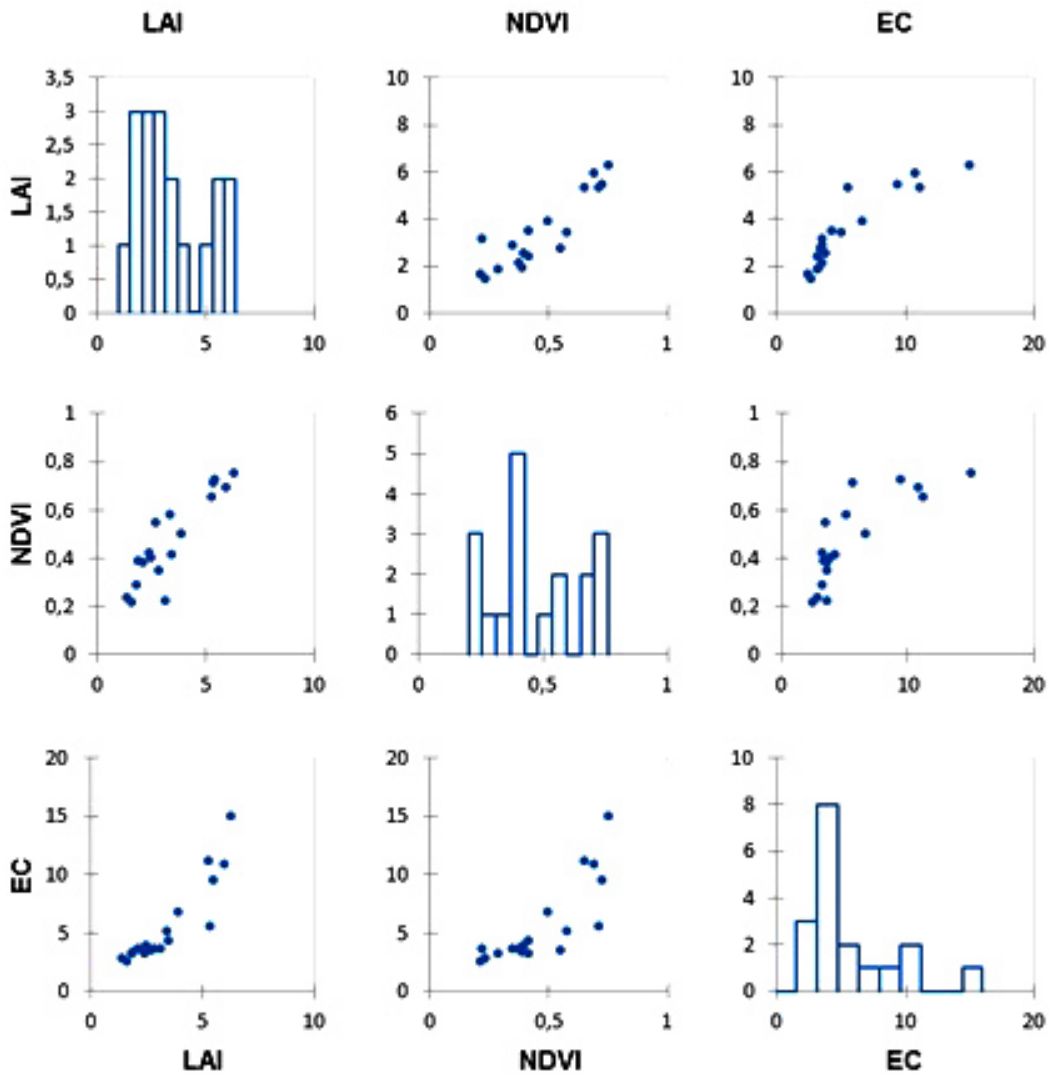

Figure 1. Diagrams of relationship between soil salinity and spectral vegetation indices

Conclusions

There is correlation between soil salinity, one of the stress factors for agricultural crops, and spectral vegetation index, that is peculiar for winter wheat plant and by this point, it is possible to study the impacts of stress factors on plants.

Modern methods, as remote sensing technologies, have a number of advantages in agricultural production and in assessment of the condition of agricultural crops, and increase the accuracy and validity of the analyses, as well as define its convenience and speed.

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INFLUENCE OF ECOLOGICAL FACTORS ON BIOCHEMICAL PARAMETERS OF BLOOD OF RABBITS OF DIFFERENT BREEDS

Abstract: The article presents data obtained during the study of the influence of various environmental factors on the biochemical parameters of blood serum in different rabbit breeds differing in directional productivity. It has been established that irrespective of the pedigree of rabbits, when growing under conditions of comparatively intensive contaminated (CIC) conditions in blood serum, the amount of total protein and albumins decreases. And the amounts of globulins and transferrin were high.

Keywords: adaptation, ecology, factors, breed, rabbits, chinchilla, giant, New Zealand, blood, protein, serum proteins of blood, total protein, albumin, globulin, transfferin, etc.

Relevance of the topic: Currently, due to the growing population demographics in the world and the deterioration of environmental among the entire planet among the population, food insufficiency is observed. This was reported by David Beasley, Executive Director of the World Food Program in his speech to the Security Council. According to David Beasley, the number of injured people in the world due to food shortages in the last 2 years has increased to 55%.

In addition, according to the director of the program the number of injured in 2015 was about 80 million, then in 2017 their number reached 124 million [15].

It should be noted that, according to the State Statistical Committee, by 1 April, 2018, the permanent population of Uzbekistan is 32.765 million people.

The period of economic development of providing people with high-quality and safe dietary rabbit meat, as well as local industry with raw materials remains a problem awaiting its positive decision. The governments of Uzbekistan along with the leading branches of livestock farming, pay special attention to the comprehensive development of such livestock breeding areas as poultry farming, fish farming, beekeeping and rabbit breeding. The decrees issued and the decision of the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan, testify that, from the side of the government, much attention is paid to the development of rabbit breeding.

It is known that an increase in the number of people in the world will lead to many different problems. Among these problems, pollution of the external environment with various food and industrial wastes is considered to be the main one, as a result of the increased pollution by chemical (heavy metals) of soil and water has led to a decrease in the reserve of natural mineral wealth.

Because of anthropogenic interference of the human factor in various cities around the world, all the components of the atmosphere, especially atmospheric air, the chemical composition of aboveground and groundwater, the ecosystem of soils are greatly altered, and this will greatly damage the crop and livestock production of the world [1, P. 83–84; 3, P. 144–146; 5, P. 277; 7, P. 241; 14, P. 99–102].

Chemical pollution of the atmosphere, exert a strong influence of all biochemical periods of natural nature. The action of a person, exerting a strong influence on the external environment, worsens the state of the biosphere, along with the whole living organism, and exerts a certain influence on the human body itself [4, P. 55–57; 10, P. 992–1006].

In addition, various: – production, environmental, physico-chemical change in nature occurs only with the active participation and action of man. At the same time, the blood system responds to changes in its composition and properties by any influence of environmental factors [2, P. 80; 8, P. 430; 11, P. 216]. The blood of the body is considered a functional system of the body and the basis of this unites the various physiological systems of the body, and constitute a single whole organism.

The negative influence exerted on the body is closely connected with the functional states of the blood-forming cells and immunological systems, and this change is manifested in clinical and hematological processes. Because of such properties, blood has always attracted the attention of researchers [9, P. 318–320; 12, P. 1193–1202].

Thus, the study in difficult environmental conditions, the influence of various climatic and nutritional factors in rabbit organisms has a certain scientific and practical significance [6, P. 122–126; 13, P. 359–366].

Proceeding from the above, we have accomplished this work in accordance with 5 priority directions of the Strategic Action for the Development of the Republic of Uzbekistan in 2017–2021. In 3 rd Priority direction is development and liberalization of the economy;

3.3. Mederinization and intensive development of agriculture; deepen the structural change and systemic development of agriculture, improve the security of security and expand the production of environmental clean food.

The purpose of the study was to study various environmental factors (stressful) on adaptation processes, digestion, hematological and immunological indices of blood and the productivity of various rabbit breeds brought from abroad.

To achieve the goal, the following specific tasks were set:

– to study the effects on feed intake with an increase in the amount of CO_2 in NH_3 in the respiratory air from the normal and with the inclusion of various food preparations in the diet; study of the change providing the constancy of cellular and biochemical indicators of functional systems under the influence of stressful climatic and nutritional factors; study of the effect on the state of natural resistance of the rabbits organism of various stress factors; study the change in morphological and biochemical indicators of blood and the state of nonspecific protective systems of rabbits' organism in after stress periods;

Objects and methods of research. The subjects of the study were rabbits breed in various regions of Samarkand province. When performing experimental studies, electrophoretic methods widely used in physiological and biochemical processes. Digital materials were processed using the Microsoft Office Excel program on a personal computer. Experimental and scientific-production experiments were carried out in the conditions of the Samur State Vision (Chinchilla and Giant), in the agro-production center "Agrovelikan" of the Pastdargom district of the Samarkand region (New Zealand) breed. The experiments lasted up to 60 days, with two breeds of animals formed from each breed, in groups of 15 each. Analogues; identical in age, live weight, sex and even masters.

Results of the study. In connection with the increase in the number of industrial enterprises and vehicles in villages and cities, the air environment and the pollution of water basins with various gases and wastes have deteriorated.

Proceeding from this, by the degree of pollution large settlements in comparison with the mountain and foothill zones of the republic are considered to be environmentally unclean. On the contrary, pasture zones of mountain, foothill and forest zones, an found ecologically clean zones. By intensity of pollution of all regions of Samarkand region, it is possible to divide into 3 zones; relatively environmentally friendly – mountain, foothill and forest zones (REF); relatively normal pollution – of the settlements and villages (RNP); relatively intensive pollution – large settlements and cities (RIP).

The table below shows the protein values of blood serum of rabbits contained in various zones of Samarkand province.

As can be seen from the figures, the rabbits of the chinchilla breed when grown in the REF zones the content of serum in the blood showed a total protein content of 66.0 ± 1.83 g/l, and under city conditions this figure was 65.0 ± 1.7 g/l i.e. between the compared groups the difference is practically not determined. When comparing the remaining groups, these indices amounted to 68.0 ± 2.1 g/l and 57.0 ± 1.2 g/l for groups of 4 gigantic; and in New Zealand –64.0 ± 1.92 g/l and 53.0 ± 1.8 g/l, respectively. In the latter groups, the difference between the compared groups by breed was almost the same,– 11 g/l.

The albumin fraction of proteins in sera from rabbits of the chinchilla breed was as follows – in the REF zones it was 52.0 ± 1.1 g/l, and for RIP conditions – 36.0 ± 1.3 g/l, respectively, and the difference between the compared zones was 16 g/l. Even more difference was observed in the gigant and New Zealand breeds of rabbits 57.0 ± 1.3; 30.0 ± 1.4 g/l, and 51.0 ± ± 1.0; 28.0 ± 1.0 g/l were respectively. The difference between the compared zones, for rabbit breeds was 27 g/l – for giants, and 23 g/l for New Zealand breeds respectively. The albumin fraction of blood serum in animals participates in metabolic processes, i.e. in the transport of food masses, since rabbits of the chinchilla breed are practically adapted to the local nature of the breed. The globulin fraction of whey proteins, along with participation in metabolic processes, perform the protective function of the organism, and the study of the number of globulin fractions of whey proteins makes it possible to characterize the immunological state of the rabbits' organism during breeding in various ecological zones, i.e., during the adaptation periods in new regions in life.

When chinchilla breeds were grown in the REF zones, the fraction of the globulin fraction was 14.0 ± 0.6 g/l, while in the growing of RIP zones their share increased to –29.0 ± ± 0.7 g/l or 2 times. This suggests that, even the local breeds in the cultivation of intensely contaminated zones mobilize all the capabilities of the body to eliminate the adverse effects of adverse environmental factors. Similar data were obtained for newly imported breeds and for breeds; 11.0 ± 0.84 and 27.0 ± ± 0.8 g/l for gigantic, and for 13.0 ± 0.42 and 25.0 ± 0.5 g/l for New Zealand respectively.

Apparently, the globulin fraction of whey proteins in comparison with the albumin fraction of the growth of SI

zones is the fraction of the first on the contrary increased. By the electrophoresis of the blood serum of the rabbit species being compared, three fractions of the globulin protein were obtained: *α*-, *β*- and *γ*-globulins. When chinchilla breed rabbits were grown in the REF zone, the number of *α*-globulins in serum was 21.43 ± 0.9% and in the RIP zone 24.5 ± 0.6% and the difference between the compared zones was 3.07%. In rabbits of chinchilla breeds grown in the REF domain, the α-globulin fraction of whey proteins was within the normal range, and decreased in the RIP regions.

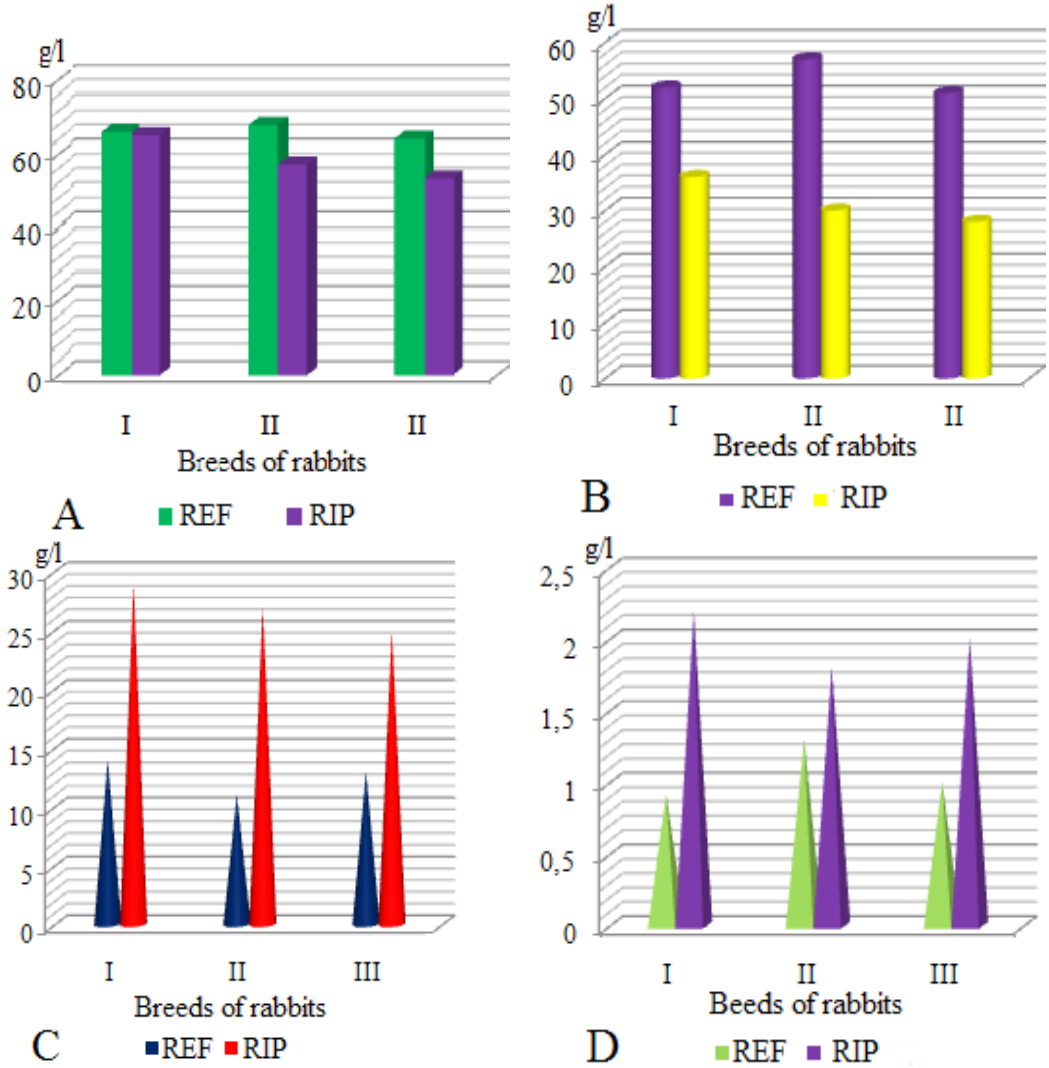

Figure 1. A – Quantities of total protein in the blood serum from different breeds of rabbits, B – Quantities of albumin fraction in blood serum from different rabbit breeds, C – Quantities of the globulin fraction of protein in the blood serum in different rabbit breeds, D – Quantities of transferrin in the blood serum from different breeds of rabbits. I – chinchilla, II – giant, III – New Zealand

An analogous picture was also observed in the analysis of the data obtained on giant rocks and New Zealand rabbits amounted to 18.18 ± 0.16%, 25.9 ± 0.7%, and 7.72%, 15.38 ± ± 0.82, 26.4 ± 0.8% and 11.02% respectively. The reverse trend was observed in the analysis of data on the β-globulin fraction of whey proteins. When growing in the REF zones, the fraction of the *β* – globulin fraction in all three compared species was within the normal range, and in the RIP zones, the fraction of the whey protein fraction studied increased and made up by the chinchilla breed –40.0 ± 1.6; 28.6 ± 1.0 g/l and 11.4%; according to the giant, 45.45 ± 1.4; 29.6±1.2% and 16.85%, and in New Zealand – 38.46 ± 1.3; 28.0 ± 0.8% and 10.46% respectively.

An analogous picture was also observed for the γ – globulin fraction of blood serum proteins of all rabbits compared to breeds. Protein transferring cells, when combined and transported iron atoms in the animal body, is of particular importance. However, it should be noted that, in the blood of all three rabbit breeds, the ratio of variability was in the range from 0.5 to 1.19 g/l. From the above, we can state the following conclusions:

Regardless of the pedigree of rabbits when growing under conditions of relatively intense (CIC) contaminated conditions in blood serum, the amount of total protein and albumin is reduced. And the amounts of globulins and transferring were high. Changing conditions of external environments, necessarily render significant effect on protein values of blood serum rabbits.

The data obtained can be used later in carrying out production experiments to evaluate the effect of various chemical compounds on the vital activity and productivity of animals.

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DEPENDENCE OF THE LEVEL OF CORRELATION LINKS AND STRUCTURE ON COTTON LEAF AND FIBER COLOR

Abstract: The article provides information on the degree of correlation between the quantitative signs of colored leaf and color fiber in the cotton. It has been established that genotype with colored fibers in cotton plants is different from white fiber genotypes. The correlation link between the quantitative parameters of the cereal field formed a group called "Amount of fever". The yellow-green and fiber-rich genotypes of the leaf show strong correlation relationships with the white fibrous green leaf genotypes.

Keywords: genotype, correlation, correlation matrices, link, quantitative and qualitative parameters, colored leaf, colored fiber, fiber index, determination and variation.

The advancement of information technology in our lives, as well as in all spheres, has further enhanced the use of statistical methods in biological research, including correlation analysis. Particularly, the new possibilities for the interconnection of the organisms in the biological area have been studied by the correlation analysis carried out by complex computing. As a result, there was a change in the interaction between the quantitative signs of plants (sunflower, wheat, cotton, rice, linseed, soybean) under the influence of the environment. The correlation between the quantitative signs of varieties of cotton sorts were found to be increased in an unfavorable environment and in low-yield genotypes [3; 4].

Ecological-biological, ecological, genotypic and biological indicators were recommended for the selection of process as a result of statistical methods. This, in turn, plays an important role in the successful completion of selection work [1].

There was shown a correlation between the fiber index and the green color of the fiber (with a lower fiber index) in the hybrids that are intertwined with white color cotton fiber (with a high fiber index).

In F_2 hybrids derived from the mutations of some lines of genetic collection of National University of Uzbekistan were identified as the result of the study of herpes in the background of plant color:

– The marking sign of the fiber is inherited without the condition of alleles of the plant color gene;

– The green (*rprp*) and intermediate (*Rprp*) plants obtained in the second generation were higher than 1000 seedlings weight rather than anthocyanic (*RpRp*) plants;

– The analogous phenomenon has also been observed in plant color and genetics of yield signs [6].

The main purpose of this research was to determine the variation, determination and the extent and structure of correlations between the quantitative signs of genetic and color of cotton genes. Because these researches are important in carrying out selection works.

As the object of experiment, materials of the genetic collection of cotton of the National University of Uzbekistan and hybrids synthesized with their participation were chosen as colorful and cotton fiber. The experiment was conducted in four variants (Table 1). All phenological observations and calculations were carried out on the basis of the methodical instructions issued by Uzbekistan Research Institute of Cotton. SPSS-14 statistical software was used to calculate correlation (r), determination (r_2) and variation (cv,%) between the studied characters [2]. In determining the indication of determinations, R_2ch, R_2m, N. S. Rostova's method was used to compare the distance between $d = 1r$ r and their correlation matrices [1].

From the initial statistical data we can see that genotype of cotton varies with quantitative indices. If it was 29.17% in green leaf at fiber output, in green leaf with white fiber gene, it was 33.47%. These white fibrous genotypes show that over 4.3% of the plant genotypes with colored fibers have been found to be fibrous. The same results were recorded by the index of the fiber and the length of the fiber. The length of the fiber is 31.25 mm in the 1 variant, 35.12 mm in the 4th variant. The difference between these options is 3.87 mm.

Table 1. – Quantitative signs of cotton and their statistical indicators

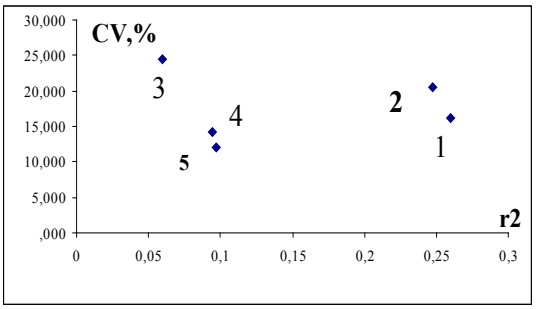
No	Variants	Fiber output, (%)	Fiber indices, (g)	Weight of cotton boll, (g)	Weight of 1000 seedlings, (g)	Length of fiber, (mm)
1	*2*	*3*	*4*	*5*	*6*	*7*
1.	Green leaf, colored fiber	29.17 ± 0.32	5.52 ± 0.07	4.47 ± 0.07	133.41 ± 1.13	31.25 ± 0.25

1	*2*	*3*	*4*	*5*	*6*	*7*
2.	Yellowish-green leaf, colored fiber	28.39 ± 0.61	5.23 ± 0.13	5.86 ± 0.16	131.98 ± 2.31	30.80 ± 0.52
3.	Yellowish-green leaf, white fiber	32.93 ± 0.81	6.16 ± 0.14	6.41 ± 0.17	126.28 ± 3.63	34.80 ± 0.56
4.	Green leaf, white fiber	33.47 ± 0.35	6.45 ± 0.09	4.53 ± 0.17	129.04 ± 2.05	35.12 ± 0.32

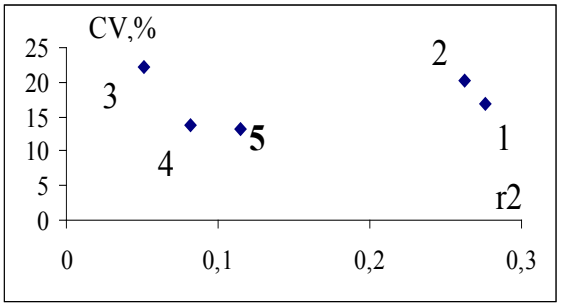
Statistical analysis of primary data shows that the differences between the options are real. This, in turn, was the basis for switching between the variants to the next stage of calculation. This information is shown in (Figure 1). The data in the figure clarified that fiber output (1) (where the number indicates the studied character) and the fiber index (2), 3 and 4 variants of fiber output (1) and 1000 seedling weight (4) are strongly determined (as the square of the correlation coefficient determines the boundary level of the sign depending on the genotype).

In such case, the variation of these characters takes place in the context of others. The length of the fiber (5) was lower in 3 and 4 variants and less varied.

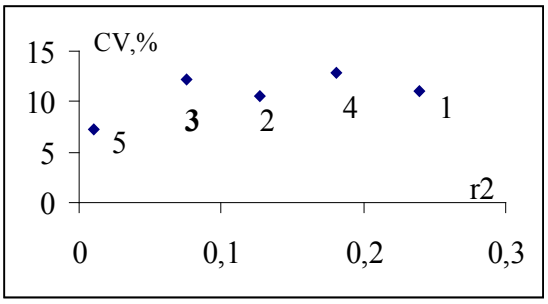
It was noted that cotton weight on the boll (3) was strongly varied in all variants.



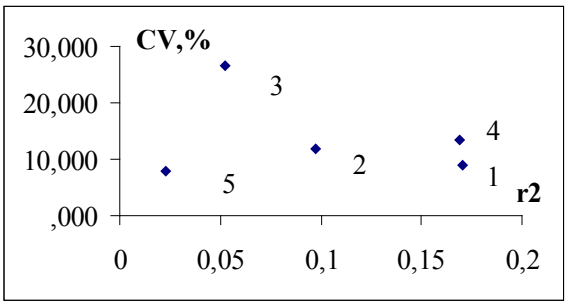
1. Leaf is green, colored fiber



2. Leaf is yellowish-green, colored fiber



3. Leaf is yellowish-green, white fiber



4. Leaf is green, white fiber

Figure 1. Variation of quantitative parameters of cotton (*CV*,%) and their determination (r^2)

Note: Numbers represent signs: 1 – fiber output, 2 –fiber index; 3 –weight of one boll; 4 –weight of 1000 seeds; 5 –length of fiber

Coloring of cotton foliage and fiber influenced the quantitative indices. If the fiber output was strongly determined in all variants, the fiber index was found to be strongly determinant in versions 1 and 2, in the 1000 seed weights 3 and 4. The length of the fiber is low in 3 and 4 variants, that is, in the plant genotypes with white fibers. This has been recognized as an indicator of independent variability.

It was found that strongly varied weight of boll is less determinated.

The color of the leaf and fiber of the cotton also influenced not only variability of the quantitative signs but also the degree of correlation between them (Figure 2). In the genotype of green leaf and colored fiber, strong correlation relationships ($r > 0.7$) between fiber output (1) and fiber index (2) were recorded. The same result was recorded in version 2. In the 3 variation there was a strong but correlated correlation between the fiber output (1) and 1000 seed weight (4). Similarly, the correlation link was recorded in variant 4 ($r = 0.3–0.7$).

The figures 1 and 2 show that the degree of correlation between quantitative characters is strong. It also shows the average determinants of the studied characters. The results of calculations in the 1 and 2 variants of the average deter-

mining coefficient were 0.16, in the 3 and 4 variants – 0.10. Thus, 1 and 2 variants have created inconvenient conditions for genetic varieties of cotton. This can be explained by an increase in the degree of correlation between plant quantitative symptoms under the conditions found in the science. In our opinion, variants and fibrous color options (1 and 2 variants) have created unfavorable conditions for the 3 and 4 options for cotton genotypes. As a result, the degree of correlation between quantitative signs increases.

The color of the leaf yellowish-green and colored fiber was influenced not only by the correlation link between the studied quantitative characters but also the composition (Figure 3). The quantitative estimates were mainly divided into one correlation group. This group can be called "Amount of Fiber".

The center of the group was contained by fiber output (1) and fiber index (2). Correlation between these indicators was high. Let's mention that the distance between quantitative signs is determined by formula $d = 1r$. As we have mentioned the higher the correlation coefficient, the closer it is to the distance. The degree of correlation link is as mentioned above in 1 and 2 variants are higher than in 3 and 4 variants.

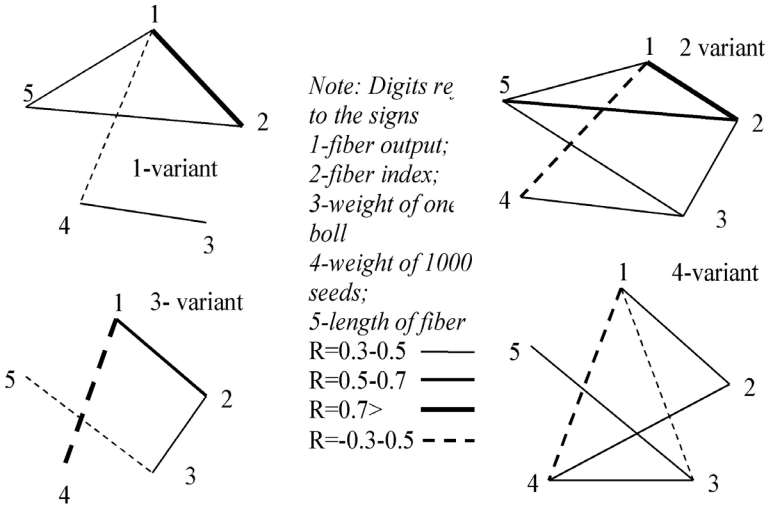


Figure 2. The degree of correlation between the quantitative signs of cotton genetics

Note: 1 – Green leaf, colored fiber; 2 – Yellowish-green leaf, white fiber; 3 – Yellowish-green leaf, white fiber; 4 – Green leaf, white fiber

Note: Digits refer to the signs (figure 1)

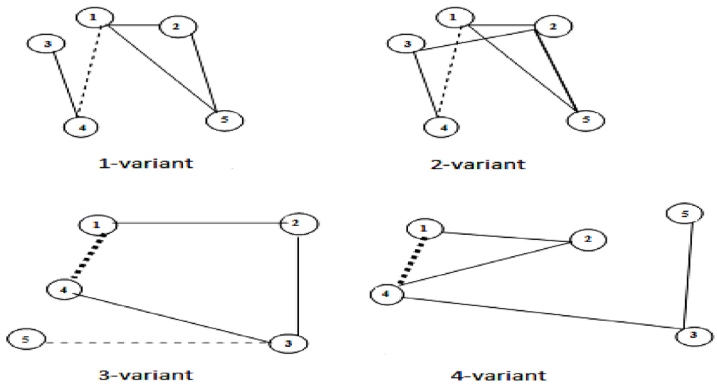


Figure 3. Structure of correlation links

Note: 1 – variant-green leaf, white fiber; 2 – variant-yellowish-green leaf, colored fiber; 3 – variant-yellowish-green leaf, white fiber; 4 – variant-green leaf, white fiber; Digits refer to signs: 1 – fiber output; 2 – fiber index; 3 – weight of one boll; 4 – weight of 1000 seeds; 5 – fiber length

Comparison of genotype correlation matrices showed that comparing results showed the similarity of green leaf with colored genotypes with green leaf and white fiber genotypes was 64%, and the similarity between 1 and 2 variants was 94%. As you can see from this information, the colored fiber of genotype differs from white fiber genotype. Recall that when the similarity of genotypes is higher than 90%, it is considered to be alike.

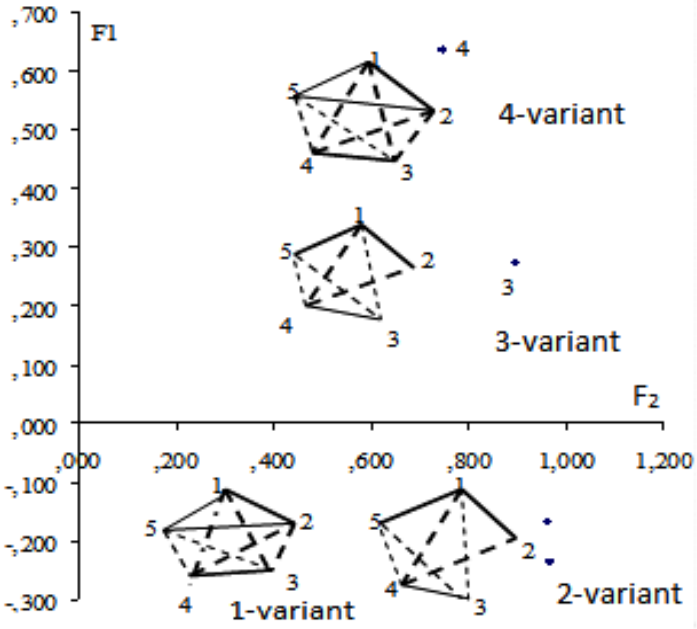


Figure 4. Similarity of correlation matrices

Note: Digits refer to signs: 1 – fiber output; 2 – fiber index; 3 – weight of one boll; 4 – weight of 1000 seeds; 5 – length of fiber; F_1 – similarity of correlation matrices; F_2 – specific features of correlation matrices

The similarity and the difference between the genotypes can be clearly seen from (Figure 4). At the top of the picture there are white and fiber genotypes in 3 and 4 variants, and colored fibers genotypes at the bottom.

This information on cotton leaf and color of fiber impacted the level and correlation links between quantitative signs. It was found that colored fibers genotypes differ from white fibers by genotypes.

1. Green leaf and white fiber genotypes of cotton dominated rather than colored leaf and fiber genotypes with their fiber output and length of fibers.

2. Colored fibrous genotypes were found that fiber output and fiber index, white fiber output genotype, and 1000 seedlings weight, and the fiber length was less determinate.

3. A strong correlation was found between the direct fiber output and fiber index and reverse strong correlation links between the fiber output and the weight of 1000 seeds.

Conclusion

4. The correlation link between the quantitative parameters of the studied cotton found a group called "Amount of fiber". The yellow-green and colored fiber genotypes of the leaf show strong correlation links with the white fiber and green leaf genotypes.

5. The results of comparisons with correlation matrices show that the genotype of the yellowish-green and colored fibers is similar to that of green leaf with white fibers genotype for 64.0%. It witnesses that genotypes with yellowish-green and colored fiber differs from genotypes with white fiber and green leaf.

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THE DISTRIBUTION OF INDICATOR-SAPROBE ALGAE ALONG SHAKHIMARDONSOY-MARGILANSOY RIVERCOURSES

Abstract: The article contains information on the distribution and separation of indicator saprobic algae of poly-, meso- and oligosaprobic zones along the Shakhimardansai-Margilansai Rivers.

Keywords: Fergana, algae, indicator, sarobic, Shakhimardansai, Margilansai.

According to AS Konstantinov, the water basins or thier individual sections are divided into poly -, meso – and oligosaprobic zones according to the degree of contamination [6, 407–410].

In polysaprobic zone, (wastewater) organic compounds that pollute the water are comminuted aerobically. The dissolved oxygen is less; proteins that are not dissolved yet, hydrogen sulfide and carbon dioxide occur; biochemical processes continues in this zone. The species of algae found in this area are very low, and their biomass is very high.

In mesosaprobic zone degree of water pollution is relatively small, proteins are completely dissolved, hydrogen sulfide and carbon dioxide occurs in small quantities. The oxygen dissolved in the water occurs partly, as well as nitrogen compounds that are not fully dissolved, namely ammonia, amino and amideocytes. Mesosaprobic area, in turn, is divided into α and β – small mesosaprobic zones. Organic compounds are dissolved under aerobic conditions, mainly by means of bacteria. *Oscillatoria chalybea* (Mert.) Gom., *Phormidium uncinatum* (Ag.) Gom. of blue-green algae that are inherent to Alpha-mesosaprobic, Diatom algae – *Cyclotella meneghiniana* Kuetz., *Stephanodiscus hantzschii* Grun., *Synedra tabulata* (Ag.) Kuetz. and others occur frequently; of green algae – *Enteromorpha intestinalis* (L.) Link. are can be exampled too.

Next, namely *β* – small mesosaprobic zone is characterized by the presence of ammonia and its derivatives (nitrogen acid). In this small zone, amino acids do not occur, hydrogen sulfide occurs in small quantities, the amount of dissolved oxygen in the water is very high, and mineralization is accomplished by the total disintegration of organic matter. In this small zone, there are many types of algae, but their numbers and biomass are much lower than the previous one. In this small zone, blue-green algae are not found; of diatom algae – *Melosira varians* Ag., *Cyclotella kuetzingiana* Thw., *Fragilaria construens var.binodis* (Ehr.) Grun, *Navicula cinkta* (Ehr.) Kuetz., *Gyrosigma acuminatum* (Kuetz). Raben, *Cymbella aspera* (Ehr.) Cl., *C. sistula* (Hemp.) Grun, *C. prostrate* (Berk.) Cl., *Gomphonema constrictum* Ehr., Nitzschia communis Rabenh., *Surirella angustata* Kuetz.; are found; of euglenous algae – *Trachelomonas oblanga* Lemm., *Phacus parvulus* Klebs.; of green algae – *Scendesmus bijugatus* (Turp.) Kuetz., *Ulotrix tenerrima* Kuetz., *Sladophora glomerata* (L.) Kuetz., *S. fracta* Kuetz., *Closterium parvulum* Naeg. can be exampled.

In oligosaprobic zone hydrogen sulfide does not happen, the mass of carbon dioxide is little, the degree of the saturation of the oxygen dissolved in the water is close to the norm, organic substances disintegrated in water almost do not happen, because they are fully digested by algae. This zone is characterized by a kind and variety of algae. However, their number and biomass are little. *Cyclotella comta* (Ehr.) Kuetz., *Diatoma vilgare* Bory., *Fragilaria bicapitata* A. Mayer., *Neidium productum* (W. Sm.) Cl., *Cymbella affinis* Kuets., *Ulotrix aequalis* Kuetz., *Closterium navicula* (Breb). Liitkom., *Hyalotheca dissilins* (Smith.) Breb. are peculiar to this zone.

Of the total (77 – seventy-seven) number of species and varieties of indicator-saprobe algae, in the upper areas of Shakhimardonsoy – Margilansoy 31 in the middle 39, and in the lower areas 37 species exist. The number of algae increases along with the rivercourse due to alpha -, oligo -, beta – mesosaprobic species and varieties. Indicator species of blue-green algae are not found in the upper part of the river.

In the middle and lower part of the Shakhimardansay – Margilansay 1 to 2 blue-green indicator-saprobe algae occur. *Oscillatoria chalybea* (Mert.) Gom., *Phormidium uncinatum* (Ag.) Gom. dominate in these areas.

The number of indicator – saprobe diatom species of algae increases in number from the upper parts (24), to the middle (32) and the lower parts reaching 31. Along the rivercourse, *Cyclotella comta* (Ehr.) Kuetz., *Diatoma vilgare* Bory., *Synedra ulna* (Nitzsch.) Ehr., *Cocconeis placentula* Ehr., *Navicula cinkta* (Eer.) Kuetz., *Cymbella venricosa* Kuetz. are commonly spread.

Indicator species of pyrophyte algae are not found along the rivercourse in algae.

Indicator saprobe species of euglena algae are not found in the upper and middle parts of the river. *Trachelomonas oblanga* Lemm., *Phacus parvulus* Klebs. of algae are identified in the middle.

In algae, it is observed that of indicator-saprobe of green algae occur 7 in the upper, 4 in the middle, and 5 in the lover parts of the

river. Of them *Scendesmus bijugatus* (Turp.)Kuetz., *Cladophora glomerata* (L.)Kuetz., *C. fracta* Kuetz., *Pediastrum boryanum* (Turp.)Menegh., *Ulotrix zonata* Kuetz. are commonly spread.

In the middle and lower parts of the river, beta – mesosaprobic algae – *Phormidium uncinatum* (Ag.) Gom., *Cerotoneis arcus* (Ehr.) Kuetz., *Synedra ulna* var. *oxyrhynchus* (Kuetz.) VH, *S. tabulata* (Ag.) Kuetz., *Cocconeis pediculus* Ehr., *Navicula cryptocephala* var. *veneta* (Kuetz). Grun., *N. radiosa* var.*tenella* (Breb.) Grun., *Cymbella affinis* Kuets, *C. prostrate* (Berk.) Cl, *Bacillaria paradoxa* Gmelin., *Surirella linearis* W. Sm, *Sladophora fracta* Kuetz., *Closterium parvulum* Naeg. are found. In the in the lower parts of the river, xeno-saprobic algae that are peculiar to cold and clean waters are not met.

Bacillariophyta branch of algae dominated in the number of saprobe species and varieties. The number of the algae increases from the upper parts to the lower respectively (24–31–28).

It is observed that 7 xeno-saprobic algae are found in the upper part of the river. Due to the high degree of the contamination in the middle and the lower parts of the river, the number of the species and varieties of the xeno-saprobic algae are reduced for a few times. Xeno-saprobic species – *Meridion circulare* Ag., *Diatoma hiemale* (Lyngb.)Heib, *Cerotoneis arcus* (Ehr.) Kuetz., *Synedra ulna* (Nitzsch.)Ehr., *S. tenera* W. Sm, *Cocconeis placentula* Ehr., *Achnanthes coarctata* (Breb.)Grun., *A. lanceolata* (Breb.)Grun, *Navicula radiosa* var.*tenella* (Breb.) Grun., *Cymbella helvetica* Kuetz., *C. venricosa* Kuetz., *Gomphonema olivaceum* (Lyngb.) Kuetz and others occur in the upper parts.

Oligosaprobic species and (18), varieties occur 8 in the upper, 8 in the middle, and 9 in lower parts. In oligosaprobic species and varieties, the leading algae are *Cyclotella comta* (Enr.) Kuetz, *Diatoma vilgare* Bory., *Cymbella affinis* Kuets., *Ulotrix zonata* Kuetz. and others.

Number of beta – mesosaprobic algae (35), makes up 14 species in the upper part of the river, in the middle 16, and 17 in the lower parts. It is observed that the number of the mesosaprobic species and varieties multiplies 3 to 4 times along the rivercourse. Out of Beta – mesosaprobic algae found in the upper parts of the river *Melosira varians* Ag., *Synedra berolinensis* Lemm., *Navicula cryptocephala* var. *intermedia* Grun., *N. cinkta* (Eer.) Kuetz., *N. dracilis* Ehr., *Cymbella aspera* (Ehr.) Cl., *C. sistula* (Hemp.) Grun., *Gomphonema constrictum* Ehr., *G. tergestinum* (Grun) Fricke., *Nitzschia parvula* Lewis., *Tetraedron minimum* (A. Br.) Hansg., *Scendesmus bijugatus* (Turp.) Kuetz, *Ulotrix tenerrima* Kuetz., *Sladophora glomerata* (L.) Kuetz. can be illustrated (see table).

Table 1.– Spread over the course of the tracer – saprobity algae

Department of algae	upper						middle						lower					
	in all	*X*	*O*	*α*	*β*	*p*	in all	*X*	*O*	*α*	*β*	*p*	in all	*X*	*O*	*α*	*β*	*p*
Cyanophyta	–	–	–	–	–	–	1	–	–	1	–	–	1	–	–	1	–	–
Bacillariophyta	24	7	6	1	10	–	32	11	7	2	11	1	31	6	7	4	14	–
Euglenophyta	–	–	–	–	–	–	2	–	–	–	2	–	–	–	–	–	–	–
Chlorophyta	7	–	2	1	4	–	4	–	1	–	3	–	5	–	2	–	3	–
in all: 7	31	7	8	2	14	–	39	11	8	3	16	1	37	6	9	5	17	–

In the middle and the lower courses of the river *Synedra vaucheriae* Kuetz., *Cocconeis pediculus* Ehr, *Stauroneis anceps* Ehr, *Navicula cinkta* (Eer.)Kuetz., *N. exigua* (Greg.)Muell, *N. gracilis* Ehr., *Gyrosigma acuminatum* (Kuetz). Raben., *Cymbella aspera* (Ehr.)Cl., *C. cistula* (Hemp.)Grun., *C. lanceolata* (Ehr.)V.H, *C. prostrate* (Berk.)Cl., *Bacillaria paradoxa* Gmelin., *Nitzschia communis* Rabenh., *Nitzschia communis* Rabenh., *Surirella angustata* Kuetz., *S. linearis* W. Sm, *Trachelomonas oblanga* Lemm., *Phacus parvulus* Klebs., *Cladophora glomerata* (L.)Kuetz., *C. fracta* Kuetz., *Closterium parvulum* Naeg. are found.

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AGE COMPOSITION OF POPULATION AND LABOR RESOURCES OF SAMARKAND REGION IN REPUBLIC OF UZBEKISTAN

Abstract: It is noted in the article that it is of great importance to research Samarkand Region population age composition and labor resources. The direct impact of age composition to increment of labor resources is also studied in this article. Also, the issue of employment of the population is considered.

Keywords: Age composition, labor resources, population density, locality of population, children, pensioners.

Introduction. It is important to explore the age composition of the population in the study of social geography, which plays a major role in determining the number of labor resources, the future of their growth, and the proper deployment of productive forces. It also plays an important role in determining the future of non-material production, service, education and other areas. In addition, the study of the age composition of the population is also necessary in order to find out the number of preschool institutions and the number of children who will the first grade of the schools.

Main part of the paper. As in other regions of the Republic of Uzbekistan, in Samarkand Region the majority of the population is young due to the natural population growth. The survey found that from 1979 to 1989 the proportion of children under the age of 4 increased enormously.

The Samarkand Region is a demographic area with its particular characteristics. As noted above, the population growth in the region is largely determined by the high natural growth rate.

The analysis shows that in 1989 the population up to labor force age was over 40%, and according to recent data their proportion dropped to 35.8%. However, the proportion of those who are at work has grown significantly since 1989. The proportion of those who have passed the age of labor has somewhat declined. The population of under labor aged in urban areas, that is the population aged 0–16 differs from those of rural areas in the region, explained as 30% of urban area, and almost 40% of the population not reaching the labor age, but in the urban areas the percentage of working age and the retired age is higher.

As noted above, the proportion of people in rural areas is under the working age is quite high as the the birth rate according to recent data in 2016 there were 88.600.00 births in the region, of which 62.000.00 thousand were in rural areas. Only the portion of 26.600.00 kids were born in urban area. 88.600.00 kids born in the region compose of 45.800.00 boys, and 42.800.00 girls.

Moreover the portion of the above working age population in the region, that is the people over 60, is higher in urban areas rather than in rural areas. There are 674 long-lived persons in the region, that is the people over 100, of which 284 are men, and 390 are women, and 404 of 674 of the long-lived persons live in the city.

As a conclusion we can sum up that the age composition of the region and their territorial location is original peculiar. It is important to consider these characteristics of the population to establish production, to form the location of the population, to predict the number of population from scientific point of view in the future and to study the composition of the population as well.

Nowadays Samarkand is one of the rapidly developing ancient and modern cities in the world. It has been well known throughout the world with its architectural monuments. The industrial companies located in the city has been reduced in the amount or totally removed to the suburbs in order to protect its unique monuments and nature.

During soviet period huge industrial companies in the city were renovated and expanded and mostly kept in their own locations. Some of these factories include cotton processing plants, "Red Motor" factory, Locomotive Depot, steel factory, plants of electromechanics, companies for repairing metal ware, asphalt and concrete plants, knitwear factory, cotton training plants and others. These factories and plants had been polluting the nature.

It should be noted that during the soviet union period the social composition of the population was absolutely different. All the regions of the country and half of the population of the republic were of working class people.

After Uzbekistan gained its independence not only the people of Samarkand Region but also the whole republican population's social structure changed. In the last years of the former soviet union the social composition of the republic included 25% of the educated, 55% of workers, 20% peasants.

The working class density was higher in Samarkand Region in the early years of independence period, and as the years passed by and by closing down the factories and industrial plants this number decreased, small-scale business and entrepreneurship, service sector developed.

As we know labor resources are considered and defined to have the ability to work according to social and cultural capacities of the population. Generally, in accordance with the attitude of the population to labor it is divided into three groups:

1) those, who haven't reached the working age;

2) working age class;

3) those, who passed the working age;

According to international standard labor resources include the ages from 15 to 65 in the countries worldwide. In Uzbekistan the men are considered as working capable population from the age of 16 to 60, and women – from the age of 16 to 55.

The labor resources in the Republic, including the Samarkand region, are effected with direct impact by the birth and natural growth rates of the population, the age structure of the population, and the population's migration. Due to the high birth and natural growth rates in the region the share of children under the age of 14 is high.

The studies show that according to the data of the year 1989 47,1% of the population of the region included people with working capability. And in accordance with the data of 2015 the regional labor resources density include 57,6%.

The reason for such a major change is that the share of labor force, as mentioned above, influenced by the birth rates and natural growth rates of the population. In 1989, the birth rate was 33.1%, and the natural reproduction was 27.4%, and now these figures are 25.2‰ and 20.4‰ respectively. This is the evidence that the birth rate and the decline in natural growth have also increased the proportion of able-bodied population.

These changes are also observed in all urban and rural areas in Samarkand region.

Table 1.– Population and labor resources of Samarkand Region (2014)

№	City and regions	Population, thousand people	Labor resources (%)	Employment of the labor resources (%)
1.	Samarkand Region	3480.2	57,6	70
2.	Samarkand City	511.2	71	79
3.	Kattakurgan City	82.6	70	75
		Regions		
1.	Bulunghur	166.1	47	73
2.	Djambay	150.2	53	74
3.	Ishtikhan	225.0	48	68
4.	Kattakurgan	244.2	53	73
5.	Narpay	192.1	54	69
6.	Nurobod	134.4	51	72
7.	Akdarya	142.1	62	60
8.	Payarik	223.2	56	67
9.	Pastdargam	315.1	53	64
10.	Pakhtachi	131.0	62	69
11.	Samarkand	225.6	77	62
12.	Taylak	177.8	54	64
13.	Urgut	443.2	50	69
14.	Kushrabat	116.4	53	66

Source: samstat.uz.

In recent years, 71% of the population of Samarkand city and 70% of the population of Kattakurgan city are the people at the age of working class. There are also differences among rural areas. For example, the labor resources density in Samarkand Region is in the first place. This index makes 77%. The next place gets Akdarya and Pakhtachi with 62%. The other regions have the index of 52% for the people with working capability.

Conclusion. Although 57.6% of Samarkand Region population is working capable not all of them are employed. The population of the cities and districts of the region also constitute the majority of non-economically active population. Employed population in the region makes 70%, in Samarkand city it is 79%, and in Kattakurgan city it makes 75% respectively. There is also a different level of employment among the rural districts. The districts of Bulunghur, Djambay, Kattakurgan and Nurabad have the high level of employment, with approximate percentage of 73, and the rest districts make average of 65% in this respect. Increase in the number of small joint ventures in the districts has a direct impact to such differences in the employment rate. The working manufacturing companies in Bulunghur, Djambay and Kattakurgan districts, as well as the health recreation centers in Nurabad district have provided employment for the population.

Thus the study of Samarkand Region labor resources show the existance of the following problems:

1. Improving the socio-economic well-being of the population taking into account the rapid population growth and population employment of the region.
2. In order to provide employment we need the followings:
   a) Further development of small and medium business;
   b) Establishing more companies;
   c) Further improvement of service sector for population;
   d) Improvement of tourism in Samarkand Region;
3. Keeping clean air and environment in the city of Samarkand and etc…

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DYNAMICS OF GENERAL AND SPECIAL PHYSICAL TRAINING OF EXPERIENCED FEMALE BOXERS

Abstract: In this paper, we present the results of the dynamics of general and special training to optimize the trainer loads of qualified female boxers in the pre- competition stage of training.

Keywords: Highly- qualified woman boxers, general and special physical training stopwatch. (SPUDERG – 4 equipment).

From the first days of independence, our government paid special attention to sports and physical culture, the priority task of the state was to ensure the health of the population, the upbringing of the intellectually-physically comprehensively developed generation. In particular, Laws, Decrees of the President and Cabinet Ministers decrees that are aimed at the rapid development of this sphere have become the basis for sports activities of different ages particular the growing generation.

In our country, increasing the government's attention to sports and especially to girls' sports sets new goals for specialists and forces them to do research on optimizing the exercise in the preparation period before the competition.

The scientists of our country and other states have done much to optimize the pre-event exercise.The relevance of our study shows that the studies done to optimize the pre-competition exercise for experienced boxer girls have not been well studied.

Purpose of the study. Development of the dynamics of general and special training of boxer girls at the pre-event stage.

The objectives of the study:

– the determining of the work studied through the analysis of scientific methodological literature.

– determining ways to optimize the pre-competition exercise for experienced boxer girls.

Methods of research: pedagogical experience, pulsometry, mathematical static methods.

Coordination of the study: The research will be held in the city of Yangiobod in the boxing base in a team of experienced boxer girls from November 2017 to April 2018.

In boxing, the optimization of the exercise before the competition plays a big role and becomes the basis for achieving good results in the future. Therefore, during our research, we selected 8 SU girls and XTSU from the Uzbek boxing team.

In the course of the study, special tests were taken to determine the indicators of general and special training. The results of these studies are as follows.

Table 1.– Dynamics of indicators of general physical training

№	Names	Types of weight	Running 30 meters	Running 300 meters	Jumping for a long distance from place	Hand force of dynamiter (kg) Right	Hand force of dynamiter (kg) left	Dynamiter the maximum force of hand 50% right	Dynamiter the maximum force of hand 50% left
1.	R. T.	51	5,8	1.10.15	183	29	27	14.5	13.3
2.	M. Yo.	54	5,6	1.04.84	175	29	30	14.5	15.0
3.	X. F.	57	5,00	53.26	170	27	26	13.4	13.0
4.	S. X.	60	5,11	1.04.47	205	30	27	15.0	13.3
5.	Yo. A.	64	5,15	56.45	200	29	26	14.5	13.0
6.	Q. R.	69	5,28	58.18	208	30	33	15.0	16.5
7.	J. X.	75	5,85	1.12.65	170	26	26	13.0	13.0
8.	M. E.	81	6,7	1.11.36	170	27	29	13.4	14.5

Taken results of the athletes are such that they increased the average indicator of 30 m run on average by 5 ± 20 s. and 300m on average by 1.04 ±20 seconds. Jumps in length from the place were X = 180cm.

On the dynamometer when checking the strength of the hands, the parameters are those of the athletes weighing 51–54 kg, the right hand's strength is 29 kg of the left arm 27 kg. Athletes weighing 57 kg left hand 27 kg right 26 kg. At athletes weighing 60 kg left hand 30 kg right hand 27 kg. In athletes weighing 69 kg, the right hand is 30 kg and the left hand is 33 kg. The next weight category is athletes weighing 75–81kg, the right hand is 26 kg and the left hand is 29 kg.

Table 2.– Test results of special training taken by the SPUDERG – 4

№	Names		Side impact of the front hand(kg) (maximum)	% Score in the 100 point system	The number of strokes applied in 8 seconds	% Score in 100 points
1.	Rakhimova T.	51	89	75%	50	90%
2.	Mirzayeva Yo.	54	85	68%	43	72%
3.	Khoshimova F.	57	87	50%	47	78%
4.	Sobirova Kh.	60	77	48%	47	78%
5.	Yoqubova A.	64	83	70%	46	75%
6.	Qodirova R.	69	117	95%	49	87%
7.	Jarmatova Kh.	78	94	75%	37	75%
8.	Melieva E.	81	102	68%	39	65%

For taking the test of special preparation were used a computer program (SPUDERG-4) and a special bag for blows. Thus, the maximum impact of the athletes of light weight from front hand was 85 ± 08 kg.The indicators of middle weight boxer girls comprised 97 ± 05kg. The maximum weight which is punched with front hand by heavy weight boxer girls is 105 ± ± 07 kg. According to these rates, it was determined that the punches of sportsmen girls were not equal to their weight, in other words, heavy weight sportsmen girls had to punch much more higher than low weight ones, but according to rates which we got, the punches of heavy weight sportsmen girls are nearly equal to the punches of low weight boxer girls.

In the next eight-second test, the average number of punches with maximal rate in low weightboxer girls comprises 45–50. The number of punches of middle weight boxer girls made up average 43–47 in eight second, while the heavy weight boxer girls' punches with maximum rate in eight second records average 39–45. In urgent punches of skilful boxer girls the rate of punches was less. For this reason we organized one-month study in order to increase physical ability of skilful boxer girls. According to the plan of the study, which is organized by us, skilful boxer girls were trained by skilful teachers, who has served in Uzbekistan in the base of Yangiabad city Tashkent province, as Marat Galiyevich, Raxmatjon Ruzioxunov, To'lqinQilichev and LochinQo'chqorov, the Professor-teachers of the chair "The theory and method of boxing, fencing and taekwondo" of Uzbekistan State university of physical training as PhD Prof. R.D Xalmuxamedov, Prof. B.N. Shin, PhD assistant professor Tajibayev helped them to exercise mentally and practically.

Carried lessons included the followings: running maximum 10 × 4 meters in order to increase general preparation, running short 100 meters, running 300 meters, jumping for long distance with load, running 3000 meters.

In order to increase the force of punches we chose special exercises, according to them we used special rods for increasing the force of punch, in other words, the force of explosive punch. The exercises as throwing rods in the air with two hands, doing returning punches and throwing full balls to partners with one hand were carried out.

In order to increase the rate of punch we used the following exercises: working in the air with half kg shaped figure, carrying out the urgent punches in specialrubber, doing spurd 10 × 20 exercises in bags (10 second fast, 20 second light punching).

After the study the second test results were taken, the results are as follow:

Table 3.– General dynamic indicators which is taken according to physical preparation after the research (n–8)

№	Names	Types of weight	Running 30 meters	Running 300 meters	Jumping for a long distance from place	Hand force of dynamiter (kg) Right	Hand force of dynamiter (kg) left	Dynamiter the maximum force of hand 50% right	Dynamiter the maximum force of hand 50% left
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1.	R. T.	51	5.00	59.88	192	30	29	15.0	14.5

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
2.	M. Yo.	54	5.00	58.92	187	20	31	15.0	15.5
3.	X. F.	57	4.97	53.02	178	29	27	14.5	13.5
4.	S. X.	60	5.4	59.87	211	31	29	15.5	14.5
5.	Yo. A.	64	5.6	56.38	208	30	29	15.0	14.5
6.	Q. R.	69	5.8	58.11	214	32	33	16.0	16.5
7.	J. X.	75	5.12	1.03.11	179	28	29	14.0	14.5
8.	M. E.	81	5.77	1.06.17	178	29	29	14.5	14.5

The taken results are as follow: the average rate of sportsmen in test which is taken for 30 meters comprises 5 + 00 while the indicators of sportsmen in test which is taken for 300 meters show the average 59 ± 98 second. Jumping for long distance from place recorded average rate 190 centimeter. When we determined hand force by dynamometer the results were as follow: the right hand of sportswomen, who were 51–54 kg, comprised average 30kg, while the left hand experienced 29 kg, the left hand of sportswomen, who were 57 kg, registered 29 kg, whereas right hand was equal to 27 kg, this rate was a bit different for the sportswomen who were 60 kg weight, the left hand comprised 31 kg, while right hand made up 29 kg, at the same time, the right hand of sportswomen, whose weight was 69 kg, was 32 kg and the left hand was 33 kg, as well as the last rate was belonged to the sportswomen who were 75–81kg in weight, their right hand was equal to 29 kg, while the rate of left hand recorded 29 kg too.

Table 4. – According to special physical preparation the results of test (*n* – 8) in technique 4 – SPUDERG

№	Name		Punch with front hand from aside (kg) (maximum)	Giving mark in 100 ball system%	The number of punches in 8 second	Giving mark in 100 ball rate%
1.	Raximova T.	51	94	75%	56	92%
2.	Mirzayeva Yo..	54	90	70%	50	74%
3.	Xoshimova F.	57	92	67%	52	78%
4.	Sobirova X.	60	82	52%	51	80%
5.	Yoqubova A.	64	84	74%	52	78%
6.	Qodirova R.	69	120	97%	53	90%
7.	Jarmatova X.	75	102	77%	42	78%
8.	Meliyeva E..	81	107	72%	41	69%

In test, which is taken according to the special preparation, the boxers were examined in order to determine the boxer's special preparation (4 – SPUDERG) and using the computer program to check their punch, to take the test of special preparation were used a computer program (4– SPUDERG) and a special bag for blows. Thus, the maximum impact of the athletes' front hand was 85 ± 08 kg. Looking at it the maximal blow put by the forward hand from a side at sportsmen of easy weight category the average parameter has made 90 ± 02 kg. Athletes of the average heavyweight category was 99 ± 08kg. In the heavyweight category, the impact with the front hand was 110 ± 05kg.

After carrying out our research work, we can see changes in the impact parameters.In the 8 second test, the fastest hits of the girls in the light weight category were 50–54 blows. Girls of the middle weight class made up 50–52 hits, and in the heavyweight category the athletes made 40–42 strokes.

Conclusion

The aim of our study was to identify and find plans for optimizing the training of athletes based on the results taken during the training of athletes.The study was conducted from November 2017 to January 2018. At the beginning of the study, tests taken from the boxer girls presented in tables 1–2. And in 3–4 tables, the results are given after the work done. Proceeding from this it is clear that if each athlete makes individual training plans and coaches, if they do it individually, the result will be very good. In addition, we think that if our athletes during the trainings will use innovative methods to analyze international experience, competition and training of athletes of other countries in the future, they will be able to achieve even more results and keep these results for themselves for a long time.

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CALCULATION OF THE OUTBREAK DISCHARGES THROUGH A CLOSURE CHANNEL WITH TRAPEZOID SHAPE OF CROSS-SECTION

Abstract: The technique for calculation of the outbreak discharges flowing through the closure channel of trapezoid shape is considered. With few limitatios this technique was tested on the example of the blocked-up dam of Kurbankul lake.

Keywords: blocked-up dam, outbreak lake, water level, rise of the level, discharge, closure channel, cross-section, trapezoid shape, outbreak discharges, calculation techniques.

Introduction. In the mountains of Central Asia and in Uzbekistan, as well, outbreak lakes of different genetic origin are observed rather often. Under influence of different factors such as meteorological, hydrological, geological, hydrogeological and others, they are filled with flood water, and then overflow over the blocked-up dam begins. With such conditions the closure channels with different shape of cross-section are formed over the top of dam. In some cases such closure channels are formed on the dam body. Often this is facilitated with a high hydrostatic hydraulic head before the dam.

From the published literary sources [1–10] it is known that many researches made calculations of the maximum outbreak discharges for the conditions when the block-ups or dams are were washed out immediately. As it was noted by Yu. M. Denisov [1; 2], this condition made it possible to be constrained with application of relevant calculation formula without taking the temporal dynamics of the studied phenomenon into account. More comprehensive analysis of this process has shown that the duration of the natural washout always has its end and can continue from several minutes to several days. Besides, the duration of the washout of the closure channel is one of the main factoros which influence the value of the maximum break-out discharge [1].

Data. In this work the technique elaborated by Yu. M. Denisov for calculation of the outbreak discharges flowing through the closure channel with the cross-section of trapezoid shape is interpreted for the conditions of the blocked-up dam of Kurbankul lake. This lake is related to the blocked-up type of tectonic group according to the genetic classification of A. M. Nikitin [4]. It is located on the northern slopes of the Alay ridge, at the height of 1725 m above sea level in the basin of Koksu river of the right tributary of Shakhimardansai river (Syrdarya river basin). In the calculations the full-size data obtained in the result of conduction of special topographic-and-geodesic, hydrological and hydrogeologial works carried out during the field studies performed in the region of the investigated territory [7] were used.

Results and discussion. It is known that the closure channels in most cases are of optional shape. For the step-by-step solution of this task we assumed the following succession of the shapes of the closure channel cross-section: rectangular, trapezoid and parabolic shapes. We have considered the issues of the calculations of the outbreak discharges flowing through the closure channel with the rectangular cross-section in the previous work [10]. This work is related to consideration and testing of the techniques designed for calculation of the outbreak discharges flowing through the closure channel with the trapezoid cross-section applying the method developed by Yu. M. Denisov [1] on the example of the blocked-up dam of Kurbankul lake.

For the solution of this task according to the method of Yu. M. Denisov, let's introduce the following symbols:

$P(Z, t)$ – area of the closure channel below Z horizontal at t time;

Z – height of the horizontal at t time;

$Z_{1P}(t)$ – mark of the low border of the closure channel at t time;

$Z_{2P}(t)$ – mark of the upper (for the hidden on the top) border of the closure channel at t time;

$X_P(Z, t)$ – length of the perimeter of the closure channel below Z horizontal at t time;

$B_P(Z, t)$ – width of the closure channel below Z horizontal at t time. Proceeding from all mentioned above, it equals to:

$$B_P(z,t) = \frac{\partial P}{\partial Z}, \quad (1)$$

On base of the mentioned above it is worth to note that that the following *two cases* of formation of the closure channel are observed:

1) with the condition if $Z_{2P}(t) \geq Z_B(t)$ – then the closure channel is open;

2) with the condition if $Z_{2P}(t) < Z_B(t)$ – then the closure channel is closed on the top, i.e. the closure channel is formed on the dam body.

Let'consider *the first case,* i.e. when the closure channel is open and the first condition is fulfilled. Then the discharge through the closure channel at t time is calculated according to the following determined integral:

$$Q_P(t) = \int_{Z_{1P}(t)}^{Z_B(t)} B_P(Z,t) \cdot \left[2g(Z_B(t) - Z)\right]^{0,5} \cdot dZ, \quad (2)$$

Taking the expression (1) into account, it is possible to write the following equation for the outbreak discharge as folows:

$$Q_P(t) = \int_{Z_{1P}(t)}^{Z_B(t)} \left[2g(Z_B(t) - Z)\right]^{0,5} \cdot dZ \quad (3)$$

After integration of equation (3) by parts, we obtain the following equation:

$$Q_P(t) = \int_{Z_{1P}(t)}^{Z_B(t)} \sqrt{\frac{g}{2}} \cdot \frac{P(Z,t)}{\sqrt{Z_B}(t) - Z} dZ \quad (4)$$

The second case, i.e., the condition $Z_{2P}(t) < Z_B(t)$ is fulfilled, and the closure channel will be closed on the top. In this case for calculation of the outbreak discharge $Q(t)$ it is necessary to change $Z_B(t)$ variable in the upper threshold of integration to $Z_{2P}(t)$ in formulas (2), (3) and (4). With this, the outbreak discharge $Q_P(t)$ can be estimated with the available values of the following morphometric characteristics of the closure channel at t time:

1) $P(Z, t)$ – area of the closure channel below Z horizontal at t time;

2) $Z_B(t)$ – mark, i.e., the height of the width of the closure channel at t time;

3) $Z_{1P}(t)$ – mark of the low border of the closure channel at t time;

4) $Z_{2P}(t)$ – mark of the upper border of the closure channel hidden on the top at t time;

We would like to knote that expression (4) is the most general formula derived for the calculation of the outbreak discharges $Q_P(t)$. As it was noted above, in the majority of cases of the dam outbreaks, the closure channels are open.

Let's consider the example of calculation of the values of the outbreak discharges $Q_P(t)$ using formula (4) with the prescribed shapes of the open closure channels. Proceeding from the task of the work, let's assume that the shape of the closure channel is of trapezoid type. Then the area of the closure channel below Z horizontal at t is estimated with the expression:

$$P(Z,t) = B_p(Z_{1P}(t),t)(Z - Z_{1P}(t)) + \frac{(Z - Z_{1P}(t))^2}{tga}, \quad (5)$$

where α – is the angle of slide of the closure channel wall.

In this case, with substituting the values of $P(Z, t)$, i.e., of the area of the closure channel with trapezoid shape of the cross-section to the formula (4) and with integrating it, we get the formula for the calculation of the outbreak discharge in the following form:

$$Q_P(t) = \frac{4}{3}\sqrt{\frac{g}{2}} B_P(Z_{1P}(t),t)(Z_g(t) - Z_{1P}(t))^{\frac{3}{2}} + \\ + \frac{1}{tga} \cdot \frac{16}{15} \cdot \frac{g}{2}(Z_B(t) - Z_{1P}(t))^{\frac{5}{2}}, \quad (6)$$

After a number of simplifications and transformations, the calculation formula (6) derived by Yu. M. Denisov for calculation of the discharge flowing through the closure channel with trapezoid shape of the cross-section is as follows:

$$Q_P(t) = \varepsilon \cdot m \cdot b\sqrt{2g} \cdot \Delta h^{\frac{3}{2}}, \quad (7)$$

where: ε – is lateral compression coefficient. In our case it can be assumed that $\varepsilon = 1.0$, as the angle of slide of the closure channel wall $\alpha = 6\,^{o}30/$; m – discharge coefficient, for the closure channel similarily as for the spillway with a thick wall of trapezoid shape $m = 0.35$ [3]; b – width along the closure channel; in our case – the width along the bottom of the closure channel, i.e., dry channel $b = 11$ m; g – free fall acceleration, 9.81 m/s^2; Δh – flow depth in the closure channel.

The last formula is applied for calculation of possible discharge flowing through the dry channel located over the top of the blocked-up dam of Kurbankul lake. The cross-section of the dry channel is of trapezoid shape (table 1).

In the table it is shown that with the inflow of water to the basin of Kurbankul lake (which is 115 m^3/s), after 5 minutes its level will rise to 14 cm. Consequently, the depth of the flow in the former dry channel will be also 0.14 m. In the result, the value of discharge in the closure channel will be $Q_p = 0.89$ m^3/s. In the end of the next 5 minute period its value rises three times and reaches 2.66 m^3/s.

It is necessary to note that because of the absence of the clearly manifested channel over the dam top, this quantity can be taken as the channel-forming discharge. Actually saying, this quantity of discharge after intensive washing out of the mountain rocks over the dam with a big slope, begins to form an appropriate channel. During the subsequent calculation periods the value of discharge flowing through the dry channel over the dam rises intensively, and reaches up to 13.37 m^3/s after 30 minutes.

Table 1. – Calculation of possible outbreak discharges flowing through the closure channel with the trapezoid cross-section

№ in order	Time, *t*, min.	$\varepsilon \cdot m \cdot b\sqrt{2g}$	Δh_i, *m*	$\Delta h_i^{\frac{3}{2}}$	$Q_p(t)$, m³/s
1	0	17.06	0	0	0
2	5		0.14	0.052	0.89
3	10		0.29	0.156	2.66
4	15		0.43	0.282	4.81
5	20		0.57	0.430	7.34
6	25		0.71	0.598	10.21
7	30		0.85	0.784	13.37
8	35		0.98	0.970	16.55
9	40		1.12	1.185	20.22
10	45		1.25	1.398	23.84
11	50		1.38	1.621	27.66
12	55		1.50	1.837	31.34
13	60		1.63	2.081	35.50
14	90		2.39	3.695	63.03

Conclusions. On the base of the obtained results, the following conclusions can be made:

1) in the calculations it is assumed that the shape and sizes of the cross-section of channel over the dam are constant. In our case only the flow depth (Dit is necessary to take to account that the above mentioned discharge values will wash out the channel, and consequently, its deepening takes place and discharge values will be much greater. Such circumstance affects negatively the stability of the blocked-up dam, and this can facilitate the origination of the mudflows in Koksu river channel down the blocked-up dam which is undesirable;

2) in perspective, with taking the recommendations and proposals given in the former studies [7] into account, it is necessary to take relevant measures directed to the provision of stability of the blocked-up dam and for the prevention of the overflow of water over the top of the blocked-up dam.

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Section 3. Journalism

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NEW MEDIA DEVELOPMENT OF THE XX1 CENTURY: GLOBAL AND NATIONAL TENDENCIES

Abstract: The XXI century came, it brought with it the Internet, flash drives, CDs and DVDs, cell phones, smartphones, e-mail, new media in the form of social networks and the blogosphere. At the present time, all aspects of human activities are being digitized, and, first of all, it concerns mass communication. The aim of the article is to analyze the development of new media sphere in the world under the influence of new information and communication technology (ICT) and new media, give the analysis of the information development in the world and in Kazakhstan at modern period.

Keywords: Mass communication, new mass media, globalization, information technologies, Kazakhstan.

Introduction

Revolutions in the sphere of human culture were largely the result of changes in the modes of transmission and dissemination of new information technologies. They have radically changed the social organization, production and distribution of wealth in societies that were harbingers of social and economic transformation.

Now the digital, multimedia interactive communication technology expands the borders between the countries, becomes more accessible in different regions of the world. There is a merge between transferring channels both telephone, and cable networks. The sector mass communication becomes exchange capable and inter additional.

The beginning of the XX1 century was market by changes in communications, which were caused by new technological processes. The new information and communication technology (ICT) erases the boundaries of time and space and becomes the principal "assistants" of globalization. And, in turn, changes the traditional economy, forms of social activity, and mentality, lifestyle, and habits. The process of convergence between different spheres of communication and information reinforces the transition to a new level of development even in those countries that are traditionally considered to be stable.

Information has become a global inexhaustible resource of humanity, entered into a new era of civilization – the information age. Information and knowledge become one of the strategic resources of the state. The increasing role of this factor as a means of accelerating the pace of global integration in the economy and a tool of influence on mass consciousness, culture and international relations allow the increasing role of information industry, state information policy in the social development. The modern level of development of states is largely formed on the basis of using the new ICT, based on the active production and the use of information. Not only the natural resources and material wealth, but also the communication infrastructure and information resources are a national wealth.

Content

Global tendencies

In the information age, investments in human capital, in human resources become more important than investments in the material sphere. New information and communication technologies, blurring the boundaries of time and space, become the main "aides" of the process of integration and globalization. And it, in turn, changes both the traditional economy, and the forms of social activity, and the mentality, lifestyle, habits of people. The process of convergence (merging, joining) of various spheres of communication and information strengthens the state of transition to a new level of development, even in those countries that are traditionally considered to be stable.

Since its inception and before mass distribution, the regular radio broadcast took 30–35 years, television 15–20, the Internet – 4 years, the social network Facebook has reached 100 million users in nine months. This indicates the accelerated implementation of new information technologies, less

and less time is spent from the time of technology discovery to its regular use and mass distribution around the world. We live in a dynamic world of the era of globalization, whose movement is constantly accelerating.

The Internet is a conductor of cultural influence, a catalyst for the unification of people by interests. It creates a qualitatively new virtual, artificial information environment that can not only provide an adequate reflection of the current state of society, but also its self-regulation. In January 2018, the number of Internet users in the world reached 4.021 billion people (the entire population of the planet is 7.6 billion). Growth for the year was 7%. This is reported by "Global Digital 2018" from "We Are Social" and "Hootsuite". "We Are Social" is an international agency specializing in research in the field of social media. "Hootsuite" is one of the oldest tools for managing social networks. At the end of 2017, the number of users increased by 250 million people. In Africa, the fastest growth rates are observed – more than 20% per year. The Internet is distributed unevenly around the world. The highest penetration is observed in Northern Europe (94%), Western Europe (90%) and North America (88%).

Top 10 countries by the number of Internet users: China – 772 million, India – 350 million, the USA – 277 million, Japan – 110 million, Brazil – 110 million, Russia – 87 million, Germany – 72 million, Indonesia – 71 million, Nigeria – 70 million, Mexico – 59 million (in relation to China according to the Information Center of the Internet China (CNNIC), India – Internet and Mobile Association of India and KPMG, for other countries, according to Internetworldstats.com).

The media sphere began to differentiate on different media platforms, for example, the Internet platform (the Internet version of the media), the mobile platform (the version of the edition for the mobile phone: news, matches, exchange rates, weather and various events), PDA platform (version of the publication for pocket personal computer), E-paper-platform (version of the edition for electronic paper). The boom of the computer industry contributed to the development of the electronic industry, an effective network of computer communication in the educational, social, banking spheres, in interregional telecommunications. Many new ICTs have emerged with the advent of the Internet, which is increasingly used in the academic and media spheres.

Electronic media have a wide range of effects on the most universal means of social communication: education, religion, leisure, entertainment, etc. These structures, in turn, have a direct or indirect influence on the formation of cultural values. The strength of the impact, the degree of influence on the views, beliefs, behavior of people of the media have no equal in public life. The social power of the media in the modern period is studied in connection with new and newest communication technologies; the influence of one region on another is being investigated.

The rapid spread of new media has influenced on the socio-cultural environment, changing the living environment of people. Information and communication technologies of XXI century led to a significant modification of the Internet, mobile telephony, which has strengthened their interactivity, engaging consumers directly in the cultural space. Contemporary cultural content is distributed through various media channels, which are characterized by a particular way of media production, migration of genres, formats, convergence, and the specifics of perception and consumption. Sometimes, this socio-cultural content is created not only by professional media, but the blogosphere, civil (public) journalism. The audience becomes complicit in cultural production, supplementing professional media field through efficiency, accessibility, interactivity, blurring the boundaries between production and consumption, between work and free time, between amateur and professional sphere.

National tendencies

Kazakhstan, to keep pace with the times, is aimed to follow the path of globalization of the world economy through industrial-innovation economy, economy of knowledge. A primary step in this direction is the Strategy of Development of the Republic "Kazakhstan-2050". The state programs of Kazakhstan, such as: "Information Kazakhstan-2020", "Digital Kazakhstan", the program on development of a national information infrastructure, and others promote working out of a new communication policy of Kazakhstan taking into account development new IT, the newest media in Republic.

The top priority for Kazakhstan is the country's transition to digital broadcasting by 2020, due to global trends – the International Telecommunication Union in the framework of agreement "Geneva 2006" transitional period (2007–2015.) for the introduction of digital broadcasting. The State Program of development of digital broadcasting in the RK for 2008–2015 years was created in Kazakhstan. The transition to digital broadcasting in Kazakhstan by 2020 made it necessary to understand the technological, social, economic, and most importantly, cultural and information processes in Kazakhstan.

The key direction of the forthcoming stage of the republic's development will be the creation of a number of high-tech industries in the priority sectors of the country. Currently, state programs are being implemented: "Electronic Government", "Information Kazakhstan-2020", "Digital Kazakhstan".

In the program "Information Kazakhstan 2020" it is planned "by 2020 to increase the volume of television production of Kazakhstan production to 60% of the total airtime. The number of Internet sites in.kz and.kaz domains should

increase by 50% compared to 2012, the number of Internet media will make up 95% of their total number [1].

The country has developed the State Program "Digital Kazakhstan", its main goal is the progressive development of the digital ecosystem to meet the challenges of sustainable economic growth and enhance the country's competitiveness in the international arena. In the course of the implementation of this program, "Digital Kazakhstan is expected to make the following changes: the share of Internet users in 1981 will be 81%, the level of digital literacy of the population in 1981 is 81.5%, the growth of labor productivity in ICT in 2021 is 5.9%; the number of employed people in the ICT industry in the year 2021 is 110 thousand people, the share of state services received electronically from the total volume of public services will be 80%. [2] The main leitmotif of this program is the need for the development of a digital economy in Kazakhstan using global network of economic and social activities carried out through the Internet, mobile and social networks.

The rate of growth of a new communication mass media show how great the demand for information services. The cellular market is actively developing in the country, more 32 million users of mobile telephony (the population of Kazakhstan – more 18 million). There is a rapid growth of Internet users in Kazakhstan. At the beginning of 2018 there were 13 million Internet users in Kazakhstan. By the number of Internet users in 2017, Kazakhstan ranked 36-th out of 137 countries. The number of Internet users in 2017 was 77% of the population [3; 2].

Conclusion

Modernization of a number of countries and regions can be successful in maintaining its identity in the society under economic globalization and communication with the active development of new information technologies and new communication media. The priorities in the development of information society in Kazakhstan have changed under the rapid introduction of new information technologies. It is important here to consider national identity, cultural identity of a society, the specifics of the telecommunication development in the country in an era of globalization and digitalization.

The information industry is entering a new quantitative and qualitative level, affecting not only companies but also countries, regions; it determines the ability to survive in the competitive high-tech world of the XXI century. Mass communication, new media of Kazakhstan the first that respond to the challenge of time, they change their policies, seeking to meet the new increased requirements.

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Section 4. History

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STATE POLICY ON THE YOUTH IN UZBEKISTAN: NATIONAL EXPERIENCE AND REAL NECESSITY OF INTERNATIONAL INITIATIVES

Abstract: In the article, reforms to establish a legal basis for youth policy, to increase younger generation's social, political, economic activity and their position in a society in the years of independence are researched with historical context.

Keywords: youth, politics, youth policy, youth rights and interests, youth activism, youth initiatives, talented youth, young cadres, youth problems, youth and religious extremism, youth education.

Shavkat Mirziyayev, the President of the Republic of Uzbekistan, signed the Decree on February 7, 2017, which is on 'Five priority direction of development of the Republic of Uzbekistan in 2017–2021'. The fourth section of the Decree is called 'Priorities of Social Sector Development', and its 4.5 article is declared 'Improvement of the state youth policy'. In the article, followers are shown:

– raising the youth's social activity in the process of education of physically healthy, spiritually and mentally, independently thinking, loyal to Motherland, deepening of democratic reforms and formation of civil society;

– employment of graduates of secondary special, professional and higher education institutions in the private business sphere;

– supporting and realizing the creative and intellectual potential of the younger generation, shaping a healthy lifestyle among children and young people, engaging them in physical education and sport;

– social protection of the youth, creation of decent living and social conditions for young families;

– as the main functions in the sphere of the state youth policy such as making effective functioning of the state, local government, educational institutes, youth organisations and others are detected [1].

The President of the Republic of Uzbekistan Shavkat Mirziyayev noted the following as the most important aspects of the youth policy: "We are doing a great job of educating young people with independent thinking, who have modern knowledge and skills and have an independent position.

However, if we say with fairness that today, in the world, what is the most acute struggle for the consciousness of the population, first of all the young people, the growing threats such as religious extremism, terrorism, drug addiction, and 'mass culture', our children's upbringing, not to slow down our work in the field of education, but to raise them to a new level [2].

Our state have paid special attention to youth issues since the first days of the independence. One of the first laws signed by Islam Karimov, the First President of our country, is the fact that it is young.

The Law 'On the Fundamentals of the State Youth Policy in the Republic of Uzbekistan', which was adopted on November 20, 1991, reflects the full rights and interests of the youth. The law also emphasizes the social protection of young people as well as the necessary foundation for the youth to find their place in society.

During the independence years, efforts to protect the interests of young people in Uzbekistan have developed in the following areas:

– using of many centuries-old experience and practice based on human values and national traditions in creating an independent state policy;

– prioritizing the problems of social protection in the field of youth protection, to support the process of integration of young people into a new democratic society;

– achieving the harmony of universal and national values in the development of youth policy issues, using of advanced ideas and norms that exist throughout the world experience.

The State Program 'The Year of Youth' adopted in 2008, the Decree of the first President of the Republic of Uzbekistan 'On Additional Measures to Implement the State Youth Policy in the Republic of Uzbekistan', on February 6, 2014, have further enhanced the youth policy in Uzbekistan.

The law 'On State Youth Policy', which entered into force on 15 September, 2016, incorporated the basic provisions of

the youth policy. The law further improved the legal framework of organizational and legal mechanisms for formulating and implementing such a policy.

Taking into account the world requirements, the Act sets out the priorities of youth policy. These include the social, economic, political, and other rights and interests of young people. On this basis, young people will be provided with open and quality education. It promotes physical, intellectual and ethical development of the younger generation.

One of the considerable points in the law is the essence of the basic concepts in this area. For instance, the terms such as 'young state policy', 'youth (young citizens)', 'young family', 'young specialist' are interpreted.

In particular, young people (young citizens) refer to people aged 14 and older than 30 years. A young family is a family of parents or mothers who are caring for a 30-year-old couple or a child, including a single widow.

With the current rate of growth, the population of Uzbekistan will reach 48 million by 2040, almost twice as much as today. By the end of the 21st century, this number will reach one hundred million. As a result of such an increase in the population as a large part of the population, it requires the development of urgent measures in this regard. Young people are in need of government policies to meet their own needs while using the rights set out in the constitution of the state, and the state, in turn, is interested in implementing the goals of the youth community for socio-economic development, and creates the basis for the development of the Youth Concept.

The issue of youth is always reflected in all strategies for ensuring long-term development of the countries. The Strategy for Action in the five priorities of the Republic of Uzbekistan for the period 2017–2021 was not exception one. It separately focuses on improving the state's youth policy. It covers a number of priority tasks aimed at improving the effectiveness of public policy towards young people, representing 10 million citizens of Uzbekistan or about 31% of the country's population.

According to those, the need for the establishment of the Youth Union of Uzbekistan (June 30, 2017) is determined by the life of the organization, which requires the organization to address the most pressing issues in youth life, support, employment and employment, and encouragement of their initiatives.

It is also symbolic that the day of the Youth Union of Uzbekistan – June 30, proclaimed as the Youth Day. This is due to the fact that the Alliance will become a professional body under the slogan "Youth – a future builder", which will ensure effective functioning of state youth policy with government agencies, non-government non-profit organizations and other civil society institutions.

This is proven by the fact that the head of the Uzbek government has set up the Youth Policy Office in the Office of the President of Uzbekistan. The service is run by the President's Youth Policy Advisor – the Chairman of the Central Council of the Youth Union of Uzbekistan. This means that the problem of youth is always in the focus of the president's attention.

It should be noted that, without the necessary material resources, it is impossible to expect any result from the work of the organization. In this regard, the Youth Development Fund of Uzbekistan will hold 8% of the unified tax payment for small businesses.

The Youth Union of Uzbekistan is also taking steps to establish partnerships with international youth organizations and similar organizations in foreign countries that will enable them to explore the best practices in working with young people. For this purpose, representatives of the Youth Union visited China in August, 2017 and Kazakhstan in September. In the near future such visits are planned for Russia, the Republic of Korea, Germany and other countries.

It should be noted that a number of concrete measures are being taken to stimulate the activation of youth in socio-political life of the country.

Alisher Sa'dullaev, 22, graduate of the Singapore Institute of Management Development in Tashkent, has been appointed Deputy Minister of Public Education, Olimjon Tuychiyev, 25, a graduate of the Turin Polytechnic University in Tashkent, and the Deputy Director General of Science and Technology Agency.

The Youth Initiative in Uzbekistan, which organized in 2017, called the 'Social Elevator' for the youth as well as the Institute for Advanced Personnel Training at the Academy of Public Administration under the President of the Republic of Uzbekistan. It is possible to say that the Institution has the right to formulate a perspective young staff database in public authorities, public organizations, monitor their professional development system, prepare proposals on promoting these positions to managerial positions, as well as provide public authorities, organization of training courses on retraining and advanced training of young promising cadres of public organizations.

The aforesaid, it is important to emphasize the direction in Uzbekistan of strengthening the role of youth in social and political life. In this regard, special attention is given to full support of youth initiatives by state and youth organizations. It is worth noting that young people play a special role in the development of Uzbekistan.

The adoption of the Decree of the President of the Republic of Uzbekistan 'On increasing the effectiveness of the state youth policy and supporting the activities of the Youth Union of Uzbekistan' on July 6, 2017 serves as an important political basis for raising the youth policy in the country to a new level.

At present, Uzbekistan has been implementing a number of initiatives to protect the rights and interests of young people

around the world. In his speech at the 72nd session of the UN General Assembly, the President of the Republic of Uzbekistan proposed to work out the United Nations Convention on the Rights of the Child, calling for the elimination of the fundamental causes of terrorism. President Shavkat Mirziyayev noted that the majority of crimes related to extremism and violence were committed by young people under the age of 30. 'The Universal Declaration of the Rights of the Child, which is aimed at the formation and implementation of youth policy in the conditions of rapidly developing globalization and information and communication technologies, convention.' The essence and importance of this initiative is that today's youth are the largest generation in human history, with a population of 2 billion [3].

President Shavkat Mirziyayev's says: 'The future of our planet depends on the well-being of our children. Our main task is to create the necessary conditions for young people to demonstrate their potential and to prevent the spread of the 'virus' of the idea of violence'. The international community welcomed his speech.

At the international conference on 'Central Asia: Common history and common future, sustainable development and progress', held in Samarkand under patronal of the UN on November 10–11, 2017, the President said: 'Central Asia is one of the youngest provinces where about 60 percent of the population is young and is much higher than the world average.'

For this purpose, Uzbekistan initiated the 72nd session of the United Nations General Assembly in New York to adopt a special resolution on the development of the International Convention on the Rights of the Child and its 'Education and Religious Tolerance'.

All of these initiatives supported by all Central Asian countries, those can be seen as a vivid expression of our willingness to prevent the spread of radical ideas among young people, the social rehabilitation of those who have strayed from the right path, and their willingness to return to a healthy life.

'Our experience shows that, first of all, teaching young people to knowledge, providing them with the human values of the Islamic religion and the values of Islamic culture are the most effective tools to combat extremism' [4].

In the conclusion, the strategy for youth policy is to develop and introduce a variety of projects that embody the diverse interests of young people, and tactics – mobilizing all public-political apparatuses in the implementation of youth policy. In turn, this creates systematic, initiative, continuous and targeted self-actualization for young people.

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Section 5. Material Science

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ON POROSITY PARAMETERS OF CERAMIC BRICKS MADE OF LOW-GRADE RAW MATERIAL USING BURN-OUT ADDITIVES OF AGRICULTURAL PRODUCTION

Abstract: This article presents a classification of methods for controlling the porous structure of materials. It presents the study of experimental data on porosity parameters of ceramic bricks made of optimal composition of a raw mix of various kinds of burn-out additives by the method of mercury porosimetry.

Keywords: Mercury porosimetry, brick, porosimeter, porous structure.

Ensuring the high quality of materials and products with a predefined set of properties is impossible without the use of modern and effective methods of structure study.

As is known, physical, mechanical and operational properties of porous materials depend to a large extent on the pores – their type, dispersion, size distribution, number of conditionally-closed ones, etc.

In this regard, the porosity study of the designed composites both at the stages of the development of manufacturing technology and the control of finished products compliance with technical specifications and other normative documents is an urgent task. Despite certain achievements in the production of porous ceramic products and extensive experience in their manufacture, a large-scale introduction is not observed in Uzbekistan and other countries, especially in the manufacture of high porosity material that provides resource and energy savings both in the manufacturing process and in further operation. This is due to the fact that the process of creating new material is associated with the solution of problems of optimization of batch compositions, studying their behavior in shaping the necessary mass, and adjusting the technological redistribution of production. Moreover, it is impossible to guarantee the necessary properties of the final material without carrying out research at the level of structural changes due to the changes in raw material characteristics, external and internal factors significantly affecting the quality of the composite.

For ceramic bricks, with a porosity of more than 50–60%, it is necessary to pay a special attention to the study of the pore space formation, as this characteristic has a significant effect on the energy efficiency of the fencing structures made of these materials.

To solve such a complex problem, the methods are needed that allow measuring not only the pore volume, but also the characteristics of the pore structure, its volume and sizes [1].

By the nature of the impact on material, all methods of controlling porosity are classified into destructive ones (hydraulic, sorption, electromagnetic and ionizing) and non-destructive ones (visual-optical) [2].

The phenomena of capillarity and diffusion are the bases of hydraulic methods. All methods of fluid porosimetry (mercury porosimetry, fluid pyknometry, capillary methods) are based on volume or weight determination of fluid amount filling the pores of material or displaced by it when immersed in fluid. To measure porosity, the sorption methods (the Dubinin's method, the BET method (the one offered by Brunauer, Emmett and Taylor)) based on the phenomenon of gas condensation on open surfaces of adsorbents are widely used.

The advantage of the sorption method is the possibility of reliable determination of such a significant structure parameter as the specific surface area of pores [3; 4]. The electromagnetic method (the method of nuclear magnetic resonance) is a sensitive method for studying the parameters of porosity [5; 6], it allows one to register the pores up to 0.1 nm in size. The ionizing methods (radiographic method and the *X*-ray observation method) along with the data on basic parameters of porous structure make it possible to conduct a detailed analysis of the closed porosity.

In the visual-optical method, the loupes, endoscopes, microscopes, flexible telescopic devices based on light-emitting diodes are used [7].

The methods mentioned above have their advantages and disadvantages. The main disadvantage of all methods (except for mercury porosimetry) is a weak registration of macroporosity.

The pore size of composite building materials is generally considered to be more than 0.1 μm. To describe the macroporous structure, a mercury porosimeter is used, as a rule. Modern and effective device for studying macroporous structure parameters is a mercury porosimeter made in Thermo Scientific, of Pascal 240 series, which allows one to determine the main parameters such as: percentage of porosity, pore volume distribution depending on pore size in solid samples, specific pore volume, average pore size, integral and differential specific surface area of material.

The method of mercury porosimetry is based on the fact that fluid, that does not wet a solid object, penetrates into its pores only when exposed to external pressure. The fluid volume filling the pores is a function of external pressure, which makes it possible to obtain data on the pore size distribution.

This method is based on the fact that an excessive pressure must be applied to induce the non-wetting fluid, its value is related to the pore size by the Washburn equation (1):

$$R = \left(-2\gamma \cdot \cos\theta\right) / P \qquad (1)$$

where γ is the surface tension of mercury 0.48 N/m, R is the pores radius, θ is the contact angle of mercury wetting, $\theta \sim 140^{\circ}$, and *P* is the pressure of mercury penetration into the sample.

In the article on the example of obtaining an effective ceramic brick [8], the possibility of using the mercury porosimetry method is considered for studying the structure parameters of porosity.

Measurements of brick porosity have been carried out on standard Thermo Scientific CD3 dilatometers at a maximum pressure of 200 MPa induced by the Pascal 240 porosimeter. In experiments a weighted portion of brick of certain mass, placed into a dilatometer to form a vacuum, was used. After the vacuum was created, the dilatometer was filled with mercury and immersed in the compartment of the porosimeter autoclave to produce the porograms. The porosity parameters were calculated automatically using the SOL.ID EVO program and output to the printing device in the form of histograms of the pore radius size distribution in logarithmic scale (Fig. 1).

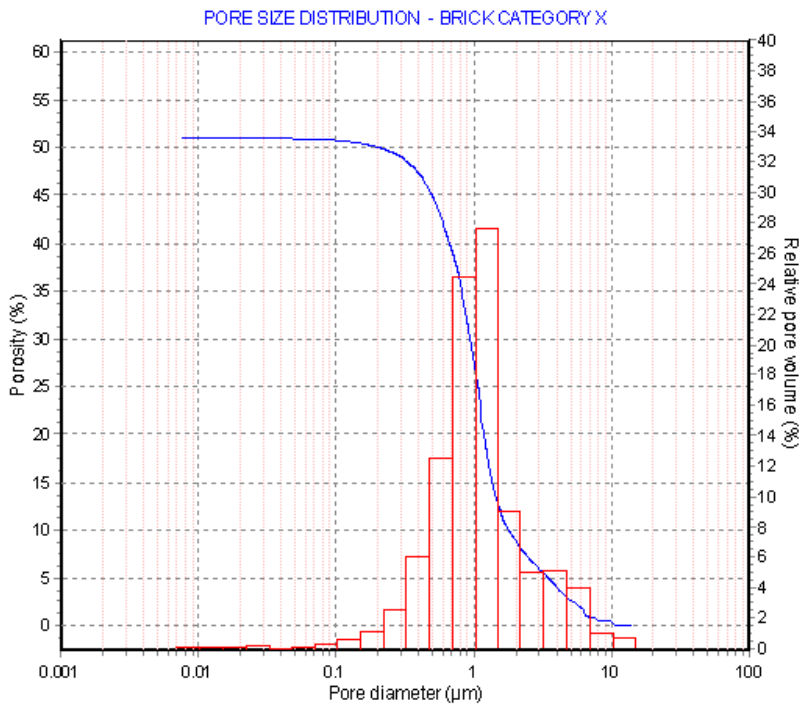

Figure 1. Example of a histogram of pore size distribution

For comparative studies, 3 series of samples made of ceramic masses (charge) containing the components listed in (Table 1) have been taken. After a complex of studies on strength characteristics of bricks of various composition of batch, the compositions of clay mass of Bestyuben loamy soil (63%) and Beltau zeolite-containing rock (27%) were stated as optimal ones.

Table 1. – Composition of ceramic masses (batch)

Components	Measuring units	Symbols of batch		
		Batch –1	Batch –2	Batch –3
Bestyuben loess loamy soil	%	63	63	63
Beltau zeolite-containing rock	%	27	27	27
Grinded rice straw	%	10	–	–
Rice husk	%	–	10	–
Grinded stems of cotton	%	–	–	10

Analysis of obtained quantitative characteristics of the porosity of ceramic shard (Table 2) shows that the most effective is the use of a burn-out additive in the form of grinded stems of cotton. This is confirmed by the fact that the total porosity of ceramic bricks made of batch No. 1 (with addition of rice straw) is 51.04%, batch No. 2 (with addition of rice husk) – 49.60%, and batch No. 3 (with addition of cotton stems) – 53.09% in the range of pore sizes from 15.000 to 0.0103 μm. The average density of ceramic brick is 1.3308 g/cm^3.

For each series of ceramic samples shown in the diagram (Fig. 2), a qualitative calculation of the porosity parameters was carried out according to the data given in (Table 2).

A study of qualitative characteristics of ceramic shard porosity (Fig. 2) has shown that despite the increased total porosity of samples from ceramic masses with a burn-out additive of grinded stems of cotton, the amount of "dangerous" pores (37.03%) is significantly less than for samples made of batch No.1 (41.76%) and batch No.2 (45.06%). This is apparently due to the peculiarities of structure formation of ceramic masses with a burn-out additive of cotton stems under baking, the essence of these peculiarities is to improve the pore structure of material due to additional number of new formations that contribute to the transition of a certain number of "dangerous" pores to the category of "safe" ones.

Table 2.– Quantitative characteristics of porosity of ceramic bricks samples with various types of burn-out additives

№	Ranges of pore diameters (μm)	Average pore diameter (μm)			Porosity (%)		
		burn-out additive			burn-out additive		
		Rice straw	Rice husk	Cotton stems	Rice straw	Rice husk	Cotton stems
1.	15.0000–10.2221	12.6111	12.6111	12.6111	0.384	0.088	0.031
2.	10.2221–6.9661	8.5941	8.5941	8.5941	0.499	1.235	1.598
3.	6.9661–4.7473	5.8567	5.8567	5.8567	2.048	0.848	2.548
4.	4.7473–3.2351	3.9912	3.9912	3.9912	2.609	0.848	2.901
5.	3.2351–2.2047	2.7199	2.7199	2.7199	3.567	1.168	3.437
6.	2.2047–1.5024	1.8535	1.8535	1.8535	4.563	2.380	4.353
7.	1.5024–1.0239	1.2631	1.2631	1.2631	13.075	7.782	11.608
8.	1.0239–0.6977	0.8608	0.8608	0.8608	12.432	15.610	12.627
9.	0.6977–0.4755	0.5866	0.5866	0.5866	6.355	9.496	7.449
10.	0.4755–0.3240	0.3998	0.3998	0.3998	3.074	4.958	2.881
11.	0.3240–0.2208	0.2724	0.2724	0.2724	1.262	2.441	1.318
12.	0.2208–0.1505	0.1857	0.1857	0.1857	0.569	1.243	0.613
13.	0.1505–0.1026	0.1265	0.1265	0.1265	0.294	0.721	0.321
14.	0.1026–0.0699	0.0862	0.0862	0.0862	0.134	0.394	0.213
15.	0.0699–0.0476	0.0588	0.0588	0.0588	0.052	0.222	0.197
16.	0.0476–0.0325	0.0400	0.0400	0.0400	0.006	0.107	0.227
17.	0.0325–0.0221	0.0273	0.0273	0.0273	0.096	0.050	0.334
18.	0.0221–0.0151	0.0186	0.0186	0.0186	0.027	0.017	0.375
19.	0.0151–0.0103	0.0127	0.0127	0.0127	0.000	0.000	0.064
					Σ 51.04	Σ 49.60	Σ 53.09

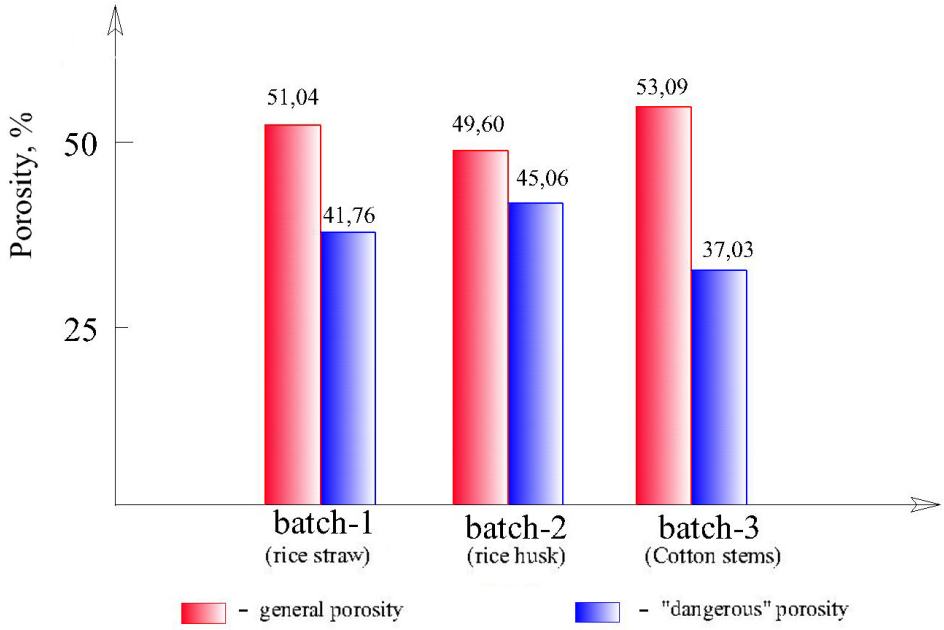

Figure 2. Diagram of porosity of ceramic bricks samples with various types of burn-out additives

Thus, it can be concluded that in order to produce an effective ceramic bricks from low-grade loess loamy soils of the Bestyuben deposit and zeolite-bearing rocks of the Beltau deposit with an inclusion of burn-out additives from agricultural waste into the batch, it is most expedient to use the following ratio of components in the form of grinded cotton stems: loess loamy soils – 63%, zeolite-bearing rock – 27% and grinded cotton stems – 10%.

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INVESTIGATION OF STRUCTURAL FORMATION OF AMINOALDEHYDE OLIGOMERS IN THE INNER SURFACE OF LEATHER

Abstract: The article deals with the research of the microstructure of the leather, various fillers and the importance of the filling process are given to improve the complex parameters of the leather.

Keywords: leather microstructure, amino aldehyde oligomers, filling, complex quality indicators, control and filled leather samples.

In order to improve many physicochemical and mechanical indicators of materials, especially porous solids, the process of filling them is carried out. To do this, it is first expedient to investigate the microstructure of the material under study. To solve the problem associated with a decrease in leather porosity, we thoroughly studied its microstructure, after which it was decided to fill the leather materials.

The inner part of the natural leather is a system consisting of capillaries, micro- and macro-structural aggregates. It is known that treating the leather with hydrophilic polymers contributes to a decrease in the porosity of the leather [1]. Proceeding from this, the study of the structure formation in the inner surface of the leather of amino aldehyde oligomers is of great importance.

Table 1 lists numerous physico-mechanical properties of the leathers established for the initial and filled with amino aldehyde oligomers.

As follows from the data in the table, the porosity of the samples as a result of filling decreases sharply. Naturally, the effect depends on the type of filler [2; 3] Simultaneously, an increase in tensile strength of the specimens was observed. Thus, when using modified amino-aldehyde oligomers, the porosity is much less.

Table 1.– Physicomechanical parameters of initial and amino aldehyde-loaded leather

Physical and mechanical properties	control (unfilled)	KFO	KFCrAO	KFMAO	KFCrAMAO
The content of unreacting oligomer,%*	–	0.5	0.5	0.6	0.6
Plyves,%	–	4.8	5.0	5.7	6.2
Total pore volume, cm^3/g	0.896	0.684	0.726	0.579	0.465
True specific gravity, g/cm^3	1.20	1.32	1.33	1.35	1.36
Porosity,%	43.4	32.4	30.2	26.7	24.5
Water vapor permeability,%	58.6	46.9	45.7	42.6	41.9
Sample thickness, mm	1.7	2.1	2.2	2.4	2.5
Rigidity,%	24.8	28.5	29.6	32.4	34.1
Tensile strength, MPa	2.32	2.52	2.54	2.65	2.73
Elongation at break,%	83.5	75.3	71.4	68.9	64.2
Elongation at a voltage of 9,8 MPa,%	18.0	19.4	20.2	21.8	23.2
Residual elongation,%	34.0	29.6	28.1	26.5	24.5
Conditional modulus of elasticity, MPa	56.4	48.7	50.2	52.8	54.0

** The content of the polymerized and unreacted oligomer was determined on a Zaichenko device*

Extremely urgent is the elucidation of complex indicators for a more complete assessment of the chemical and physico-mechanical properties of the leather, which have a dominant effect on the process of filling with polymers. To this end, various methods of assessing the quality of raw materials, semi-finished products and end products are widely used. However, the known methods are very durable for filling, time-consuming and not always reliable the data received. From the point of view of the influence of the process of filling leathers with amino-aldehyde oligomers, it is very important to use a complex quality indicator (CQI) for the most objective assessment of the consumer, chemical

and physical-mechanical properties of the leather. The CQI was defined as the area of a polygon composed of twelve basic indicators, determined experimentally, characterizing the basic properties of the leather. Next, based on the selective indicators that make up the CQI, polygons were built (Figure 1).

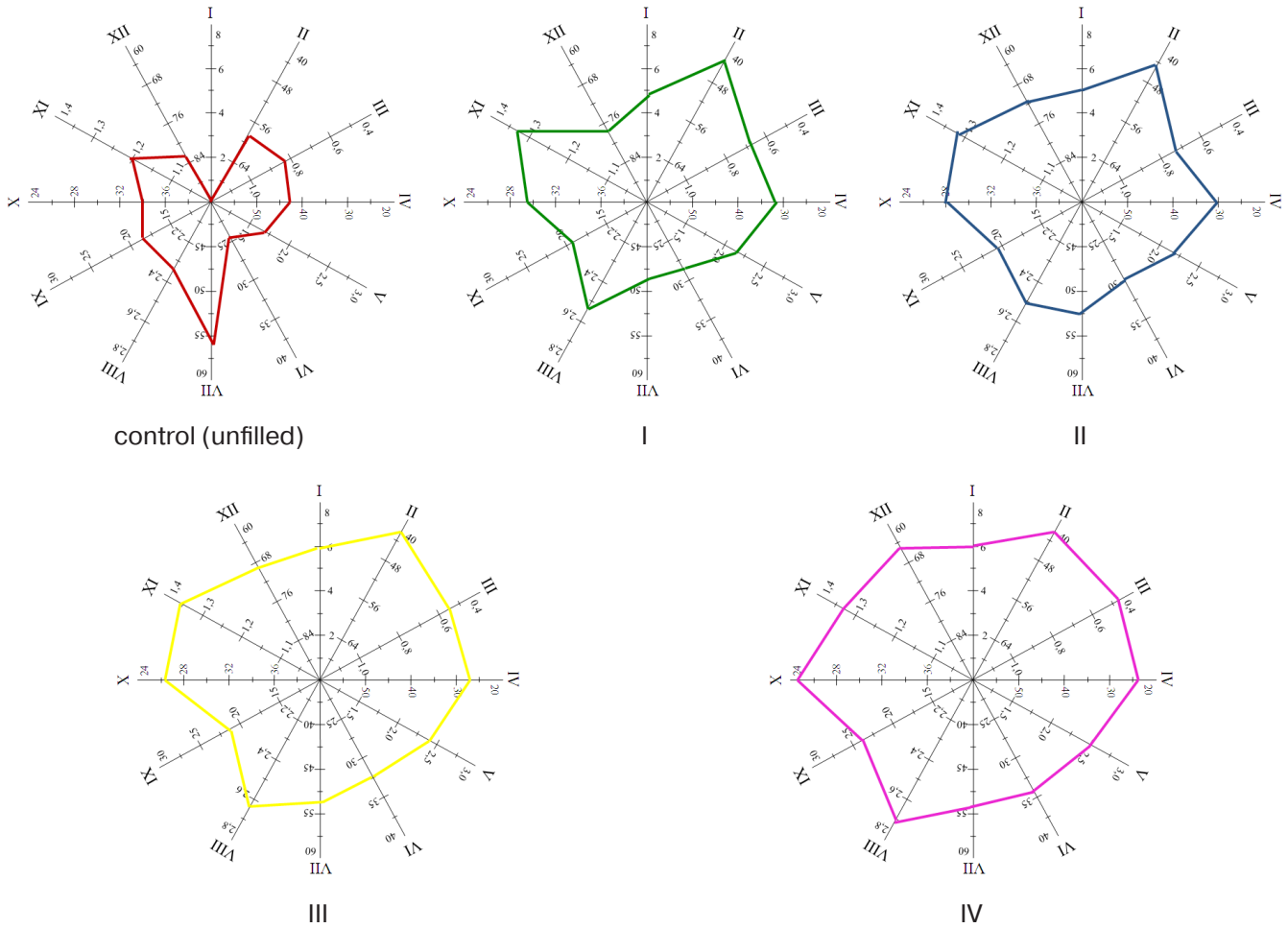

Figure 1. Complex quality indicators of the test control (unfilled) and experimental leather variants with amino-aldehyde oligomers

Note: the order of the values, in order, the marked figures in the figures: I – Gain,%; II – Water vapor permeability,%; III – Total pore volume, cm³/g; IV – Porosity, %; V – Sample thickness, mm; VI – Hardness,%; VII – Conditional modulus of elasticity, MPa; VIII – Ultimate tensile strength, MPa; IX – Elongation at a voltage of 9,8 MPa, %; X – Residual elongation,%; XI – Specific gravity, (true) g/cm³ and XII – Elongation at break, %

Conditionally denoting the sides of the triangles a_1, a_2, a_3. a_{12}, the angle α and the area of the triangles s_1, s_2, s_3, … s_{12} calculate the common surface as the sum of the surface of the individual triangles

$$S = s_1 + s_2 + s_3 ... + s_{12} \quad (1)$$

The area of the triangle was calculated by the formula:

$$S = \frac{a \cdot b \cdot sin\alpha}{2} \quad (2)$$

In formula (2), for all triangles, the angle α is 30 °. Therefore, the area of this figure can be calculated by the formula:

$$S = \frac{a_1 \cdot a_2 \cdot sin\alpha}{2} + \frac{a_2 \cdot a_3 \cdot sin\alpha}{2} + ... + \frac{a_9 \cdot a_{10} \cdot sin\alpha}{2} + \frac{a_{11} \cdot a_{12} \cdot sin\alpha}{2} \quad (3)$$

The results of calculating the areas of the triangles that make up the CQI of the experiment are shown in (Table 20).

From the data of (Table 2) it follows that relatively high chemical and physicomechanical properties are characterized by leather filled with KFCrAMAO. This can be easily explained, since the area of its polygon has the highest value of the CQI. The control and CQI of sample I have a relatively

low value (614.57 and 747.51 versus 883.14). Thus, the use of CQI s has made it possible to determine complex quality indicators of unfulfilled and leather-filled amino aldehyde oligomers. It should be noted that this method also allows more objective evaluation of the operational properties of finished products. From Table. 1 it can be seen that with the change in the compositions of amino aldehyde oligomers in the semi-finished products of the leather, the porosity and, to some extent, the leather's permeability are reduced. Reducing porosity (KFO – KFCrAO – KFMAO – KFCrAMAO) is undoubtedly due to the filling of empty spaces inside the leather with amino aldehyde oligomeric particles. Confirmation of this conclusion is obtained by us electron microscopic images of microstructures of samples, which are presented in (Fig. 2).

The data of physicomechanical analysis showed that with the change in the composition of oligomers in the semi-finished product, the thickness (by 32.0%) and the tensile strength (15.0%) increase, and the porosity (43.5%) and the residual elongation (27.9%), in the case of modified amino-aldehyde oligomers, decreases. The index of vapor permeability is the same, although it decreases, but not very much. This indicates that the micropores are preserved to a certain extent.

Table 2.– The areas of triangles that make up the CQI of the experiment

№	Indicators	Control.	KFO*	KFCrAO	KFMAO	KFCrAMAO
A[1]	Plyves	0	56.28	57.13	60.70	64.94
A[2]	Water vapor permeability	13.23	8.02	8.29	6.17	4.87
A[3]	Total pore volume	9.72	5.54	5.48	3.86	2.85
A[4]	Porosity	18.45	17.01	16.61	16.02	15.32
A[5]	Sample Thickness	10.54	14.96	16.28	19.44	21.32
A[6]	Rigidity	14.26	17.96	18.80	21.47	23.28
A[7]	Conditional modulus of elasticity	349.68	346.98	371.48	427.68	460.35
A[8]	Ultimate tensile strength	10.44	12.22	12.83	14.44	15.84
A[9]	Elongation at a voltage of 9,8 MPa	153.00	143.56	141.90	144.42	143.71
A[10]	Residual elongation	10.20	9.77	9.34	8.94	8.33
A[11]	Specific gravity	25.05	24.85	23.74	23.25	22.82
A[12]	Elongation at rupture	0	90.36	89.25	98.18	99.51
Area of triangles		s_1 = 614.57	s_2 = 747.51	s_3 =771.13	s_4 = 844.57	s_5 = 883.14

**(I variant – Karbamid-Formaldehyde – MFO and II variant – Karbamid-Formaldehyde -Croton aldehyde – KFCrAO) have been obtained in the I and II variants, and in III and IV variants (III variant – Karbamid-Formaldehyde-Methacrylic acid-MFMAO and IV – Karbamid-Formaldehyde-Croton aldehyde Methacrylic acid – KFKrAMAO)*

Taking into account the above, indirect coverage of structural elements of the leather by a layer of amino aldehyde oligomer can be indirectly assessed. In the case of an increase in the specific gravity of the samples, a decrease in their porosity and the preservation of the vapor permeability can be explained by the process of structure formation, i.e. the emergence of larger new structural aggregates.

This assumption is clearly illustrated by micrographs of sections of experimental and control leather samples. In Fig. 2(a, b) shows electron micrographs of sections of control and amine-aldehyde oligomer samples of leather prototypes.

To put it more accurately, it should be noted that in the process of filling natural leathers with KFO, KFCrAO, KFMAO and KFCrAMAO, distribution of amino aldehyde oligomers will take place on the surfaces of fibrillar aggregates in the leather microstructure (Fig. 2b).

In this case, to a certain extent, the separation of elements of structures of supramolecular collagen parts of fibers occurs. This is largely due to surface activity, in comparison with organic salts, and involved in the modification of methacrylic acid molecules.

Investigation of the distribution of amine-aldehyde oligomer particles in the leather structure using the electron microscopy method has shown that in the case of KFCrAO and KFCrAMAO, its intense deposition is observed both in fibrils and in the interstructural space as separate disordered particles and clusters.

They certainly have different shapes and sizes. The particles of KFOs and KFCRAs have a different distribution pattern in the structure (Fig. 2). In the latter case, the absorption of oligomer particles and their fixation occurs only on the surfaces of the fibrils, and in the zones of their closure. Differences in the nature of deposition of amino aldehyde oligomers in the microstructure of collagen can be explained by the unequal degree of activity and the features of their chemical properties. The dispersed phase of KFMAO and

KFCrAMAO, apparently, has a better reactivity. Therefore, it is more evenly distributed in the structure of the leather compared to KFO and KFCrAOs.

It can be concluded that in the process of filling the leather with KFOs, KFCrAO, KFMAO and KFCrAMAO, their deposition occurs on the surfaces of supramolecular collagen formations. At the same time, it should be pointed out that amino aldehyde oligomers are distributed uniformly on the surface of fibrils in the cases of KFMA and KFCrAMAO discretely under KFO and KFCrAO. This is due to their chemical nature.

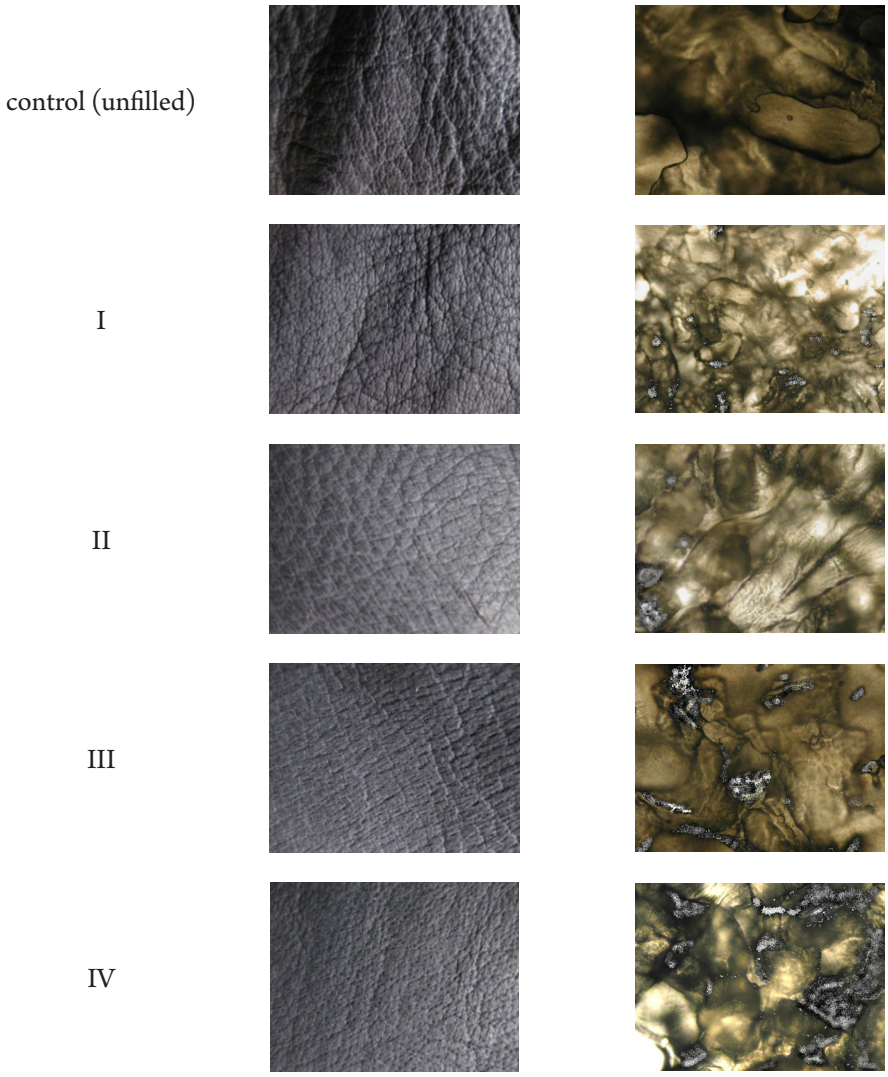

Figure 2. Electronic microphotographs of control structures – unfilled and prototype leathers filled with amino aldehyde oligomers: a – the front surface (× 100); b-section of the middle layer (× 5000). 1 cm 20 mkm

Thus, in the process of filling with amino-aldehyde oligomers predominantly with KFKrAMAO, the porosity decreases. The specific weight of the prototypes, in comparison with the control unfilled and the first prototypes, is significantly increased. This is explained by filling the pores. Obviously, this is due to the structuring effect of KFKrAMAO.

So, the structural studies carried out made it possible to establish and explain the effects that occur when the leather is filled with amino aldehyde oligomers. Because of solutions of aminoaldehyd oligomers are true and represent a relatively high dispersion, due to which they are able to penetrate deeply into the microstructure of the leather and interact with the functionally active groups of amino acids.

Laying on the surfaces of fibrillar aggregates of collagen, aminoaldehyde oligomers block the active groups of amino acids of the protein, which is better structured. As a result of this the physicochemical and mechanical properties of the leather samples are improved. Simultaneously, the crosslinked oligomer introduced into the dermis of the leather wedges the collagen parts, which is the reason for the decrease in porosity, the increase in thickness and the specific weight of the semi-finished leather.

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Section 6. Mechanical engineering

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ANALYSIS OF ENERGY INDICATORS OF THE SAW GIN WITH A NEW DESIGN

Abstract: The aim of the research is to find the law of frequency variation and uneven rotation of the rotor of electric motor, saw cylinder, throwing drum and the rotor barrel pulleys depending on the elastic-dissipative parameters of the belt drives, the moment of inertia of the electric motor, saw cylinder, throwing drum, the barrel drums of the feeder and the moment of resistance of the saw A cylinder, a throwing drum, and a pinch rollers of the feeder at different values using the equation of motion of the machine. In addition, it is necessary to establish ways to reduce the unevenness of rotation and the power consumption of the electric motor.

Keywords: saw gin, electric motor, saw cylinder, throwing drum, rib.

Ginning, in its strictest sense, refers to the process of separating cotton fibers from the seeds. The cotton gin has as its principal function the conversion of a field crop into a salable commodity. Thus, it is the bridge between cotton production and cotton manufacturing. Ginning is the first and most important mechanical process by which seed cotton is separated into lint (fiber) and seed and machine used for this separation is called as gin. It consists of two spirally grooved leather roller, two moving blades combined with seed grids called as beater assembly. During the ginning operation the shaft fails at certain location

In drawing up the differential equations of the feeder, we use the Lagrange equation of the second kind:

$$\frac{d}{dt}\left[\frac{\partial T}{\partial \dot{\phi}_i}\right]-\frac{\partial T}{\partial \phi_i}+\frac{\partial \Pi}{\partial \phi_i}+\frac{\partial \Phi}{\partial \dot{\phi}_i}=Q[\phi_i], \qquad (1)$$

where T – is the kinetic energy of the system; Π – is the potential energy of the system; Φ – is the dissipative function of the system; ϕ – generalized coordinate; $\dot{\phi}$ – the generalized speed; $Q[\phi_i]$ – generalized force.

The dynamic model of the machine aggregate and the kinematic scheme are shown in (figure 1), where $\Im_D, \Im_1, \Im_2, \Im_3, \Im_4, \Im_5,$ – respectively, the moments of inertia of the rotating masses, кг · м^2; $M_D, M_1, M_2, M_3, M_4, M_5$ – are, respectively, the driving torque of the electric motor and the moments of loads acting on the rotating shaft of the saw cylinder overlapping the drum, the intermediate shaft and the tumbling drum of the feeder $H \cdot m$; c_1, c_2, c_3, c_4, c_5 – the stiffness of the belt drives $H \cdot m/rad$; $в_1, в_2, в_3, в_4, в_5$ – coefficients of dissipation of belt gears, $H \cdot m \cdot s/rad$; $\dot{\phi}_1, \dot{\phi}_2, \dot{\phi}_3, \dot{\phi}_4, \dot{\phi}_5$ – angular velocities of the rotating masses of the system; c^{-1}; $i_{D1}, i_{12}, i_{13}, i_{34}, i_{35}$ – transmission ratios of belt gears.

The saw gin drive with a throwing drum and two drum feeders consists of belt gears. The following kinematic relations are valid for the drive:

$$i_{D1}=\dot{\phi}_D/\dot{\phi}_1=2,\ i_{12}=\dot{\phi}_1/\dot{\phi}_2=2.1,\ i_{13}=\dot{\phi}_1/\dot{\phi}_3=1,$$
$$i_{34}=\dot{\phi}_3/\dot{\phi}_4=i_{35}=\dot{\phi}_3/\dot{\phi}_5=1.737 \qquad (2)$$

For the generalized coordinates we take the angular velocities of the rotating masses of the feeder $\dot{\phi}_D, \dot{\phi}_1, \dot{\phi}_2, \dot{\phi}_3, \dot{\phi}_4, \dot{\phi}_5$. The kinetic energy of the drive has the following form:

$$T=\frac{\Im_D\cdot\dot{\phi}_D^2}{2}+\frac{\Im_1\cdot\dot{\phi}_1^2}{2}+\frac{\Im_2\cdot\dot{\phi}_2^2}{2}+ \\ +\frac{\Im_3\cdot\dot{\phi}_3^2}{2}+\frac{\Im_4\cdot\dot{\phi}_4^2}{2}+\frac{\Im_5\cdot\dot{\phi}_5^2}{2}. \qquad (3)$$

The potential energy of the feeder is a homogeneous quadratic form of the generalized coordinates and is written in the form

$$\Pi=\frac{1}{2}\cdot\left[\begin{array}{c} c_1\cdot(\phi_D-i_{D1}\cdot\phi_1)^2+c_2\cdot(\phi_1-i_{12}\cdot\phi_2)^2+ \\ +c_3\cdot(\phi_1-i_{13}\cdot\phi_3)^2+\ c_4\cdot(\phi_3-i_{34}\cdot\phi_4)^2+ \\ +c_5\cdot(\phi_3-i_{35}\cdot\phi_5)^2 \end{array}\right] \qquad (4)$$

The dissipative function of the system is expressed in the form

$$\Phi = \frac{1}{2}\cdot\begin{bmatrix} в_1\cdot(\dot{\phi}_D - i_{D1}\cdot\dot{\phi}_1)^2 + в_2\cdot(\dot{\phi}_1 - i_{12}\cdot\dot{\phi}_2)^2 + \\ +в_3\cdot(\dot{\phi}_1 - i_{13}\cdot\dot{\phi}_3)^2 + в_4\cdot(\dot{\phi}_3 - i_{34}\cdot\dot{\phi}_4)^2 + \\ +в_5\cdot(\dot{\phi}_3 - i_{35}\cdot\dot{\phi}_5)^2 \end{bmatrix}. \quad (5)$$

Substituting certain terms, we obtain a system of differential equations of motion of the machine aggregate in a general form:

$$\left.\begin{aligned}
&\Im_D\cdot\ddot{\phi}_D = M_D - c_1\cdot(\phi_D - i_{D1}\cdot\phi_1) - в_1\cdot(\dot{\phi}_D - i_{D1}\cdot\dot{\phi}_1)\\
&\Im_1\cdot\ddot{\phi}_1 = c_1\cdot i_{D1}\cdot(\phi_D - i_{D1}\cdot\phi_1) + в_1\cdot i_{D1}\cdot(\dot{\phi}_D - i_{D1}\cdot\dot{\phi}_1) -\\
&\quad c_2\cdot(\phi_1 - i_{12}\cdot\phi_2) - в_2\cdot(\dot{\phi}_1 - i_{12}\cdot\dot{\phi}_2) - c_3\cdot(\phi_1 - i_{13}\cdot\phi_3) -\\
&\quad - в_3\cdot(\dot{\phi}_1 - i_{13}\cdot\dot{\phi}_3) - M_1 \qquad (6)\\
&\Im_2\cdot\ddot{\phi}_2 = c_2\cdot i_{12}\cdot(\phi_1 - i_{12}\cdot\phi_2) + в_2\cdot i_{12}\cdot(\dot{\phi}_1 - i_{12}\cdot\dot{\phi}_2) - M_2\\
&\Im_3\cdot\ddot{\phi}_3 = c_3\cdot i_{13}\cdot(\phi_1 - i_{13}\cdot\phi_3) + в_3\cdot i_{13}\cdot(\dot{\phi}_1 - i_{13}\cdot\dot{\phi}_3) -\\
&\quad - c_4\cdot(\phi_3 - i_{34}\cdot\phi_4) - в_4\cdot(\dot{\phi}_3 - i_{34}\cdot\dot{\phi}_4) -\\
&\quad - c_5\cdot(\phi_3 - i_{35}\cdot\phi_5) - в_5\cdot(\dot{\phi}_3 - i_{35}\cdot\dot{\phi}_5) - M_3\\
&\Im_4\cdot\ddot{\phi}_4 = c_4\cdot i_{34}\cdot(\phi_3 - i_{34}\cdot\phi_4) + в_4\cdot i_{34}\cdot(\dot{\phi}_3 - i_{34}\cdot\dot{\phi}_4) - M_4\\
&\Im_5\cdot\ddot{\phi}_5 = c_5\cdot i_{35}\cdot(\phi_3 - i_{35}\cdot\phi_5) + в_5\cdot i_{35}\cdot(\dot{\phi}_3 - i_{35}\cdot\dot{\phi}_5) - M_5
\end{aligned}\right\}$$

When examining engine aggregates, it is important to select the correct motor characteristics. At present, static, linearized dynamic, refined dynamic and dynamic mechanical characteristics of asynchronous electric motors are used. One of the most promising directions is an approximate consideration of the electromagnetic transients occurring in the engine and their mathematical description by a system of differential equations.

The system of nonlinear differential equations (5) and (6) has been studied on a computer, based on the results of which the graphs of the change in the consumed power of the electric motor are plotted, depending on the following real parameters of the system (0,%): moment of resistance (M_1 = *125.4629;* M_2 = *1.680576;* M_4 = *6.64 H ·m* – figure 2); elastic-dissipative parameters (c_1 = *30700.06;* c_2 = *186.82;* c_3 = *204.85;* c_4 = c_5 = *=52.93 H ·m/ rad и* $в_1$ = *157.083;* $в_2$ = *0.662;* $в_3$ = *1.055;* $в_4$=$в_5$=*0,188 H ·m ·s/rad* – figure 3) belt drive, moment of inertia of the electric motor ($\Im_D = 0.6\ kg\cdot m^2$), saw cylinder ($\Im_1 = 0.37\ kg\cdot m^2$), the throwing drum ($\Im_2 = 0.013\ kg\cdot m^2$), the intermediate shaft ($\Im_3 = 0.01\ kg\cdot m^2$), and the pin drums ($\Im_4 = \Im_5 = 0.257\ kg\cdot m^2$ – figure 4) with a decrease (–100%) and an increase (100%) of the actual parameters.

The results of the analysis (Figures 1–2) shown, that with an increase in the resistance moment from –100 to + 100%, the power consumption of the electric motor of the saw cylinder, respectively, from 605.8 to 18448.1 W, the throwing drum from 9513.0 to 9627.0 W and the drum feeder barrel 9025.1 and 10115.0.

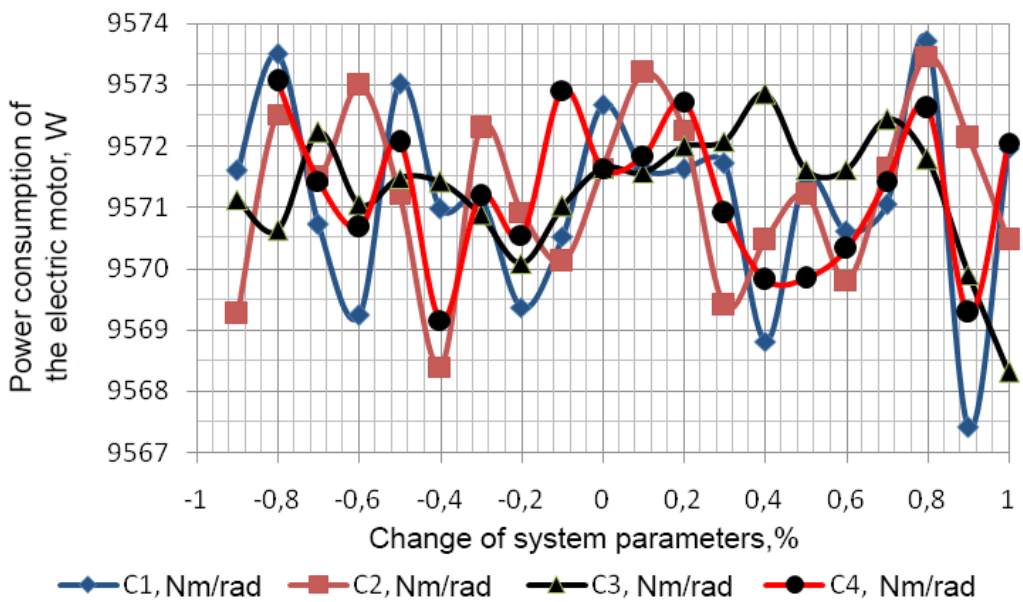

Figure 1. The graph of change of consumed capacity of the electric motor in dependence from the stiffness of the belt transfers c_1, c_2, c_3, c_4, %

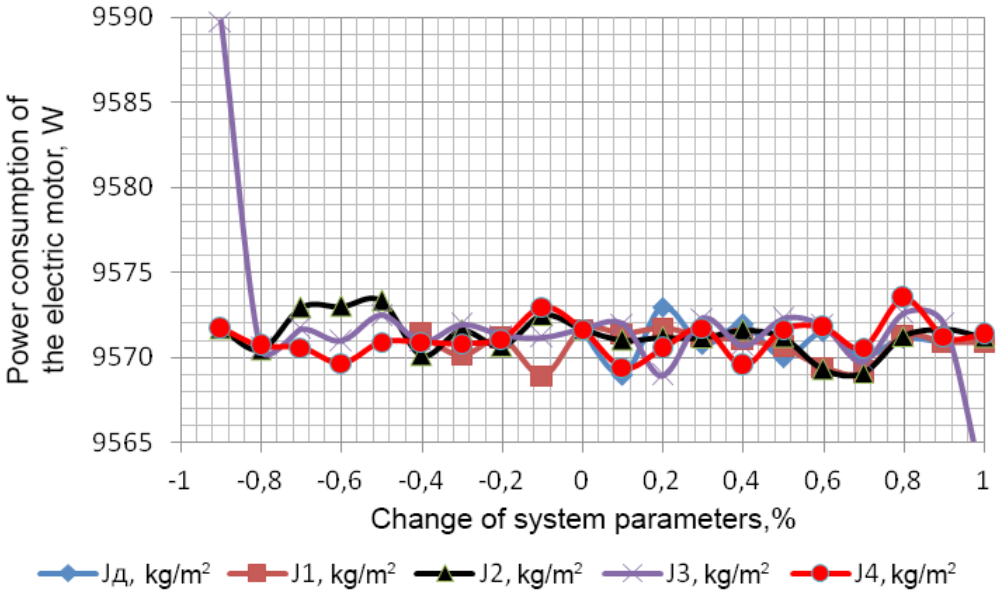

Figure 2. The graph of the change in the power consumption of the electric motor, depending on the moments of inertia of the electric motor $\Im_D$, the saw cylinder $\Im_1$, the throwing drum $\Im_2$ and the intermediate shaft $\Im_3$ and the feed roll barrel $\Im_4$, %

With an increase in the elastic-dissipative parameters of the belt transmission from –90 to –10%, the change in the power consumption of the electric motor is in the range of 9568–9584 W, and then remains constant with small deviations and amounts to 9567–9574 W.

With an increase in the moments of inertia of the electric motor rotor, the saw cylinder, the throwing drum and the drum barrel from –90 to 100%, the change in the power consumption of the electric motor is in the range 9562–9590 W.

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DETERMINATION OF CRITICAL ANGULAR SPEED OF SAW CYLINDER OF A COTTON GIN

Abstract: Results of calculations for determining the critical angular speed of saw cylinder are presented in the paper with account of a mass of raw material roll in the form of an ideal incompressible fluid. Comparison of the values of critical angular speed of a saw cylinder with an analytical method, not accounting the load from the raw material roll, made it possible to establish a difference in the calculations up to 3.5%.

Keywords: cotton gin, saw cylinder, raw material roll, critical angular speed, shaft, cushion, saw blade, distributed load.

Units of the working chamber and its main unit – a saw cylinder – are located in a saw gin under considerable force from external loads. To determine the critical speed of the saw cylinder shaft, the methods by A. N. Krylov, A. I. Makarov, I. Ya. Koritytskiy, M. Ya. Kushul, Rayleigh; the methods of successive approximations; initial parameters in the matrix form and others are used. In [1; 2] it was shown that the definition of critical speed is reduced to solving the problem of determining the natural frequencies of oscillations.

In [3], to reduce analytical computations when determining the critical speed of saw cylinder, the finite element method is used.

In Kh. K. Tursunov's monograph, results of theoretical and experimental studies of the dynamics of saw shafts and grates of cotton gin are given and their critical speeds are evaluated [4].

Determination of critical speeds of saw cylinder makes it possible to assess the danger of the operating speed approaching the critical speed.

At $\omega_p = \omega_{kp}$ the deflections of the shaft and the load on the bearings can increase without limit, although this does not happen due to restrain of deflections of shaft pinching in the bearings, the presence of frictional forces and external loads. However, when designing high-speed shafts, it is necessary to take into account the danger of their operating speeds approaching the critical ones, therefore at shaft speeds below the first critical one the following ratio is recommended: $\omega_p \le (0.75 - 0.8) \cdot \omega_{kp}$. The interval between the first and the second critical speeds is $1.4 \cdot \omega_{1kp} \le \omega_p \le 0.8 \cdot \omega_{2kp}$. When operating in the first pre-critical zone of angular speeds the shafts are called rigid ones, and when operating in the zone after the first critical speed, they are flexible.

The goal is to determine the critical angular speed of saw cylinder ω_{kp} (D = 320 mm – a diameter of the saw blade, d = 100 mm –a diameter of the saw cylinder shaft under load from the raw material roll (ideal incompressible fluid, Figure 1).

The weight of the raw material roll consists of seeds and cotton per unit length of the saw cylinder m_1, the weight of the length unit of saw cylinder is m_0, (shaft, spacers, saw blades), the bending rigidity of the shaft is EJ_x. Coriolis forces of inertia of seeds and raw cotton are neglected due to their smallness.

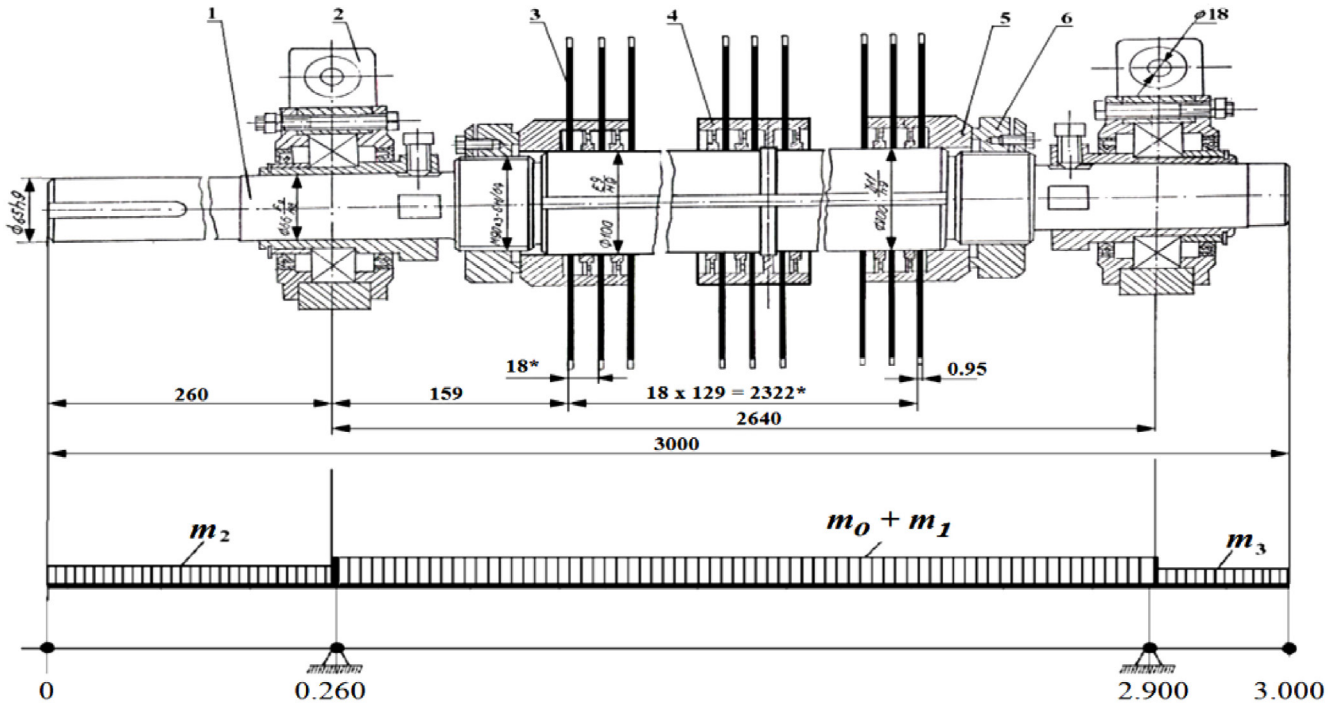
Uniformly distributed loads are: m_1 = 110.0 kg/m; m_2 = =114.54 kg/m; m_3 = 27.27 kg/m.

At the state, deviated from the rectilinear equilibrium position, the inertial force due to rotation of saw cylinder with a raw material roll (the seeds and raw cotton) per each length unit equals to $(m_0+m_1)\cdot\omega^2\cdot y$, and the centrifugal force of inertia of rotating raw material roll caused by the curvature of saw cylinder is $m_1 \cdot v^2 / \rho = -m_1 \cdot v^2 \cdot y''$ (Figure 2) (the minus sign is determined by the curvature sign).

Differential equation of the curved axis of the shaft of saw cylinder is represented in the form

$$EJ_x \cdot y^{IV} = (m_0 + m_1) \cdot \omega^2 \cdot y - m_1 \cdot v^2 \cdot y'' \qquad (1)$$

or $y^{IV} + k_1^2 \cdot y'' - k_2^4 \cdot y = 0.$ where $k_1^2 = m_1 \cdot v^2 / (EJ_x)$, $K_2^4 = (m_0 + m_1) \cdot \omega^2 / (EJ_x)$. $(m_0 + m_1) \cdot \omega^2 \cdot y \;\; m_1 \cdot \dfrac{v^2}{\rho}$



1 – Shaft, 2 – Bearing body, 3 – Saw blades, 4 – Shaft spacers, 5 – Washer, 6 – Nut

Figure 1. Design scheme of a saw cylinder

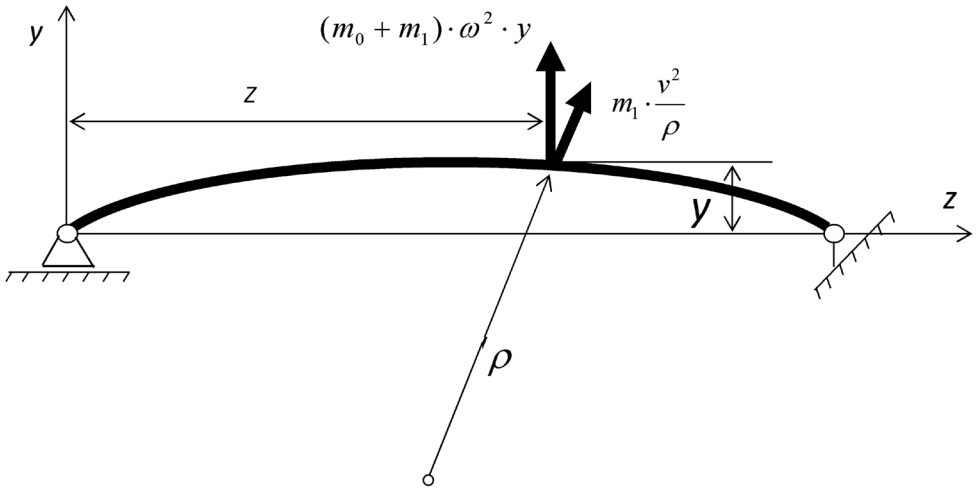


Figure 2.

Differential equation of the curved axis of the shaft of saw cylinder is represented in the form

$$EJ_x \cdot y^{IV} = (m_0 + m_1)\cdot\omega^2\cdot y - m_1\cdot v^2\cdot y'' \qquad (1)$$

or $y^{IV} + k_1^2\cdot y'' - k_2^4\cdot y = 0.$ where $k_1^2 = m_1\cdot v^2/(EJ_x)$, $K_2^4 = (m_0+m_1)\cdot\omega^2/(EJ_x)$. $(m_0+m_1)\cdot\omega^2\cdot y$ $m_1\cdot\frac{v^2}{\rho}$

Characteristic equation for equation (1) has the form

$$\lambda^4 + k_1^2\cdot\lambda^2 - k_2^4 = 0,$$

hence

$$\lambda_{1,2} = \pm i\cdot\sqrt{(k_1^2 + \sqrt{k_1^4 + 4\cdot k_2^4})/2};$$

$$\lambda_{3,4} = \pm\sqrt{(\sqrt{k_1^4 + 4\cdot k_2^4} - k_1^2)/2};$$

Solution of equation (1) is obtained in the form $y=C_1\cdot sin(\lambda_1\cdot z)+ C_2\cdot cos(\lambda_2\cdot z)+ C_3\cdot sh(\lambda_3\cdot z)+ C_4\cdot ch(\lambda_4\cdot z)$.

To determine the integration constants C_1, C_2, C_3, C_4, the following conditions should be met:

at $z = 0, y = 0$ and $y'' = 0$;

at $z = l\, y = 0$ and $y'' = 0$.

To determine the critical angular speed of saw cylinder ω_{kp}, the following equation is obtained

$$sin(\lambda_1\cdot l)\cdot sh(\lambda_3\cdot l) = 0. \qquad (2)$$

The left-hand side of equation (2) is zero in the following cases: $\lambda_3=0$, at $\omega=0$; $(\lambda_1 \cdot l)= k\cdot$

At $k = 1$, *that is*, $(\lambda_1 \cdot l)= \pi$, the value of the critical angular speed is obtained

$$\omega_{кр} = \sqrt{\frac{\pi^4 EJ_x}{l^4(m_o + m_1)} - \frac{\pi^2 mv^2}{l^2(m_o + m_1)}} \qquad (3)$$

Taking into account the values $l = 2.64m$; $(m_0 + m_1) = 110$ *kg/m*; $(EJ_x)= 785398.16$ $H\cdot m^2$ and substituting into (3), the law of change of the critical speed of saw cylinder $\omega_{кр}$ depending on the weight of raw material roll m_1 and on bending rigidity of the shaft of saw cylinder EJ_x is determined (Fig. 4).

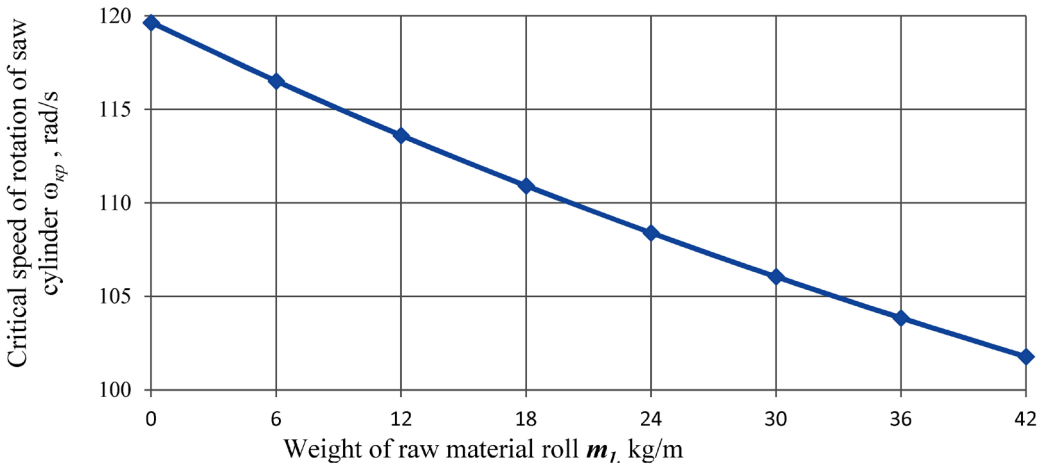


Figure 3. Change of the critical speed of saw cylinder $\omega_{кр,}$ depending on the weight of raw material roll m_1

Analysis of equation (3) and (Fig. 3) has shown that the critical angular speed decreases from 119.66 to 101.79 rad./s (15.0%) with an increase in the weight of the raw material roll per length unit of saw cylinder from 0 to 42 kg/m. Analysis of equation (3) and Fig. 4 has shown that at m_1= =*38 kg/m*, with an increase in bending rigidity of the shaft of saw cylinder EJ_x from 100,000 to 1,000,000 $H\cdot m^2$, the critical angular speed decreases from 135.02 to 42.70 rad./s (68.4%).

With load acting from the raw material roll, the angular speed of gin saw cylinder 5DP-130 is in the first pre-critical zone ($\omega_p \leq 0.75\cdot\omega_{1кр}$ – rigid shaft) 76.44 rad/s ≤ (76.43–77.3) rad/s.

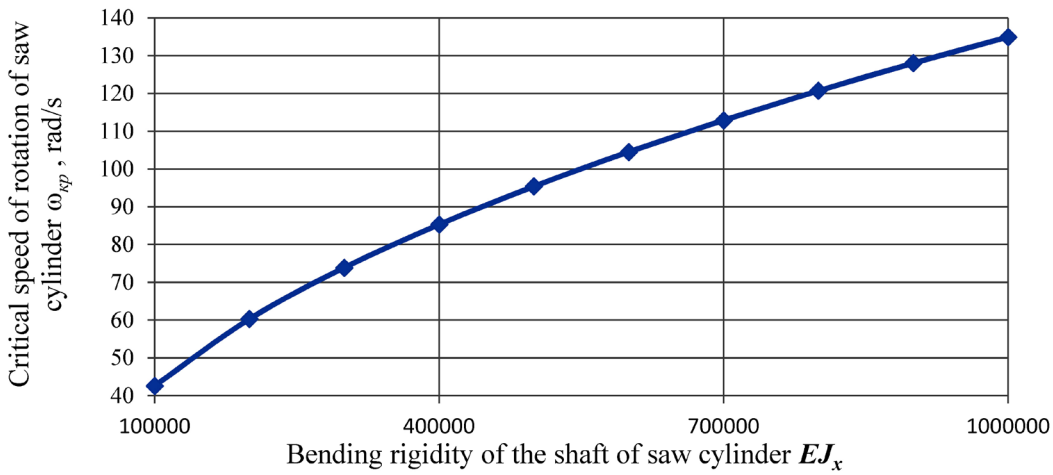


Figure 4. Change of the critical speed of saw cylinder $\omega_{кр,}$ depending on bending rigidity of saw cylinder EJ_x

The difference of critical speeds of the gin saw cylinder 5DP-130 is obtained between analytical calculations according to the data presented by JSC "Pakhtagin KB" not accounting the load of the raw material roll, which is 121.3 *rad/s* [5] and proposed by the authors calculations with account of the load from the raw material roll which is 103.1 *rad/s* (15.0%).

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Section 7. Medicine

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EVALUATION OF POTENTIALLY REMOVABLE RISK FACTORS OF ARTERIAL HYPERTENSION IN CHILDREN OF UZBEKISTAN

Abstract: Arterial hypertension (AH) is one of the topical problems in the modern medicine not only due to high prevalence in the population, but also high risk of vascular complications and invalidation. Late diagnostics and inadequate prognosis in children and adolescents serve the basis for high morbidity and lethality rates in elder age groups, while the success of prophylactic programs is directly dependent on the early implementation. Positive experience in the countries with low rate of lethality due to CVP demonstrates that the success of the strugle against that pathology is strongly dependent on its detection, treatment, and prevention in early childhood. That dictates the necessity of the designing of effective prophylactic programs, including screening in the risk groups and prevention of the formation of resistant forms of the disease.

Keywords: Arterial hypertension, late diagnostics, children.

Arterial hypertension (AH) is one of the topical problems in the modern medicine not only due to high prevalence in the population, but also high risk of vascular complications and invalidation. AH became significantly "younger", and its development in children and teenagers is not rare anymore. The performed multiple massive studies of children's population showed that the frequency of AH varied from 2.4% to 18% [2; 11], while according to the results of foreign researches it varies from 0.7% to 33.0% [4; 6].

A systematic review of school-based cross-sectional studies was conducted to estimate the prevalence of hypertension among 14115 adolescent Brazilian students, (the articles were searched in the databases MEDLINE, Embase, Scopus, LILACS, SciELO, Web of Science, CAPES thesis database and Trip Database. Was retrieved 1,577 articles from the search and included 22 in the review) among them 51.2% (n = 7.230) female. The prevalence of hypertension was 8.0% (95%CI 5.0–11.0; I = 97.6%), 9.3% (95%CI 5.6–13.6; I = 96.4%) in males and 6.5% (95%CI 4.2–9.1; I= 94.2%) in females [10].

Within the last decades there was notable growth in the prevalence of essential AH (EAH), which had its manifestation mostly in adolescence, according to some authors opinion [3]. There are data that 17–25% of teenagers have progression of EAH with further formation of hypertonic disease [12]. Scientists from the University of North Carolina (USA) reported that predictors of cardiac pathologies were revealed in 60% of adolescents. The pathology develops slowly for years, increasing the risk of vascular or cardiac death. In the structure of adult population morbidity in Russia cardiac-vascular pathology is of the second rank (12–15%). Prevalence of these diseases among children in 2006 reached the value of 912.4 cases per 100000 children in the age from 0 to 14 years old and 1576.9 per 100000 children in the age from 15 to 17 years old [8]. In our republic there is no data about the prevalence of EAH among children. That's why the design and implementation of normative criteria of AH diagnosis dependently on the age, gender, and height of children in the primary line of health care system is extremely important.

It is true that the results of multiple researches demonstrated that pediatric hypertension was followed till adult life. In other words, children with increased arterial pressure (AP) have more chances to become adults with hypertension. That

shows the importance of AP control among children and adolescents in the conditions of the primary line of health care system. In the process of aging arterial pressure (AP) gradually increases, and that is conditioned by increase of body mass and growth. That is why there is no common normative value of AP in children and adolescents. The criterion for AH diagnosis is the level of systolic AP (SAP) and\or diastolic AP (DAP) equal to or above 95 percentile for the given age, gender, and height. The normal AP corresponds to the values below 90th percentile; the values of SAP or DAP between 90th and 95th percentiles are considered to be high normal AP, and the child with that kind of pressure requires further follow up. Doctoral monitoring of children's health is performed both in our republic and abroad, but there are significant defects in the system of AP control taking into account the age, gender, and height. Absence of a standard strategy for the assessment of the AP makes it impossible to evaluate real situation of AH prevalence among children. Urgency of the problem of AH in children and adolescents is determined by the importance and significance of the control of arterial pressure at home within everyday clinical practice of GP in developed countries. That method is included into the list of checkings, the management of which is compensated by insurance companies, in case of both state and private forms of help provision in the system of health careя [1; 7; 12].

There are detailed pediatric standards worked out for the United States based on the data of clinical studies performed by means of auscultation in more than 70000 children. AP percentiles were calculated for each gender, age group, and seven height percentile categories (Center for Disease Control and Prevention).

Because of the great volume of available data on the study of arterial pressure in children, the problem is still studied in the whole world. Besides that, it should be taken into account that, the results of the corresponding American Task Force are not applicable to European population, and for all age groups these data are just several millimeters of mercury column below the values, received by means of auscultation in the standard Italian, and about 10 mm below the values, received by oscilographic method in Norway. In the developed countries of Europe, USA, and Japan, even now that problem persists. Multicenter meta analysis shows certain tendencies. The search for the works in the system of Pubmed database demonstrated heterogeneity of the analyzed randomized groups of patients, which caused less definite results [5; 9].

In the modern time there is a justified opinion, according to which a greater part of adults with hypertonic disease are those who had high AP in childhood and adolescence. In this field it is very important to reveal early, treat, and prevent AH. The prophylaxis is based on the concept of common risk factors (RF), which can be relatively classified to congenital, non-modulated, and potentially removable. Congenital RF are genetically conditioned ones, which make us classify the child as a member of high risk group; non-modulated ones are age, gender, suffered diseases, biochemical markers, etc. Removable RF are unbalanced nutrition, excessive body mass, insufficient physical activity, eating too much salt, smoking, alcohol, stress, 'chronic negative emotions', and so on. Exactly these ones are the most important for the prevention of AH. Our research of RF and evaluation of its impact on the development of EAH among 425 children of 13–15 years old based on the results of screening showed that distribution of the examined children dependently on the AP rate determined the prevailing of number of children with normal arterial pressure, while the number of children with high normal AP (HNAP) was equal to 16.9%, and with AH to 7.1%. According to the age and gender criteria there was a reliable prevailing of 15 years old children with AH, while HNAP was reliably more often registered in 14 years old, and in both groups the number of boys prevailed over girls [5].

The prevailing risk among girls according to the integration risk coefficient (IRC) of "physical development" was attributed to the factors such as 'low height risk' in all age groups, 'excessive weight risk' only in the age of 13 years old, 'exhaustion risk' also in all age groups. In 14 and 15 years old 'low height' factor was registered. Among boys reliable RF were 'excessive weight risk' and 'low height risk' in all age groups, but there was no 'low height'. 'Complicated gynecological history' factor was more often registered among boys. There are gradually decreasing in prevalence factors such as endemic goiter, obesity, which were characteristic for both men and women, and high rate gaining weight in pregnant women.

Both genders had prevailing factor of 'complications of CVD of the I stage relativity'. 'First-born syndrome' was met more often among boys, than girls. Presence of relatives with CVD was an important factor for the prognosis of AH development in children [5; 7]. And the prevalence of arterial hypertension in the family, where there were relatives with arterial hypertension was 15 folds higher, than in the families with normal AP [1]. For the evaluation of the risk of AH and cardiac-vascular pathologies development in children and grandchildren the important criterion is not only presence of cardiac-vascular pathologies in parents, but also the age when these pathologies occurred. So, when we checked a group of children, whose parents had cardiac-vascular pathologies acquired before 45 years old, and a group of children, with "healthy" parents, it was noted, that the children, whose parents had "early" onset of cardiac-vascular diseases, had higher AP values, thickness of vascular wall, and metabolic alterations (increase cholesterol, prostaglandin B2-alfa, and glucose) compared to the children, whose parents were "healthy" [1; 6; 8].

But family predisposition to AH is not absolute [4]. Performed study demonstrated that, among the two groups with AH diagnosis, the first group had relatives with AH and worse results of AP, while the second group had no relatives with AH in history and better values of AP. During 6 years the group with family hypertension lived a healthy style of life (no smoking, moderate physical activity, etc) and their values of AP improved. At the same time the group without family history of AH lived a worse life and the values of AP also deteriorated [4; 11; 12]. IRC of "feeding", to be more exactly "formula feeding prior to 6 months" was more reliable risk factor of AH onset among boys (IRC = 12.3), than among girls (IRC = =10.8). According to chance correlation (CC) the distribution of that risk factor was almost identical to integration values: CC = 4.1 for boys and CC = 3.8 for girls.

The impact of nutrition on the human genotype was linked with the trigger action of many nutrients on the start of alteration of the functions of certain genes, by these means changing metabolism, hormonal pathways, direction of signaling molecules. Critical periods in the alteration of the functions of genes correspond to the period of early development, and exactly 1000 days of existence, including antenatal period and initial two years of life. During postnatal period the speed of gaining weight or growth are the most important. Breastfeeding is the best method for provision of ideal nutrition for a healthy growth and development of infants; it is also a part of health with important consequences in adult life. The global recommendation of civil health care for optimal growth, development, and health of infants is the necessity of exclusive breastfeeding for initial six months of life.

3 months old breastfed baby receives average 1.2g\kg of protein a day, while a baby on formula receiving a standard mixture (containing 1.4 g protein per 100ml) gets 2.5g\kg a day; i.e. the amount of protein consumed with formula is actually 2 times more, than in case of breastfeeding. Increase in the protein consumption stimulates high level of amino acids with branched chains, so called insulinogenic amino acids, which in their turn increase the secretion of insulin and insulin-like growth factor 1 (IGF-1), intensifying baby's growth and possessing adipogenic activity.

IRC of "excessive body mass in initial 2 years of life" (between + 2SD and + 3SD – standard deviations of BMI) was equal to 10.6 for boys and 9.2 for girls. IRC of "obesity" (above + 3SD – standard deviation of BMI) was 12.7 and 12.8 for boys and girls, respectively. An important predictor of increased arterial pressure is body mass.

The processes leading to the rise of AP in children with obesity and excessive body mass are complex and have multifactor character. Children with obesity have not only increase in body mass, which can occur even without pathological process, like in case of physical training, but increase in the amount of fat.

Ranks of the leading risk factors of the development of AH among the examined children for integration risk (X) independently of the age distributed as follows gradually decreasing: "complicated with CVS with the I stage relativity" among both genders was the most important factor (X = = 17.3 for girls and X = 15.8 for boys); while the lowest one was "little iron amount" (X = 11.4 and 11.8, respectively). Only for the boys there was significant risk of "excessive weight", "GIT pathologies" and "formula feeding" (X = 13.1, 13.1 and 12.8, respectively), while for the girls these were "carriage disorder and flat-footedness" (X = 12.7).

Ranking of the leading risk factors for the development of arterial hypertension in children according to chance correlation (CC) was almost identical to integration values. Difference was conditioned by the factors such as gender (male) and age (15 years old), "little body mass at birth" was the third important factor, while retardation of fetal development the fifth one. Thus, screening of school-age children showed that, 16.9% of them from 13 to 15 years old had high normal AP and 7.1% had arterial hypertension.

Complicated heredity history with cardiac-vascular pathologies, formula feeding prior to 6 months, and disharmonic physical development within initial 2 years of life can 6.5 folds increase the chance of AH formation in children. Exclusive breastfeeding during initial six months is necessary not only for physical health and development of young children, but also for the diminishing of the risk of CD, including AH, with long-term perspectives. In relation to that, design and implementation of prophylactic actions among school-age children is a topical and important social-economical problem, the salvation of which will provide decrease of the risk of development and onset of AH in children and adolescents.

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PSYCHOTROPIC ACTIVITY OF CYTISINE N-BENZOYL DERIVATIVES

Abstract: Psychotropic activity in open field conditions, antihypoxic activity on the model of normobaric hypoxia with hypercapnia, antinarcotic (against sodium ethaminal), and anticonvulsant activity (pentylenetetrazole) of N-benzoyl derivatives of cytisine were explored. It has been established that the studied substances have a psychostimulating effect, increases motor activity, orientation and research behavior, brain resistance to hypoxia, and have antinarcotic and anticonvulsant effects.

Keywords: Cytisine derivatives, psychotropic activity, antihypoxic activity, convulsions, anesthesia, motor and research activity.

Introduction and methods of research: CNS stimulants are widely used in a complex treatment of neurodegenerative disorders, intoxication with alcohol, drugs and other psychoactive substances. Cytisine derivatives have neuropharmacological activity proved in many studies [1–5].

The purpose of this work is to study psychotropic activity of a series of N-benzoyl derivatives of cytisine.

The effect of the testing compounds on the orienting-investigation behavior was carried out in experiments on white male mice weighing 18–22 grams in open field 40 × × 40 cm divided into squares of 10 × 10 cm with 16 round holes of diameter 4 cm. The investigated substances were injected to mice subcutaneously at doses of 0.1, 0.5, 1.0, and 5 mg/kg. Each dose of drug was tested on 10 mice. The control group of mice under the same experimental conditions was administered a sterile isotonic NaCl solution. In 30 minutes after injection the observation of experimental mice behavior were held for 2 minutes, including number of horizontal displacements in intersected squares, vertical stands and surveyed holes. The mean values of the parameters for the group, their standard deviations and confidence intervals were calculated.

Antihypoxic activity was studied on white mice with the same weight of 21–22 grams on the model of normobaric hypoxia with hypercapnia. The animals were placed by twos in hermetically sealed 500 cm^3 cans. The survival time of mice under hypoxic conditions was recorded and the percentage of increase in the survival time relatively to the control group was calculated. Each dose was tested on 10 animals.

The analeptic effect of the tested substances was assessed by their antagonism with sodium ethaminal effect. The sodium ethaminal was administered intraperitoneally at a dose of 50 mg/kg in 30 minutes after subcutaneous injection of the tested substances. The duration of anesthesia (mice lateral position) was recorded.

Convulsions were induced by subcutaneous administration of pentylenetetrazole at a dose of 80 mg/kg. The tested substances were administered subcutaneously in 30 minutes

before the application of pentylenetetrazole. Time of tremorogenic – convulsive action onset, its duration, and time of animals death was recorded.

Piracetam-Darnitsa (400 mg/kg) preparation was used as a comparative drug in all experiments. The obtained data were processed by Student [6].

Table 1.– Effects of cytisine N-benzoyl derivatives on orientation-exploratory behavior of mice in open field (n=10)

No.	Investigated substances	Dose, mg/kg s/c	Horizontal movies	Vertical stands	Holes survey
1.	Control group (NaCl solution)	0.2	11 ± 3.8	6.4 ± 2.1	_
2.	Pyracetam	400	15.4 ± 4.1	6 ± 2.0	19.2 ± 4.4
3.	Cytisine	0.1	16 ± 3.6	8 ± 1.9	27.6 ± 3.7
		0.5	16.2 ± 3.5	8.5 ± 1.6	19.8 ± 1.9
		1.0	16.6 ± 3.7	6.8 ± 1.3	21.6 ± 2.4
		2.0	18.8 ± 4.2	5 ± 1.2	22.5 ± 2.5
4.	N-(2-oxybenzoyl) cytisine hydrochloride	0.1	10.4 ± 3.4	3.6 ± 1.3	11.8 ± 3.8
		0.5	18.2 ± 4.2	10.8 ± 2.4	12.6 ± 3.5
		1.0	17.4 ± 5.1	8.2 ± 1.9	12 ± 3.4
		5.0	9.6 ± 3.2	4.7 ± 1.2	9.4 ± 2.9
5.	N-(3,4-methylenedioxybenzoyl) cytisine hydrochloride	0.1	18.4 ± 4.5	7 ± 1.6	30.2 ± 6.2
		0.5	17.5 ± 4.3	5.5 ± 1.3	29.4 ± 5.5
		1.0	16.2 ± 3.8	5.2 ± 1.2	30.6 ± 6.5
		5.0	12.6 ± 3.6	4.6 ± 1.1	14.4 ± 3.2
6.	N-(2-bromo-3-oxy-4-methoxybenzoyl) cytisine hydrochloride	0.1	15.2 ± 4.0	6.8 ± 1.4	27.6 ± 4.1
		0.5	18.4 ± 4.9	8 ± 1.6	26.2 ± 4.8
		1.0	16.6 ± 3.7	8.2 ± 1.2	34.7 ± 4.3
		5.0	15.6 ± 3.3	5.6 ± 1.3	22.6 ± 3.9
7.	N-(3,4-dimethoxy-6-brombenzoyl) cytisine hydrochloride	0.1	14.2 ± 3.5	7.4 ± 1.2	30.2 ± 3.5
		0.5	17.6 ± 4.4	6.2 ± 1.4	31 ± 3.6
		1.0	16.4 ± 3.7	9 ± 2.0	34.6 ± 4.0
		5.0	13.8 ± 2.9	5.7 ± 1.8	30.5 ± 4.1

Results of the study and discussion. The experimental data showed that the studied N-benzoyl derivatives of cytisine possess high psychostimulating activity. All studied substances significantly increased the motor activity and orienting-exploratory behavior of the experimental mice in the open field (Table 1), increased the survival time of mice under conditions of normobaric hypoxia with hypercapnia (Table 2), showed pronounced antagonism, analeptic effect in narcosis caused by sodium ethaminal (Table 3), and anticonvulsant effect on the convulsions caused by subcutaneous administration of pentylenetetrazole (Table 4).

The intensity of the stimulating effects depended on the dose of the investigated substances. Overdose of optimal doses reverse the stimulating effect and lead to inhibition of animal's activity.

This effect manifested most clearly in the open field test which is characteristic for substances having stimulating action.

Table 2.– Time of mice survival in normobaric hypoxia with hypercapnia (n = 10)

No.	Investigated substances	Dose, mg/kg s/c	Surviving time, min.	Reserve time increasing,%
1	*2*	*3*	*4*	*5*
1.	Control group (NaCl solution)	0.2	17.8 ± 0.56	–
2.	Pyracetam	400	17.4 ± 0.75	19.1**
3.	Cytisine	0.1	21 ± 1.2	19.9**
		0.5	16.8 ± 0.8	–5.6
		1.0	16.2 ± 0.95	–8.9
		2.0	18.4 ± 0.86	9.3
4.	N-(2-oxybenzoyl) cytisine hydrochloride	0.1	20.8 ± 0.8	16.8**
		0.5	23.8 ± 1.1	33.7*

1	2	3	4	5
4.	N-(2-oxybenzoyl) cytisine hydrochloride	1.0	21 ± 1.1	17.9 **
		5.0	18.8 ± 0.7	5.6
5.	N-(3,4-methylenedioxybenzoyl) cytisine hydrochloride	0.1	21.4 ± 0.96	28.9 *
		0.5	18.2 ± 0.67	9.6
		1.0	20 ± 0.75	20.4 **
		5.0	16.8 ± 0.62	1.2
6.	N-(2-bromo-3-oxy-4-methoxybenzoyl) cytisine hydrochloride	0.1	22.4 ± 0.92	30.2 *
		0.5	21.8 ± 0.95	26.7 **
		1.0	17.6 ± 0.74	2.3
		5.0	18.5 ± 0.85	7.5
7.	N-(3,4-dimethoxy-6-brombenzoyl) cytisine hydrochloride	0.1	17.8 ± 0.82	–3.2
		0.5	21 ± 1.0	14.1 **
		1.0	20.6 ± 1.4	11.9 **
		5.0	22.5 ± 1.5	22.2 *

*Note: *– P < 0.01, **– P < 0.05*

Table 3. – Antagonism of the investigated substances to narcotic effect of sodium ethaminal (*n* = 10)

No.	Investigated substances	Dose, mg/kg	Narcotic effect duration, min.
1.	Control group (sodium ethaminal i/p)	50	92.6 ± 9.4
2.	Pentylenetetrazole s/c in 30 min after sodium ethaminal introduction	10	69.5 ± 7.5**
3.	Caffein s/c in 30 min after sodium ethaminal introduction	10	65.2 ± 7.0**
4.	Cytisine s/c in 30 min after sodium ethaminal introduction	0.1	39.8 ± 4.1*
		0.5	47.4 ± 3.9*
		1.0	55.2 ± 5.4*
		2.0	79 ± 6.1**
5.	N-(2-oxybenzoyl) cytisine hydrochloride s/c in 30 min after sodium ethaminal introduction	0.1	68 ± 5.8**
		0.5	60.2 ± 7.3*
		1.0	56.6 ± 6.5*
		5.0	72 ± 8.4**
6.	N-(3,4-methylenedioxybenzoyl) cytisine hydrochloride s/c in 30 min after sodium ethaminal introduction	0.1	52 ± 6.2*
		0.5	65.4 ± 5.8**
		1.0	56.2 ± 6.4*
		5.0	60.7 ± 7.3*
7.	N-(2-bromo-3-oxy-4-methoxybenzoyl) cytisine hydrochloride s/c in 30 min after sodium ethaminal introduction	0.1	58.4 ± 6.6*
		0.5	49 ± 5.8*
		1.0	47.2 ± 4.8*
		5.0	68.5 ± 6.7**
8.	N-(3,4-dimethoxy-6-brombenzoyl) cytisine hydrochloride s/c in 30 min after sodium ethaminal introduction	0.1	65.8 ± 7.2**
		0.5	67.2 ± 6.6**
		1.0	56.4 ± 7.0*
		5.0	38.7 ± 3.8*

*Note: *– P < 0.01, **– P < 0.05*

Table 4. – Anticonvulsant effect of investigated substances (*n* = 10)

No.	Investigated substances	Dose, mg/kg	Convulsions duration, min.	Survival of mice, %
1	2	3	4	5
1.	Control group (pentylenetetrazol) s/c	80	9.2 ± 1.2	0

2.	Pyracetam s/c in 30 minutes after pentylenetetrazole	400	26.4 ± 1.4	1
3.	Cytisine s/c in 30 minutes after pentylenetetrazole	0.1	16.2 ± 0.8	0
		0.5	17.2 ± 1.4	1
		1.0	18.4 ± 1.5	3*
		2.0	13 ± 0.7	0
4.	N-(2-oxybenzoyl) cytisine hydrochloride s/c in 30 minutes after pentylenetetrazole	0.1	10.8 ± 0.8	0
		0.5	14.5 ± 1.3	0
		1.0	25.6 ± 1.1	1
		5.0	16 ± 0.9	1
5.	N-(3,4-methylenedioxybenzoyl) cytisine hydrochloride in 30 minutes after pentylenetetrazole	0.1	18 ± 1.2	1
		0.5	15.8 ± 1.3	1
		1.0	14 ± 1.6	2**
		5.0	16.8 ± 0.8	1
6.	N-(2-bromo-3-oxy-4-methoxybenzoyl) cytisine hydrochloride in 30 minutes after pentylenetetrazole	0.1	20.8 ± 1.2	5*
		0.5	20.2 ± 0.9	3*
		1.0	23 ± 1.4	3*
		5.0	14 ± 0.7	2**
7.	N-(3,4-dimethoxy-6-brombenzoyl) cytisine hydrochloride in 30 minutes after pentylenetetrazole	0.1	18.2 ± 1.3	1
		0.5	12.8 ± 0.7	3*
		1.0	21.2 ± 1.2	2**
		5.0	17.2 ± 1.5	2**

*Note: *– P < 0.01, **– P < 0.05*

Conclusions

1. All investigated N-benzoyl derivatives of cytisine showed high stimulating activity on the central nervous system.

2. Among studied N-benzoyl derivatives of cytisine, N-(2-bromo-3-hydroxy-4-methoxybenzoyl) cytisine provided the greatest psychostimulating effect that exceeded activity of the comparative drug.

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THE IMPORTANCE OF PROTEINURIA AS A PREDICTOR OF DIAGNOSIS AND A RISK FACTOR FOR THE DEVELOPMENT OF CHRONIC KIDNEY DISEASE

Abstract: Proteinuria, which is a predictor of early diagnosis of chronic kidney disease, is also a risk factor for the development and progression of renal disease. The interdependence has a multi-faceted nature, and are built according to the type of feedback. On the one hand, the kidney can act as a target organ for most of the risk factors such as arterial hypertension, coronary heart disease, diabetes, age, obesity associated with albuminuria. On the other hand, a decrease in renal function and pronounced albuminuria is an important cause of the accelerated development of the terminal stage of chronic kidney disease.

Keywords: proteinuria, albuminuria, chronic kidney disease, risk factors.

Chronic kidney disease (CKD) – this is the problem with deep social and economic consequences associated with the prevalence among people, disability and death due to renal failure (RF) and cardiovascular events (CVE) [2, 3].

The prevalence of CKD occurs as often as hypertensive disease (HD), diabetes mellitus (DM), obesity and metabolic syndrome (MS). Relationships renal dysfunction and CAS changes are multifaceted and line feedback type [5].

Currently installed the role of proteinuria/microalbuminuria (PU/MAU) as a marker of activity and independent factor of progression of CKD.

The aim of the work – to estimate the value of the PU/MAU as a marker of early diagnosis and risk factors (RF), the progression of CKD

Material and methods. The study included 317 patients: 99 (31.2%) men, 118 (68.8%) women aged 17–80 years.

The study was conducted in two different family polyclinics in the Bukhara region. The study included persons not previously observed at the nephrologist. Among these, 103 (32.5%) of the person does not consulted a doctor and had no complaints of the renal.

To assess the potential risk factors of CKD in all subjects performed a survey. We calculated the body mass index (BMI) formula Ketle, depending on what was recovered normal weight with BMI <25; overweight – a BMI of 25–30, obesity – BMI > 30.

All surveyed analyzed urine using test strips Combina 13 («Human GmbH", Germany). Test for measuring microalbuminuria (MAU) in the urine is based on the principle of the indicator color change under the influence of proteins. MAU level was determined according to the following scale: 10 mg/l norm (NAU), 10–30 mg/l – initial increase, 30–80 mg/l – average increase, 80–150 mg/l – high level. To verify the probability of MAU was determined with albumin/creatinine ratio (ACR). The ACR was evaluated on the following scale: Normal – normal; Abnormal – pathology; High abnormal – severe pathology. Kidney function was assessed by glomerular filtration rate (GFR).

Results and discussion. The detection rate of MAU (up to 10 mg/l) was 27.7%, but of these, 11.2% ACR was Abnormal. The initial increase MAU (10–30 mg/l) is determined at 47% average increase (30–80 mg/l) – in 21.8% MAU and high level (80–150 mg/l) – 3.5%.

The incidence of MAU> 30 mg/L in men was higher (68.6%) than in women (46.6%). When analyzing the detection of the frequency of MAU> 30 mg/L in different age groups, it was found that in the elderly (<60 years) the MAU was more frequent (40.6%) than the average (29.8%) and young (13, 8%) of the age of the contingent (p<0.001).

In our study the main risk factors CKD had hypertensive disease in 53.6% of cases, and coronary heart disease (ischemic heart disease) in 18.3% of cases. The most sensitive predictors were the following factors, such as, history of proteinuria and abuse of analgesics and nonsteroidal anti-inflammatory drugs (NSAIDs) (44.8% and 34.2%). The detection rate of MAU>30 mg/l in patients with hypertension was 67.6%, in patients with coronary artery disease and diabetes, 52.7% and 83.5%, respectively. In women who had a history of proteinuria (nephropathy during pregnancy), MAU > 30 mg/l was detected in 58.7%. MAU> 30 mg/l, associated with abuse of analgesics and NSAIDs, was 47.4% (p<0.01). The detection rate MAU>30mg/l in those with normal BMI was 22.3%, overweight (BMI>25) – 49.8% (p<0.01). Among the examined persons CKD was detected in 28.7% (91 people). The distribution of the stages of CKD was as follows: 1 st.– 4.4%, 2 st.– 84.6%, 3 st.– 11% (p<0.001). CKD with 4 and 5

st. not detected. To assess the role of the PU/MAU as the development of CKD risk factors, we assigned patients on a scale of MAU and analyzed their frequency of occurrence stage of CKD and its associated risk factors. Thus, a high level of MAU (80–150 mg/l) was detected in 11 people, 45.5% of them had 3 stage of CKD, 54.5% had 2 st. of CKD. The average increase in MAU (30–80 mg/l) was revealed in 69 people, among them CKD3 st.– in 7.2% of cases, 2 st – in 43.4%, 1 st.– in 1.4%. Initial increase of MAU (10–30 mg/l) was determined in 149 people, among them CKD3 st.– 1,3%, 2 st.– 23.5%, 1 st.– 3,4%. ($p<0.01$)

In the course of our studies, we established the relationship of CKD with general population characteristics – sex and age. Numerous studies have shown that CRF in men progresses more rapidly than in women. In our studies, this was also confirmed: the expressed MAU (<150 mg/l) and the third stage of CKD, were most pronounced among men – 76.9%. Elderly age is also one of the risk factors of CKD. The prevalence of MAU and CKD increased with age in our work. The most frequently occurring risk factors of CKD were MS and hypercholesterolemia. Obesity is risk factors of chronic disease, such as, II type of debate millets, coronary heart disease and HD. Simultaneously, these diseases are risk factors for the development of renal disease [5, 6].

Thus, the definition of MAU and GFR is of diagnostic importance and allows earlier detection of patients with different risk groups with CKD. Determining the MAU in an outpatient setting will allow early diagnosis and prevention of CKD.

PU/MAU, which is a predictor of CKD diagnosis, is simultaneously a developmental factor of CKD. Hypercholesterolemia worsens the prognosis of CKD. Given the close link between MS with MAU and HD, it can be concluded that there is a particular significance for MS in development and progression of CKD.

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ANALYSIS OF THE ROLE rs1544410 POLYMORPHISM OF THE VDR GENE TO THE DEVELOPMENT OF ROSACEA ASSOCIATED WITH DEMODEX FOLLICULORUM MITES

Abstract: The role of the polymorphism rs1544410 of the VDR gene in the development of rosacea associated with mites of the genus Demodex folliculorum was studied. The studies were conducted on samples of 140 patients with rosacea and 145 conditionally healthy persons of Uzbek nationality. The results of the study showed the significant role of BsmI *G* > *A* polymorphism of the VDR gene in the development of rosacea associated with Demodex folliculorum. The relationship of the chances of developing rosacea in the presence of Demodex folliculorum is significantly higher in patients with heterozygous genotype *G*/*A*.

Keywords: rosacea, erythematous form, papular-pustular form, VDR gene, polymorphism rs1544410.

Rosacea is a recurrent chronic inflammatory skin disease affecting mainly the Central part of the face and characterized by a stage course [1].

The etiology and pathogenesis of the disease have not been fully studied, and the method of treatment does not satisfy either doctors or patients. There are exogenous and endogenous trigger factors that contribute to the development of rosacea.

Exogenous causes include alimentary factor, heat (shower, bath, sauna), cold, solar insolation, etc., the presence of Demodex folliculorum in the skin. Among the endogenous causes, the most often revealed are disorders of the gastrointestinal tract, disorders of the immune system, psycho-vegetative disorders, vascular diseases, etc [2; 3; 4].

In dermatology, the role of Demodex folliculorum in the development of this rosacea has been discussed for a long time and many authors have found a high density of its contamination in the lesion of patients compared to healthy individuals [5; 6; 7]. Thus, G. sh. Gulyamova (2007) found this infection in 86.3% of patients with rosacea [8]. R. S. Babayants et al. (1983) in 75.7% of patients [9].

Despite numerous studies the question whether Demodex folliculorum is the cause of rosacea remains open. It is believed that the presence of this tick in the skin of patients exacerbates its clinical course, causing certain additional clinical signs, and makes torpid to the therapy [10].

At present, it is important to study the genetic polymorphism of various cytokines involved in the inflammatory process, in particular in the pathogenesis of rosacea. Until now, in scientific literature genetic aspects of rosacea, little studied. As for the Association of causal factors (Demodex folliculorum, Helicobacter pylori, microflora, etc.) with genotypic variants of polymorphisms of different genes in patients with rosacea have not yet been studied.

The aim of the present study was to analyze the role of rs1544410 polymorphism of VDR gene in rosacea development associated with Demodex folliculorum mites.

Material and methods of research. Under our clinical supervision were 140 patients suffering from rosacea. There were 103 women (74%) and 37 men (26%). According to the classification of the national society of rosacea (Wilkin J., Dahl M., Detmar M., et al., 2002) erythemato-teleangiectatic the subtype was sick 100 (71.4%) patients, papules-pustular 40 (28.6%).

The distribution of patients by clinical forms of rosacea and sex is presented in (table 1).

Table 1.– Distribution of patients by clinical forms of rosacea and sex

Clinical subtitles rosacea	Women		Man		Total	
	абс	%	абс	%	абс	%
Erythematosis-telangiectatic	74	52.85	26	18.6	100	50.6
papulo-pustular	29	20.7	11	7.9	40	28.6
Total	103	73.6	37	26.4	140	100

The material for the determination of Demodex folliculorum were morphological elements of the rash (papules, pustules, etc.), as well as the contents of the sebaceous glands. To take the material used a needle Banner, with which made a puncture in the morphological elements and scraped, or the skin was taken in the folds and by pressing it to get the material. The control group received only the contents of the sebaceous glands from the individuals. With a thick material, 1 drop of distilled water or saline was added. The obtained native drug was examined under the microscope "Leica" at 7x8 magnification. For a more in-depth study of mites used lenses with magnification of 10 ×, 20 × and 40 ×. When one or more ticks were found, Demodex was considered positive. The control group consisted of 30 healthy individuals.

All 140 patients with rosacea was determined by infection of mites of the genus Demodex. The frequency of patients with the presence of Demodex folliculorum tick was 69.3% (97/140). The remaining 43 patients (30.7%) did not have Demodex folliculorum. Of the 97 patients who were found Demodex folliculorum 66.0% (66/100) suffered erythematous teleangiectatic subtype, 77.5% (31/40) with papulo-pustular rosacea. The remaining 43 patients (30.7%) did not have Demodex.

The control group consisted of 145 healthy unrelated individuals (Uzbek nationality), corresponding by sex and age of the examined group of patients ($p > 0.05$), and who had no history of skin pathology. Genomic DNA preparations were used as a material for molecular genetic screening. DNA isolation from peripheral blood was performed by phenol-chloroform extraction and using a set of rib-Sorb (AmpliSens, Russia). PCR genotyping of polymorphism rs1544410 of VDR gene was carried out using the device "Applied Biosystems" 2720 (USA), using a set of company "Litech" (Moscow), according to the instructions of manufacturers. PCR products were separated by electrophoresis in 1–2% agarose gel containing ethidium bromide.

The deviation of genotypes from the canonical distribution of hardy-Weinberg was estimated using a computer program "GenePop", available on the Internet [10]. The coefficient of deviation of the actual heterozygosity from the theoretical one was calculated by the following formula: D = (Hobs-Hexp)/Hexp, where hobs and hexp are the observed and expected heterozygosity, respectively.

As a tool of statistical calculations we used the application package "OpenEpi 2009, Version 2.3".

Research result. It must be emphasized that when comparing frequencies of alleles and genotypes for all genetic markers in patients with the presence of Demodex folliculorum and its absence in subgroups of patients erythemato-teleangiectatic and papules-pustular rosacea subtypes was not statistically significant differences ($p > 0.05$).

The comparative analysis of allele and genotype frequencies of rs1544410 polymorphism of VDR gene in rosacea patients associated with mites of Demodex folliculorum genus (I-subgroup) and patients with absence of Demodex folliculorum (II - subgroup) revealed a number of associations. As can be seen from tables 2 and 3, there was a statistically significant difference in the distribution of allele frequencies *G* and *A* between I and II subgroups: the frequency of adverse allele a was higher in the group of patients associated with Demodex folliculorum compared to the group of patients without Demodex (37.6% and 19.7%, respectively; $\chi^2 = 8.7$; $P = 0.003$; $OR = 2.4$; 95% CI 1.34–4.48). The relative risk of rosacea + Demodex folliculorum combination for individuals with allele a increases 2.4 times compared to the alternative allele carriers. At the same time, the carrier of allele G is associated with a reduced risk of rosacea associated with Demodex (62.4% vs. 80.2%, respectively).

As expected, there was a significant decrease in the frequency of carrier of a favorable homozygous g/G genotype in patients associated with Demodex folliculorum compared to the group without Demodex folliculorum (33.0% vs. 65.1%, respectively; $\chi^2 = 12.5$; $P = 0.0001$; $or = 0.2$; 95% CI0.123–0.56).

Among the carriers of heterozygous genotype G / a there is a significant predominance of the number of patients with rosacea associated with Demodex folliculorum compared to patients without Demodex folliculorum (58.8% versus 30.2%, respectively; $\chi^2 = 9.7$; $P = 0.002$).

The relative risk amounted to $OR = 3.3$ 95% CI1.529–7.07. At the same time, there was no significant difference in the distribution of frequencies of unfavorable genotype a / A between the comparative subgroups ($\chi^2 = 0.5$; $P = 0.4$) although the frequency of this genotype in the first subgroup of patients was 8.2%, which is higher ($OR = 1.8$ at 95% CI0.374–9.06) compared to subgroup II (4.6%).

Table 2. – The frequency of distribution of alleles and genotypes of polymorphism rs1544410 of VDR gene in rosacea groups with presence and absence of Demodex folliculorum.

Rosacea group		Allele frequency				The frequency distribution of genotypes					
		G		A		G/G		G/A		A/A	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%
1	Major group (*n* = 140)	190	67.9	90	32.1	60	42.9	70	50.0	10	7.1
A	associated with the mite Demodex *n* = 97	121	62.4	73	37.6	32	33.0	57	58.8	8	8.2
Б	with the absence of the mite Demodex *n* = 43	69	80.2	17	19.7	28	65.1	13	30.2	2	4.6

Table 3. – The differences of allele and genotype of the rs1544410 polymorphism of the VDR gene

Alleles and genotypes	Group of patients with rosacea		Statistical difference
	associated with Demodex	with no Demodex	
Allel G	121	69	χ^2=8.7; *P*=0.003; *OR*=2.4; 95% *CI* 1.34–4.48
Allel A	73	17	
genotyp G/G	32	28	χ^2=12.5; *P*=0.0001; *OR*=0.2; 95%*CI* 0.123–0.56
genotyp G/A	57	13	χ^2=9.7; *P*=0.002; *OR*=3.3; 95% *CI*1.529–7.07
genotyp A/A	8	2	χ^2=0.5; *P*=0.4; *OR*=1.8; 95% *CI*0.374–9.06

Thus, the results of this study indicate the significant role of polymorphism BsmI *G > a* of the VDR gene in the development of rosacea associated with Demodex folliculorum. The ratio of the chances of rosacea development in the presence of Demodex folliculorum is significantly higher in patients with heterozygous genotype G/A.

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PURULENT-SEPTIC AND SPECIFIC COMPLICATIONS IN SURGICAL TREATMENT OF ESOPHAGUS THORACIC PART TUMOR

Abstract: The article is devoted to the topical problem – purulent-septic and specific complications which occur at the expanded operations on the esophagus with locally distributed and some disseminated forms of esophageal cancer; to discussing of modern treatment tactics of this formidable complications form; to the assessing of the possibilities for using new technologies and antibiotic therapy.

Keywords: esophageal cancer, specific complication, purulent-septic complication.

Introduction

About 5.2 millions of death cases due to malignant tumors are registered all over the world annually and esophageal cancer is the reason for 900 thousands of them. Esophageal cancer is distinguished by a high mortality. And about 70% of patients die during 1 year after the diagnosing. These sad digits are firstly connected with the fact that in 70–805 of cases esophageal cancer is already revealed at the late development stages when it is difficult to hope for successful treatment outcome and long life. The highest rate of esophageal cancer morbidity is in China, Iran and in the Central Asia countries – about 100 people to 100 thousands of population annually get ill in Uzbekistan [1–2; 4].

450000 patients are annually performed surgeries due to the cancer with a lethality in 30–70%. At an average up to 125 radical surgeries for treating esophageal cancer are performed at the leading hospitals of Uzbekistan a year, 450–550 patients are undergone chemotherapy and radiation therapy. A general mortality makes up from 13 to 36% during the first years after esophageal cancer diagnosing. A high post-operative lethality is conditioned by different complications.

A general quantity of post-operative complications by different authors data significantly varies from 55% to 70% [3, 7–8]. The most frequent postoperative complications are pneumonia, atelectasis, purulent pleuritis, empyema and their frequency makes up 19–50% [1; 4; 6]. The appearance of bronchopulmonary complications is conditioned by the severity of performed surgeries, their duration, denervation at lymphodissection, due to a high stem vagotomy and bronchial tubes drain function abnormality [4; 6; 8]. The other infectious complications can be as follows: postoperative wound infection of chest, abdominal wall or neck; subphrenic space abscess; septic conditions in 2–17% of cases [1; 5]. From our point of view and by other authors' investigation results the causes of infection and purulent-septic complications are anastomosis sutures inefficiency and transplant necrosis.

Aim

To analyze the causes of infectious complications development in patients with the cancer of thoracic esophagus in early postoperative period; to develop the methods for their prevention and treatment.

Material and methods

216 patients with the cancer of thoracic esophagus were performed surgeries at the Esophagus and Stomach Surgery Department of our centre from 1994 to 2018. There were 101

(46.76%) females and 115 (53.24%) males. 139 (64.35%) among them were at capable and 75 (34.3%) – at mature age.

The basic parts of the performed surgeries were: extirpation or multilayer resection of esophagus; lymphodissection; formation of esophageal transplant from greater curvature of stomach, forming of esphagogastroanastomosis. At the end of the surgery the draining of the chest, mediastinum, abdominal cavity and neck wound have been performed. All operations were one-phase during 5–6 hours.

Results

Anastomosis between esophagus stump and transplant were formed at the neck level in 216(100%) cases, the approaches were defined subject to the tumor localization. In 159(73.6%) patients abdominocervical approach has been used and in 49(26.4%) – thoraco-abdominocervical one. A surgical injury can also cause the development of purulent complications subject to the type of approach.

In all 216(100%) patients a predisposing factor to the development of purulent complication was alimentary cachexia associated with dysphagia. According to the dysphagia rate by Chernayvskiy A. A. (1991), the patients were randomized as follows: rate I (dysphagia only to hard food) – 50(23.1%), rate II (dysphagia to hard and solid food) – 140(64.8%), rate III (dysphagia to hard, solid and fluid food) – 21(9.7%) and rate IV (full esophageal obstruction) was 5(2.3%) patients. As we mentioned above, one of the reason for purulent complications development is anastomosis sutures inefficiency (in 43(19.9%) cases) and it has a direct relation with a method of anastomosis formation, but in this study we will not discuss these moments.

According to the surgical treatment results there were different purulent-septic complications in the wound area in 37(17.1%) patients and in broncho-pulmonary system – 39 (18%) cases.

In all cases of bronchopulmonary complications in 76(35.2%) patients we studied a bacterial origin and sensitivity to antibacterial agents. Pathologic samples from wound area, anastomosis, drain, bronchus lumen were taken with adherence of safety. The results analysis has shown that the following pathogenic micro-organisms were revealed: Pseudamonas aerogenosus (29%), Stafillococcus aureus (37%).

Sensitivity to antibacterial agents was as follows: Aminoglycosides (Amikacin) – highly sensitive; Cephalosporines, gentamycin – medium sensitive; the other drugs including fluoroquinolones – stable. Amikacin being highly sensitive was used in combination with metronidazole (1gr 2 times a day, 7 days). During antribacterial therapy we carried out microbiological control and study the immune status of organism. C-reactive protein varied in the range of 90–100mg/l at the beginning of inflammatory process. The patients usually recovered after 7–10 days. Antiseptic drugs were used for wounds d-bridement. There were also performed the following procedures at the treatment of bronchopulmonary complications: a bronchoscopic sanation, drugs inhalation by the way of insufflations, respiratory gymnastics, percussion and others.

Conclusions

1. Surgical treatment of esophageal cancer is very labour-intensive process. Esophageal anastomosis sutures inefficiency (19.9%), purulent inflammations of lungs and pleural cavities (17.1%) and surgical wounds suppurations (18%) negatively influenced on treatment results.

2. A rational use of highly sensitive antibacterial agents in combination with other essential drugs in early postoperative period made possible to prevent purulent complications development in 140(64.8%) patients. In 68(31.5%) cases with bronchopulmonary and specific complications antibacterial therapy was effective in 90% of cases. The cause of the lethal outcomes in 10.5% of patients were purulent-septic complications.

3. Nowadays at purulent-septic complications the method of antibacterial agent choice are Aminoglycosides.

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CHARACTERISTICS OF THE LIPID SPECTRUM VALUES IN THE PATIENTS WITH CHRONIC RENAL DISEASES

Abstract: Metabolic disorders in chronic renal diseases can be considered as a lipid distress syndrome, which is a systemic pathological reaction of the organism that arises on the basis of violations of lipid metabolism. The detection of initial manifestations of lipid metabolism disorders in patients with CRD allows the identification of high-risk groups with an unfavorable outcome.

Keywords: chronic renal disease, diagnosis, lipid spectrum.

Chronic renal disease is widely spread pathology and it is met in developed countries in 10–11% of population [2; 6]. Urgency of the study of lipid metabolism in nephrology is conditioned by the proven participation of kidneys in lipid exchange, increase of atherosclerosis specific weight among the reasons of invalidation and death of patients with renal diseases, completely negative impact of some drugs (glucocorticoids, cytostatics, diurrhetics, hypotensive agents, etc) used for the therapy of nephrologic patients on lipid exchange [1; 5]. It is known, developed dyslipoproteinemia (DLP) leads to lesion of endothelium of capillaries in glomerula and accumulation of lipids in mesangial cells, which link and oxidize low density lipoproteins (LDLP), and that stimulates proliferation of mesangium and development of glomerular sclerosis. Besides that, lipoproteins filtrated in glomerula, are accumulated in channels, they induce tubular interstitial processes, interstitial sclerosis, and development of chronic renal failure (CRF) [4].

In case of nephropathies energetic demands of kidneys, covered mostly by means of lipid oxidation, where the basic source of energy for a complete perfused kidney are free fatty acids (FA), suffer the most [7]. It is clear, that basic renal syndromes (nephrotic, hypertensive) determine formation and progress of DLP, though these are often diagnosed at late stages, when there are CRF manifestations [8; 9].

Detection of predictors of development and progression of renal lesion will provide effective performance of primary and secondary nephroprotection, by these means inhibiting development of nephrosclerosis progression.

The objective: to study the values of lipid spectrum in patients with CRD dependently on the stage.

Materials and research methods. The study involved 51 patients (21 men and 30 women) with CRD I–IV stages, mostly parenchymal renal diseases (chronic glomerulonephritis, chronic recurrent pyelonephritis, etc) in the age from 30 to 74 years old, the average age was 52 ± 10 years old. CRD was determined as damage of kidneys with any etiology and/or decrease of its function, registered within three or more months. CRD stages were determined in compliance with the National Kidney Fund classification, USA (NKF K/DOQI, 2002) dependently on the GFV rate and presence of renal damage markers [3].

All patients had standard clinical laboratory and instrumental tests.

GFV was calculated using shortened MDRD (Modification of Diet in Renal Disease Study) formula. For the performance of the basic analysis all patients were divided to two groups: the 1st group involved 20 people with CRP I–II stages; 2nd group 31 people with CRP III and IV stages.

CRD criterion was considered to be the velocity of glomerula filtration below 60 ml/min/1.73m^2 lasting 3 months and more with or without renal lesion symptoms. Renal lesion is structural and functional renal abnormalities revealed in the analysis of blood, urine or by visual examinations [9].

The study did not include patients with CRD V stage (terminal renal failure); lupus, systemic vasculitis; severe cardiac-vascular pathology, developed prior to the start of renal disease; renal failure; hypothyroids or thyrotoxicosis; patients with neural degenerative or demyelinating pathologies and neural infections diagnosed earlier.

Control group consisted of 20 examined people: 10 women and 10 men, the average age of whom was 48.2 ± 8.8 years old; somatically healthy people in the history of which there was cardiac-vascular pathology and disorders of carbohydrate exchange. Comparison group was compatible in age and gender parameters. When the members of the control group were checked again using N. S. Korotkov's method we registered AP rates below 140/90 mm.m.c.

For the detection of proteinuria (PU) a test with sulfur salicylic acid was done with further qualitative definition of protein using photometer ROKI-2002 (Olvex Diagnosticum Ltd., Russia).

We also determined amount of total cholesterol (TC) in blood, triglycerides (TG), cholesterol of high density lipoproteids (HDLP C), cholesterol of low density lipoproteids (LDLP C), and atherogenecity coefficient (AC).

The results of the study were evaluated using parametric and non-parametric methods with the help of a set of applied programs of STATISTICA 7.0.

Results of the study. Most of the patients with CRD are patients with GFV below 60 ml/min (31 out of 51 (60.8%)). In the general group the part of patients with renal failure is great 43.1% (22 out of 51).

Part of the patients with SAP 150 mm.m.c. and more (167.3 ± 1.4 mm.m.c.) is reliably bigger in the group of patients with CRD III and IV stages compared to the patients with CRD I–II stages (134.4 ± 1.4 mm.m.c). Average duration of AH in the patients of the 2nd group was significantly longer than in the patients of the 1st group (8.6 ± 0.5 years and 4.9 ± 0.3 years, respectively; P < 0.05).

The number of patients with cerebral vascular diseases with atherosclerotic nature (AFCC, ТИА) was reliably bigger in the 2nd group of patients 21.3% (7 out of 31), compared to the 1st group – 10% (2 out of 20; $P < 0.05$). there was a tendency for revealing a greater frequency of cerebral vascular pathologies in the 2nd group compared to the 1st one (19.4% (5 out of 31) versus 10.0% (2 out of 20); though there was no statistically significant difference.

Assessment of average values of the studied lipid of blood serum in the group of patients with CRD revealed that the majority of analyzed values differed from the values in healthy group. Compared to healthy people patients with CRD had TC higher to 27.0% ($p < 0.01$), LDLP C to 46.4% ($p < 0.01$), and atherogenic potential of blood serum, calculated according to AC, was 6 folds increased ($p < 0.05$).

The study of correlation analysis revealed that the values of lipid spectrum were interrelated with the values of GFV in the patients with CRD. There was correlation feedback with the values of TC ($r = -0.628$), LDLP C ($r = -0.518$), TG ($r = -0.499$) and with HDLP C ($r = 0.510$). The achieved data prove that misbalance of lipid spectrum leads to progression of CRD.

Thus, the character of dyslipidemia in the patients with CRD differs dependently on the stage of the process. Patients with CRD had hypertriglyceridemia due to the decrease of enzyme processing of TG, conditioned by the decrease of lipoproteid lipase and hepatic triglyceridlipase activity [4]. Besides that, patients with CRD were characterized by low values of anti-atherogenic HDLP, promoted by low concentration and activity of lecithin-cholesterol-acyltransferase, leading to disorder of the synthesis, transport of HDLP and accelerated degradation of HDLP [1; 4].

Metabolic disorders in case of CRD can be considered as lipid distress-syndrome, representing systemic pathologic reaction, appearing on the basis of disorder of lipid exchange and promoting appearance of new or progression of existing pathologies.

Revealing of initial manifestations of lipid exchange disorder in the patients with CRD provides definition of the high risk group with unfavorable outcome.

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INFLUENCE OF BIORHYTHMS ON STUDYING FOREIGN STUDENTS AT A MEDICAL UNIVERSETY

Abstract: The article deals with the manifestations of daily fluctuations in mental and physiological functions and their use in labor, educational and other fields of foreign student's activity in the medical university.

Keywords: biorhythms, learning process, working capacity of foreign students.

The vital activity of all biological systems on Earth is prone to cycle. And man is no exception. Our organism continuously interacts with the surrounding world, exchanges energy and information with it. Due to the constant interaction of human biological rhythm adapts to the environment biorhythms. The received information from sensory organs, the CNS regulates the release of various hormones, activating or inhibiting the work of the whole organism, therefore the biological rhythms of man and the world are intertwined and proceed in the same order [1, 30–50].

Between biorhythms and working capacity there is a thin link. The efficiency increases with optimal coordination of the human life's rhythm with its individual biorhythm. Indicators of the functional state of the circulatory, endocrine, and other systems of the body have allowed suggesting assumptions about different types of human capacity. As a result of many scientific studies scientists from different countries have been able to prove that some people experience the same fluctuations in the level of physiological abilities course of during the day. Famous Russian chronobiologists V. O. Doskin and N. O. Lavrentiev found that most people experience rhythmic variations in performance:

41% prefer to work in the early hours;

30% prefer working at night or at night;

29% can work equally well during wakefulness.

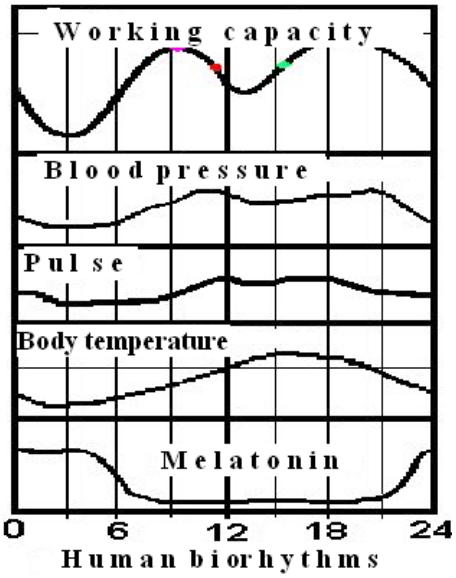

Figure 1.

German researcher G. Hump found that the representatives of the early type -mostly belong to employees, the evening-people of mental work, arrhythmics – persons engaged in physical activity [7, 56–70].

The student's ability to work depends largely on the schedule of the day, how many hours a day he spends on classes, and

how much to rest, in particular, sleep and other activities. All this basically depends on the biological rhythms [8, 93–99].

Table 1. – Depending on the ability to work people are divided into:

	«larks»	«turtledoves»	«owls»
Women	25%	50%	25%
Men	50%	–	50%

In our work, we decided to conduct a study to determine the daily human chronotype and to determine the biorhythmological organization of functions. The research was conducted with the help of questionnaires and observations.

Among our foreign students, we found individuals with a persistent stereotype of disability, as well as arrhythmias. Students attributed to the earliest type-"larks" – get up early, cheerful, cheerful, keep an uplifting mood in the daytime; The highest working capacity is kept at them from 9 to 14 hours; in the evening their efficiency is noticeably reduced. This type of students is most adapted to the mode of study, since their biological rhythm coincides with the social rhythm at our university. Unfortunately, there are so few foreign students who come to us from different countries of Africa, Asia, the Middle East, India, Latin America and European countries [4, 7–9].

Students of the evening type – "owls" – have the greatest capacity from 18 to 24 hours; late go to bed often do not fall asleep, usually late for classes; in the first half of the day are slowed down, so they are in less favorable conditions, especially when there are practical or final classes in the morning. Unfortunately, there are a lot of them among our foreigners. First of all it is connected with climatic, and secondly – social conditions in which they have grown up. The heat is in the daytime, siesta and rest, and the most activity in the evening and at night, when the heat is slightly reduced.

The period of decline in the ability to work for both types of students should be used for rest and lunch, and if you need to study, then the best is the least complex disciplines. For "owls" it is advisable to arrange consultations and prepare for practical lessons from the most difficult sections of the program and disciplines from 18 hours, and students – "larks" to prepare for practical lessons better in the morning.

Based on the questionnaire we conducted students from African countries and India in most "larks" and prefer to get up 5–6 hours in the morning and prepare for practical classes, while those from Asia and the Middle East will love to sleep in the morning and stay up late tonight.

Our observations have shown that in students– "larks" 1.5 times more often there is hypertension than in the group "owls". This is explained by the fact that in the "larks" in the morning the body faster and more actively thrown into the blood adrenaline and norepinephrine, which increase blood pressure. In students– "owls", internal mechanisms that influence pressure increase work slowly. The third group of students – arrhythmics – is an intermediate between "larks" and "owls", but closer to "larks". They turned out to be the least among our surveyed ones. These are mostly African-speaking people who lived for some time or were born and raised in European countries. In addition, they adapt quickly enough to change the biological clock.

Figure 2.

An analysis of the actual data on the livelihoods of students suggests its disorderly and chaotic organization. Violations of the biological rhythms of the basic physiological functions are manifested in all: untimely feeding, systematic lack of sleep, violations of the training and rest regimen, activity and sleep, etc. Therefore, for a period of studying at a university, a healthy student worsens his health quickly. And health 60–70% depends on lifestyle. It is necessary to have sufficient intelligence, special knowledge and will power to withstand self-destruction. And here the important place is the knowledge and the help provided by our faculty during classes and curators of academic groups outside of classroom to foreign students [5, 153; 6, 39].

On the dynamics of labor productivity is influenced by biological laws, environmental conditions and production activities, as well as a number of subjective factors. On working productivity in a descending order affect the duration of the working period, the experience of this work, the level of motivation, the predominance of elements of accuracy or speed, the influence of factors of the environment (noise, temperature, etc.). In the daily rhythm of efficiency, the whole hierarchy of many of the rhythms of the human body, in particular, the rhythm and state of the central nervous system, the system of analyzers, the motor apparatus, the etching, etc., is manifested.

After analyzing the data we can choose the right methods of work during the educational process, paying attention to the study of various topics of the course for alternation and rest during the study of higher nervous activity, give recommendations on the methods of memorization in learning memory, pay attention to motor processes in the sections "CNS" and "Cardiovascular system", give appropriate recommendations for nutrition and the regime of the day when passing the section "Digestion", while studying the topic "Breathing" to recommend preventive measures with colds and diseases of the upper respiratory tract. We discuss the issue of adaptation in the topic of "Endocrine system" and "Digestion", as well as "CNS".

It is useful to know the individual rhythm of working capacity for every person, and especially the student, as this knowledge will help in preparation for practical classes, especially during the preparation for the final sessions and session exams.

In the individual system of healthy lifestyles and maintenance of working capacity, self-control is crucial, which is accustomed primarily to active observation of their physiological state. Such systematic monitoring of the indicators of the basic systems of the organism and their constant analysis will provide important assistance to students in planning their workloads, working week, will allow more rational use of time and realize their capabilities to solve their tasks: to find time for learning, and for physical development, and for recreation.

The study of biorhythms of the human body makes it possible to scientifically approach the health of students for the comprehensive and harmonious development of their physical and spiritual qualities, as well as to improve the organization of all life processes. The interaction of the body, of feelings and of the spirit leads to the interaction between them and from this point of view, each individual is individual.

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THE EFFECTS OF ELECTRICAL MUSCLE STIMULATION TRAINING (EMS) ON IMPROVING POSTURAL PARAMETERS IN MIDDLE AGE (50–60 YEARS)

Abstract: This study illustrates how the methods of training with electrostimulation work and what are its effects on health and on physical and physiological parameters. EMS is a healthy method that accelerates metabolism, increases strength and endurance, reduces back pain, tones and removes excess kilograms. Everything is parallel to the diet. The results are different and this depends on the metabolism of each of the operators: rehabilitation purposes (post-operative muscle development); improvement of back pain; local muscle development (for athletes).

Keyword:

Introduction

How does EMS training works?

When we talk about EMS training we refer to a training integrated with the muscle stimulation technology that has long been used in the field of rehabilitation medicine. The electrical impulse generated by the WB-EMS device replaces the normal electrical impulse of the muscle that the central nervous system sends to the muscle to contract it. EMS training in this way reacts directly to the nerve that connects the muscle to the central nervous system causing contraction.

The best results are achieved when active exercises are combined with electrical stimulation: each exercise, which leads to muscle contraction, will also stimulate a corresponding elective impulse from the outside. The muscle will thus experience a further increase in tension, an optimal presence and a recruitment of its fibers, with even more effective stimulation.

During EMS training, approximately all the motor units are activated synchronously. This means that at the same time, during which only some of the few muscle groups could be trained so far, it is now possible to complete a full body exercise. Working with the training parameters and choosing the appropriate exercises, you can achieve the desired results, from muscle tone to weight loss, increased metabolism and improved sports performance.

To improve the potential of sports results, so-called "self-aware" load limits must be applied during training. These stimulations are created on the basis of a common load and interfere with the biological balance. For this reason, loading and relaxation should be planned as a unit, relaxation should work in proportion to the intensity and volume of the exercise. The training sessions can be up to two a week with a duration of 20 minutes each. The period of rest between them should be at least 72 hours, which will allow the body to recover and eliminate the unnecessary substances that are created during training.

When we can use the EMS training?

This type of training is very effective in the case of muscular imbalances to be compensated if the back pain must be alleviated when the pelvic floor muscles have to be tightened and the blood circulation must be encouraged. During high performance sports, EMS Training is used to achieve optimal excitation of training in terms of muscle guidance:

1. EMS is used for amateur and professional sportsmen. The combination of EMS with active exercises leads to new levels of resistance and performance. Electrostimulation allows greater muscle contraction and increases strength in the speed range. Individual training procedures that activate a large number of muscles have an optimal influence on developmental abilities such as endurance, maximum strength, explosive strength and muscle development.

2. For rehabilitation needs after a short or long period of rest for health or traumatic reasons [1, 88–93].

3. For those who want to lose weight and increase metabolism while maintaining a good muscle tone.

Advantages of the use of electrostimulation technique

- Influences the conservation of the locomotor system from damage: the EMS exercise is an exercise "without extra loads". The intensity of the exercise during the EMS is created not through heavy weights, but through electrostimulation. And this aspect is the most protective for the wrists and for the locomotor apparatus. During EMS training, exercise intentions are produced by electrostimulation. As a result, you can perform a workout that protects your wrists and does not use extra loads through weights;
- Compensation for muscular imbalances: EMS allows the targeting of muscle groups. This is especially important if

the muscle differences are compensated. Here we talk about all those people who make a sedentary life because of the profession [2; 8];

- The effects of muscle stimulation on power capacity: through EMS it is possible to produce a stronger muscular contraction than when the energy develops voluntarily. Moreover, the rapid stimulation of the muscle fibers and fast muscles of the trunk will be visible;
- Maximum power and endurance affects: inexperienced people are able to voluntarily control only 40–70% of their energy potential. EMS reduces this energy deficit between maximum and absolute energy. This is because, through EMS, the motor units are able to synchronize and take better action. Furthermore, resistance increases through EMS in a visible and verifiable manner;
- Electrostimulation has a good effect on muscle development (hypertrophy): the maximum increases already mentioned through EMS are substantially attributed to the increase in muscle mass. The enlargement of the thorax, upper and lower limbs is visible. Often, these effects of muscle response are observed a few days after the training units;
- Compensation for muscular imbalances, better attitude, less backache: the imbalance of the musculature of the vertebral column, abdomen and pelvic floor is a permanent postural problem. Through EMS, these muscle groups can be directed and trained effectively, especially during imbalance and when there is pain in the spinal cord, the results are very evident and after a short time. In a study by Bayeruth University, it was concluded that EMS Training is a good way to reduce back pain and increase strength in the same way or in a better way than usual strength training [3]. At the same time, the correct compensatory positions are corrected, an aspect that further improves attitude and mobility;
- EMS influences muscle development after surgery: various studies have shown that through EMS, muscle retraining after an operation can be effectively accelerated. Especially when used during the acute phase, shortly after surgery;
- There is efficiency in increasing sports performance: Resistance has low returns in many types of sports. EMS is offered, when it is intended to improve specific endurance to sport, improves the quality of muscle constituents and serves to balance imbalances. Complementately, EMS is offered through numerous types of technical and specific training as an alternative, which saves time, compared to traditional training [4];
- Electro-stimulation training programs help reduce weight and subcutaneous fat: the EMS promotes a continuous reduction of body weight and body fat. High metabolic activity, during and up to several hours after EMS training, causes a high volume of work. The continued development of fat-free muscle mass causes a significant increase in basal metabolic rate. In women, a reduction in fat mass obtained through EMS can be found, mainly in the problem areas: the waist, hip and thigh and at the same time the tension in the chest and wrist. Furthermore, in men, EMS leads to voluminous contractions of life, the enlargement of the chest, the arms and the lowering of the perimeter of life. There is a slight and constant increase in the musculature of the legs and buttocks.

Both men and women generally have a 5–9% reduction in fat mass, which is more evident in males because muscle mass tends to grow more than women for genetic and hormonal reasons. This was noted in a study at the University College of Nyíregyháza (Hungary), where it was found that after 16–18 sessions of EMS the muscles and fat mass had changed significantly. Specifically, the subjects involved in the study had an average waist circumference reduction of 4–6% while muscle mass values increased by 30–50% [5]:

- It affects the protection of the joints, since with the EMS we do not use barbells and weights: time is saved, as in a year you can save on average 300 time and effort;
- Regulates muscle tension: improves the relationship of muscle tension given that the energy transmitted to each muscle is the same and in traditional exercise is impossible. During the exercise, adrenaline is released at a high level. After 20 minutes of exercise the high level of stress improves significantly [6, 75–81];
- Professional sportspeople in 12 sessions x 20 minutes can improve explosive strength, speed and endurance by 20–30%. Untrained individuals can improve 40–100% of strength, speed and endurance.

It should be kept in mind that, as in all types of training, either for competitive or amateur goals, even for EMS Training it is mandatory to have a medical certificate.

All people who use the pacemaker, have circulatory problems, cardiac arrhythmia, kidney problems, abdominal or inguinal hernia, tumor, atherosclerosis, diabetes mellitus, neurological diseases, bacteriological or viral diseases, hemophilia, plastic operations should consult with a specialist doctor who will be able to use EMS Training.

Materials and Methods

18 people in the 45–55 age group were taken for the study, 9 women and 9 males, who attended a gym (Body Code) and a group of 18 people of the same age group (9f + 9m) as a control group. The study was done for a period of 12 months with a frequency in the gym of 1 time a week with 20 min of training. Data were recorded before starting the program and at the end of the period mentioned above. Comparative analysis revealed significant changes in all physical and physiological parameters.

Results

After 12 months, significant changes in overall muscle mass were observed for the EMS group (0.6 ± 2.2%) compared to the control group (–0.6 ± 1.9%) (p = 0.025) and abdominal fat mass for the EMS group (–1.0% ± 4.8%) compared to the control group (2.3% ± 5.6%) (p = 0.038).

In addition, the muscle mass of the upper leg varied in favor of the EMS group (0.6% ± 2.3%) compared to the control group (–0.9% ± 1.8%) (p = 0.033), while the effects on the fat mass of this part of the body were within the limits (–0.7% ± ± 3.3%) for the EMS group compared to the control group (1.1% ± 2.5%) (p = 0.050).

In terms of functional parameters, the effects on the thrust force of the feet were distinct in favor of the EMS group (9.2% ± 10.9%) compared to the control group (1.2% ± ± 7.9%) (p = 0.010).

Conclusions

Analyzing the results obtained from the case study described above, we come to some conclusions that show that the use of EMS training in the case group for a duration of 12 months with a weekly session of 20 minutes has had positive and very visible effects in compared to the control group. Significant changes have been observed in the change in overall muscle mass, but also in the change in abdominal fat mass. Important for the age group was the result obtained in the thrust force that was very distinct in the case group compared to the control group.

In conclusion, the use of EMS training in the 50–60 age group should be customized on demand and is highly effective in improving the appearance of fitness.

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RADIOSENSITIZING EFFECT OF K-19 AND K-2 UPON THEIR INTRATUMORAL ADMINISTRATION TO ANIMALS WITH WALKER'S CARCINOSARCOMA STRAIN

Abstract: The efficacy of new antitumor drugs K-19 and K-2 was studied in rats with a transversal tumor strain of Walker's carcinosarcoma with intratumoral administration as substances that enhance the effect of radiation exposure. An evaluation of the efficacy showed that the combination of K-2 with irradiation causes an additive effect, Which is 22% higher than the effect of radiation, and K-19 increases the effect of irradiation by 25%.

Keywords: new anticancer drugs, K-2, K-19, radiosensitization, Walker's carcinosarcoma, intratumoral administration.

The application of antitumor drugs with properties to enhance the effect of radiation therapy seems to be the most promising direction in terms of increasing the effect of ionizing radiation [2; 3]. Antineoplastic drugs K-19 and K-2, which possess high antitumor activity [4; 5; 6], have been developed at the Republican Specialized Scientific and Practical Medical Center of Oncology and Radiology (RSSPMCOR), which are currently being studied for use in a new quality – radiosensitizers [7–10]. Data have been obtained that these substances have the property of enhancing the effect of irradiation when exposed to mice with transfused tumor strains of Sarcoma 180, a solid Ehrlich tumor, and rats with transfused tumor strains of Walker's carcinosarcoma (CSU) and Sarcoma 45 [7–10]. On the tumors of mice, the radiosensitizing effect of new drugs was studied and the ability of K-2 and K-19 preparations, applied for 16 hours before both single-dose irradiation at a dose of 4.5 Gy, and fractional irradiation at the same total dose (1.5 Gy × 3) The effect of irradiation is 32–42%. Also, a study of the radiosensitizing effect of drugs on rats with Sarcoma 45 tumors and Walker's carcinosarcoma revealed that new drugs applied for 16 hours before irradiation of 7Gy increase the effect of single irradiation on rats with KSU K-2 tumor by 33%, K-19 by 28%, and in rats with a Sarcoma 45 K-2 tumor at 49/56 and K-19 by 47/55%, while reducing the side effect of irradiation [10–12]. It is also necessary to evaluate the efficacy of the new antitumor drugs K-2 and K-19 as substances that enhance the effect of irradiation with intramedullary administration, since successful treatment of patients with intramedullary administration of such drugs as metronidazole in combination treatment of rectal cancer [13] and usage of sanazol in the complex therapy of locally advanced breast cancer has been reported in the literature [1].

Aim of research: Evaluation of the effectiveness of new antitumor drugs K-19 and K-2 with intratumoral administration in rats with an intertwined tumor strain of Walker's carcinosarcoma as substances that enhance the effect of radiation exposure.

Materials and methods of research: The object of the study was the preparation K-19 and K-2, synthesized from colchamine and created in the laboratory for the development of antitumor drugs RSSPMCOR. All the experiments were carried out in accordance with the recommendations and requirements of the World Society for the Protection of Animals (WSPA) and the European Convention for the Protection of Experimental Animals (Strasbourg, 1986). In this work, 36 outbred rats weighing 77–90 g were used. The animals contained 4–6 individuals under the natural illumination regime with free access to water and food. Six animals were tested in experimental and control (with the infusion of physiological solution) groups. The study was performed on rats with a transversal tumor strain of Walker's carcinosarcoma, which was obtained from a tumor bank of the Russian Blokhin Cancer Research Center and passaged on donor rats, according to the strain protocol: the tumor is grafted subcutaneously with a suspension of tumor cells of 30–60 mg in 0.3–0.5 ml of nutrient medium per rat [18].

The study of the radiosensitizing effect of the injected preparations (together with irradiation) on animal tumor carriers was started on the 20th day after tumor inoculation. The drug

solution was injected into the developed tumors, the tumors were cut off from 3–4 sides, the preparations were administered at a dose of 0.3 ml per 100 g of the rat 16 hours prior to exposure to the irradiation. The irradiation was carried out on a gamma therapeutic device TENRATRON with a power of 1.25 MeV, a Co60 source in a total dose of 7 Gy, locally on the tumor. Each animal was attached to a special fixator, shielded with a lead block and a special hole in place of the tumor. Within 7 days after the drug was administered, the rats were euthanized by ether anesthesia using humane methods of working with laboratory animals [18]. The body mass of the animals was determined before and in the end of the experiment. In the course of the experiment to study the dynamics of tumor growth, tumor volumes were measured through the skin of animals in all groups (in 3 projections) at 10 and 17 days after tumor transplantation and during slaughter. At the end of the experiment, in slaughtered animals, the efficacy was determined by the volume (V) of the extracted tumor tissue, and by the tumor mass in the compared groups. The inhibition of tumor growth was calculated by the formulas [18]. The tolerability of the treatment was evaluated by the death of animals, for the indirect assessment of possible hematotoxicity in dead and killed rats, the weight of the spleen was determined. Time of observation: from the beginning of the experiment, i.e. transplantation of the tumor, to the slaughter of animals – 27 days.

Statistical processing was carried out using the program Statistica, version 6.0. $p < 0.05$ was taken for the level of statistical significance.

Results and discussion:

Effects on animals were evaluated in the following groups (drugs were administered intramondemally): 1 group – control received physiological solution, the 2nd group received irradiation 7Gy, the 3rd group received K-2 at a dose of 100 mg/kg once, in the 4th group the animals received K-2 at a dose of 100 mg/kg 16 hours prior to irradiation. In the 5th group, animals received K-19 in a dose of 50 mg/kg, in the 6th group, animals received K-19 at a dose of 50 mg/kg 16 hours before irradiation. An experiment on animals with the Walker's carcinosarcoma strain was started 20 days after transplantation according to the above schemes, tumor measurements were performed 10 and 7 days after transplantation, animals were slaughtered on day 7 after administration of the preparations and irradiation, the mass and volumes of tumors, and the mass of the spleen were measured. The death of animals during the experiment was in the groups receiving irradiation of 7 Gy, as well as in group 5 with the use of preparation K-19 (Table 1.).

Irradiation of 7 Gy caused an effect in 65%, (by volume and mass of tumors). When studying the effects of K-2 and K-19 preparations with a single intratumoral administration, it was found that they cause the effect in 50/45% and 65/64%, respectively. When K-2 was administered 16 hours before irradiation, the effect of suppressing tumor growth was 87/86%, which is higher than the irradiation effect of 7 Gy at 22/21%. K-19, administered 16 hours before irradiation, causes an effect of 90%, which increases the irradiation effect of 7 Gy by 25%.

Table 1.– The effect of intratumoral administration of K-19 in a dose of 50 mg / kg and K-2 in a dose of 100 mg/kg to rats with Walker's carcinosarcoma strain both independently and 16 hours prior to irradiation of 7 Gy (treatment from 20 days after tumor transplantation)

Group of animals	Amount of animals/ case	Mass of animals (g)		Volume of tumor (sm$^{3)))}$			Mass of tumor (g)	% inhibiton		Mass of spleen (g)
		Before experi-ment	After experiment	On 10 day	On 17 day	On 27 day		By volume	By mass	
1. control	6	88.8 ± 3.9	92.6 ± 22.4	10.3 ± 2.4	20.3 ± 6.15	57.1 ± 11.3	47.2 ± 0.73			1.7 ± 0.32
2. radiation 7gr	6/2	90.8 ± 3.3	52.2 ± 16.6	7.0 ± 1.1	17.5 ± 6.40	19.8 ± 3.2	16.3 ± 0.7	65	65	0.8 + 0.04
3. K-2100 mg/kg	6	79.2 ± 3.7	87.2 ± 18.0	4.0 ± 1.1	17.7 ± 3.45	28.6 ± 6.7	26.0 ± 6.3	50	45	1.1 +0.05
4. K-2100 mg/kg 16 hrs prior to radiation 7 gy	6	76.7 + 3.3	75.2 + 4.0	6.4 + 1.3	15.4 + 3.5	7.7 + 1.11	6.3 + 0.8	87	86	1.1 + 0.05
5. K-19 50 mg/kg	6/1	88.3 + 4.2	102.5 + 8.3	8.7 + 1.0	11.2 + 4.2	19.9 ± 6.9	16.8 ± 5.9	65	64	1.1 ± 0.13
6. K-19 50 mg/kg 16 hrs prior irradiation 7 gr	6	90.0 + 3.5	95.0 + 5.8	11.0 + 0.7	14.8 + 1.5	5.8 + 0.33	4.7 + 0.33	90	90	1.0 + 0.04

*Note: * The differences are statistically significant in comparison with the control at P < 0.05. STG-inhibition of tumor growth by V/M (volume/mass)*

In the experimental group with irradiation, the body weight of the animals was reduced by 42%, the spleen weight by 52%. In other experimental groups, body weight decreased only in group 4 (by 2%), and the weight of the spleen did not decrease as much as in the irradiation group: 35% in groups 3–5 and 41% in group 6, compared with control group.

The dynamics of tumor volumes is shown graphically (Fig. 1). In the control group of the tumor, from 17 to 27 days, increased by 3.8 times, in the 2-group, where irradiation at a dose of 7 Gy was applied, the tumors increased 1.13 times. The effect of K-19 reduced the tumors 2.5-fold 16 hours before irradiation. The effect of K-2 reduced the tumors 2-fold 16 hours before irradiation.

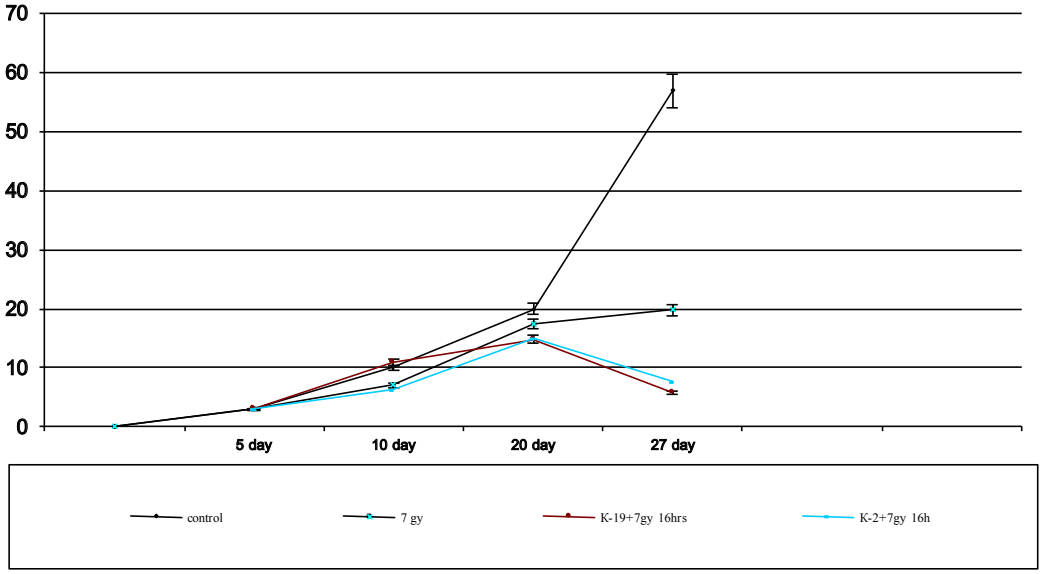

Figure 1. Dynamics of tumor growth of csu in treatment with irradiation, preparation k-19 and preparation k-19, applied 16 hours before irradiation intramammally

A study of the antitumor activity of drugs with a single intratumoral application on day 20 after transplantation showed that K-19, in comparison with K-2 in the transfected Walker's strain, exhibits a more significant antitumor effect with a difference of 15/19%, which can be explained by a higher activity K-19, and its better solubility. However, radiosensitizing activity of K-19 with intramural injection in comparison with K-2 is only 3–4% higher in weight and volumes of treated tumors. The combination of K-2 with irradiation causes an additive effect, which is 22% higher than the effect of irradiation. K-19 increases the irradiation effect of 7Gy by 25%.

Thus, it was shown on the transfected Walker's tumor strain that both preparations possess a significant additive radiosensitizing effect upon intratumoral administration, causing a more significant (by 22–25%) antitumor effect than irradiation, while the effect of the preparations is accompanied by a reduction in the side effects caused by irradiation, such as decrease in body weight and spleen. It should be noted that intraperitoneal administration of K-19 preparation (equal in effectiveness to intravenous injection) 16 hours before irradiation causes a somewhat lesser effect 85/86% than with intutumoral injection, whereas in K-2, a more significant efficacy (90%) is noted with intraperitoneal administration, therefore, the proposed intratumoral method of administration is a selection method.

Apparently, the detected ability of preparations K-2 and K-19 to suppress DNA synthesis and topoisomerase activity [7], explains their high antitumor activity and contributes to radiosensitizing activity. However, the ability to synchronize a tumor with mitotic activity and effect on DNA synthesis [9] causes the activity of new drugs as radiosensitizers. All this can contribute to their further clinical use both as cytostatics and as more effective radiosensitizers.

Conclusions:

1. The efficacy of the new antitumor drugs K-2 and K-19 was evaluated with an intratumoral single injection in rats with developed Walker's carcinosarcoma tumors, which were respectively 50/45 and 65/64%.

2. The efficacy of substances as radiosensitizers with intratumoral administration in rats with developed tumors of CSU16 hours before irradiation of 7 Gy was high and equal to 87–90%, an increase in the effect of irradiation with the introduction of K-2 by 22/21%, K-19 by 25% with a reduction in the side effects of irradiation.

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THE STUDY OF MITOTIC ACTIVITY, ALKYLATING ACTION AND EFFECT ON TOPOISOMERASE PREPARATIONS K-19, DECOVIN AND K-20, OBTAINED ON THE BASIS OF COLCHICINE AND COLCHAMINE

Abstract: New drugs derived from colchicine K-19, decovin and K-20, have high antitumor activity and the ability to potentiate the effects of radiation. The elements of the mechanism of action of new drugs: mitotic activity, alkylating action, effects on topoisomerases I and II were studied.

Keywords: derivatives of colchicine K-19, decovin, K-20, mitotic activity, alkylating action, topoisomerase.

Introduction. The pronounced general toxic effect, the rapidly developing resistance of the organism to the drugs used, as well as the variety of forms of oncological diseases dictate the need to expand the arsenal of active drugs. A large group of new substances based on tropolinic alkaloids colchicine and colchamine with activity equal to or exceeding the activity of the known antitumor drugs (vincristine, taxol, etoposide, cyclophosphamide, 5-fluorouracil and xeloda) has been developed in the Republican Specialized Scientific and Practical Medical Center of Oncology and Radiology (RSSPMCOR) of the Ministry of Health of the Republic of Uzbekistan [6; 7]. For 3 drugs of this series K-19, decovin and K-20 studies were conducted to their toxic properties and antitumor activity, both in vitro (NCI), as well as in vivo in strains of 6–8 tumors [1; 3; 4; 6; 7]. It was necessary to find out the elements of the mechanism of action of these substances.

The purpose of this study was to study mitotic activity, alkylating action, effects on topoisomerases I and II.

Research methods: Mitotic activity has been studied in the crypts of the intestine of intact mice, which were intraperitoneally injected with the study drug at a dose of 1/2 LD_{16}. After 30, 60 minutes and every hour during the day the animals were slaughtered with decapitation. For histological examination the material was taken-1 cm 12 duodenum, which was fixed in a saturated solution of the Bowen mixture, then poured into paraffin with the preparation of histological preparations with hematoxylin-eosin staining. After that, microscopy was performed with counting the number of cells in crypts and in division, to calculate the mitotic index /MI/ and mitotic activity /MA/ [12].

The effect on the synthesis of DNA and RNA was studied using the spectrophotometric method [9]. The effect on internucleosomal DNA degradation and topoisomerase I and II activity was studied on tumor cells of ACATOL. DNA was isolated by the method (Maniatis TF, 1984) [9]. The DNA preparations were analyzed by electrophoresis in 1.5% agarose gel, 60 V, 4 h. The results were determined by evaluation of DNA degradation in comparison with control variants, as well as with doxorubicin and etoposide [8].

The effect of radiation therapy was studied in mice on a THERATRON device with a power of 1.25 MeV, a Co^{60} source in a sublethal dose equal to 6 Gy on the 9th day after irradiation [5; 14]. Statistical processing was carried out using the program Statistica, version 6.0. The level of statistical significance was assumed to be $p < 0.05$.

Results

As can be seen from picture 1, all the studied substances cause an increase in the mitotic index within 1 hour after administration (mainly 2 times compared to the control and 1.1–15 times compared to colchicine). The number of mitoses increased for 3 hours and reached the maximum values for almost all substances after 6 hours and remained so for another 6 hours, then by 18 hours it decreased to the level of control and remained unchanged after 24 hours.

The values of the mitotic index (MI) of the epithelium of the intestinal crypt at various times after the administration of preparations in K-19 turned out to be the highest MI – 38.97 + 0.33%, higher than that of colchicine and colchamine. The values of MI decovin (29.68 + 0.33%) and

K-20 (25.18 + 0.87%) were lower than those of colchicine, but 19–20% higher compared to the control.

It is known that the amine derivatives of colchamine have, in comparison with colchicine, generally a smaller MI on normal cells (crypts of the intestine, bone marrow cells) [2; 12], but their MI is higher than that of colchicine on the tumor [13].

The effect of the studied preparations of decovin, K-19 and K-20 and Etoposide on the synthesis of DNA, RNA and internucleosomal DNA degradation was carried out on the cells of the tumor strain of ACATOL. The results of the experiment are shown in picture 2: at an exposure of 48 h, decovin inhibits DNA synthesis by 81.5%, K-19 by 83.7%, K-20 by 79.3%, and etoposide by 80.4%. Under the influence of these preparations, the synthesis of RNA was suppressed by 63.7–66.5%, under the effect of etoposide by 62.4%. It can be seen that the preparations of decovin, K-19 and K-20 are not inferior in activity to the inhibitory effect of etoposide when exposed to the synthesis of DNA and RNA.

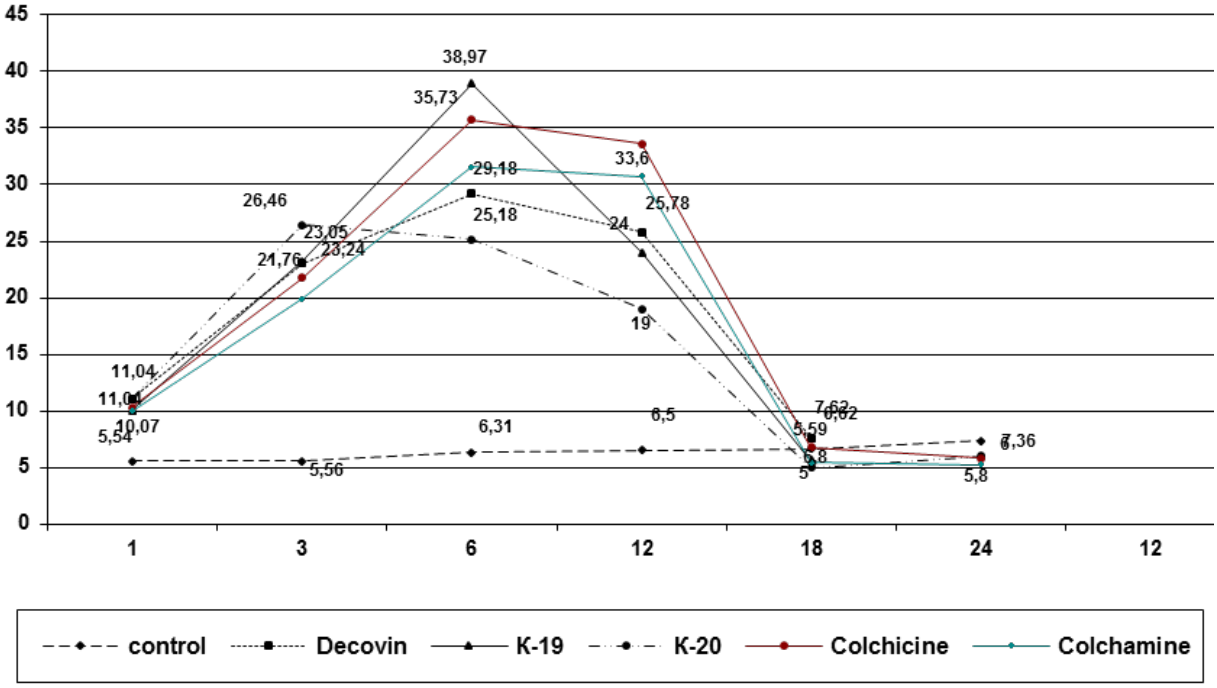

Figure 1. Mitotic index of the epithelium of the crypt of the small intestine (in percent) when animals are administered drugs

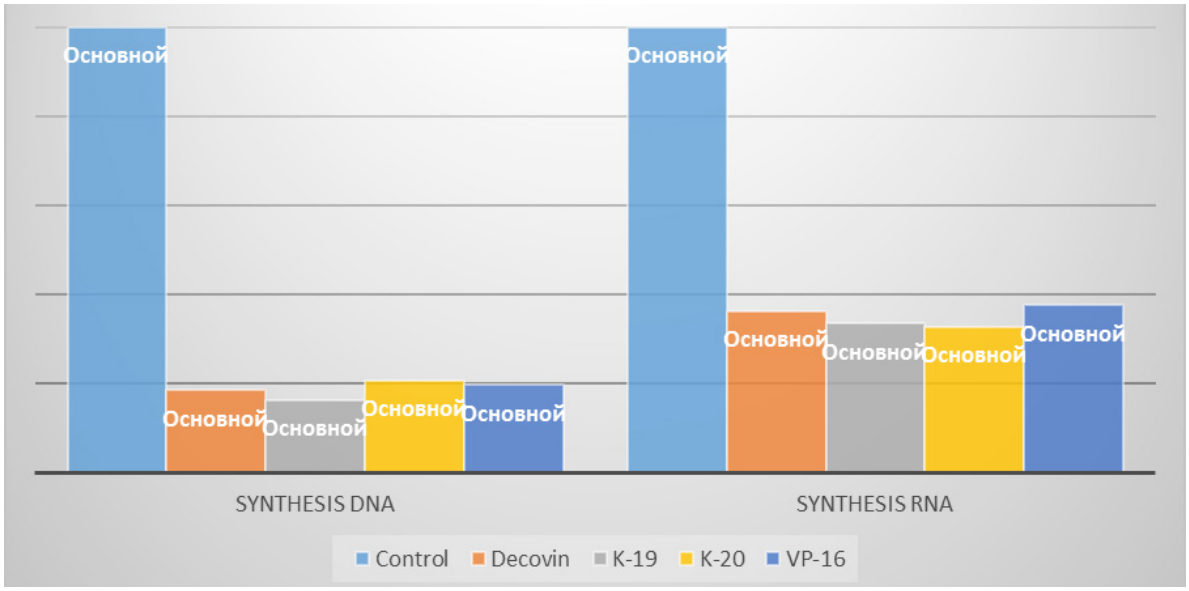

Figure 2. Effect of Decovin, K-19 and K-20 on the synthesis of DNA and RNA of an intact tumor of Acatol in comparison with etoposide (VP-16)

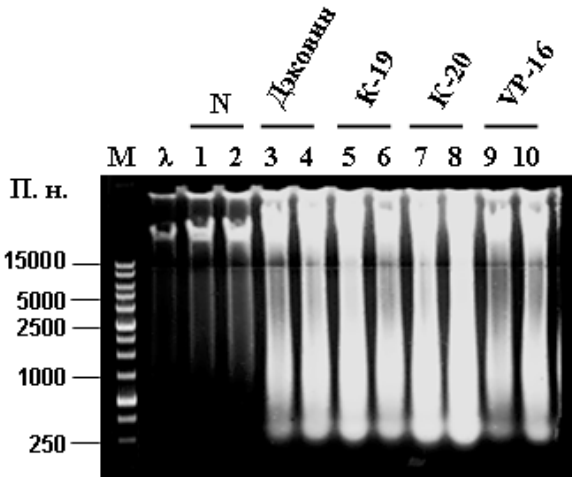

Figure 3. Electrophoregram of DNA degradation of intact tumor Akatol under the influence of preparations of Dekovin, K-19, K-20 and etoposide

Tracks: M-DNA ladder 100 kb; λ – native phage DNA; N – intact DNA of tumor cells; 3–10 – DNA isolated from the tumor after application of antitumor drugs. Tracks: 3, 4 – Decovin; 5.6 – K-19; 7.8 – K-20; 9.10 – VP-16 (etoposide)

Figure 3 shows the high natality of DNA isolated from an intact tumor of Akatol, which is not degraded and has no plume (lane N). When using the drugs under study, DNA fragmentation is observed in all variants in the range of 90% in the form of a plume.

With internucleosomal degradation, DNA is fragmented as a "ladder", which is associated with proteolytic cleavage of the specific protein of topoisomerase II [11]. In this connection, we link data on internucleosomal DNA degradation and changes in the activity of topoisomerases. The investigated drugs decovin, K-19, K-20, as well as etoposide (topoisomerase II inhibitor) promote high DNA degradation, which results from the suppression of topoisomerase II activity.

Conclusion

All 3 new drugs have mitotic activity, actively inhibit both the synthesis of DNA (from 79 to 84%) and the synthesis of RNA (from 64 to 67%) in tumors and are alkylating agents. Often, their alkylating effect is higher than that of etoposide and 40–50% of the initial colchicine and colchamine [2]. All drugs suppressed the activity of topoisomerase II, which leads to a decrease in DNA repair under their influence. The mechanism of action of the drugs under study consists of a pronounced cytotoxic effect, consisting of mitotic, highly alkylating activity and internucleosomal degradation and DNA fragmentation, suppression of topoisomerase II.

Colchicine in the literature [10] is attributed to radiomimetics, substances similar in effect to irradiation. It should be noted that both K-19 and some other derivatives due to their structural features due to the introduction of alkylating fragments are stronger radiomimetics than the original alkaloids.

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FREQUENCY OF OCCURRENCE OF ADHESIVE INTESTINAL IMPASSABILITY IN THE STRUCTURE OF PEDIATRIC EMERGENCY SURGICAL CARE

Abstract: According to the World Health Organization and the International Society for the Study of Adhesions (International Adhesion Society), postoperative adhesions in the abdominal cavity are the most common complication (55–70%) of abdominal surgical interventions. In more than 50% of children, acute intestinal adhesive obstruction is resolved by conservative treatment. In this work, the analysis of frequency of occurrence of adhesive intestinal obstruction (AIO) in children in three medical centers of the Republic of Uzbekistan, selected according to the principle of a multilevel system of organization of medical care.

Keyword: emergency surgical care, frequency, adhesive intestinal obstruction, children.

Background. According to the World Health Organization and the International Society for the Study of Adhesions, the postoperative adhesion process in the abdominal cavity is the most common complication (55–70%) of abdominal surgical interventions [3; 6]. Currently, the frequency of acute adhesive intestinal obstruction ranges from 50.0% to 93.3% of all other acute intestinal obstruction types of non-tumorous genesis [4]. To date, it is known that the inflammatory process is the main reason for the formation of adhesions [1; 2]. Despite numerous experimental works and clinical studies, effective preventive measures have not been developed to date. In more than 50% of children, acute intestinal adhesive obstruction is resolved by conservative treatment [5]. At the same time, the number of unsatisfactory outcomes of conservative and operative treatment remains very high. The analysis of the literature testifies that at the present time, the therapeutic and diagnostic tactics in the case of adhesive intestinal obstruction in children are one of the topical and completely unsolved problems of modern children's abdominal surgery [7; 8]. A high percentage of unsatisfactory outcomes, lack of choice of the optimal method of treatment, taking into account the age of the patient and the stage of the disease, prompt further research in this area.

Objective. Conduct an analysis of the frequency of occurrence of adhesive intestinal obstruction (AIO) in children in three medical centers of the Republic of Uzbekistan, selected according to the principle of a multilevel system of organization of medical care.

Material and methods. Statistical indices for 2012–2016 have been analyzed for the number of hospitalized children with various surgical pathologies, with the determination of the share of AIO in the Republican Scientific Center for Emergency Medical Care (RSCEMC), the Andijan branch of RSCEMC (AFRNCEMC) and the Andijan regional children's multidisciplinary medical center (ARCMMD). Primarily, the structure of pathology was analyzed in children hospitalized in these medical centers with the definition of the proportion of intestinal obstruction and, accordingly, the adhesive form of this disease. According to clinical reports, 33582 cases of hospitalization of children with various surgical pathologies were analyzed from these centers. Of these, 19.019 children had abdominal pathology, the rest – another surgical structure of the disease. In total, the prevalence of 797 cases of acute intestinal obstruction (AIO) was studied, of which 491 children were hospitalized with AIO.

Static studies were conducted on the basis of standard clinical recommendations. At the first stage of the statistical analysis, the main statistical characteristics of the studied parameters were determined (mean, median, quartiles, variance, standard deviation, standard error).

Quantitative data are presented as the arithmetic mean (M) ± standard deviation (SD) for the normal distribution and as the median (Md) and quartile (Q) or (SD) for other distributions. The reliability of differences was determined from the paired and unpaired Student t-test and the criterion of non-parametric statistics – the criterion of homogeneity χ^2. The correctness of the sampling was carried out by the criteria: χ^2 (chi – square or the so-called Pearson's agreement criterion). The reliability of the differences was determined from the pair and unpaired t-criterion of the Student. Differences were considered statistically significant at $p < 0.05$.

Results of the study and their discussion. For the period from 2012 to 2016, 33.582 children were hospitalized, of which 25.504(75.9%) were with abdominal pathology. Operative treatment was subjected to 16963(66.5%) of the child, 8541(33.5%) people were conservatively treated. Postoperative mortality in the group of abdominal pathology was 0.38% (64 of 16963), the overall mortality rate was 0.38% (96 of 25504 children). In turn, the overall mortality rate among all pediatric pathologies was 0.50% (169 of 33.582 children). The proportion of intestinal obstruction in the general structure was 2.4% (797). Of these, 410 (51.4%) children were operated, 387 (48,6%) were conservatively treated, postoperative mortality was 3.17% (13 of 410), and the overall mortality was 1.63% (13 of 797). 281 children (57.2% out of 491) were operated with AIO, 210 (42.8%) children were conservatively treated, mortality rates were 3,20% (9 of 281) and 1.83% (9 of 491) respectively (table 1).

Table 1. – Consolidated distribution of patients according to the type of emergency surgical pathology, type of treatment and the proportion of intestinal obstruction in the total structure of hospitalized children for 2012–2016

Pathology	Total		Operated		Conser-vative		Died after surgery		Died total	
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Abdominal pathology	25504	75.9	16963	66.5	8541	33.5	64	0.38	96	0.38
Pathology of the kid-neys and urinary tract	3698	11.0	2783	75.3	915	24.7	2	0.07	12	0.32
Pathology of the chest	806	2.4	434	53.8	372	46.2	8	1.84	24	2.98
Other	3574	10.6	1237	34.6	2337	65.4	8	0.65	37	1.04
Total	33582	100	21417	63.8	12165	36.2	82	0.38	169	0.50
Intestinal obstruction	797	2.4	410	51.4	387	48.6	13	3.17	13	1.63
Adhesive disease	491	1.5	281	57.2	210	42.8	9	3.20	9	1.83

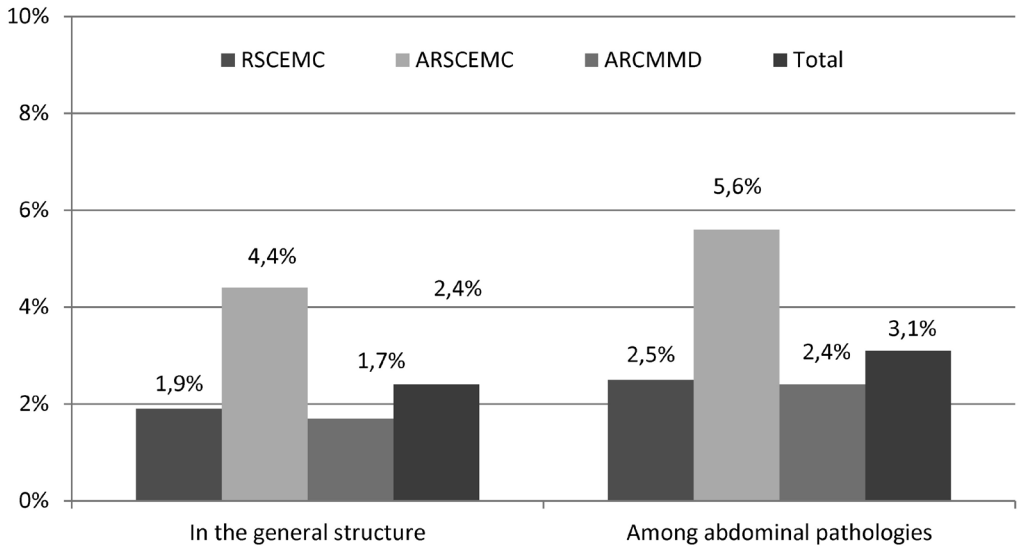

Figure 1. Prevalence of intestinal obstruction in the structure of emergency surgical pathology in children

In (figure 1) the comparative indices of the proportion of intestinal obstruction in three children's departments of various medical institutions are reflected.

In RSCEMC, this indicator in the overall structure of the entire children's pathology was 1.9%, in ARSEMC – 4.4% and ARCMMD – 1.7%, in the structure of abdominal dis-

eases – 2.5%, 5.6% and 2.4%% respectively. When analyzing the share of the adhesive form in the general structure of the intestinal obstruction, it was noted that in the RSCEMC and ARCMMD this index was virtually identical – 73% and 71%, whereas in the ARCEMC the AIO was determined only in 44.7% ($P < 0.001$) (Fig.2).

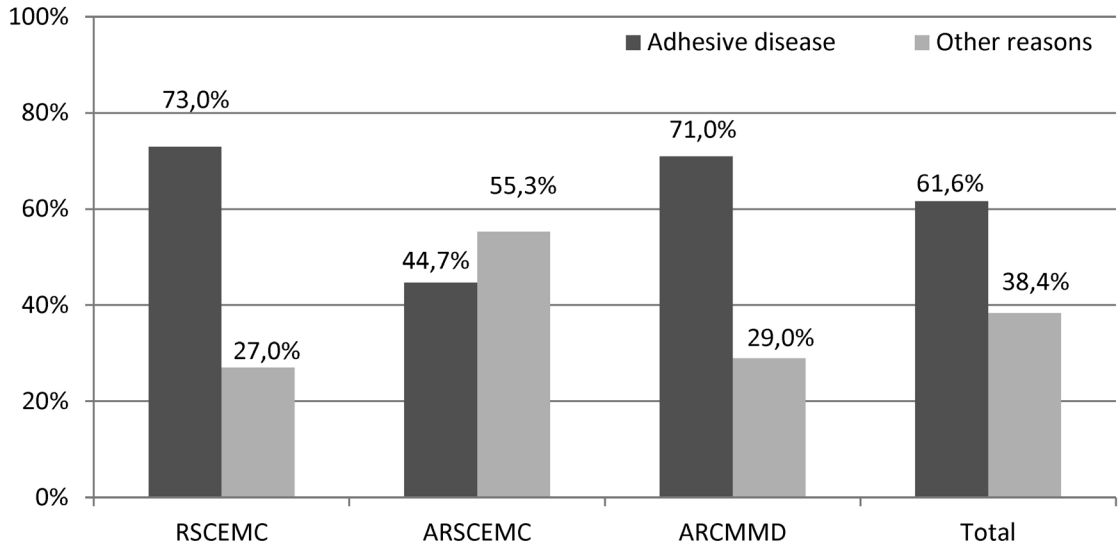

Figure 2. Distribution of the structure of intestinal obstruction, depending on the etiology

Thus, in the general structure of pediatric surgical pathology, the proportion of intestinal obstruction is 2.4% (797 out of 33.582), and among abdominal diseases – 3.1% (797 out of 25.504). In turn, the share of adhesive form of intestinal obstruction accounts for 61.6% (491 of 797) cases, in the remaining 38.4%, another etiology of the disease was determined. Indicators for the share of adhesive form in the structure of the entire intestinal obstruction significantly differed in the regional branch of the emergency center, with the predominance of other etiological factors.

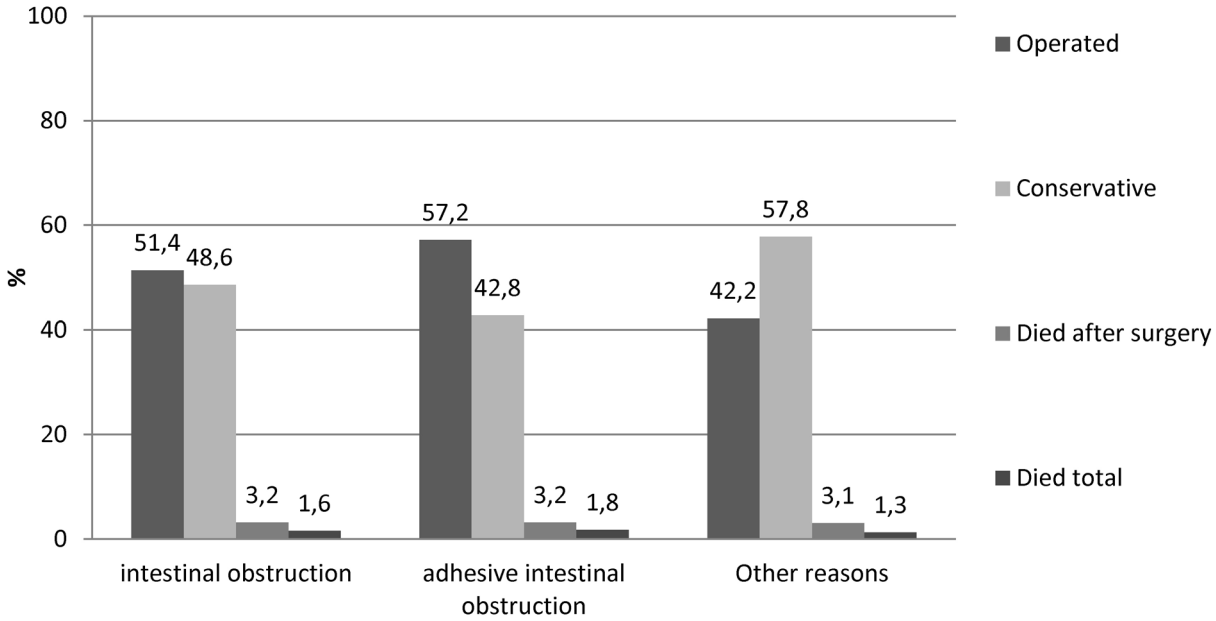

Figure 3. Distribution of the structure of intestinal obstruction, depending on etiology, type of treatment and lethality

No less interesting statistical analysis is the distribution of the frequency of AIO depending on the period of its development, that is, as an early or late complication of surgical interventions on the abdominal organs. In our study, out of

797 cases of intestinal obstruction in children, 61.6% (491) fell on AIO and 38.4% (306 children) on another etiology of the disease. In turn, it was noted that in the management of these patients (conservative or surgical treatment), as well as the frequency of postoperative and general mortality, there was a significant difference in the AIO group with a predominance of the share of surgical treatment and, in fact, a half-fold increase in the risk of overall mortality (χ^2–17.474, $Df = 3$, $P < 0.001$). Thus, 281 (57.2%) children were operated in this group, whereas in the other etiology of intestinal obstruction – 129 (42.2%), 210 (42.8%) and 177 (57.8%) were conservatively treated children. Postoperative mortality was 3.20% (9 of 281) and 3.10% (4 of 129), in turn the share of the overall mortality was 1.81% (9 of 491) versus 1.31%(4 of 306) (Figure 3).

The earliest form of AIO was reported in 62 (12,6%) children, of which 28 (45.2%) were operated on, 34 (54.8%) were treated conservatively, postoperative mortality was 3.57% (1 case), and the general lethality – 1.61% (1). In turn, a late form of complication developed in 429 (87.4%) children, 253 (59%) were operated, 176 (41%) managed to resolve obstruction by conservative measures, postoperative mortality was 3.16% (8 cases), and the overall mortality rate was 1.86% (8) (Figure 4).

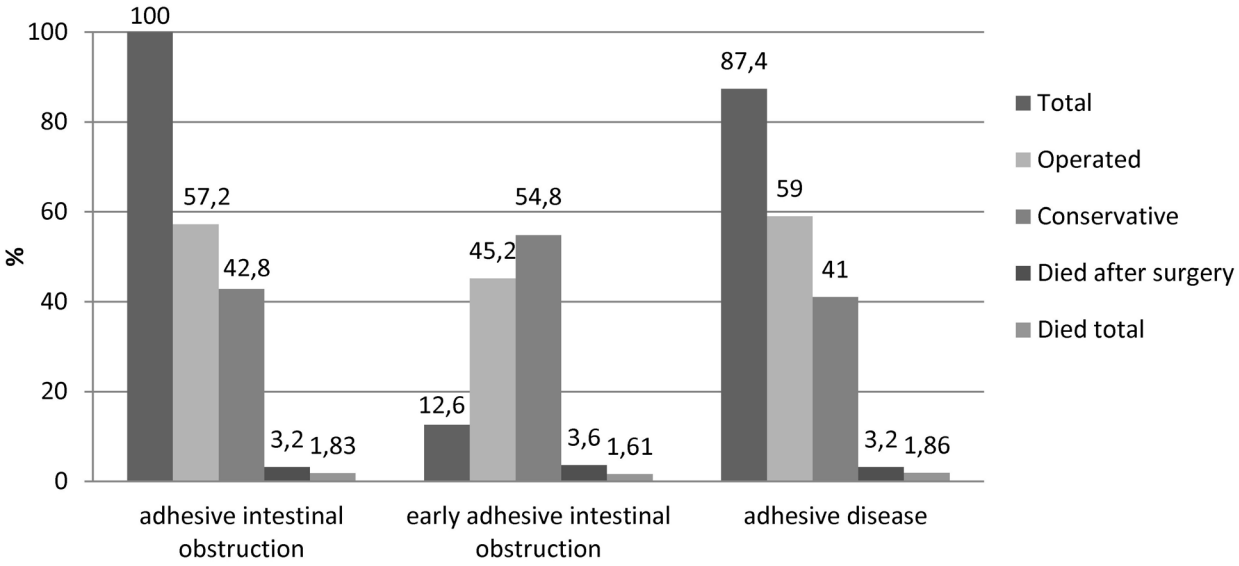

Figure 4. Distribution of early and late commissural intestinal obstruction, depending on the type of treatment and lethality

Studies have shown that AIO is one of the most difficult problems of pediatric surgery. Despite the seemingly low incidence of this complication, the results of her treatment can not be attributed to the resolved problem. First, this is due to the imperfection of diagnostic tactics, when in some cases it is the adhesive nature of the development of obstruction that can not be determined in time. This leads to belated surgical treatment and, accordingly, an increase in the frequency of postoperative complications and the risk of mortality. The other side is a long-term attempt to conduct conservative therapy, which is also unjustified in a number of cases and leads to a deterioration in the results of surgical treatment of AIO. Secondly, AIO can develop not only in the presence of phenomena of peritonitis, but also in any other surgical intervention on the organs of the abdominal cavity or other organs, the operations on which are carried out through abdominal access. The literature describes a number of risk factors for the development of this complication in surgery, ranging from the blood group, the state of hemodynamics and the composition of blood components, concomitant pathology, up to the type of acetylation phenotype and other causes. In this case, AIO is often a recurrent disease, which in more than half the cases may require regular surgical treatment with the subsequent risk of developing a repeat episode of the disease. This significantly increases the state of children, worsens their quality of life. Third, the timely tactics of surgical treatment and the overall integrated approach to managing this group of patients, including intra- and postoperative preventive measures, also have an impact on the outcome of treatment. Later, surgical treatment, the prevalence of adhesions, the presence of peritonitis against the background of obstruction worsen the prognosis of the disease. That is why the statistical analysis performed showed a relatively high incidence of mortality in children with AIO compared with other groups of diseases.

Conclusions. In the structure of general children's emergency surgical pathology, the proportion of intestinal obstruc-

tion is 2.4% (797 of 33582 patients), among the group of abdominal diseases – 3.1% (797 of 25504 patients), of which 51.4% (410 of 797) underwent surgical treatment, with a postoperative mortality rate of 3.17% (13 patients out of 410 operated) and 1.63% (13 of 797) in the total group of patients. In the structure of intestinal obstruction, 61.6% (491 out of 797 patients) accounted for the adhesive etiology, of which 57.2% (281 out of 491) underwent surgical treatment with a mortality rate of 3.20% (9 patients) and 1.83% (9 out of 491) in the total group of patients, while among other causes of obstruction, the mortality rate in the total group of patients was 1.31% (4 of 306) (χ^2–17.474, Df =3, P < 0.001).

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CHARACTERISTICS OF RENAL DAMAGE EARLY STAGE IN HYPERTONIC DISEASE

Abstract: The damage of the kidney as the target organ of hypertensive disease in 40% of patients starts to form early – within 5 years from the debut of the disease. The early stage of hypertensive nephropathy is a dynamic process that has clinical and functional markers at each stage, so microalbuminuria, increased intrarenal vascular resistance, and changes in the total filtration function of the kidneys are the earliest.

Keywords: hypertensive disease, kidney damage, early diagnosis, dopplerometry.

Hypertonic disease (HD) is a widely spread disease the prevalence of which involves about 40% of adult population of Russia. According to statistic data HD occupies one of the leading places in the range of the causes of terminal renal failure in patients on dialysis [2; 11], and that makes the problem of the study of renal pathology linked with arterial hypertension to be extremely topical one [1; 10].

According to the modern notions the central part of the development of hypertonic nephropathy (HNP) is non-immune damage of renal vessels. Through hem dynamic factors (shift tension and circled stress) high hypertension activates/damages renal endotheliocytes causing their dysfunction. Dysfunction of endothelium of internal renal vessels together with metabolic disorders, oxidative stress, neural humoral activation potentiate ischemia of renal tissue and fibroangiogenesis, realized through pathologic activation of local renal angiotensine II [3; 9]. Structural functional reconstruction linked with fibroangiogenesis is dysadaptation remodeling of micro vascular renal lumen, desolation of intraglomerular and peritubular capillaries with intensification of ischemia serve to be pathologic physiologic basis for hypertonic vascular nephropathy (HNP) [5; 10].

On the other hand, kidneys damaged by hypertension can produce the factors, intensifying the damage of systemic vascular lumen and create conditions for the involvement of other HD target-organs such as heart, central and peripheral vessels, and its complications (SVC) [6; 8]. Close interrelation of cardiac vascular pathologies and renal damage via arterial hypertension served to be premise for creation of a notion of renal-cardiac-vascular continuum on the basis of common mechanisms of organic damage in case of HD, and, first of all, endothelial dysfunction [4; 7].

Due to the mention concept, clarification of hem dynamic pathways of early HNP stage development gains primary importance for the definition of more effective measures of pathogenetic impact on the progress of the disease as a whole.

The objective: to characterize the early stage of renal damage in case of hypertonic disease – hypertonic nephropathy (HNP),

Materials and research methods: We examined 259 patients with hypertonic disease (HD): 186 (65%) men and 73 (35%) women in the age from 17 to 67 years old, who received therapy in the 5th city clinic in Tashkent. The control group involved 57 healthy people of the age and gender corresponding to the patients of the studied group: 38 men and 19 women in the age from 20 to 63 years old, with average age 42.1 ± 0.1 years old. Verification of HD diagnosis was performed in compliance with the WHO recommendations on the diagnostics and treatment of arterial hypertension. Diagnosis criterion was considered to be office AP ≥ 140/90.

In the majority of the patients (76% of all the examined) duration of HD did not exceed 10 years; more than in half (75%) hypertension term was less than 5 years. Long-lasting progression of the pathology (≥ 16 years) was registered in less than 10% of the patients. Most of 259 patients (73%) had 1(38%) and 2(35%) stages of HD, approximately 27% the 3rd (more severe) stage of hypertension.

Besides common clinical tests, patients passed special checkings. For the characteristics of alterations in kidneys all patients were checked for micro albuminuria (MAU) by means of enzyme immunoassay, calculation velocity of glomerular filtration (GFV) using Cokroft-Gowlt formula with correction for a standard square body surface (ml/min/1.73m^2). Stages of chronic renal pathology (CRP) were determined according to NKF K/DOKI criteria (2002).

Ultra sound Doppler of peripheral and internal renal arteries (USD) was performed on SSD-5500 (Aloka, Japan). We studied internal renal arteries (segment and interlobular) in the projection of three segments of both kidneys. According to our data, among the studied Doppler parameters such as resistance index (RI) and pulsation index (PI), the value of RI of inter-

lobular renal arteries was the most descriptive (sensitivity 0.75, specificity 0.67, and positive prognostic value 90%), and that provided its usage in the further work for the assessment of internal renal hem dynamics, taking RI 0.65 for a threshold value.

In the statistical analysis the results of the study were evaluated by means of parametric and non-parametric methods with the help of applied software pack STATISTICA 7.0.

Results of the study: day excretion of albumin with urine in 259 examined patients with HD varies from 10.3 to 288 mg/day. In the group of patients with MAU (186.72%) its rate was average 51.73 mg/day; in the rest (73.28%) of the patients with HD the rate of albuminuria did not reach MAU stage and was average 22.4(12.1 28) mg/day. Distribution of the patients with HD dependently on the term of the disease in the groups with and without MAU was approximately similar, and that provided performance of the further analysis of specific renal lesions without taking into account the term of the disease. The group of patients with HD with MAU was characterized, as a whole, by a higher prevalence of expressed AH, than the group of patients without MAU: the 3rd stage of AP rise was revealed in 37% of the patients with MAU and only 12% without MAU.

Besides that, we revealed statistically significant increase of the average MAU rate among the people with more expressed (2nd and 3rd stages) AH. We did not determine a reliable link of MAU with traditional risk factors (RF) such as disorder of lipid exchange (total cholesterol, high and low density lipoproteids) and carbohydrate exchange (starving glycemia).

At the same time we revealed a reliable close correlation of MAU with the age of the patients and their BMI. Among the examined 212 patients with HD summary filtration function of kidneys was higher in 59 patients without MAU, then in 153 patients with MAU, 108(94–125) and 96.2(79–116) ml/min/1.73 mI, respectively ($P < 0.05$). for the clarification of the character of GFV alteration dependently on MAU we compared the prevalence of normal filtration (GFV from 90 to 130 ml/min/1.73m^2), hyper filtration (GFV > 130 ml/min/1.73mI) and hypo filtration (GFV < 90 ml/min/1.73mI) in the groups of HD patients with and without MAU. Prevalence of normal and increased GFV in these groups had no statistically significant difference, while decreased GFV – hypo filtration was revealed reliably more often in the group of patients with MAU.

Calculation of the probability (chance) of renal function deterioration showed that the chance of hypo filtration reveal in the patients with MAU was 2.2 folds higher that in the group of patients without MAU (59:94 versus 13:46, ratio of chances = 2.21).

Among 224 patients with HD, internal renal blood flow of which was checked by Doppler, RI value of interlobular renal arteries, as a whole, was statistically higher than among 57 healthy people. Analysis of average RI and prevalence of RI high values (> 0.65) dependent on the severity of hypertension syndrome showed that both values were higher among the patients with the 2nd and 3rd stages of AH, then among the patients with the 1st stage AH. Thus, average RI in the patients with the 1st stage AH was 0.63 ± 0.001 (0.6–0.665), 2nd stage AH 0.65 ± 0.001 (0.61–0.665), 3rd stage AH 0.67 ± 0.002 (0.64–0.7); prevalence of RI high values revealing (> 0.65) in the groups 38%, 59% and 69%, respectively ($P < 0.05$).

Among the patients with pathology term above 5 years increased RI values (> 0.65) were revealed 2.3 times more often than normal ones. At the same time among HD patients with short term disease (less than 5 years) the frequency of increased RI values revealing was 1.6 times less, than the frequency of revealing normal RI values. Though, 40% of the patients of that group also had increase of internal renal vascular resistance (RI > 0.65), testifying probability of earlier involvement of kidneys as HD target-organ requiring active revealing.

Conclusion. Thus, degree of internal renal vascular resistance increase evaluated according to interlobular renal arterial RI (> 0.65) correlated with AP value, term, MAU and decrease of GFV, and it can be considered to be an indicator of further development of HNP early stage. Pathological physiological basis of these alterations is considered to be hypertonic remodeling of internal renal vessels, desolation of micro circulation lumen, leading to the decrease of renal blood flow and ischemia of renal tissue.

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PSYCHOSOCIAL FACTORS OF QUALITY OF LIFE ASSOCIATED WITH HEALTH IN WOMEN WITH CONGENITAL ADRENAL HYPERPLASIA

Abstract: 27 women with congenital adrenal hyperplasia aged from 18 to 43 years old (mean age is 24.9 ± 6.8 years) were observed at the Republican Specialized Scientific and Practical Medical Center of Endocrinology under the Ministry of Health of the Republic of Uzbekistan. The control group consisted of 23 women.

The conducted studies showed that the lowest quality of life of people with congenital adrenal hyperplasia, not exceeding 50 points, was noted on the scales: role-physical functioning (in 74.1% of patients), general health (in 59.3% of patients), vitality (48.1% of patients). To a lesser extent, changes have affected the scale of bodily pain (22.2%). An integrated scale of the physical health below 50 points was noted in 66.7% of patients.

Keywords: Syndrome of hyperandrogenism, congenital adrenal hyperplasia, glucocorticoids.

Congenital adrenal hyperplasia refers to a group of diseases with an autosomal recessive type of inheritance, caused by a congenital defect in corticosteroid biosynthesis enzymes. Congenital adrenal hyperplasia in 95% of cases is associated with a deficiency of 21-hydroxylase. Deficiency of 21-hydroxylase leads to inadequate production of cortisol that causes excess production of adrenocorticotropic hormone and leads to congenital adrenal hyperplasia [4; 7; 8; 9; 10]. The classical form of congenital adrenal hyperplasia occurs on the average in 1:15000–16000 newborns, and the non-classical form – on the average in 1:1000 newborns [3; 14].

Treatment of patients with classical forms of congenital adrenal hyperplasia consists of life-long use of glucocorticoids (GC) and mineralocorticoids (in the case of salt-losing form of the disease) to prevent adrenal insufficiency and normalization of the increased level of androgen precursors [6; eleven; 18].

In recent decades, there has been an increase in the number of researches in the field of quality of life, since the researches in this field makes it possible to evaluate the complex effect of the disease on the life of the patient, compare the effectiveness of various therapies, predict the course of the disease, identify factors affecting quality of life, and influence them [1; 2].

The aim of the study is to research the psychosocial aspects of the quality of life of women with congenital adrenal hyperplasia on the background of therapy.

Materials and techniques.

A survey of 27 women with congenital adrenal hyperplasia aged from 18 to 43 years (mean age 24.9 ± 6.8 years), observed at the Republican Specialized Scientific and Practical Medical Center of Endocrinology under the Ministry of Health of the Republic of Uzbekistan. More than half (55.6%) of women were between the ages of 20 and 30. The control group included 23 women with a regular ovulatory menstrual cycle with no signs of hyperandrogenemia, the mean age was 31.3 ± 7.3 years.

All women signed consent for participation in the study. The diagnosis of congenital adrenal hyperplasia was established for women with a violation of menstrual and reproductive functions, with level of 17-hydrogsyprogesterone > 6 nmol/l and mutation of CYP21 gene.

All women with congenital adrenal hyperplasia were given substitution therapy with glucocorticoids and mineral corticoids. Dexamethasone (in a dose of 0.25–0.75 mg per day) or prednisolone (in a dose of 2–4 mg/day) was used for treatment. The effectiveness of treatment was evaluated after 6 months.

To assess the quality of life of patients, MOS36-Item Short-Form Health Survey (MOS SF-36) was used [19]. The 36 items of the questionnaire are grouped into eight scales: physical functioning (PF), role-physical functioning (RP),

bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional functioning (RE) and mental health (MH). The scores of each scale range between 0 and 100, where 100 mean that the patient is fully healthy. All scales form two categories: physical health (PH) and mental health (MH). The data for each category is calculated using a special unique key protected by International copyright [20]. The results are presented in the form of scores in 8 scales formulated in such a way that a higher score indicates a higher level of quality of life.

Mental health category of quality of life also included socio-demographic and anamnestic characteristics of women: age, education, marital status, social status.

The data obtained was processed using Statistica 6.0 and Biostat software. Quantitative scales are presented as mean ± standard deviation (M ± SD). The reliability of differences in the mean values was estimated using the Wilcoxon test. Differences between the groups were considered statistically significant at $p < 0.05$.

Results and discussion

After analysis of the data, it was found that a significant proportion of patients complained of headache (19–70.4%), excessive body hair growth (14–51.9%), excessive weight (8–29.6%), acne rashes (8–29.6%). From the anamnesis it is established that 6 (22.2%) of women were conceived by closely related partners. Hereditary load of diabetes was found in 7 (25.9%) women. The age of menarche on average was 13.6 ± 1.6 years. Early menarche was noted in 1 case (11 years), late menarche (14–18 years) in 12(44.4%) cases. Violation of the menstrual cycle was in 15(55.6%) of the patients. Violation of the menstrual cycle according to the type of opsoniformes and amenorrhea was noted respectively in 7(25.9%) and 8(29.6%) of the patients. 7(25.9%) women were pregnant before. The average number of pregnancies was 2.1 ± 1.6, 71.4% of all pregnancies ended with childbirth, 7.4% – with artificial abortions, 11.1% with spontaneous miscarriages.

The study of the social status of women with congenital adrenal hyperplasia showed that the level of education of patients was mostly secondary-level and secondary professional education (17–63.0%), more than a quarter of patients had higher education (7–25.9%), and 3 women (11.1%) had no education. By social status, almost half (13–48.1%) had trade job, students and office employees were almost tied (5–18.5% and 6–22.2% respectively) and 3 women (11.1%) were housewives. By marital status, more than half of the patients were married (14–51.9%), more than a third (10–37.0%) were never married, 3 (11.1%) women were divorced. It should be noted that 5 (35.7%) married and 3 (66.7%) divorced women were childless.

As a result of the analysis of the quality of life scales in women with congenital adrenal hyperplasia, we found a significant decrease in the quality of life compared to the control group (Table 1.).

Table 1.– Scales of the physical and mental components of health quality of life in patients with congenital adrenal hyperplasia (according to SF-36), shown in points

SF-36 Scales	Control, *n* = 23	Before treatment, *n* = 27	After treatment, *n* = 27
Physical Functioning, **PF**	76.7 ± 9.0	50.2 ± 12.7*	64.9 ± 10.3#
Role-Physical Functioning, **RP**	74.5 ± 11.7	40.7 ± 11.7*	62.1 ± 11.5#
Bodily pain, **BP**	79.7 ± 8.8	56.0 ± 7.8*	53.1 ± 12.6#
General Health, **GH**	83.0 ± 8.4	47.0 ± 9.5*	61.6 ± 12.4#
Physical Health, **GH**	74.5 ± 5.7	46.1 ± 4.9*	57.4 ± 5.2#
Vitality, **VT**	83.7 ± 8.7	52.4 ± 12.5*	67.8 ± 13.3
Social Functioning, **SF**	86.3 ± 10.4	61.0 ± 11.6*	68.7 ± 11.7
Role-Emotional, **RE**	80.9 ± 9.9	53.6 ± 15.4*	66.2 ± 13.0
Mental Health (subcategory), **MH**	79.0 ± 10.0	54.3 ± 9.5*	69.9 ± 11.6
Mental Health (category), **MH**	78.4 ± 5.2	52.5 ± 8.5*	64.7 ± 7.8

*Note: *p < 0.0001 reliability in relation to the control; #p < 0.0001 – reliability in relation to scales before treatment*

The lowest quality of life scales in patients with congenital adrenal hyperplasia, not exceeding 50 points, were noted on the following scales: role-physical functioning (in 74.1% of patients), general health (in 59.3% of patients), and vitality (in 48.1% of patients). To a lesser extent, changes have affected the scale of bodily pain (22.2%). An integrated scale of the physical component of health below 50 points was observed in 66.7% of patients.

Analysis of the components of the physical component of health showed that congenital adrenal hyperplasia influenced the ability to perform various physical functions (PF decrease compared to the control group by 34.5%), daily role-physical functions (RP – by 45.4%), daily activity (BP – by 29.7%), which reflected a decrease in the subjective assessment of patients' general health (GH – by 43.4%) (Fig. 1.).

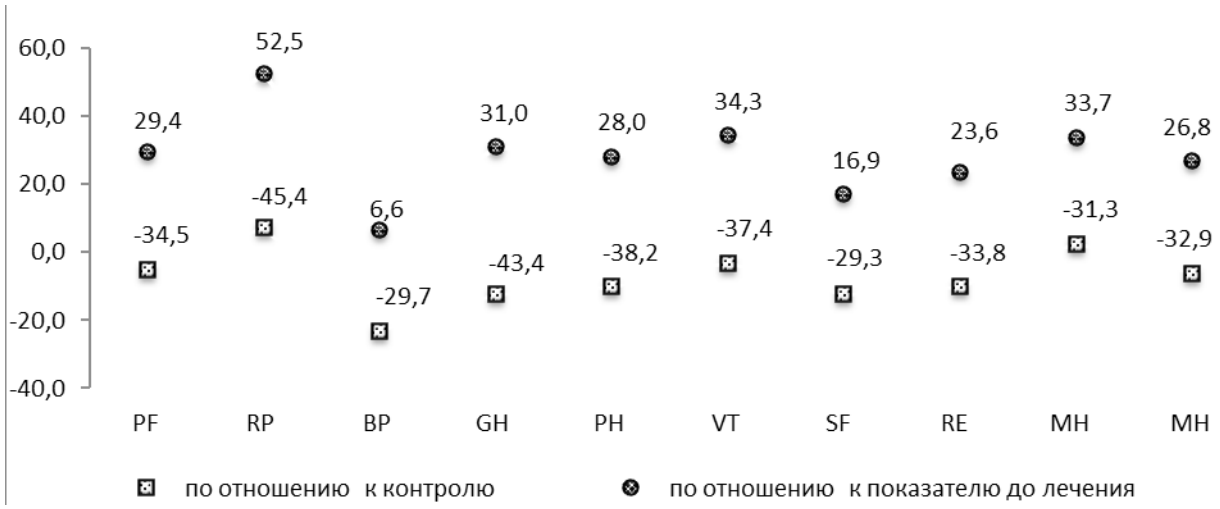

Figure 1. Scales of the physical and psychological components of the quality of life of patients with congenital adrenal hyperplasia over time

The presence of clinical manifestations of congenital adrenal hyperplasia influenced the psychological component of health, the indices not exceeding 50 points were noted on the scale to be: role emotional functioning (in 44.4% of women), vital activity (in 37.0% of women) and mental health (in 33.3% of women). Scale of the mental health of less than 50 points was observed in 40.7% of patients.

When analyzing the subcategories of mental health category, there was a significant decrease in the scale of vital activity, reflecting a subjective sense of happiness (by 37.4% lower compared to clinical control), role-emotional functioning (by 33.8%). A lowered VT level indicates that patients have problems (anxiety about their health, decreased mood), which have a significant negative impact on their social functioning (SF reduction by 29.3%) and daily role-playing activities. Self-assessment of their mental health decreased by 31.3%.

On the backdrop of the therapy, a significant increase in the RP scale was observed from the scales of the physical health category of quality of life health – by 52.5%, GH – by 8.2%, PF – by 29.4%, compared to the level before the treatment, the parameter BP also increased by 6.6%, but not by reliable margin.

When assessing the effect of glucocorticosteroid drugs on the scales of the mental health, a significant increase in the scales of VT (by 34.3%), RE (by 23.6%) and MH (by 33.7%) was noted.

The study of the main parameters of the quality of life over time makes it possible to judge the results of the course of therapy and evaluate social and psychological components that enable us to identify the most effective components in improving the physical and mental state of patients, which ultimately allows patients to participate in public life and realize their social importance.

In various studies using semi-structured interviews, a decrease in the quality of life in patients with a deficiency of 21-hydroxylase was found. The quality of life was influenced by the genotype and the surgical procedure that these women underwent. It is believed that the main reasons for the decline in quality of life in such patients are psychological trauma in connection with tedious diagnostic procedures, the chronic nature of the disease and psychological complications [13; 15; 16].

In comparison with healthy women with comparable age, marital status, education and professional status that make up a control group psychosocial identification was disrupted in 45 patients. Women with congenital adrenal hyperplasia noted a higher level of anxiety related to sexual contacts and relationships with partners, as well as due to changes in their physical appearance. However, as soon women of this group entered a relationship with a partner, they viewed their relationship with them as more stable and satisfactory than healthy women in the control population. The authors who conducted this study came to the conclusion that the overall level of quality of life was not affected [12].

A population study conducted in Norway using SF-36 Survey, revealed a reduction in the subjective assessment of the health status of adult patients with congenital adrenal hyperplasia [13]. The results of one of the cross-sectional studies involving adult patients with congenital adrenal hyperplasia using the same SF-36 survey in 17 endocrinology centers in the UK showed a significant reduction in the subjective health assessment. In the same study, elevated scores on the anxiety scale were measured in all patients with congenital adrenal hyperplasia and elevated scores on the depression scale in patients with classical hypertension [5]. Comparing with SF-36 a subjective assessment of the health status of adult patients with congenital adrenal hyperplasia

registered in two specialized centers in Germany showed a decrease in the vitality scale, but otherwise the subjective assessment of the quality of life of such patients was normal [17]. Therefore, the situation with psychosocial health and quality of life of women with congenital adrenal hyperplasia remains unclear. The results of various studies cannot be directly compared, because different domains of quality of life and well-being were evaluated in the course of these studies using various techniques. There is also the possibility that the observed differences in the assessment of the quality of life are the result of the sum of the specificity of congenital adrenal hyperplasia and the level of medical care provided. It is necessary to study the onset and progression of decrease of the quality of life or a subjective assessment of the health status in childhood and adolescence.

Considering that patients respond differently to functional abnormalities, assessing the quality of life is as important as evaluating the most functional abnormalities, especially if we consider the outcome of treatment in a clinic. Until standardized assessment methods are developed that are highly sensitive to specific psychosocial aspects in patients with congenital adrenal hyperplasia and sexual dysfunction, physicians should use methods and scales for assessing the quality of life developed for use in other areas of chronic disease management.

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USE OF LAZER THERAPY IN THE TREATMENT OF CHRONIC RECCURENT HERPETIC STOMATITIS FOR FOR CHILDREN

Abstract: Investigating the influence of the device of the magnetic-infrared-laser therapy (MILT) "Sogdiana" for children with the chronic recurrent herpetic stomatitis (ChRHS). At total 189 patients of children's age with the diagnosis of ChRHS are studied. Patients of the 1st group were treated in traditional way, the 2nd group – a complex methodis used. In the 2nd group of patients with ChRHS the complex treatment (CT) (traditional treatment + MILT "Sogdiana") had bigger efficiency in comparison with the traditional therapy (TT).

Keywords: children, chronic recurrent herpetic stomatitis, magnetic-infrared-laser therapy, patients, complex treatment, a mucous membrane of an oral cavity, herpes-virus infection (HVI).

In recent years, 30–50% of children with herpes observed recurrence of herpes infection (HI) during the first years of life. After the primary GI has been transferred, the virus remains in the human body, obviously, throughout life [1; 2].

The choice of optimum strategy and tactics of therapy the HVI at children presents certain difficulties. It is also necessary to note that a constant obstacle in a way of effective therapy of diseases of the MMOC is emergence of stability of a virus to medicines [3; 5; 6].

In this regard, the efficiency of treatment depends not only on medicament us therapy by various specific antiviral medicines, but also on final physiotherapeutic treatment [4].

The aim of the work was to study the therapeutic effect of MILT "Sogdiana" in children with ChRHS.

Materials and methods. Observed 189 children with the diagnosis of ChRH of 1 year to 7 years divided into two groups: 85(45%) patients the TT(the 1st group) were treated. 104(55%) the patient – the 2nd group – along with a TT in addition received physiotherapeutic treatment by means of the office of MILT "Sogdiana" (Uzbekistan). All patients were generally treated on an outpatient basis.

The diagnosis of patient with ChRH was established on the basis of clinical symptoms and molecular and genetic researches by the polymerase chain reaction (PCR)-method. The severity was estimated on the frequency of a recurrence of a disease, prescription or expressiveness of symptoms of the general and local character. In the anamnesis of patients of both groups acute and chronic respiratory diseases, including flu, tonsillitis, anemia, chicken pox, etc. were noted. At survey on edematous and hyperemic MMOC the multiple, often single and merging among themselves acutely painful erosion came to light. Most often erosion settled down on a mucous membrane of language (edges, a tip and a back) in 157 cases from 189, i.e. 83.06%, and a mucous membrane of lips (52 of 189 i.e. 27.51%), on a mucous membrane of cheeks (from 189 in 67 cases – 35.44%), a mucous membrane of gums (21 cases – 11.11%), a soft palate (14–7.40%), a hard palate (21 cases – 11.11%), an alveolar shoot (42–22.22%).

With the help of molecular genetic studies of 189 sick children, the positive reaction of PCR was in 166 (87.83%) children, in 12.16% (23 children) – the result was negative.

In the treatment of group 1, TT was used: an antiviral drug acyclovir 200 mg 4 times a day for 5–7 days was prescribed. Local therapy included analgesics before and after eating, irrigation of the oral cavity with a solution of chlorhexidine (1: 1 distilled water) – at the first visit, irrigation was performed by a dentist, in the future-parents (up to 3 times a day), as well as applications of 0.25% oxoline ointment (3–4 times a day for 7–10 days). Patients of the 2nd group (104 children) along with a TT and local dental treatment in addition received physiotherapeutic treatment by means of the office of MILT "Sogdiana" (production Uzbekistan).

Results and discussion. The results of treatment of patients with HCV using both MILT "Sogdiana" and without physical therapy were performed according to the "**Criteria for the effectiveness of complex therapy of patients with** ChRHS".

In both groups the efficiency of therapy can be estimated as high, good, weak and there is no effect. Efficiency of treatment at children of the 1st group after a TT: at 56 patients with ChRHS was weak, at 26 – good. There is no effect of treatment – at the 3rd patient. The high efficiency of treatment wasn't at one child.

In children of the 2nd group with ChRHS in most cases (76 children) treatment was highly effective. Good efficiency of treatment was found in 27 patients. Weak effectiveness of treatment was revealed in 1 child with severe form of CHRGS.

After therapy all recurrence of ChRHS within a year (recurrence) and also duration of remissions between them was considered and standardized. The remote results of treatment (1 year of out-patient observation) estimated on change of quantity and forms of a recurrence, remission duration.

From among sick children in the 1st group in the first 3 months of observation a recurrence was observed at 8 (9.41%) patients whereas at patients of the 2nd group a recurrence wasn't observed.

In 6 months of observation a recurrence of a disease showed high percent in the 1st group of patients with ChRHS – 14 (16.47%) children, and this indicator was equal in the 2nd group 2 (1.92%). In 1 year of observation in the 1st group with ChRHS a recurrence is celebrated at 13 (15.3%) patients whereas this indicator was equal in the 2nd group 3 (2.9%). This fact confirms efficiency of inclusion in CT of patient children of the office of MILT "Sogdiana".

Conclusions:

In CT of children of ChRHS had bigger efficiency. When using the office of MILT "Sogdiana" and a TT at children of the 2nd group observed earlier disappearance of symptoms of intoxication of HVI and morbidity in MMOC, fast approach of a full epitelization, reduction of frequency and weight of a recurrence and also increase in duration of terms of remission.

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HORIZONS AND CHALLENGES OF THE SILVER NANOPARTICLES APPLICATION IN THE PRACTICAL MEDICINE (REVIEW PAPER)

Abstract: Based in the literature review devoted to analysis of the current status of the issue of synthesis and stabilization of the silver nanoparticles (NP) and medical claims on their basis, it has been identified that transition from the macro-scale and micro-scale to the nanoscale causes emergence of qualitative modifications in the physical – chemical and medical – biological properties of compounds along with polymer systems obtained on their basis.

Synthesis and investigation of the silver NP stabilized in the polymer matrices are currently presenting promising trends in the polymer chemistry and medicine.

Keywords: nanotechnologies, nanoparticles, silver, silver nitrate, nanostructure, nanocluster, nanocomposites.

Since end of 80-s last century, the new terms with "nano" prefix appeared in scientific terminology, such as: nanotechnology, nanostructure, nanocomposite material, nanocluster, nanochemistry, nanophysics, nanobiotechnology, etc. Scientific centres, institutes, chares and scientific schools dealing with nanotechnology problems were established. The publications and journals exist in many countries for publication of the outputs devoted to the nanomaterials entirely. Variety of review papers and monographs devoted to nanotechnologies, nanostructures and nanomaterials have been written. Frequently, the new expertise with "nano" prefixs has been assigned to the well known objects or phenomena. However, the concepts not applied in the researchers' toolkit already 25–30 years ago has been introduced in the practice and occupied rightful place; and the modern science development cannot be imagined without these concepts. They include nanoparticles (NP) in their entire variety. Frequently, the attempts are made to explain the properties of nanoclusters, nanoparticles, nanostructures and nanocomposites only based on their sizes, which not always has been justified.

Over 20 recent years, globally, the technologies focused on obtainment and application of NP and nanostructures materials based mostly on the metals are being rapidly developed.

In the present message we have considered the possibilities of obtainment and research of physical – chemical, medical – biological properties and structure of the silver nanoparticles formed in the various environments.

Antibacterial properties of metallic silver and its compounds have been known for ages. In small concentrations is safe for the human cells but ruinous for the most of bacteria and viruses; therefore it has been widespread for the water and foodstuff decontamination in everyday life and for infection control in human treatment [15]. At this point, the unique antimicrobic and antiviral properties of the silver compounds have been extensively studied and several comprehensive reviews devoted [25; 33]. Unlikely, that microorganisms in the course of mutations are able to produce silver resistance (except for the cases when it exists a priori), since its ions attack a mass of various cell protein objects. This asset has become extremely crucial at present with emergence of growing quantity of pathogenic bacteria strains resistant to narrow-spectrum

antibiotics and posing serious threat for the human life and health [25].

The studies on elaboration of the mechanism of the silver effect on microbial cell have been deployed in the Institute of Colloidal Chemistry and Water Chemistry under AS of the Ukraine under the leadership of L. A. Kulskiy. It is known, that the metal uptake by the cell can be done through three various ways [12]:

1. Metal adsorption by the cell surface;
2. Metal active transportation to the cell;
3. Biphasic process: first phase – adsorption rapidly removed with the second phase – active transportation of the metal to the cell.

Experiments accomplished by the above Institute employees demonstrated that the silver absorption by the microorganism cells had been made by the third way regardless their species composition.

It has been identified that the various species of microorganisms have the high silver adsorption by microbial cell; as a result, the cell stops breathing and dies (dries out). The silver ions adsorbed by the capsomeres (proteins) of the viral capsid (membrane) deprive the virus of capability to penetrate to the cells since the virus "becomes heavier" from the silver, its activity reduces and it is killed as a result [6; 12].

Antibacterial properties of the metal silver are associated with its slow oxidation and Ag^+ ion release to environment; therefore, the use of nanosilver medicine as a special class of biocidal agents it is seemed as a promising one. Nanoparticles have the high antibacterial activity due to their extended surface providing the maximal contact with environment. Moreover, they are rather small and able to penetrate through the cell membranes and influence the intracellular processes internally [2; 5; 16].

The long-term drinking of potable water containing 50 mkg/l of silver (MAC level) by the human being does not affect negatively on the functions of organs of digestive system, including liver antitoxic function [6; 19].

In the course of identification of antimicrobial properties of ionized silver it has been established that its antibacterial effect is extremely higher compared to the carbolic acid, sublimate and chlorinated lime. The spectrum of the silver antimicrobial effect is significantly wider compared to many antibiotics and sulfanilamide. Antibacterial effect is manifested with the minimal doses [22].

The silver has the more prominent antimicrobial effect than penicillin and the other antibiotics, and causes the similar effect on antibiotic-resistant bacterial strains. The silver ions provide the various antimicrobial effect on aurococcus, Proteus vulgaris, blue pus bacillus and colon bacillus – from antibacterial to bacteriostatic one [2; 4; 22; 26].

The silver ions have the prominent capability to inactivate and depress the activity of the influenza viruses, some enteroviruses, adenoidal viruses and AIDS viruses. At that, the high advantage of the colloidal silver therapy compared to the conventional one has been identified [4; 13].

The studies of the German scientists has demonstrated the prominent antibacterial activity of the silver nanoparticles related to the antibiotic- resistant microorganisms (*Staphylococcus epidermidis* and *Staphylococcu saureus*) with their addition to the bone cement [27]. The integration of the nanosilver with imidasole suclophosphan has the same antimicrobial activity as 0.5% solution of the silver nitrate in terms of *S. aureus*, as well as *E. coli*, *P. aeruginosa*, *C. albicans*, *A. niger* and *S. cerevisiae*. This integration acute toxicity (LD_{50}) in intravenous injection to the rats achieved 100 mg/kg [16; 17].

The information on necessity of the deepen analysis of toxicological aspects pf nanomedicines, including nanosilver, are emerging in scientific literature. D. Chen at al. [12] were studying effect of the silver nanoparticles and microparticles in their implantation in the rat spinal muscles. The positive biological effect in application of the silver nanoparticles and microparticles was obtained on the 7th and 14th day of observation. The inflammation effect was identified on the 30th day of observation in application of both silver medicines; this was associated with its high concentration in the muscles.

The research was devoted to the influence of the silver NP on the vital activity of gram-negative microorganisms *E. coli, V. cholera, P. aeruginosa* and *S. Typhys* at logarithmic phase of growth with the state-of-the-art high-precision methods [28]. At that, *V. cholera* and *P. aeruginosa* manifested higher resistance compared to *E. coli* and *S. typhys*, however, in case of silver concentration 75 $mkg \cdot ml^{-1}$ the growth cessation was identified in all samples. The electronic microscopy identified that the silver NPs were not only fixed on the cellular membrane but were also abletopenetrate through it and split up inside bacterium. Only individual NPs but not their agglomerates had this capability. Moreover, the sizes of NPs connected to membrane, as a rule, did not exceed the size of the particles inside the cell. Based on this, the conclusion was made that only clusters able to interact with the cellular membrane could penetrate in the cytoplasmic space [12; 28].

The mechanism of NP penetration inside the cell is still unclear at all. There have been reports presented on the high modifications in the bacterial membrane structure *E. coli*, increase of its penetrance and loss of microorganisms in interaction with the silver NPs. Bacterial wall comprises high quantity of sulphur and phosphorus containing molecules interacting with NPs and losing their activity. Inside bacterium NPs may interact with DNA, and at that, DNA is losing replication capability causing its loss as well [20].

The same team of researches was studying the influence of the silver NPs on activity of the human immunodeficiency virus (HIV-1) [20]. For this purpose, the test of the NP samples stabilized with foam carbon, poly (N-vinil-2-pyrrolidone) and bovine serum albumin was fulfilled.

The silver cysteinat is being suggested for eradication of immunodeficiency virus: "proteins with the link protein – metal are the important components of retroviruses of the human immunodeficiency virus (HIV) type. Therefore, the metals can be used as antiviral agents. However, most of the metals are poisonous for the human beings, excluding the silver which is the poison only for prokaryotic cells and viruses. Therefore, untoxic silver cysteinat can be applied as antiviral medicine and cysteine source. The silver is a very active antibacterial metal with minor toxicity for the human beings. It was also demonstrated that the silver can act as a powerful inhibitor of HIV protease. The silver is interacting with HIV proteins (for instance, with the surface receptors, gene or cellular biosynthesis of viruses) and, therefore, interrupting the cellular replication of HIV at the various stages [9; 26].

In the authors' opinion, not neutral metal atoms but Ag^+ ions adsorbed on NP surface make decisive contribution to antibacterial activity of the silver NPs. The large silver NPs (62 ± 18 nm) were synthesized for identification of the influence of the size of oxidized NPs on their dispersion antibacterial effect. It was identified that with equal concentration of the metal NP dispersions with the mean diameter 9.8 nm were manifesting biological activity by 10 times exceeding activity of dispersions of the larger silver clusters. The outputs of research devoted to analysis of antibacterial activity of the large silver NPs (from 25 nm and bigger) can be found in the paper [26; 30]. In analyzing the influence of NPs on the bacterial stains resistant to the silver nitrate effect (mutants *E. coli* – strains [33] $AgNO_3$ R and J53(pMG101)), it was identified that these microorganisms stayed capable to propagate with NP concentrations maximally possible under experiment conditions. This fact indirectly proves that chemisorbed ions provide decisive influence on biocidal properties of the particles. Detailed information on silver resistant bacteria is presented in reviews and articles [25; 26; 30].

Studying of fundamental issues related to the mechanisms of antibacterial effect of the silver NPs is currently on the initial stage. However, the number of emerging publications is increasing with description of the use of antibacterial properties of the silver NPs for solution of applied medical and industrial objectives. Thus, it was reported [32] on the positive synergetic effect of nanosilver and various antibiotics in control of *S. aureus* and *E. coli*. The simple and cheap procedure of creation of bio-compatible polyelectrolyte layer on the basis of laminated film ofpolyethylenterephtalate containing silver clusters and having high anticoagulative and antibacterialactivite is described in the paper [21]. In the authors' opinion, such films can have potential application in surface modification of the various medical facilities, specifically, cardiovascular implants. The research authors [31] obtained and described properties of food packing materials based on the natural polymers able to bio-degradation and having antibacterial properties due to the silver-containing nanocomposite. A lot of papers have been devoted to infiltration of textile goods with solutions of the silver NPs in order to provide them with antibacterial properties [19]. The simple and efficient industrial method of infiltration of woven and nonwoven fiber with the silver nanoparticles (~2–3 nm) has been developed [24].

The recent period is characterized with the growth of the microbial infection number, including surgical and post-operational, in all countries of the world, regardless their economic development [7].

The number of water soluble metal containing nanobiocomposites have been obtained; their composition includes the silver nanoparticles [3], stabilized with the natural polysaccharides: arabinogalactan, its functionalized derivatives and heparine. The parameters of synthesis of nonorganic – organic silver nanocomposites remaining physical – chemical properties of biogenic matrix were developed and optimized.

Obtained nanoparticles are [resented in form of homogeneous formations with the mean sizes 4–30 nm, and their shape has regular character and close to the oval one. Particle distribution by size appeared to be extremely limited, for instance, the sample argentoarabinogalactan is narrow disperse: the share of particles with the size within the range 6–12 nm is equal to 80% [3; 8; 18].

It has been identified that the minimal antibacterial concentration of argentoarabinogalactan and argentoheparine varies within the range from 1 to 100 mkg/ml in terms of the principle representatives of the surgical infections, including *Staphyllococcus aureus* [1; 13].

The paper [5; 10] is suggesting the synthesis of sustainable concentrated (up to 3 g/l) highly dispersive silver aquasols stabilized with cetyltrimethylammonium bromide. The possibility of modification of polyethylenterephtalate previously deformed according to the creysing mechanism with the silver nanoparticles has been considered. Based on the outputs of microbiological tests with the use of bacteria *Pseudomonasaeruginosa* it was identified that obtained nanocomposites had prominent biocidal effect.

Recently, the ready-made bandages containing colloidal (ultra-disperse, nanocrystallic) silver [9; 19; 31] receive widespread acceptance; numerous studies prove efficient antimicrobial and wound-healthing properties of these products, however, the differences in manufacturing ways, con-

centrations, particle sixes, nature of carrier material, etc. are hindering the meaningfull comparison of the products. Despite the number of unsolved issues, these bandaging materials have passed successful trial in Germany, France and Italy; the studies accomplished in Canada demonstrated improved clinical parameters and reduction of the surface bioburden of the wound; at the same time, the flora of the deeper tissues remained unchanged [8; 11; 29]. The authors are also stating that the modern materials not only need to have antibacterial efficiency for the wound bandaging; they require additional properties accelerating the wound redressing; for instance, the material has been described which removes the products of bacteria metabolism from the treatment area and connects endotoxins formed in the course of the cell loss [14; 25; 33].

Hydrogel bandaging materials have been offered; they are based on chitosan and include the silver nanoparticles. The integrated research of antibacterial properties, toxicology, safety, sanitary – chemical properties and wound-healthing action of the new material has been accomplished [31].

Chitosan hydrogel bandaging materials with the silver clusters were applied in the local treatment of the patients with the limb trophic ulcers and for the treatment of burns of II, III-a and III-b degrees. Based on the outputs, the conclusion was made on the high efficiency of traumatic dressings. This medical product cay be widely used in out-patient and clinical practice. The bandaging material provides the favourable course of traumatic process, facilitates tissue regeneration and results in reduction of the treatment duration. Chitosan hydrogel bandaging materials containing the silver clusters are promising for the use in surgical practice [2].

Compounds of colloidal (metallic) silver with the protein – trademarks "Argirol", "Protargol", "Collargol", etc. can be obtained through interaction of the silver oxide with gelatin or albumin (silver concentration 19–25%). Collargol and Protargol are applied externally in form of 1–2% solutions as astringent, antiseptic, anti-inflammation remedies in the treatment of ear, nose, throat; the possibility of these compounds application as antihypoxic drugs has been demonstrated [12].

The paper shows the low toxicity of the silver proteinate (rats, orally), however, the possibility of argyria development in case of overuse of these remedies has been manifested [8].

Along with the silver positive properties, its negative characteristics, for instance, toxicity, have to be taken into consideration. The numerous individual papers and surveys have been devoted to the problem of the silver toxicity. The scientific toxicological studies of silver in Russia are dated by the end of XIX – beginning XX century. Thus, Rodzevich [24; 34] in 1903 analyzed the silver influence on blood using the extensive pilot material and demonstrated peculiarities of its effect in case of various ways of the silver medicine introduction in the organism.

The silver (especially in ionic water soluble form) is toxic for aquatic organisms (aquatic fauna). At the same time, "the silver toxicity in terms of mammals is relatively low. In the blood serum of human being, within 24 hours up 600 mkg/l of Ag concentration can be observed and in the urine – 1.100 mkg/l without clinical consequences. The fact that there has not been any reports known about any mutagenic or carcinogenic activity of the silver compounds [11] is the most important".

The authors predominantly agree that, unlike the salts of the other heavy metals, the silver is not dangerous for the external and internal medical application. Many scientists are warning about risk of overuse of the various products promoted in the market in form of biologically active supplements: "silver proteins", colloidal solutions and the other commercial (nonmedical) silver medicines. Apart from insufficient efficiency, the authors indicate the risk of argyria formation in case or oral application (argyria, argyrose or argyriasis, from the Greek word "argyros" – silver; brown or black and grey pigmentation of skin, mucous coat, tissues of internal organs and eyes caused by the silver settling).

WHO established the maximal silver dose which does not cause observable adverse effect on the human health (NOAEL level –No Observable Adverse Effect Level) – 10 grams. Therefore, according to the WHO methodology, the person "eating and drinking" totally 10 grams of silver over entire life (70 years) is reliably not supposed to have any associated health problems [31]. Based on this dimension the recommendations were developed on the tolerant (tolerable) silver content in the potable water – 100 mkg/l. Such concentration during 70 years of life gives the half of the NOAEL level, which is certainly safe for the health. According to the domestic "Sanitary Norms and Rules", MAC of silver in the potable water is equal to 50 mkg/l. The similar indicator was accepted as the silver maximum allowable level in the potable water for many states of America [26].

The silver practically "does not provide adverse effects on the human beings; argyria (change of the skin colour due to the silver subdermic settling) is a rare phenomenon and there is no any reason, mainly, for cosmetic concern". One of the recent articles [11; 29] categorically shows that ***"…the interest to the silver as the medicine for the wound treatment and redressingsy is experiencing Renaissance".***

The analysis of the literature demonstrates that the silver compounds, specifically, silver nanoparticles with the narrow distribution by size and stabilized with polymeric systems are of a great interest in manufacturing of the new generation medical remedies and goods with unique new properties. Creation of antibacterial traumatic surfaces containing silver

nanoparticles in the structure of biodegradable and water soluble polymers is of a specific interest. Such polymers in form of powders, solutions, hydraulic gels and especially films to some extent simultaneously functioning as a skin are protecting the traumatic surface and do not injure it; and provide antibacterial wound redressingsing effect and are subject to biodegradation [11].

Based on the literature survey, devoted to the analysis of the current status of the issue on the methods of synthesis and stabilization of the silver NPs and NP-based remedies properties it has been identified that transition from macro-scale and micro-scale to the nanoscale causes emergence of qualitative modifications in the physical – chemical and medical – biological properties of compounds along with polymer systems obtained on their basis.

Synthesis and investigation of the silver NP stabilized in the polymer matrices are currently presenting promising trends in the polymer chemistry and medicine.

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VIOLATIONS OF COAGULATIVE HEMOSTASIS IN PATIENTS WITH LIVER CIRRHOSIS OF THE VIRAL ETIOLOGY

Abstract:

The objective of the research is to carry out comparative clinical and laboratory characteristics of coagulopathy in patients with liver cirrhosis of viral etiology.

Materials and methods: clinical studies were carried out in the hepatobiliary department of the Tashkent medical academy. The study included 80 patients with liver cirrhosis of the viral etiology, in the stage of decompensation of class B according to Child-Pugh and 20 patients with liver cirrhosis of non-viral etiology.

Results: the decrease of blood coagulation system activity is more pronounced in the group of hepatitis B (55.5%) and C (33.3%) positive patients with liver cirrhosis, in contrast to non-viral liver cirrhosis.

Keywords: hemostasis, coagulopathy, hypocoagulation, liver cirrhosis, hemorrhage syndrome.

Introduction. Over the past decades, the incidence of liver cirrhosis has remained consistently high, accounting for 30% of the total number of patients with chronic diffuse liver diseases treated in specialized hospitals. In 50–85% of patients with liver cirrhosis is complicated by portal hypertension, the manifestation of which is the extension of varicose veins in the esophagus and in the cardiac part of the stomach. Bleeding from the extension of varicose veins occurs in every fourth patient, reaching 50–70% of mortality already at the first episode [3]. The share of viral etiology of liver cirrhosis (in the outcome of chronic hepatitis B, C, B+D) is from 10 to 23,5% of all cirrhosis [2; 6]. In recent years, the number of cirrhosis has increased about 30,3% as a result of viral hepatitis C [1, 5]. The liver plays an important role in hemostasis, so diffuse lesions of its parenchyma lead to complex blood clotting disorders [8]. At present, it is believed that changes in hemostasis in liver cirrhosis affect pro – and anticoagulation systems, while maintaining a balance between them, however due to the reduced reserve of each of these systems, it easily shifts towards hypo-or hypercoagulation [7; 9]. In liver cirrhosis, changes in the hemostatic system are complex and multidirectional. Complex and ambiguous changes in the hemostatic system in patients with impaired liver function can lead to various complications. Such as bleeding is the most common clinical manifestation due to thrombocytopenia and thrombocytopathy, and a violation of the synthesis of coagulation factors, as well as the activation of fibrinolysis [4].

Development of a comprehensive assessment of hemostatic homeostasis in chronic liver diseases is in the research to solve this problem. Many pathogenetic aspects of hemorrhagic syndrome and the role of hemostatic changes are not explored in chronic liver diseases. Analyzing hemostatic disorders in patients with liver cirrhosis of viral etiology, and appropriate hemostatic therapy on time will reduce the risk of hemorrhagic complications. In this regard, we have undertaken this study.

The objective of the research is to carry out comparative clinical and laboratory characteristics of coagulopathy in patients with liver cirrhosis of viral etiology.

Materials and methods. Clinical studies were carried out in the Hepatobiliary Department of the Tashkent medical academy. The study included 80 patients with liver cirrhosis of the viral etiology, in the stage of decompensation of class B according to Child-Pugh and 20 patients with liver cirrhosis of non-viral etiology. Group I consisted of 30 patients with positive virus of hepatitis B, group II of 20 patients with positive virus of hepatitis B and D, group III of 30 patients with positive virus of hepatitis C and group IV consisted of 20 patients with liver cirrhosis of non-viral etiology. From men – 56 (56%) and women-44 (44%). The age of patients ranged from 21 to 69 years, the average age of the examined patients was 49.2 ± 12.9 years. All patients were with a long term chronic liver disease, the duration of liver cirrhosis amounted to an average of 4.15 ± ± 1.74 years. Among the sick patients of reproductive age were 43.97%. The control group consisted of 20 patients who did not suffer from liver and biliary tract diseases, with negative results on hepatitis B and C markers. Hematological, hemostasiological and methods of variation statistics were used. Hematological studies were carried out on the hematological analyzer "Mindrey 3000" (China) microscopic studies of platelets were carried out on a light microscope "Micromed" (Russia), the coagulogram was studied on the coagulometer "Clot" (China) using a

set of reagents "Human", the biochemical analysis was carried out on the biochemical analyzer "Mindrey" (China) using a set of reagents "Human".

Results and discussion. Coagulation hemostasis is a cascade of reactions involving plasma coagulation factors. The process of blood clot formation is divided into 3 phases. To assess the first phase of blood clotting, the time of blood clotting by Moravitz and activated partial thromboplastin time (APTT) were investigated (table 1).

APTT-test that reveals only plasma defects of the internal system of activation of X factor in the first phase of blood clotting. The lengthening of the APTT reflects the deficiency of plasma factors XII, XI, IX, VIII and is observed with their significant decrease (below 10–25%) and indicates the predominance of hypocoagulation, which was reliably shown in groups I and II. In group III and IV, the APTT was slightly increased.

Pronounced lengthening of blood clotting time (BCT) is observed with a deep deficiency of blood clotting factors. Blood clotting time was also significantly extended in groups I, II and III. In IV group BCT has been slightly extended.

Table 1.– Evaluation of the first phase of blood clotting in liver cirrhosis

Groups	Start of BCT, sec	End of BCT, sec	APTT, sec
Controlgroup, *n* = 20	125 ± 12.5*	248 ± 13.2*	29.1 ± 2.24*
I group, *n* = 30	352 ± 23.2*	482 ± 32.5*	39.4 ± 3.01*
GroupII, *n* = 30	372 ± 26.5*	488 ± 29.8*	41.0 ± 6.80*
GroupIII, *n* = 20	212 ± 13.4*	306 ± 19.7*	36.57 ± 2.55*
Group IV, *n* = 20	139 ± 9.4*	248 ± 11.9*	36.5 ± 1.25*

*Note: * – p< 0.05 was reliable with respect to the control group*

As can be seen from the table, expressed violations of the first phase of plasma hemostasis have increased in patients with cirrhosis of the liver viral etiology, while in patients with liver cirrhosis non-viral etiology were slightly shifted towards hypocoagulation. For the study of the second phase of plasma hemostasis were determined prothrombin time, prothrombin index.

Prothrombin time characterizes the first and second phases of plasma hemostasis and reflects the activity of prothrombin complex – factors VII, V, X and prothrombin factor II. The increase in prothrombin time indicates a tendency to hypocoagulation. Studies have shown a significant mixing of hemostatic system in the direction of hypocoagulation in patients of groups I and II, while patients of groups III and IV had a tendency to hypocoagulation.

The prothrombin index calculated from the prothrombin time (PT) reflects both the first phase of blood clotting (prothrombin formation) and the second phase (thrombin formation), and they were within the range of 68.47 ± 13.2% and 62.35 ± 2.78% in the first and second groups respectively. This indicated no pronounced hypocoagulation. In the III and IV groups, this was 70.39 ± 15.29% and 69.5 ± 13.36% respectively, indicating moderate hypocoagulation. Data of prothrombin time (PT) and prothrombin index(PTI) are given in (table 2).

Table 2.– Evaluation of the second phase of blood clotting in liver

Groups	PT, sec	PTI,%
Control group, *n* = 20	15.57 ± 1.03*	95.6 ± 11.79*
Igroup, *n* = 30	19.68 ±3.01*	65.47 ± 13.2*
IIgroup, *n* = 30	20.93 ± 0.75*	62.35 ± 2.78*
IIIgroup, *n* = 20	19.89 ± 2.84*	66.39 ± 15.29*
IVgroup, *n* = 20	19.61 ± 2.29*	69.5 ± 13.36*

*Note: * – p< 0.05 was reliable with respect to the control group*

To characterize the third phase of blood clotting, the number of fibrinogen, plasma tolerance to heparin, thrombotest and thrombin time were determined. Fibrinogen – I factor of blood coagulation and stable protein – globulin are synthesized mainly in the liver. So the study of fibrinogen indicates a pronounced hypocoagulation. This showed a significant decrease in the concentration of plasma fibrinogen in all groups with liver cirrhosis of viral etiology. And this was more decreased in groups I, II, and III, while in groups IV these changes were unaffected. Thrombin time is the time required for the formation of a fibrin clot in plasma when thrombin is added to it. It depends on the fibrinogen concentration and activity of thrombin inhibitors (antithrombin III, heparin); it is used to evaluate both the third phase of blood clotting and the state of natural and pathological anticoagulants. The study of the third phase of plasma-coagulation hemostatic link showed that patients of I, II, III and IV

groups had a distinct elongation of thrombin time compared to the control group. Plasma tolerance to heparin (PTH) characterizes the state of the blood coagulation system as a whole, at the same time is an indirect indicator of the state of thrombin. The lowering of TPG depends on factors V, VIII, IX, XII. Similar changes were found in the previous analysis: in patients of I, II, III and IV groups, compared with the control group, there is a clear decrease in plasma tolerance to heparin. Thrombotest (TT) is determined by the intensity of the formation of a fibrin clot. Grade III is characterized by the inferiority of loose clot fourth degree the clot decorated and glued to the wall of the tube, V the extent of the clot fills the entire volume of the tube. The main part of the indicators of thrombotest were III degree in patients with liver cirrhosis.

Indicators of thrombin time, plasma tolerance to heparin (PTH) and thrombotest (TT) are shown in (table 3).

Table 3.– Indicators of the third phase of plasm hemostasis in liver cirrhosis

Performance	Control group	I group	IIgroup	IIIgroup	IVgroup
Trombin time, sec	26.75 ± 1.67*	37.03 ± 4.52*	37.6 ± 4.84*	37.73 ± 3.28*	36.31 ± 1.56*
PTH, sec	310.5 ± 35.3*	544.7 ± 40.9*	550.3 ± 36.2*	537.9 ± 23.9*	533.5 ± 36.9*
TT	4.8 ± 0.10*	3.07 ± 0.28*	3.05 ± 0.50*	3.13 ± 0.83*	3.56 ± 0.43*

*Note: * – p < 0.05 was reliable with respect to the control group*

Thus, our study of the plasma-coagulation level of hemostatic system in patients with liver cirrhosis of viral etiology showed the presence of significant deviations in the direction of hypocoagulation shift. This was manifested by the lengthening of the blood clotting time, activated partial thromboplastin time, prothrombin time, prothrombin index, plasma tolerance to heparin and thrombin time, a decrease in the amount of fibrinogen, the degree of thrombotest. Given that APTT lengthens with a deficit of factors XII, XI, IX and VIII, we can assume that the formation of these factors in patients with cirrhosis of the liver is disturbed. It should be noted that the decrease in the activity of the blood coagulation system is more pronounced mainly in I, II and III groups of patients, while hypocoagulation was insignificant in IV groups.

Conclusions:

1. The plasma coagulation hemostasis significantly deflected in the direction of hypocoagulation in the liver cirrhosis of viral etiology. This is manifested by a decrease of the blood clotting time, activated partial thromboplastin time, prothrombin time, prothrombin index, plasma tolerance to heparin and thrombin time, a decrease in the amount of fibrinogen, the degree of thrombotest.

2. It should be mentioned that the decrease in the activity of the blood coagulation system is more pronounced in patients with liver cirrhosis viral etiology in comparison with liver cirrhosis non-viral etiology.

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EVALUATION OF HEPATOPANKREATOBILIARY SYSTEM FUNCTIONAL ACTIVITIES IN POSTOPERATIV PERIOD IN GASTRIC CANCER PATIENTS

Abstract: Patients with gastric cancer (GC) have evaluated the hepatopancreatobiliar system disorders and their outcomes after surgery. For this purpose, activity of liver, gallbladder and enzymes (ALAT, ASAT, ALP, α-amylase, lipase, elastase-1) in liver, gallbladder and pelvic function in blood and coprofiltrates of patients with GC without complications with 51 malabsorption syndromes were studied. The role of some cytokines (IL-6 and TNF-α) and antimicrobial peptides (lactoferrin, calprotectin and zonuline) in the immune mechanisms of the inflammatory process in the intestines has been studied. The analysis and biochemical analyzes were performed prior to surgery and were followed in 3 and 6 months after surgery. It has been established that the enzyme activity of the pancreatobiliar zone after the procedure of postoperative surgery in patients with malabsorption GC was significantly decreased after 3 months and 6 months after the surgery: The activity of ALAT, ASAT and ALP enzymes was 39.5%, 19.9% and 58.4%, and the activity of α-amylase and lipase enzymes reflecting the secretory activity of the pancreas was 40.6% and 24.3%, respectively, compared with the preoperative predictors of fecal elastase-1 enzyme activity compared to 13.9% in comparison with the previous year. In these patients, cytokines and antimicrobial peptides concentrations increased significantly after 6 months of operation: concentration of zonuline, calprotectin and lactoferrin was 16.9%, 44.6% and 9.2% higher than the preoperateness indicators, IL-6 and TNF-α. The density of a increased by 52.9% and 26.5%, respectively.

Keywords: Gastric cancer, antimicrobial peptides, cytokine.

Gastric cancer (GC) is the most widespread tumor among the malignant tumors of the hepatopancreatobiliary system and is one of the most important areas of clinical oncology in terms of diagnosis and treatment. Although great success has been achieved in the diagnosis and treatment of gastric cancer over the past few decades, difficulties in early diagnostic, the incidence of primary non-resectible tumors and, in some cases, patients' in advanced stages, create problems in adequate treatment of this disease. GC is the second most common cause of diseaes related death rate after lung cancer in men, and takes the 4th place in death rate women in menopause. Every year, around 1 million new cases of GC and 700.000 deaths are reported worldwide. Now days surgery is considered to be the main radical treatment of gastric cancer [1; 3; 4].

Although significant progress has been made in the treatment and prophylaxis of GC in recent decades, the incidence of perioperativ complications, requiring the identification of new areas and perspectives in treatment and diagnostic of the disease. It has been established that one of the causes of post-operative death in GC patients are metabolic disorders associated with the structural-functional changes in different organic, especially those entering the pancreatobiliary system. Disfunction of lungs, gallbladder and pancreatic secretory activity is observed in most patients in the early and late post-operative period [2; 5; 6; 7; 8] Investigating the biochemical mechanisms of digestive tract disorders in GC patients can lead to early and accurate diagnosis and also can be used to provide effective treatment methods of this disease. Recently, the study of antimicrobial peptides (AMP) and cytokines is in the focus of assessment of digestive system activity. This method is feasible by its non-invasiveness and high sensitivity [9; 10; 11]. The purpose of the present study is to study the dynamics of some enzymes, antimicrobial peptides and cytokines, which reflect the functional activity of hepatopancreatobiliary system in postoperative period in GC patients.

Materials and Methods. The study includes 51 patients with a diagnosis of stomach cancer not complicated by malabsorption syndrome at the age of 31–76 years treated at the

Oncology Clinic of Azerbaijan Medical University. The control group consisted of 17 elderly healthy people.

Patients were diagnosed using radiologic, endoscopic, histological and laboratory diagnostic methods. The diagnosis of gastric cancer, histological structure of the tumor and the stage of the disease have been confirmed by the morphological examination of biopsy of the tumor. All tumors were adenocarcinoma. In order to achieve the goal, the levels of some marker enzymes of the liver, gallbladder and pancreas (ALAT, ASAT, ALP, α-amylase, lipase enzymes and some cytokines α(IL-6, TNF-α), were investigated in parallel, the pancreatic elastase-1 enzymes, zonuline, calprotectin and lactoferrine antimicrobial peptides were analyzed in coprofiltrate of healthy individuals and patients included in the research contingent and the level of investigated biochemical parameters was investigated 3 and 6 months after surgery. The level of ALAT, ASAT, ALP, lipase and amylase in the blood of patients with gastric cancer were analyzed by reactives of "Human" (Germany) company.

The concentration of cytokines TNF-α and IL-6 in the blood serum was carried out by a "sandwich" method through a jet set of Vektor-Best (Russian Federation). The principle of an analysis of the amount of elastase-1 enzyme in coprofiltrate is based on the double-synthetic immunoferment reaction (Immun Diagnostics, Germany). Zonuline, calprotectin and lactoferrine in coprofiltrate were determined by immunoferment method using a reactive kit of Immun Diagnostic (Germany).

All patients were followed up after surgery and data of 3 months later. Their complaints examination included clinical, laboratory and instrumental examinations.

The obtained results were statistically analyzed using the variation method. The non-parametric U-Wilcoxon (Mann-Whitney) criterion was applied to determine the difference between the groups.

Results of research and their discussion. The results showed that the activity of AlAT and ASAT enzymes in blood serum of GC patients was (40.6 ± 1.4 U/l, $p < 0.001$; control: 29.6 ± 1.7U/l) and 17.9% (41.4 ± 1.8 U/I, $p < 0.01$; control: 32. 6 ± 1.4 U/l) increased by 37/2% compared to the control group and respectively. AlAT and ASAT enzymes are important in aminoacides metabolism. They enter the bloodstream during cells damage and destroyment. The activity of the ALP enzyme, one of the major enzymes of the bile ducts, was not significantly differ from the control group, and it was 203.5 ± ± 7.8 U/l (control: 188.8 ± 9.9 U/). The results showed that the concentration of ALAT, ASAT and ALP enzymes significantly rose 3 month after surgery compared to the preoperative data 17.9% ($p < 0.01$); 16.9% ($p < 0.05$) and 28.5% ($p < 0.001$) and 39.5% after 6 months ($p < 0.001$); 51.7% ($p < 0.001$) and 58.4% ($p < 0.001$) respectively.

Activity of α-amylase, lipase, and fecal elastase-1 enzymes is of great importance in detection of pancreatic secretion deficiency [12].

The activity of the α-Amylase enzyme increased by 24.5% (61.6 ± 2.4 U/l, $p < 0.05$, control: 49.5 ± 4.7 U/l) compared to the control group. The activity of lipase enzyme in this group was 29.9 ± 1.1 U/l and did not differ from the control group (28.7 ± 1.6 U/l). This result was not statistically significant/

α-Amylase and lipase activity rose by 18.2% ($p < 0.01$) and 13.3% ($p < 0.05$) within 3 months, respectively.After 6 months 40.6% ($p < 0.001$) and 24.3% ($p < 0.001$) increase was observed, respectively.

Since the pancreatic elastase-1 enzyme that is synthesized by the acinar cells of the pancreas don`t destroyed in intestine, its concentration in the feces can be considered an objective criterion for assessiment of exocrine function of this gland [13]. The activity of the fecal elastase-1 enzyme was lower by 9% in the control group (203.0 ± 2.2 mkg/g, $p < 0.001$, control: 223.3 ± 5.2 mkg/g). There was a statistically significant decrease in fecal elastase-1 enzyme activity 6 months after surgery ($p < 0.001$) (Table 1).

Table 1. – Dynamics of changes in liver, gallbladder and pancreas enzymes in the serum of the stomach cancer patients without malabsorption syndrome, (M ± m)

Indicators	**Groups**		
	Before surgery	**3 months after surgery**	**6 months after surgery**
1	***2***	***3***	***4***
ALAT, U/L	40.6 ± 1.4*** (23.2–60.3)	47.8 ± 2.0***.^^ (21.4–69.9)	56.6 ± 2.7***.^^^ (22.6–83.2)
ASAT, U/L	41.4 ± 1.8** (21.5 ± 65.1)	48.4 ± 2.2***.^ (25.3–78.4)	62.8 ± 2.8***.^^^ (25.8–96.7)
ALP, U/L	203.5 ± 7.8 (103–299)	261.4 ± 12.2**.^^^ (113–386)	322.3 ± 13.2)***.^^^ (158–482)
α – Amylase, U/L	61.6 ± 2.4* (30.9–91.3)	72.8 ± 3.0***.^^ (33.4–107)	86.6 ± 4.2***.^^^ (36–134)

1	*2*	*3*	*4*
Lipaza, U/L	29.9 ± 1.1 (17–43.2)	33.9 ± 1.4. ∧ (17.5–52.5)	37.2 ± 1.8)*. ∧∧∧ (17.6–58.8)
Elastaza, mkg/g	203.0 ± 2.2*** (183–237)	188.1 ± 4.4***. ∧∧ (107–247)	174.9 ± 5.5)***. ∧∧∧ (83.3–229)

*Note: By control:*** – p < 0.001, ** – p < 0.01, * – p < 0.05; According to pre-operative data: ∧∧∧ – p < 0.001, ∧∧ – p < 0.01, ∧ – p < 0.05*

Thus, our results showed, serious changes in functional activity of the hepatobiliary digestive system after surgery in GC patients with included in this study.

Recently, research has been carried out to improve non-invasive methods for the early diagnosis and treatment of malabsorption syndrome and to detect new biomarkers. In this regard, it is of particular interest to study antimicrobial peptides such as lactoferrine, calprotectin and zonuline in patients with gastrointestinal disorders. Due to the resection of a certain part of the stomach, the reduction of chloride acid production leads to the massive increase of conditional-pathogenic bacteria in the upper gastrointestinal tract, resulting in acceleration of inflammatory processes in the intestine. It is well-known that AMP plays an important role in observation of inflammatory reactions and determination of their severity level. AMP is considered to be the main component of the organism's immune system and plays an important role in immune system [13; 14]

Calprotectin is a calcium regulations related protein heterocomplex, which release from activated neutrophils and tissue macrophages and invoered in inflamation. Calprotectin has antibacterial, antifungicidal, immunomodulatory and antiproliferative effect, and is capable to induce apoptosis by weakening the growth of fibroblasts. In the digestive tract inflammation can be detected in feces couse of migration granulocytes from the intestinal wall.The elavation calprotectin in the feces is a key indicator of gastrointestinal tract the inflammation [15]. The consentration calprotectin in coprofiltrates of GC patients without malabsorption syndrome was 1.6 times higher than in the control group (±; control: 17,2 ± ± 1.2 mkg/g)

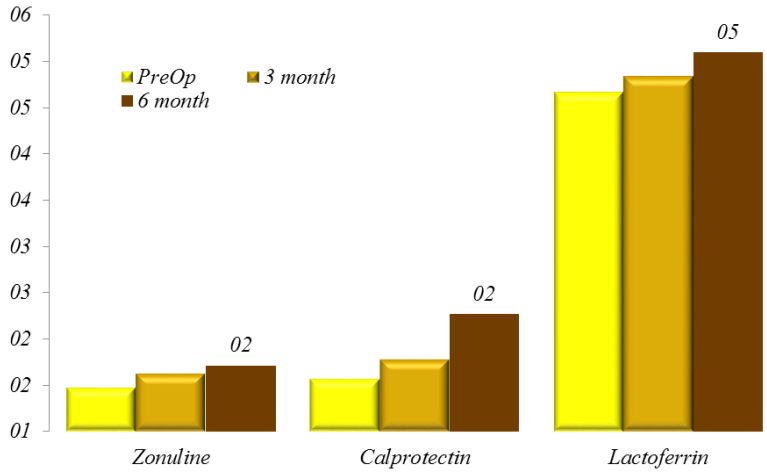

Figure 1. Change of antimicrobial peptide levels 3 and 6 months after surgery in GC patients without malabsorption syndrome

One of the important representatives of antimicrobial peptides is zonulin. It belongs to the group of haptoglobulin proteins and is synthesized in liver and inner epithelial tissues. Zonuline molecules provide tight contact between the mucous membrane cells of the small intestine wall. In study, it was determined that the level of zonuline in the coprofiltrates of GC patient without malabsorption syndrome was 1.5 times higher than in the control group (1.265 ± 0.043 m mkg/g, $p < 0.001$; 0.858 ± 0.094 mkg/g). Hyperproduction of zonuline activates the chain of reactions that expands intercellular contacts and so causes the intestinal perfusion (transfusion) [16].

Comparison of the results between investigation and control group revealed that the level of lactoferrine was 4.6 times higher in control group than in GC patients without malabsorption (4.56 ± 0.31 mkg/g, $p < 0.001$; control: 0.98 ± 0.16 mkg/g). Lactoferrin is a glycoprotein found in specific granules of neutrophils, refers to acute phase proteins, participates in non-specific humoral immune responses, and

has the ability to affect the activity of immunocompetent cells. Along with iron combining and transport functions, it provides antibacterial, antivirus, antifungicide, antiparasitic and antioxidant activity and encure microbalance of the gastrointestinal tract [13].

Located at the end of the "n" part of lactoferrin the specific peptide of lactoferrisin combines with the receptors of the immunocompotent cells with the participation, to perform an immunomodulatory effect. In this way, lactoferrin provides the releasing of some cytokines: IL-6 and TNF-α from mononucleated cells.

Cytokines perform a special immunomodulatory function in progression of inflammation in GC. The deepest studied cytokines are IL-6 and TNF-α. Cytokines are polypeptide mediators that participate in formation and regulation of defense response of the organism by establishing connection among immune, nerve, endocrine, gonadotropic and other systems [17]. Density of IL-6 (3.4 ± 0.2 pq/ml, control: 3.0 ± 0.3 pq/ml) was slightly different in the control group (Figure 2).

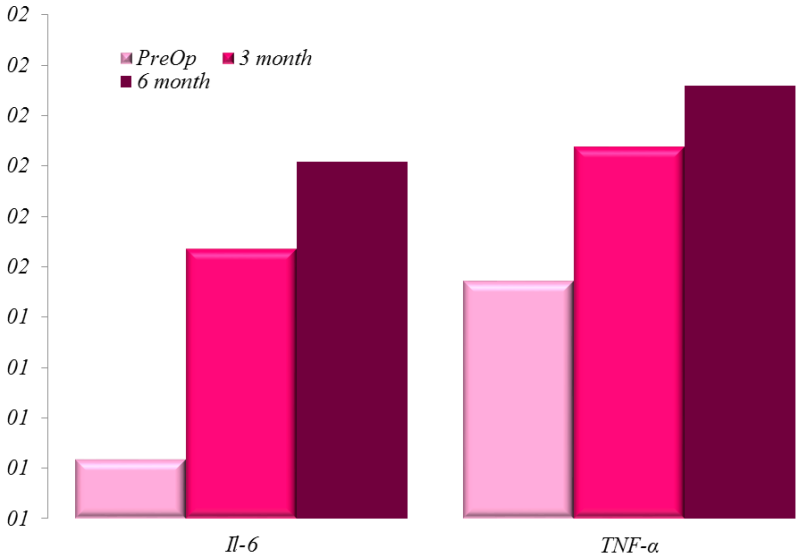

Figure 2. Change of cytokine indexes in patients with non-complicated GC after 3 and 6 months postoperatively without malabsorption syndrome

As can be seen from the presented data, the blood concentration of TNF-α was 1.5 times more than in the control group (7.1 ± 0.5 pq/ml, $p < 0.05$; control: 4.9 ± 0.6 pq/ml). It stimulates the synthesis of various pathogenic molecules and acute phase mediators (TNF-α and IL-1) and IL-6.

The level of IL-6 and TNF- α 3 months after surgery were 37% (1.4 times, $p < 0.001$) and 18.2% (1.2 times) higher respectively compared to the preoperative indicators (the result was inaccurate).

The level IL-6 rose up to was 5.2 ± 0.3 pg / ml of markers above became higher and the TNF-α rose up to 9.0 ± 0.5 pg/ml 6 months after surgery.What is more than the previous figures, IL-6 was respectively 1.5 times thick, $p < 0.001$ and 1.3 times of TNF-α ($p < 0.01$).

IL-6 and TNF-α are important is synthesized by cytokines involved in immunological and inflammatory responses. IL-6 macrophages, T-cells, vascular endothelial cells, fibroblasts, epithelial cells and so on. The IL-6 participates in immunological reactions and haemopoesis. In inflammation, IL-6 accelerates the chronic inflammation and synthesis of active phase proteins in hepatocytes [18; 19]. TNF-α is synthesized mainly by activated macrophages, and its prodrugs include endothelial cells, CD4-lymphocytes, NK-cells, dysplasia cells, mastocytes, myeloid, LAC, neuroglia cells and activated T-lymphocytes. TNF- α is an adipocytokine, participates in a systemic inflammatory processes, activates acute phase reactions. In healthy persons, TNF-α is founded in very small concentrations its synthesis is induced by microorganisms and endotoxins [20].

IL-1β, IL-6 and TNF-α are known as proangiogenic factors of malignant processes, such as gastrointestinal tumors, play a great role in vascularization of the tumor, its development, progression, and proliferation. IL-6 and TNF-α stimulate the migration of tumor infiltrating leucocytes. It has been established that TNF-α, IL-1β and IL-18 increase the expression of cell adhesion molecules in endothelium stimulate migration of immunocompetent cells to the tumor. Tumor infiltrating leucocytes begin to synthesize inflamatory and prooncogenic factors, thus creating pathological circulation [18; 19; 20; 21].

The results showed that after surgery in GC patients without malabsorption syndrome, serious irregularities in liver,

gallbladder and pancreatic secretory activity was observed that is accompanied by progression of inflammation in the bowl. Postoperative disorders in GC patients affect the patient's life quality and requires adequate medication correction.

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ALTERATIONS IN THE RIGHT CHAMBERS OF HEART IN COPD

Abstract: The research demonstrated that in case of COPD progression we could observe step-by-step remodeling of the right chambers of heart such as dilatation of the cavity of the right ventricle (RV) at the early stages with further development of hypertrophy of its myocardium and diastolic dysfunction. Thickening of the RV wall above 5.0 mm, increase of the pressure in pulmonary artery more than 20 mm of mercury column, the size of RV more than 70 mm, and its diastolic dysfunction can be considered to be unfavorable echometric parameters.

Keywords: chronic obstructive pulmonary disease, echocardiography, right chambers of heart.

At the moment COPD is a pathology possessing systemic effects at certain stages. Important extra pulmonary effects are cardiovascular pathologies [1; 3; 4; 10; 11]. According to researches, risk of death due to cardiovascular pathology in patients with COPD is 2–3 folds increased. Hypoxia in case of COPD promotes inadequate perfusion of organs and tissues. Activation of neuro humoral compensatory mechanisms for the satisfaction of the increased metabolic demands in cases of COPD initially has adaptive character. However, later almost all compensatory mechanisms transform to pathogenic factors promoting further dysfunction of heart and formation of significant alterations in hem dynamics [6; 7; 13].

At the same time the problem of the impact of cardiovascular disorders on the prognosis and remote outcomes in COPD cases requires clarification. Traditionally, secondary pulmonary hypertension and involvement of the right chambers of heart into the pathologic process, i.e. development of cor pulmonale and its decompensation is considered to be prognostically unfavorable symptom [5, 9, 12]. But the parameters of Doppler echocardiography in the checking of right chambers of heart in the patients with COPD, the most actual for the evolution of the disease are still not clear.

The objective of this research was the study of echometric parameters of the right chambers of heart at the different COPD stages.

Material and research methods. We observed 150 patients with COPD I, II, and III stages. The average age of the patients was 47 ± 1.5 years old. Dependently on the severity of the progression the patients were divided to three groups. The first group involved 54 patients with light degree of chronic obstructive pulmonary diseases, the second group 59 patients with mild severe progression of COPD, and the third group consisted of 37 patients with severe COPD. The control group included 20 healthy people of the corresponding age. Ecocardiographic tests were performed in parastenal position in B and M modes. We determined the thickness of the wall of right ventricle (RVWT), linear size of the RV and RA, thickness of inter ventricular septum (IVS), terminal systolic and diastolic sizes of RV. We calculated terminal diastolic volume (TDV) of the right ventricle using L. E. Teiccholz's formula [8]. RV ejaculation fraction was calculated according to the value of the maximal linear systolic velocity of the lateral part of fibrous ring of tricuspid valve Sm in impulse-wave Doppler (ID) mode. Sm parameters below 11.5 sm/sec correspond to the RV ejaculation fraction less than 45% and indicate RV systolic dysfunction [2]. RV diastolic function (RVDF) was assessed using impulse-wave Doppler (ID). We measured E peak (cm/s) and A peak (cm/s) above the cuspids of tricuspid valve, the time of E peak inhibition (E peak DT, mc), E/A ratio. Average pressure in pulmonary artery (mAPPA, mm of m.c) was calculated according to the duration of the intervals of systolic flow in pulmonary artery using Kitabatake formula (1988). Statistical processing of the received data was performed with the help of variation statistical methods using applied STATICTICA 6,0 software. Statistical significance of the difference of mean values was determined by means of Student's criterion with significance level $p < 0.05$.

Results and discussion. Results of the research demonstrated that the size of RA and RV long axis were increased to 14% and 11% in the third group of the patients compared to the first one ($p < 0.05$). perpendicular axis of the RV was almost unchanged in the patients with light and mild COPD and increase nearly to 11% in the patients with severe progression.

More significant alterations involved the parameters characterizing RV hypertrophy. So, RV free wall thickness and IVS increased to 8% and 18% compared to the desirable values in the II group and 20% and 29% in the III group, respectively. RV ejaculation fraction was in normal limits, and that indicated average SM values above 11.5 cm/sec.

Table 1 – Basic parameters and hem dynamic values of the right chambers of heart in patients with COPD

Parameter	COPD I stage (n=54)	COPD II stage (n=59)	COPD III stage (n=37)	Control (n=37)
APPA, mm. m.c	16. 30 ± 0.87	25.0 ± 1.22*	32.4 ± 1.31*	14.4 ± 0.70
RA, mm	34.2 ± 5.0	36.4 ± 3.4	39.7 ± 7.0*	32.4 ± 3.5
LRV, mm	66.0 ± 3.3	69.4 ± 5.2*	74.3 ± 6.0*	65.2 ± 4.2
SRA, mm	30.1 ± 3.4	30.4 ± 3.8	34.8 ± 3.4*	29.9 ± 2.2
RVWT, mm	5.0 ± 0.63	5.2 ± 0.71	6.0 ± 0.72*	4.8 ± 0.56
IVS	0.92 ± 2.0	1.11 ± 2.3*	1.28 ± 3.1*	0.9 ± 1.7
KCO RV	82.7 ± 3.0	53.1 ± 2.32*	44.6 ± 2.61*	84.2 ± 3.9
TDV RV	119.5 ± 3.56	125.3 ± 3.44*	132.4 ± 3.06*	118.8 ± 3.63
Sm sm/sec	15.0 ± 2.2	14.0 ± 2.1	13.8 ± 2.5	15.2 ± 1.1
E RV, cm/s	50.2 ± 3.5	47.5 ± 9.1	55.6 ± 8.8*	49.1 ± 4.1
A RV, cm/s	40.7 ± 3.2	42.1 ± 7.4*	34.9 ± 5.9*	38.0 ± 4.06
E\A ratio, units.	1.23 ± 0.104	1.11 ± 0.160*	1.59 ± 0.173*	1.29 ± 0.075

*Note: * – p < 0.05 compared to the control*

Differences in the values of diastolic peaks on impulse-wave Doppler from the lateral side between the groups testify development of diastolic dysfunction of the RV with COPD progression. Thus, in the first group of the patients E and a peaks and their ratio were compatible to the control values. In cases of COPD mild progression there was notable inhibition of E peak velocity and acceleration of A peak values (47.5 cm/sec and 42.1 cm/sec) and decrease of RV E/A ratio to 16.2 compared to the control indicating prevailing of the patients with diastolic dysfunction of the RV relaxation type in that group. in case of severe COPD we observed a significant E peak rise and A peak decrease (55.6 cm/sec and 34.9 cm/sec) and E/A increase to 18.8% in relation to the standard values, respectively. Thus, comparative analysis of echogeometric parameters of heart showed, that COPD progression was linked with more expressed diastolic dysfunction of the right ventricle, while systolic dysfunction had no significant differences in the studied groups of patients.

Analysis of the results also showed, that early hem dynamic disorders in case of COPD are pulmonary hypertension, indicated by the increase of average pressure in pulmonary artery. So, starting from the II stage of COPD APPA increases to 34.8% in comparison with the I stage of the pathology. In case of severe stage APPA increases to 47% compared to the I stage and to 22.3% compared to the II stage.

Thus, in cases of COPD progression we observed step-by-step remodeling of the right chambers of heart such as dilatation of the cavity of the right ventricle at the early stages, with further development of hypertrophy of its myocardium and diastolic dysfunction. Significant thickening of the right ventricular wall (> 5.0 mm), increase of APPA (> 20 mm of m.c.), size of the right ventricle > 70 mm, and diastolic dysfunction of the right ventricle can be considered to be unfavorable echometric parameters of COPD progression.

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CORRELATION INTERRELATION OF IMMUNOLOGICAL AND HORMONAL INDICES IN CHILDREN WITH CONGENITAL HEART DISEASES

Abstract: The authors studied the relationship between immunological and hormonal parameters of blood in congenital heart diseases. At the same time, an increase in the acute process of antibody formation with the acceleration of the processes of energy release from the body's stores by increasing catabolism was revealed. A cytokine profile shows an increase in the processes of apoptosis of cardiomyocytes due to the enhancement of oxygen exchange with the formation of a free radical of oxygen and nitrogen oxide and a reduction in the inflammatory process against a background of hypothyroidism.

Keywords: correlation, children congenital heart disease, immune system, hormonal, immunocompetent cells, immunoglobulins, cytokines, lymphocyte, hypothyroidism.

The interrelation of immunological parameters is the basis for the methods of parametric quantitative assessment of the functional state of the organism, which allows to identify and evaluate quantitatively the trends in the analytical state, to predict both the subsequent disease, and possible deviations [1; 2; 5].

The study of the influence of endocrine gland hormones on the reactivity of the body is one of the urgent problems of modern medicine. Meanwhile, the materials accumulated in the library for studying the effect on the immune system of thyroid hormones have not yet gained access to analytical thinking, although their influence on the reactivity of the organism is of great interest [3; 4].

The purpose of the work: to study the correlation relationship between immunological and endocrine parameters of congenital heart defects (CHD) in children.

Materials and methods. Clinical-laboratory examination of 116 children with CHD was carried out. The control group consisted of 30 healthy children. The criteria for exclusion were immunological and endocrine diseases, CHD with chromosomal diseases.

To determine the main populations of human lymphocytes, monoclonal antibodies of the LT series, developed at the Institute of Immunology of the Ministry of Health of the Russian Federation, SPC Sorbent (Moscow), were used by indirect rosetting.

The content of immunoglobulins was determined by the method of radial immunodiffusion in G. Mancini et al. (1965) with the use of monospecific sera against immunoglobulins G, A and M from the Moscow Institute of Microbiology and Epidemiology. The phagocytic activity of leukocytes (PhAL) was determined by the method of I. Todorov (1963). Blood tests for thyroid (T_3, T_4, *TTG*) and corticoid status (cortisol) were performed by ELISA on STATFAX 303 (USA, 2010)) using the standard set of VECTOR-BEST AO (International certificates ISO 9001 and ISO 13485, Russia). Blood tests were taken early in the morning on an empty stomach and before morning cleansing.

IBM Excel-97. Information about the reliability provided that $t \geq 2$, and $P < 0.05$. Correlation analysis was carried out by the method of Pearson (Pearson). In organizing and conducting scientific research on the principles of evidence-based medicine.

Results and discussion. At birth and depending on the order in which you enter the body. Feedback between *T*-lymphocytes and free T_4($r = -0.288$). The main actions of free

T_4 is the enhancement of catabolism, that is, the acceleration of processes that take place with the release of energy from body stores. Overcoming the level of *T*-lymphocytes is compensated for the free T_4 stock, while the tissue energy requirement is covered by increased catabolism.

The analysis showed the presence of a direct average relationship between *T*-helpers, total T_3 ($r = 0.590$), free T_4 ($r = 0.524$), and an inverse relationship with free T_3 ($r = -0.472$). It is known that the hormone T_3 is a free intake in oxygen metabolism and its assimilation cells. Overcome all the difficulties associated with improving the level of security.

If *T*-lymphocytes-helpers strengthen the immune response, suppressors, on the contrary, are suppressed. Moreover, these cells do not suit the sabotage of immune processes, but simply regulate the strength of the immune response. This allows the immune system to respond with restraint and with moderate strength to stimuli. When *T*-suppressors die, they release a lot of ATP. Usually, ATP helps to supply the body with energy, but the dying Tregs quickly convert ATP into adenosine. Adenosine then targets *T*-lymphocytes and changes their functional activity [6].

A direct relationship between T-suppressors and concentrations of total T_3 ($r = 0.282$) and total T_4 ($r = 0.396$) in the blood of patients with CHD was established. The average inverse relationship is noted between *T* suppressors with SVT_3 ($r = -0.681$) and cortisol ($r = -0.504$). All this shows the physiological connectivity of the hypothalamic-pituitary-thyroid and hypothalamic-pituitary-adrenal systems, which take part in pathogenesis and determine the course of CHD.

Consequently, an increase in the level of T-suppressors against the background of hyperthyroidism contributes to a decrease in oxygen tissue needs and suppression of adrenal function, which is manifested by an increase in hypocortisolemia.

A significant proportion of *T*-killers in children with AMS was found to correlate inversely with a reduced level of T_4 ($r = -0.430$) and T_3 ($r = -0.388$). The high content of *T*-killers in the blood with AMS indicates the presence of cells with virus-specific antigens infected with the virus. Therefore, in the case of CHD, the antiviral immune response is directed at enhancing cytotoxic reactions, which is accompanied by suppression of the processes of energy release from body stores and oxygen exchange.

The high content of CD20 cells in children with AMS as a result of repeated infections was directly related to the indicators of total T_3 ($r = 0.348$) and cortisol ($r = 0.309$), and is inversely related to the total T_4 ($r = -0.376$). Although the established relationships were of a weak nature, it can be concluded that a decrease in the level of total T_4 in CHD against the background of an increase in the level of CD20-lymphocytes in the blood can be the result of a violation of protein-energy metabolism and a reduction in the delivery of oxygen to all tissues (especially with blue defects), as well as the development of hypothyroidism [7].

Today, the level of immunoregulatory index (IRI) is assessed in comparison with the phase of the immune response. In the period of the height and stagnation of clinical manifestations IRI reaches high values due to a high percentage of *T*-helpers ($CD_4 + T$ cells). During the period of convalescence, the value of the indicator decreases, due to the increase in the level of $CD_8 + T$ cells (killers). Violation of this pattern indicates an inadequate immune response and the possibility of chronic infection, due to incomplete eradication of the pathogen.

In our studies, the indices of IRI in children with CHD directly correlated with the concentrations of total T_3 ($r = +0.456$), free T_4 ($r = 0.449$) and cortisol ($r = 0.533$), which confirms the reliability of the results obtained on the relationship of T-helpers to thyroid hormones and adrenal glands. An increase in both humoral and cellular immunity in children with CHD has been established. This is confirmed by the presence of the IgM bond with the level of free T_4 (r = 0.441) in this case.

Analysis of the correlation matrix of immunological indices allowed to establish that the cytokine status of children with CHD has correlative interrelations with thyroid hormones and cortisol. Among the cytokines studied, only TNFα directly correlates with the levels of St. T_3 (r = 0.779) and cortisol ($r = 0.444$), and is correlated with the level of total T_3 ($r = -0.366$).

The special effect of TNFα is cytotoxic. It causes cell death, stimulating the formation in the cell membrane of superoxide radicals, reactive oxygen species and nitrogen oxide.

From the obtained data it follows that the cytokine status in children with CHD is characterized by the intensification of apoptosis-cardiomyocyte processes due to the enhancement of oxygen exchange with the formation of a free oxygen radical and nitrogen oxide and a decrease in the inflammatory process against hypothyroidism.

Thus, the analysis of communication revealed the presence of a high degree of integration of immunological and hormonal parameters included in the correlation structure, which may indicate a violation of the mechanisms of internal regulation of immunity and the hormonal system in children with CHD.

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MODIFIED METHOD OF PLASMAPHERESIS IN THE TREATMENT OF PATIENTS WITH PURULENT CHOLANGITIS

Abstract: The study was based on the treatment results of 217 patients with mechanical jaundice of benign genesis complicated by purulent cholangitis. In 53 patients with cholemic endotoxicosis after preliminary minimally invasive decompression of the bile ducts various methods of treatment were used. In 17 patients (group I), traditional treatment including infusion and antibiotic therapy was used; in 18 patients (group II) plasmapheresis was used in combination with indirect electrochemical oxygenation (IECO) of plasma with sodium hypochlorite; and in 18 (group III) with additional ozonation of plasma (PA with IECO + Ozone) and subsequent reinfusion of detoxified plasma. Comparative evaluation of the laboratory parameters dynamics in the process of treatment in groups 2 and 3 did not reveal any significant differences. Hyperleukocytosis before operative treatment is noted in both groups. However, after surgical treatment in group 1 patients, the leukocytosis parameters are normalized only at the time of discharge, which indicates more pronounced purulent intoxication. At the same time, in patients of groups 2 and 3 there was a more rapid decrease and normalization of leukocytosis on the 5th postoperative day. The developed differential surgical tactic with the implementation of minimally invasive decompression and the use of plasmapheresis allows to stop the phenomenon of endotoxicosis, cholestasis and liver dysfunction and thereby improve the results of treatment.

Keywords: purulent cholangitis, endogenous intoxication, plasmapheresis, indirect electrochemical detoxification of plasma.

Introduction. Purulent cholangitis is one of the most frequent and severe complications of benign and malignant diseases of the biliary tract. Acute purulent cholangitis and biliary sepsis are different manifestations of the infectious and inflammatory process that occurs locally and systemically [1; 4; 12]. Cholangitis and biliary sepsis are manifested as a complex of organic and functional, general and local pathological changes in the body as a result of the development of the infectious process in the bile ducts and occur when their passability is disturbed and observed in 17–83% of patients with choledocholithiasis, stenosis of the Fater papilla, Mirizzi syndrome [2; 6; 11].

Cholangitis is detected in more than 80% [1; 5] of patients with posttraumatic strictures of bile ducts, and cicatricial stenosis of the biliodigestive anastomoses.

The inflammatory process in the bile ducts is characterized not only by the local purulent-destructive process, but also by systemic disorders that quickly lead to severe endogenous intoxication and severe organ dysfunction. This condition is most often considered as a cholangitis, the severity of morphological and clinical manifestations of which is very diverse [3; 7; 9]. It is believed that without surgical intervention, acute purulent cholangitis leads to death in 100% of cases.

Postoperative mortality according to different authors, varies considerably and amounts to 13–60% [3; 6; 8]. In the surgical treatment of cholangitis, significant advances have been made related to the introduction of modern minimally invasive interventions, but there are a number of unresolved problems. One of them is cholemic endotoxicosis, accompanied by an increase in the level of metabolites in the blood plasma (bilirubin, urea, creatinine, residual nitrogen, transaminases, oligopeptides with an average molecular weight, etc.) [2; 10].

Postoperative mortality varies widely, ranging from 8 to 27% [3; 8]. Based on the fact that the main cause of mortality is endotoxemia, the question naturally arises about the detoxification therapy. Plasmapheresis is the most studied method of adjuvant therapy. With convincing evidence of the effectiveness of plasmapheresis in purulent cholangitis, further research is needed to increase its effectiveness by reducing the volume of plasma replacement and the possibility of reinfusion to patients with purified plasma.

Purpose of the study. Improvement of the surgical treatment results of patients with acute cholangitis by differentiated application of minimally invasive methods of preliminary decompression of bile ducts and improved method of detoxification – plasmapheresis.

Materials and methods. The study was conducted on the basis of the Samarkand State Medical Institute clinic. The research is based on treatment results of 217 patients with hyperbilirubinemia, acute cholangitis, biliary sepsis and severe biliary sepsis. The majority of patients were women – 136, men were 81. The average age of the patients was 65,3 ± 8,7 years. Diagnosis of acute cholangitis and biliary sepsis is based on the history, clinical picture (the Sharko triad, Reynolds pentada) and laboratory examination which allows to calculate the degree of organ failure according to SOFA score (Sepsis organ failure assessment) and the severity of the systemic inflammatory reaction according to the SIRS criteria (Systemic inflammatory response syndrome). Clinical manifestations of acute cholangitis were chills, a sudden rise in body temperature to 38–40 °C with a rapid decrease. In 63% of patients chills were accompanied by jaundice in the first days of the disease. The most frequent clinical symptoms were pain, jaundice, fever. The classical triad of Charcot and the Reynolds pentad were relatively infrequent (in 37% and 9% of cases).

Thus, there were no absolute reliable clinical signs that make it possible to distinguish acute cholangitis from acute cholecystitis. Therefore, in the diagnosis of acute cholangitis, we gave preference to highly informative laboratory and instrumental methods of diagnostics. Laboratory and instrumental diagnostics in addition to the generally accepted clinical analysis include determining the level of bilirubin and its fractions in blood serum, the activity of serum aminotransferase, alkaline phosphatase, protein content and its fractions, cholesterol, prothrombin, thymol and sublimate samples.

Non-invasive methods of preoperative diagnostics of acute cholangitis, biliary sepsis and pathologies of hepatopancreatoduodenal organs, against which they occurred, in addition to physical examination included ultrasound, computer tomography. Endoscopic studies included choledochoscopy, fibrogastroduodenoscopy, laparoscopy, retrograde pancreatocholangiography. The definitive diagnosis is established during the operation by characteristic changes in the wall of the bile duct and bile with microflora examination.

The most common cause of cholangitis and biliary sepsis is choledocholithiasis (65.9%), acute destructive cholecystitis (6.9%), rupture of echinococcal cysts in holedoch (6.0%), stricture of the terminal section of choledochus (6.0%), stricture of the larger duodenal papilla – 5,5% stricture of biliodigestive anastomosis and Mirizzy syndrome, respectively, 5.1% and 5.0%.

All the patients with acute cholangitis and biliary sepsis underwent surgical treatment. Depending on the type of operation 6 groups of patients were identified, which are presented in (Table 1).

Table 1. – Types of surgery

№	Surgeries	Amount
1.	Endoscopic papillosphincterotomy (EPST)	23
2.	Percutaneous-transhepatic cholangiostomy (PTCS)	5
3.	Cholecystectomy, choledocholithotomy, external drainage of choledochus	160
4.	End-to-side hepatojejunoanastomosis on Roux limb	24
5.	Cholecystectomy drainage of the cystic duct by Abbe-Pikovsky	21
6.	Choledochotomy, external drainage of choledochus	12
Total		217

The tactics of surgical treatment of patients with acute cholangitis complicated by biliary sepsis were strictly differentiated. At the same time, a three-stage method of decompression, plasmapheresis and sanation of the bile ducts were predominantly used.

Decompression of the bile ducts allowed to delay the radical operation and perform it in a more favorable period. Indications for EPST and PTCS were considered choledocholithiasis with inflammatory stricture of the biliary tract or without it which caused the development of acute cholangitis. In view of the initial severe condition at the first stage of treatment the main goal of the undertaken mini-invasive operation was the elimination of purulent cholangitis by decompression and restoration of passage of bile into the duodenum.

According to the results, all the patients were divided into four groups: Group A – patients with mechanical jaundice without signs of inflammatory reaction (SIRS = 0) – 85 patients; Group B – patients with mechanical jaundice and mild inflammatory reaction (SIRS single sign) (acute cholangitis) – 79 patients; Group C – patients with two or more signs of SIRS (biliary sepsis) – 40 patients; Group D – patients with two or more signs of SIRS and organ dysfunction SOFA> 0 (severe biliary sepsis) – 13 patients.

In 164 patients from A and B (85 + 79) groups predominantly (in 160 patient's cholecystectomy, choledocholithotomy and external drainage of choledochus were performed), the one-step operative intervention was done.

53 patients from C and D (40 + 13) groups were treated with plasmapheresis (PA), after preliminary minimally invasive decompression of the bile ducts. After improvement of the patients' condition and normalization of the peripheral blood parameters, operative treatment was performed. Among these patients three subgroups were identified (Table 2).

Table 2. – Characteristics of patients with biliary sepsis

Patient groups	Traditional treatment	PA with IECO	PA with IECO and Ozone	Total	%
Biliary sepsis	13	14	13	40	75.5
Severe biliary sepsis	4	4	5	13	24.5
Total	17	18	18	53	100

In 17 patients (group I), along with preliminary decompression of the bile ducts, traditional treatment including infusion and antibiotic therapy was used; in 18 patients (group II) plasmapheresis was used in combination with indirect electrochemical oxygenation (IECO) of plasma with sodium hypochlorite; and in 18 patients (group III) IECO with additional ozonation of plasma (IECO and Ozone) and subsequent reinfusion of detoxified plasma. The criteria for detoxification of exfused plasma which makes possible its reinfusion was determined by Fedorovsky N. M. (2004) (Table 3).

Table 3. – Criteria of exfused plasma detoxification

Plasma indices	Criteria for reinfusion
Level of PAMM (by Gabrielian)	< 0.24 conv. Units
Hematocrit	< 27 U/ml
Bilirubin	< 32 mmol/L
Creatinine	< 0.2 mmol/L
Urea	< 8 mmol/L
The total concentration of albumin	> 35 g/L
The effective concentration of albumin	> 30g/L
The binding capacity of albumin	> 0.86
Reserve binding ability of albumin	> 10 g/L

With the purpose of developing a rehabilitation program for patients with cholangitis and evaluating the appropriateness of using extracorporeal detoxification methods, we set the goal to investigate the effect of plasmapheresis on the main biochemical and specific parameters of intoxication in patients with severe endotoxicosis in cholangitis.

Our proposed method of detoxifying the organism with cholemic endotoxicosis [10] (patent for invention UZ, No. IAP 04630), which involves the extraction of exfused plasma, the addition of sodium hypochlorite solution at a concentration of 1200 mg/L in a volume ratio of 10:1, maintaining the mixture at a temperature of 6–8 °C, the precipitate aspiration removal and reinfusion autoplasma (fig. 1.), characterized in that after adding the plasma sodium hypochlorite solution resulting mixture is ozonized by bubbling ozone-oxygen gas mixture for 10 minutes, after which the mixture is left for 3–4 hours (without exposure of O_3 plasma exposure time is an average of 8–12 hours. (RU2033190 C)).

Figure 1. Stages of extracorporeal detoxification

1. Blood sampling; 2. Centrifugation; 3. Separation of plasma from blood cells; 4. Separation of plasma using a plasma extractor; 5. Exfused plasma; 6. Addition of sodium hypochlorite; 7. Ozone bubbling; 8. Toxic sediment; 9. Detoxified plasma; 10. Reinfusion of autoplasma

Results & Discussion. Comparative evaluation of the laboratory parameters dynamics in the process of treatment in groups 2 and 3 did not reveal any significant differences. Hyperleukocytosis before operative treatment is noted in both groups. However, after surgical treatment in group 1 patients, the leukocytosis parameters are normalized only at the time of discharge, which indicates more pronounced purulent intoxication. At the same time, in patients of groups 2 and 3 there was a more rapid decrease and normalization of leukocytosis on the 5th postoperative day. The initial increase of the leukocyte index of intoxication (LII), acute increase in the day of the operation takes place in all the study groups. In patients of Group 1 a significant decrease in this indicator was observed by 46.9% at the time of discharge. On the contrary, in patients of groups 2 and 3 there was a significant decrease in this indicator on day 6 (64.1%) and complete normalization at the time of discharge, which is associated with a more effective treatment of endotoxicosis. Significant hyperbilirubinemia was noted in all patients. The highest rates of total and direct bilirubin followed by a slow decrease were found in the group 1. In contrast, patients in groups 2 and 3 showed a decrease in total bilirubin by 79.7% on the first and 85.4% on the third day after the operation, which led to a more rapid normalization of this indicator. A slow decrease in the level of bilirubin in group 1, despite decompression of the biliary tract, reflects the preservation of cholestasis and impaired hepatic cell function. Preliminary decompression and plasmapheresis in patients of groups 2 and 3 ensured rapid arrest (on day 3) of cholestasis, endotoxicosis, and liver dysfunction.

Patients in group 1 had high rates of creatininemia on the first day after surgery, which persisted for a long time, indicating liver failure in patients with severe endotoxicosis and cholestasis, which was aggravated by an operating trauma. In contrast, in patients in groups 2 and 3, creatinine chemistry remained within the normal range throughout the postoperative period, preliminary decompression and plasmapheresis contributed to the prevention of hepatic renal failure. The effectiveness of reducing the basic indices of endogenous intoxication of Groups 2 and 3 is shown in (table 4).

Table 4. – Indicators of the effectiveness of the main indices of endogenous intoxication decrease

Indicators	On admission	After decompression	2 days after PA with IECO	2 days after PA with IRCO and Ozone
total protein. g/L	77.3 ± 0.3	76.5 ± 0.2	74.5 ± 0.5	74.6 ± 0.45
urea. mmol/L	16.3 ± 0.8	14.1 ± 0.6	7.2 ± 0.3	7.1 ± 0.3
creatinine. mmol/L	0.2 ± 0.01	0.16 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
total bilirubin. mmol/L	218.2 ± 16.4	197.4 ± 9.8	39.3 ± 2.7	38.1 ± 2.5
alanine aminotransferase	0.96 ± 0.04	0.85 ± 0.03	0.09 ± 0.05	0.09 ± 0.04
aspartate minotransferase	1.5 ± 0.05	1.3 ± 0.06	0.2 ± 0.08	0.19 ± 0.09
molecules of medium mass. cond. units	0.85 ± 0.09	0.73 ± 0.08	0.40 ± 0.05	0.39 ± 0.04
total concentration of albumin. g/L	38.7 ± 1.4	37.9 ± 1.1	36.3 ± 2.0	36.4 ± 2.1
effective albumin concentration. g/L	18.3 ± 0.5	19.7 ± 0.6	35.2 ± 0.5	35.1 ± 0.5
binding ability of albumin. cond. units	0.46 ± 0.03	0.53 ± 0.04	0.9 ± 0.07	0.9 ± 0.08
leukocyte index of intoxication	3.7 ± 0.01	3.2 ± 0.02	2.8 ± 0.02	2.7 ± 0.03

As it can be seen from the table 4 the combination of PA and IECO with additional plasma and ozone treatment more efficient in many ways, except that an additional effect by the ozone reduced exposure time from 4–16 (average 8–12 h.) to 3–4 hours. The reliability of the data was checked using *t*-criteria Student $P = 0.05$ in relation to the initial indicators.

Comparative analysis of laboratory parameters established their normalization in patients of the groups 2 and 3 on the 5th–6th day, which corresponds to the optimal timing of the operation.

The greatest number of complications occurred in patients of the 1st group (17.7%), in patients of the 2nd and 3rd groups – 9.7% and 8.1%, respectively. The most frequent of them – suppuration of the postoperative wound, acute hepatic-renal failure, cholemic bleeding and peritonitis.

There was a higher postoperative mortality in Group 1 (6.4%), which was 2 times higher than in the 2nd and 3rd groups of patients (3.2%). The main cause of death was acute hepatic-renal failure, angiocholitis, and sepsis. In the 2nd and 3rd groups the severest patients with purulent obstructive cholangitis died. Preliminary decompression and sanation of the biliary tract with plasmapheresis in these patients led to a reduction in lethal outcomes and duration of hospitalization on average by 5–9 days.

In patients with severe endogenous intoxication, in the postoperative period the most severe endotoxicosis and multiple organ failure were preserved in patients of the 1st group. On the contrary, in patients of groups 2 and 3 the best results of surgical treatment were noted due to the developed medical diagnostic algorithm. Thus, the differentiated treatment and diagnostic tactics for acute cholangitis complicated by biliary sepsis using the 3-stage method of decompression, plasmapheresis and sanation of the bile ducts is the most rational for this category of patients which is confirmed by a significant reduction in the number of complications, a decrease in postoperative mortality, recovery.

Conclusions. The most informative instrumental and laboratory methods which allow to establish the diagnosis and severity of purulent cholangitis at the early stage are: echography of hepatopancreatoduodenal region in dynamics and ERCP, bilirubin, creatinine levels, leukocytosis, indices of intoxication.

The most severe degree of endogenous intoxication was detected in patients who underwent operative intervention without plasmapheresis sessions, which was accompanied by high lethality (6.4%). Preliminary minimally invasive decompression, a course of detoxification therapy including plasmapheresis can reduce postoperative lethality by 4 times, the number of complications – by 2 times, and accelerate the clinical recovery of patients.

The developed differential surgical tactic with the implementation of minimally invasive decompression and the use of plasmapheresis allows to decrease the phenomenon of endotoxicosis, cholestasis and liver dysfunction and thereby improve the results of treatment.

The proposed method of plasmapheresis is a highly effective method of preoperative preparation of patients with severe degree of cholemic endotoxicosis, which helps stabilize cytolytic activity (lowering of alanine aminotransferase and aspartate aminotransferase) and cholestatic (lowering of bilirubin) process, which improves protein-synthetic liver function, allows to eliminate the main clinical manifestations in severe patients and thereby significantly expand the indications to surgical treatment.

Regeneration of the plasma exfused with plasmapheresis during 3–4 hours with a solution of sodium hypochlorite and additional ozonization provides a reduction in its toxicity and makes it suitable for reinfusion in the patient's organism. The

proposed improved plasmapheresis with reinfusion of extracorporally modified autoplasma allows to reduce the need for donor protein preparations, reducing the risk of possible immune reactions, the risk of infection of the patient with hepatitis B and C viruses, human immunodeficiency virus, cytomegalovirus, herpes virus.

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RESULTS OF SURGICAL TREATMENT OF "FRESH" INJURIES OF MAGISTRAL BILE DUCTS

Abstract: The results of surgical treatment of 103 patients with intraoperative magistral bile ducts injuries have been analysed. The main operation in complete extrahepatic bile ducts transaction and excision is HepJA according to Roux that had been performed in 64 patients with a good follow – up result making 95,3%. Restorative operation is only indicated in partial injury of the duct. BBA formation in complete transaction of the duct in all cases resulted in stricture. HepDA also produced negative results of treatment. Complications in the near – by postoperative period made 22.3% and in the follow – up period 35.9%. Repeated operative interventions were performed in 32.3% of patients, lethal outcome made 5.8%.

Keywords: bile ducts, cholangitis, stricture, biliodigestive anastomoses, treatment.

Introduction. It is noted that during 2 recent decades in Uzbekistan as well as in many countries of the world the number of patients with bile – excreting tracts diseases increases. Thus, about 700.000 operations for cholecystectomy (ChE) are performed in the USA yearly, in Russia more than 100.000 and in Uzbekistan about 10.000 ChE [5; 7; 13; 20]. Together with this, significant increase of frequency of bile duct injuries in 2–4 times is noted that makes from 0.22 to 1.86% [2; 4; 7; 8; 9; 14; 16; 19]. The authors studying this problem, notice that introduction of laparoscopic cholecystectomy resulted in marked increase of frequency and severity of bile ducts injuries. If the average rate of magistral bile ducts traumas makes 0.5–1%, from 50 to 100 people suffer from such complications in Uzbekistan. In bile ducts traumas, treatment is particularly complicated, requiring long period, expensive therapeutic diagnostic manipulations, resulting in severe disability of patients. Lethal outcome makes 8–17%, complications in operations make almost 47%, development of bile ducts posttraumatic strictures to 35–55% [1; 3; 6; 10; 12; 15; 17]. The terms of revealing of EHBD injuries, taking into account the results of treatment are of great significance. Intraoperative injuries and posttraumatic cicatricial strictures of bile ducts and biliodigestive ducts are differentiated. Intraoperative injuries in their turn are divided into diagnosed on the operating table and revealed in early postoperative period [11; 18]. The findings of investigations, including those in Uzbekistan, reveal that only in 30% of observations iatrogenic injuries of bile ducts are diagnosed during the operation, about

50% of injuries are diagnosed in the postoperative period on the background of peritonitis development, rapidly developing mechanic jaundice or bile excreting along the drainage. More than 15% of patients die from progressing peritonitis, augmentation of jaundice or other undiagnosed in a due time postoperative complications. The analysis of frequency and causes of unfavorable results of operative interventions in bile excreting tracts is particularly urgent for Public Health of our Republic. It is very important for practical surgeon to develop the algorithm of activities in intraoperative injuries of bile ducts.

The aim of investigation. Improvement of surgical treatment of intraoperative magistral bile ducts injuries.

Material of investigation. The results of surgical treatment of 103 patients with intraoperative magistral bile ducts (MBD) injuries during the period of 2007–2017 have been analysed. According to our findings MBD injuries were noted in 38 (0.58%) patients for 6521 cases of ChE, of them 27 after LChE, 6 after minilaparotomic ChE (MLChE), 5 after traditional Ch E. 65 patient were admitted from the other in – patient departments with intraoperative MBD injuries, of them 12 after LChE, 52 – TchE and 1 – MLChE. In 28 (27.2%) patients MBD injuries were revealed intraoperatively, in most of them – 75 (72.8%) patients the injuries were revealed in early postoperative period. There were 81 operated females (78.6%), 22 males (21.4%). The age of the patients was 19–80 years. Evaluation of injuries was carried out according to E. I. Galperin's classification (2009) and is given in (table 1). Marginal partial injury of bile ducts was revealed in 11 patients, clipping and ligating of the duct without its transaction and excision of bile ducts in 47, excision of the duct and ligating of its proximal stump in 31. In 24 patients the injury was revealed at "+2" level, in 38 – "+1", in 18 – "0", in 13 – "–1", in 10 – "–2". In 22 patients admitted from the other in – patient departments the character and the level of the injury was only revealed after performing laparotomy, as far as medical documentation did not include necessary information. In early postoperative period MBD injuries in 34 patients were manifested by augmentation of mechanic jaundice and 20 by bile peritonitis, in 10 by profuse bile excreting along the drainage from the abdominal cavity and in 11 patients by two or more complications.

Table 1. Character and localization of MBD injuries (*n* = 103)

	Marginal injury	**Transection**	**Excision**	**Excision and ligating**	**Clipping or ligating without transection**	**Total**
+2	8	5	1	4	6	24
+1	2	4	12	17	3	38
0	1	–	8	4	5	18
–1	–	–	10	3	–	13
–2	–	–	7	3	–	10
Total	11	9	38	31	14	103

Results. In intraoperative revealing of bile ducts injuries of 28 patients, 18 patients had complete duct transaction, 10 – marginal injury. In 25 patients the operations for rehabilitation of bile ducts anatomy were performed at once and in 3 patients during two stages. In transaction and excision of the duct hepaticojejunoanastomosis (HepJA) according to Roux was performed in 5 patients, of them in 3 patients on transhepatic carcass drainage (THCD) and in 2 without carcass drainage. In intrahepatic MBD injuries with confluence disturbance (4 patients) in one case bihepaticojejunoanastomosis (BiHepJA) according to Roux is performed on THCD immediately after revealing the duct trauma. Drainage of hepatic ducts was performed in 3 patients at the first stage due to their narrow diameter, in 3 months BiHepJA according to Roux on THCD was performed. Of these patient anastomosis stricture developed in 18 months after elimination of carcass drainage, which was removed by antegrade bougienage.

Hepaticoduodenoanastomosis (HepDA) was applied to 2 patients. In these patients cholangitis and anastomosis stenosis were observed in the follow – up period. One of the patient underwent the course of balloon dilatation and diatermodilatation and HepJA was applied to the second patient (who

developed hemobilia in the postoperative period, controlled by conservative treatment.

Biliobilary anastomosis (BBA) was applied to 7 patients with transaction of the common bile duct (CBD). All of them developed duct stricture and needed the repeated intervention. HepJA was performed in 5 patients (4 on THCD and one without carcass drainage). HepDA was applied to one patient with satisfactory follow – up result (according to anamnesis this female patient underwent resection of the stomach on Bilrot – II). One patient underwent endoscopic stentation of the duct. In marginal partial injury of the hepaticocholedochus (HCh) the injured wall was sutured in 10 patients (prolen 5/0) on Kehr's drainage. The results of treatment were satisfactory. In revealing bile ducts injuries in early postoperative period (n = 75) one or two stages interventions were performed, depending on presence of infiltrative – inflammatory changes in subhepatic area. 34 patients with mechanic jaundice without inflammatory – infiltrative process underwent one – stage operative intervention. Of 14 patients with clipping or bandaging of the bile duct without its transaction 12 patients underwent removal of ligature or clip with external drainage of the bile duct. Satisfactory follow – up result is observed in 7 of them. In 5 patients duct stricture developed and reconstructive operations according to Roux were performed. BBA was applied to 2 patients after removal of ligature. In a year they developed duct stricture and endoscopic stentation with satisfactory follow – up result of treatment. Of 20 patients with HCh excision and bandaging of proximal duct stump, reconstructive operations were performed in 8 patients, HepJA according to Roux on THCD in 4 patients, HepJA without carcass drainage was applied to 2 patients. Satisfactory result was noted in 5 patients, in one case (after HepJA without carcass drainage) there was bile excreting along the control drainage, that stopped itself on the 15th day after the operation. Transcutaneous transhepatic cholangiostoma was applied to 2 patients with hepatic insufficiency at the first stage and HepJA according to Roux on THCD according to Pradery – Smith at the second stage. Of these patients in 1 patient anastomosis stricture developed in a year after carcass drainage removal.

HepDA was applied to 2 patients with anastomosis stenosis and in one case repeated reconstructive operation was performed (HepJA without carcass drainage was applied), in the second case endoscopic dissection of stricture. BBA was performed in 10 patients, 8 of them needed repeated operative interventions due to the duct stricture (HepJA was applied to 5 patients, HepDA to 3 patients). Of 20 patients with peritonitis with marked infiltrative changes in the subhepatic area in 12 patients (with HCh dissection) external drainage of proximal duct stump was performed at the first stage, of them 2 patients died from severe neglected peritonitis. HepJA was applied to 7 patients at the second stage. Of them in 1 patient biloma drainage was performed in the postoperative period under US control. After carcass drainage removal this patient was under our observation and anastomosis stricture did not develop. HepDA was applied to 3 patients and all of them developed recurrent cholangitis and anastomosis stenosis and so repeated endoscopic balloon dilatations and diathermodilatations were performed. 3 patients were admitted from the other in – patient departments after external drainage of the duct proximal stump: HepJA was applied to 2 of them. One patient refused from the second stage of the operation. 5 patients were admitted from the other in – patient departments after rehabilitation – reconstructive operations with insolvent sutures and peritonitis (1 patient after HepJA and 4 after BBA). Of them two-stage operative interventions were performed and high HepJA was applied in 4 patients. One patient died due to neglected peritonitis. In early postoperative period MBD injuries in 11 patients resulted in peritonitis and mechanic jaundice. These patients underwent two-stage operative interventions. The first stage of external drainage of the duct proximal stump was performed in all 11 patients (of them 3 patients were operated in other in – patient departments). The second stage of the operation was performed in 2–3 months after remission of inflammatory – infiltrative process of subhepatic area. HepJA was applied to 9 patients (7 on THCD, 2 – without carcass drainage). Satisfactory result is noted in 8 cases, in 1 case bile excreting along the control drainage was observed, which stopped itself on the 11th day after the operation. HepDA was applied to 2 patients, of them 1 patient died from cardiac insufficiency. Of 10 patients with profuse bile excreting from the abdominal cavity in 1 female patient in the repeated operation, marginal injury of the bile duct is revealed and suturing of the defect on Kehr drainage is performed. In HCh excision at the first stage external drainage of the duct proximal stump was applied and HepJA at the second stage. 1 patient was admitted after external drainage of the duct proximal stump, HepJA according to Roux on THCD was applied to her, 2 patients were admitted with BBA insolvent sutures performed in other in – patient departments. These patients also underwent repeated two-stage operative interventions with HepJA application in the first and HepDA in the second observations. In 2 patients with bile excreting from the abdominal cavity without marked infiltrative process in the porta of liver area, HepJA according to Roux was applied by single stage.

Complications in the near – by postoperative period were observed in 23(22.3%) patients, of them in 6(5.8%) with lethal outcome. In the follow – up period unfavorable result was observed in 37(35.9%) patients, moreover 3(4.7%) patients

with Hep JA stenosis, 12(85.7%) with Hep DA stenosis, 17 (89.5%) with BBA. 33(32.03%) patients needed repeated operative interventions.

Discussion. In recent years the number of performed operations for cholecystectomy has significantly increased and most of them are performed by means of laparoscopic method (more than 80% according to our findings). MBD injuries have considerably increased after introduction of laparoscopic cholecystectomy, particularly at the period of mastering the use of this method. These injuries are of special severity as far as in addition to high bifurcated mechanical trauma there is marked thermic effect on the duct wall.

The best results were achieved in the group of patients where the operations were performed in intraoperative revealing of MBD traumas. Of 28 patients good near – by and follow – up results of treatment were received in 84.3% of patients. However MBD injuries (according to our findings) were revealed intraoperatively only in 27.2% of patients. In most patients bile ducts injuries are diagnosed lately (in 72.8% according to our findings) after development of peritonitis or mechanical jaundice. So in most patients external drainage of bile ducts is performed instead of bile outflow normalization immediately after getting trauma.

In revealing MBD injuries in the nearest postoperative period on the background of peritonitis, subhepatic abscess, bile excreting, it is reasonable to perform only external drainage of the bile tracts. It is desirable to perform reconstructive operation after remission of inflammatory – infiltrative process in 2–3 months as a second stage of treatment. This tactics proved to be correct in 30(73.1%) patients of this group. In 7(17.1%) patients rehabilitation – reconstructive operations on the background of peritonitis resulted in insolvency of anastomosis sutures. The main operation in complete MBD transaction and excision is HepJA according to Roux that was only performed in 64 patients with good follow – up result in 95.3%. HepJA without carcass drainage shortens considerably the terms of patients treatment, however this method (Hepp-Couinaud) was only performed in 11 patients of this group. According to E. Itala (2006) the main feature of this operation is in isolation of the left hepatic duct in the place of its confluence with the right duct under the portal lamina. It gives opportunity to isolate the ducts out of cicatricial tissues and to apply anastomosis 2–3 sm wide, mainly on the account of the left hepatic duct, escaping burdensome, long (1.5–2 years) drainage of anastomosis area. Rehabilitative operation is only indicated in partial marginal duct injury. In 11 patients of this group suturing of the duct defect on Kehr's drainage had satisfactory result. In the duct injury unlike its complete transaction receiving of good results takes place because preservation of narrow posterior duct wall provides its sufficient blood supply. BBA formation in transaction and excision in all 19 observation was completed by development of cicatricial stricture. Of them 16 patients underwent reconstructive operations, 3 – endoscopic stentation. Some experience in endobiliar stentation permits us to estimate positively this method. Performance of operations for formation of anastomosis of the injured duct and duodenum had unfavourable results. These patients had chronic cholangitis and biliodigestivanastomosis stenosis that required repeated reconstructive operations in 2 and endoscopic interventions in 9 patients. The cause of failure in treatment of intraoperative MBD injuries are unpunctual diagnosis and performance of inadequate in volume operations directed to restoration of bile outflow by formation of biliobiliary and bilioduodenal anastomoses.

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AMBULATORY BLOOD PRESSURE MONITORING IN ADOLESCENTS WITH ENDOCRINE PATHOLOGY

Abstract: Arterial hypertension is one of the most important modifiable risk factors for cardiovascular diseases. In recent years, arterial hypertension has shown prevalence increase in children and adolescents. Early and accurate detection of hypertension in childhood is important in preventing it in adulthood. We have examined 59 children in age 12–18 years with endocrine pathology (diabetes, obesity) for elevated blood pressure. Office measurements of blood pressure and ambulatory blood pressure monitoring were done. Ambulatory blood pressure monitoring allows obtaining more accurate detection of subjects at high risk for hypertension.

Keywords: adolescents, diabetes, obesity, arterial hypertension, ambulatory blood pressure monitoring.

According to the World Health Organization cardiovascular disease is the number one cause of death globally: more people die annually from cardiovascular disorders than from any other cause. In recent years, arterial hypertension (AH) has shown an increase in the prevalence in adults and among adolescents too [7, 10]. The diabetes and endocrine pathology with obesity are two conditions with higher risk of various cardiovascular problems in childhood, especially such as AH [1; 8; 9]. The blood pressure (BP) even in healthy children was reported to increase with a higher body mass index (BMI) [2]. Obese children have an approximately 3-fold higher risk of AH than non-obese children. To establish diagnosis of AH manual measurements of BP is widely used but they have the disadvantage of not checking the BP continuously. Ambulatory blood pressure monitoring (ABPM) allows obtaining more accurate and more physiological results by considering daily changes [6; 7]. ABPM could predict vascular events better than office BP or random BP measurements and could identify the nondipper status, characterized by a decrease in physiological nighttime drop of BP, constituting the first sign of the increase of pressure load on blood vessels [3; 5]. However, standards have not been established, so medical staffs hesitate to use it.

Objective: The aim of this study was to assess blood pressure in adolescents with endocrine pathology on basis of ambulatory blood pressure monitoring.

Materials and methods. In the study 59 children in age 12–18 years from urban and rural areas were examined. They were subdivided into two groups – first with type 1 diabetes (29 persons) and second with other endocrine pathology mostly with overweight (30 persons). The study includes assessment of resting anthropometric data, nutrition, physical activity habits, peculiarities of sleep, family and socioeconomic data etc. The BP measurements were done triple after the subject had been in a sitting position for at least 5 min. The average of two last measurements assessed. Participants with systolic or diastolic blood pressure above the 95th percentiles by age, sex and height regarded as hypertensives. All persons with elevated BP underwent ABPM. ABPM was performed using a "Ritm-2000" ambulatory blood pressure system (RTO Beta, Ukraine), with a suitably sized cuff. The blood pressure system programmed to measure every 30 min, from 8:00 AM to 10:00 PM and every 60 min, from 10:00 PM to 8:00 AM. Hypertension was regarded when the daytime or nighttime mean systolic or diastolic BP was higher than the 95th percentile of the pediatric norms for ABPM. Circadian rhythm chronotype assessed too with the standard questionnaire for identifying the chronotypes (morningness–eveningness). Statistical analysis conducted with program Statistica (version 5.11, StatSoft Inc.). All p-values were two-tailed and $p<0.05$ was considered statistically significant.

Results. Diabetes is associated with a higher BP but it is more typical for second type of disease. In our cohort all diabetic patients had first type of disease. Elevated BP by first office measurements registered in 10 children (34.5%) and average systolic blood pressure (SBP) was 130.3 ± 3.07 mm Hg. By ABPM elevated BP was only in 2 subjects (6.9%) and average SBP was 110.8 ± 2.27 mm Hg (fig.1). Office measurements in following days show decrease of SBP that could be signs of subject's psychological adaptation and diminish of "white coat" reaction.

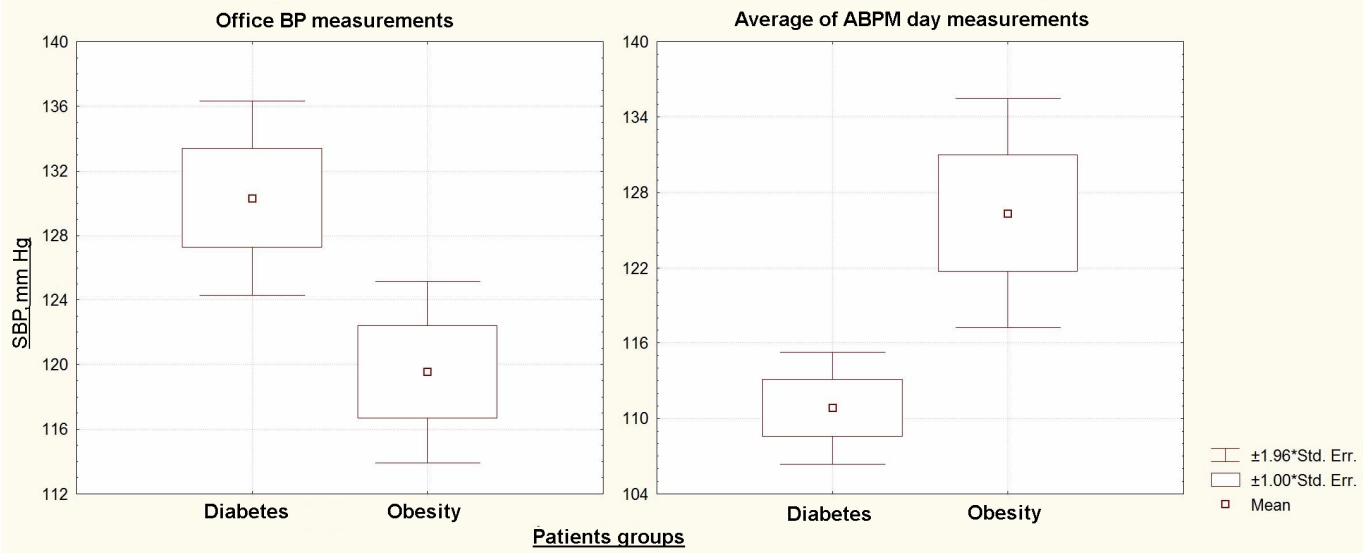

Figure 1. Comparisons average SBP of morning office measurement and daytime part of ABPM

Obesity is another independent risk factor for AH and more than 60% of adult hypertensive patients have overweight. In our cohort in diabetic patients average BMI was 20.4 ± 1.21 kg/m^2 and overweight was registered in 17.2% of patients, in second group average BMI was 27.7 ± 1.22 kg/m^2 with 83.3% overweight persons. Elevated BP in second group by first office measurements was registered in 10 children (33.3%) and average SBP was 119.5 ± 2.86 mm Hg. By ABPM elevated BP was in 20 subjects (66.7%) and average SBP was 126.3 ± 2.65 mm Hg. SBP in this group had correlation with BMI (R =0.51, $p < 0.05$).

The significant positive correlations of BMI with daytime, nighttime and 24-hour SBP ($r = 0.36$, $r = 0.41$, $r = 0.40$, respectively; $p < 0.05$) were stronger than the correlations with DBP ($r = 0.21$, $r = 0.24$, $r = 0.23$, respectively; $p < 0.05$). Nighttime BP also positively correlate with adolescent evening chronotype ($r = 0.26$, $p < 0.05$). Our study demonstrated that elevated nighttime SBP is more common in all children and based on ABPM data the risk of ambulatory nighttime systolic hypertension increased significantly with the degree of BMI. Macumber IR et al. [5] also reported that the BMI is associated with the severity of ambulatory hypertension, similar to our findings.

Our study did not show significant differences in numbers of nondippers subjects between both groups. The nondipper status, characterized by physiological decrease of nighttime BP and mostly is the first sign of the of pressure overload on blood vessels, which is leading factor to the vascular damage of the kidneys [2; 4]. Alterations of the normal circadian blood pressure rhythm have been correlated with the progression of diabetic nephropathy [4].

Both types of endocrine pathology diabetes and overweight are conditions with increased cardiovascular risk. Type 1 diabetes patients present in the long-term outcome micro- and macroangiopathy such as nephropathy, retinopathy, and cardiovascular disease, that lead to increased morbidity and premature mortality [1] and elevated systemic blood pressure is a promoter of both the development and the progression of vascular sequelae such as diabetic kidney [4].

Traditionally, the assessment of hypertension in children has relied on office blood BP measurements. However, office BP measurements may be misleading for the diagnosis of hypertension, due to the white coat and masked hypertension phenomena in children, as observed in adults [7; 10]. Also it could be a masked hypertension – a clinical condition in which the office BP is normal but ABPM shows hypertensive values. In our patient, we just obtained both types of data misleading.

Conclusions

ABPM could help to define patients with increased risk for the development of AH, who might benefit from the early introduction of anti-hypertensive treatment. Masked and/or subclinical AH, reduced nightdipping could be diagnosed only via ABPM use. Include of ABPM in follow-up of diabetes and overweight subjects much better in diagnostic of cardiovascular events than that provided by office measurements. ABPM also offers numerous advantages in adolescents, thus providing continuous data about BP during everyday activities and nighttime sleep, which is better correlated with real level of daily BP.

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STROKE BURDEN IN ASIA: TO THE EPIDEMIOLOGY IN UZBEKISTAN

Abstract:

Objective: Meta-analysis of review of the recent epidemiology of stroke in some Asian countries, including burden, registry, mortality, incidence, prevalence, stroke subtypes and risk factors.

Materials and Methods: We analyzed all the publications in the PubMed, Medline, Scopus, ScienceDirect, Web of Science, EBSCO, Google Scholar databases, from the time of entry into the database until March 2018.

Results: Based on data from the WHO, GBD study, recent publications from Asian countries and our own studies, we summarized and compared the main epidemiological data on stroke in Asia, including Uzbekistan. With the economic transition of these countries, towards achieving "developed country" status, risk factors such as hypertension, diabetes mellitus, hypercholesterolemia, obesity, and cigarette smoking will become more prevalent, raising the incidence of stroke. However, due to insufficient healthcare facilities in these developing countries, the mortality will be high, and the number of disabled survivors will also rise.

Conclusion: The global burden of stroke has the largest contribution from Asia. As life expectancy increases, with the aging of Asian populations and reduction in mortality due to infectious diseases, and the rise in the prevalence of vascular risk factors among economies in transition, the stroke burden in Asia will surely rise. Governments and healthcare workers need to work together, with an informed public, to stem this growing epidemic.

Keywords: stroke, burden, registry, mortality, incidence, prevalence, stroke subtypes, risk factors, Asian countries, Uzbekistan.

Introduction. Stroke is an especially serious problem in Asia, which has more than 60% of the world's population, and many of its countries are "developing" economies [3]. Stroke mortality is higher in Asia than in Western Europe, the Americas or Australasia, except in the case of some countries such as Japan [5]. Objective of this study is review of the recent epidemiology of stroke in some Asian countries, including burden, registry, mortality, incidence, prevalence, stroke subtypes and risk factors, based on data from the World Health Organization (WHO), Global Burden of Disease (GBD) study, and recent publications from Asian countries. A deeper understanding of the stroke burden in this part of the world could assist in the appreciation of the magnitude of stroke and its diversity, and help in healthcare planning and resource allocation [3].

Materials and Methods

We analyzed all the publications in the PubMed, Medline, Scopus, ScienceDirect, Web of Science, EBSCO, Google Scholar databases, from the time of entry into the database until March 2018. The WHO website, World Health Rankings, World Life Expectancy and specific countries journals were consulted. The search was limited to papers published in English, Russian, or Uzbek languages. The search terms used were "stroke" with the operator "and", along with any ("or") of the following terms: "burden", "epidemiology", "registry", "mortality", "incidence", "prevalence", "subtype", and "risk factors". The operator "and" was then used with the name of each Asian country. Data from European countries were excluded. The abstracts were reviewed for relevance, and data on stroke epidemiology were extracted. Where possible, the original papers were also obtained and reviewed. The most recent studies or review papers from each country, were preferred over older publications. Data on incidence and prevalence were obtained from community-based studies with wide age ranges and no upper limit. Data on the stroke subtypes and vascular risk factors among stroke patients were preferably from multi-center hospital collaborations with high brain scan rates. Data on stroke mortality and morbidity were obtained from the GBD study, and vascular risk factors in the community were obtained from the WHO

database. The data were then tabulated, stratified according to geographical regions.

Results and Discussion

The definition of stroke and its types. The WHO definition of stroke is: "rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin". By applying this definition transient ischemic attack (TIA), which is defined to last less than 24 hours, and patients with stroke symptoms caused by subdural hemorrhage, tumors, poisoning, or trauma are excluded. The pathological background for stroke may either be ischemic or hemorrhagic disturbances of the cerebral blood circulation.

Stroke burden. The best measure of stroke burden is the number of disability-adjusted life years (DALYs) lost because of stroke. Based on data from the GBD study, there was a wide range of age- and sex-standardized stroke DALYs lost in Asia, in 2010 [5]. The lowest rates are in Japan (706.6/100,000 people) and Singapore (804.2/100,000 people), with low rates also observed in Bangladesh and Bhutan. The highest rates are in Mongolia (4.409.8/100,000 people) and Indonesia (3.382.2/100.000 people), with high rates also observed in Myanmar, Lao PDR, North Korea, and Cambodia. As in the case of mortality, a range of the rates of DALYs lost are observed in all three regions, but the DALYs lost tend to be lower in high-income countries in East and South-East Asia. The DALYs lost reflect the net effects of mortality, incidence, and disability among prevalent cases, and the latter possibly indicates the effects of stroke severity and rehabilitative services [3; 9; 13; 28; 29].

Incidence and Prevalence. Stroke incidence data are available for most Asian countries, but only for some in the other regions. The lowest rate is observed in Malaysia (67/100,000 person-years). The highest rates are in Japan (422/100,000 person-years among men and 212/100,000 person-years among women) and Taiwan (330/100,000 person-years). Data on stroke prevalence are more readily-available than those on incidence [3, 23].

Variations in stroke epidemiology have been found within many countries. Studies in China have shown that the stroke incidence is higher in the northern regions compared to the south [20], with double the incidence along the stroke belt [27]. In India, on the contrary, the incidence is higher in rural areas [15]. In Thailand, the stroke prevalence is highest in the cities, and then, in a decreasing fashion, in the central, south, north, and northeast regions of the country [22]. Similarly, stroke prevalence was found to be higher in cities and urban areas than in rural regions, in Indonesia [13]. These differences have been attributed to the differences in the risk factors between various regions in the same country. However, there is no difference in the age-standardized stroke mortality between the metropolitan cities of Korea and the other regions in the country [9].

The problem of stroke is very urgent for Central Asia with population over 70 million. In Kazakhstan, over 49 thousand people suffer stroke annually, 80% of them became fully or partly disabled [4]. Kyrgyzstan is the sixth in mortality from CVD in Eurasia, following Russia, Belarus, Ukraine, Kazakhstan and Moldova. In the Eurasian region, Kyrgyzstan ranks first in the standardized parameter of stroke mortality index of 88.5/100,000 population. The prevalence of stroke in Kyrgyzstan in 2014, according to the WHO Atlas of cerebrovascular diseases, was 139.1/100,000 population [24].

In Uzbekistan, the annual number of new stroke cases is about 209/100,000 people, among men stroke cases is about 1.95, while in women is 3.15/1000 people [2; 16; 17]. Gafurov B. G. (2009) reported 44.6% of deaths from stroke, of them 5.1% at early hospitalization (first 6 hours) that is 3-fold lesser than in late stages (14.7%). Disability affects 42.2% of stroke survivors, and no more 10.2% stroke patients could save their employability [7; 17; 19].

However, comparison of the results is difficult, as different study methods were used for case-finding, which were performed at different time points, and different age bands were studied. However, the observed variations may reflect differences in the risk-factor prevalence, screening/detection method and level of control.

According to the WHO database (DALYs/1000 capita, 2004), in Uzbekistan, the country rate of cardiovascular diseases, including stroke, was 4.9 per year, after diarrhoea (12), respiratory infections (6.6), other unintentional injuries (5.2), while the world's highest country rate rank was 14.

Stroke registry. The objectives of a stroke population-based register is to (a) evaluate the frequency, distribution and prognosis of the disease providing indicators such as attack rate, incidence rate, prevalence and case fatality; (b) compare trends in different countries; (c) evaluate trends and changing pattern, outcomes and treatment effectiveness; and (d) monitor disease prevention programmes. Focusing on the general population, a stroke registry may provide a comprehensive picture of stroke in the community, highlight problem areas and suggest where there are population groups at high risk and where treatment facilities are most in need of improvement. It may provide information needed to plan healthcare services and to develop and test which methods are most useful as a basis for preventive action (The EUROCISS Project, 2007).

The WHO Stroke Register was the first attempt to collect data on stroke in the community in a uniform manner from countries with different social, cultural, and environmental

background. It lasted from May 1971 to September 1974 and was a joint undertaking of WHO and 15 collaborating centres in 10 countries from Asia, Africa and Europe. About 2 million people were under surveillance and data was obtained from 6,395 new cases of stroke (3.270 men and 3.125 women) (EUROCISS Project, 2000).

Besides existing registries in America (GWTG, CSR/CCP, PCNASR, RCSN et al.) and Europe (WHO MONICA, EUROCISS, EROS, ECHIM, HDR, ASTRAL, PERFECT, ESO, SITS, GP's register et al.), including National, Regional Population- or Hospital-based registers, there are several Asian stroke registries: Khorasan Stroke registry (KSR), Khorasan posterior circulation stroke registry (KPCSR), Khorasan Pediatric Stroke registry (KPSR), Khorasan stroke in young adults registry (KSYAR), Chinese acute ischemic stroke treatment outcome registry (CASTOR), Kyoto Stroke Registry, Stroke Acute Management with Urgent Risk-factor Assessment and Improvement (SAMURAI) rt-PA Registry, Japan Standard Stroke Registry Study (JSSRS), Japan Multicenter Stroke Investigators' Collaboration (J-MUSIC), Yonsei Stroke Registry and many others.

The registry includes all cases in a defined population, whether treated at home or in hospital, in whichever season of the year or time of the day they may occur, and would also include rapidly fatal cases unable to reach the medical service.

Mortality. As per the GBD study, the age- and sex-standardized mortality in Asia has a wide range [5]. The lowest rates are observed in Japan (43.4/1.000,000 person-years and Singapore (47.9/100.000 person-years), followed by Bangladesh, Papua New Guinea, and Bhutan. The highest rates are observed in Mongolia (222.6/100,000 person-years) and Indonesia (193.3/100.000 person-years), followed by Myanmar and North Korea. All three regions show a range of mortality values, although, in general, they are lower in South Asia and high-income countries in East Asia. These varying rates may reflect the differences in stroke incidence, disease severity, and quality of healthcare. Competing causes of death such as coronary artery disease may provide a falsely low mortality value attributable to stroke [3; 9; 11; 13; 23; 28; 29].

According to the WHO (2017), stroke deaths in Afghanistan reached 18.204 or 7.78% of total deaths, while this rate is 14.315 (8.13) in Iraq, 109.165 (8.96%) in Pakistan, 890 (10.02%) in Kuwait, 130.159 (12.12%) in Japan, 42.356 (13.06%) in Iran, 8.809 (14.55%) in Azerbaijan, 3.385 (18.09%) in Mongolia, 2,098.609 (22.46%) in China, 49.241 (22.51%) in North Korea.

Among 33 Asian countries, the latest Stroke death rate rankings (2017) showed top 10 countries with high death rate (in decreasing order): Indonesia, Mongolia, North Korea, Turkmenistan, Russia, Muanmar, Afghanistan, Georgia, Tajikistan, and Kyrgyzstan. Among Asian countries, the lowest death rates were in South Korea, Japan and Singapore (WHO, Age Adjusted Death Rates Estimates: 2017).

In 2017, by the stroke death rate, Uzbekistan is on the 20th place after Kazakhstan among 33 Asian countries, having the lowest death rate among Central Asian countries. The highest rank had Turkmenistan, then Tajikistan and Kyrgyzstan. Uzbekistan is on the latest place in this ranking. In Uzbekistan, stroke deaths reached 16.641 or 9.85% of total deaths, while this rate is reached 14.871 (10.86%) in Kazakhstan, 5.012 (14.27%) in Kyrgyzstan, 5.347 (12.51%) in Tajikistan and 5.737 (15.06%) in Turkmenistan (Table 1).

Table 1.– Stroke deaths ranking in Central Asia (WHO, 2017)

Country	Population	Deaths of strokes	%	The age adjusted death rate/100.000 population	World Rank
Uzbekistan	30.932.878	16.641	9.85	83.74	90
Kazakhstan	17.067.216	14.871	10.86	90.99	84
Tajikistan	8.628.742	5.347	12.51	140.11	21
Kyrgyzstan	5.940.743	5.012	14.27	137.56	25
Turkmenistan	5.817.285	5.737	15.06	170.80	6

Comparative epidemiology. Heart disease and stroke are competing causes of mortality. Generally, stroke-associated mortality, as a percent of total mortality, is lower than ischemic heart disease-related mortality, in most parts of the world [10]. This could be explained by the higher prevalence of diabetes mellitus and hypercholesterolemia among those with ischemic heart disease, than stroke patients. However, in some countries, the converse is true, wherein the stroke-related mortality exceeds the mortality caused by ischemic heart disease (in China by 11.9%, Korea by 9.9%, Mongolia by 8.0%, Thailand by 6.6%, etc.). Yet, the stroke mortality in Asia is higher than in North America or Europe [11].

According to the DALYs lost, the stroke burden is lower than that associated with ischemic heart disease. However, in terms of mortality, the stroke burden exceeds the ischemic heart disease burden in the same countries in which an excess stroke mortality is observed – China, Mongolia, and Thailand.

According to Age Standardized death rate, in 2010, the top 10 causes of death in Uzbekistan were: coronary heart disease (37.41%), stroke (9.85%), hypertension (6.05%), liver disease (4.70%), diabetes mellitus (3.34%), Influenza and pneumonia (4.35%), kidney disease (3.25%), low birth weight (3.12%), congenital anomalies (2.28%), and birth trauma (2.12%).

Ischemic stroke occurs more frequently (75–90%) than hemorrhagic stroke in much of the world. However, the incidence of hemorrhagic stroke (15–40%) is much higher in Asia, notably in China, than most developed countries in North America and Western Europe [12].

Stroke subtypes. Information on stroke subtypes is also available in most countries, as derived from hospital-based stroke registries. In general, ischemic stroke (75–90%) occurs more commonly than hemorrhagic stroke, except in India and Vietnam, where the converse is observed. Subarachnoid hemorrhage is uncommon. Cerebral venous sinus thrombosis may also cause stroke, especially among young women [3].

In Uzbekistan, using the TOAST classification, Vereschagin-Suslina's criteria and computed program of the Russian National Stroke Center to determine subtypes of ischemic stroke [1; 21; 25], were determined the following most frequent ischemic stroke subtypes: atherothrombotic stroke (42%), lacunar stroke (41%), and cardioembolic stroke (17%) [17]. Later on, additionally using a new method of differential diagnosis of pathogenic subtypes of ischemic stroke (Invention Patent No.04956, 2014) [18], it has been possible to determine the frequency of the following stroke subtypes: 40.4% of atherothrombotic stroke, 39.1% of lacunar stroke, 12.3% of cardioembolic stroke, 3.6% of stroke of other determined or mixed etiology, and 4.6% of cryptogenic stroke.

Stroke subtyping can have different purposes, e.g. describing patients' characteristics in a clinical trial, grouping patients in an epidemiological study, careful phenotyping of patients in a genetic study, and classifying patients for therapeutic decision-making in daily practice. Regarding the 4 main categories of aetiologies of ischemic stroke (i.e. atherothrombotic, small vessel disease, cardioembolic, and other causes), the classification should reflect the most likely aetiology without neglecting the vascular conditions that are also found [16].

Vascular risk factors. Data on the vascular risk factors among stroke patients are available for a number of countries. These are derived from hospital-based stroke registries. Increasing age, sex (male), and genetics are non-modifiable risk factors for stroke. The modifiable stroke risk factors are well known and presented in the WHO database. These were derived from community-based cross-sectional surveys. Similar criteria were used for diagnosis, which makes the studies comparable.

Hypertension remains the most common medical risk factor for stroke, whereas current smoking and inactivity are the most predominant among lifestyle-related risk factors. In most countries, high or low frequencies of occurrence are observed consistently across all risk factors for that country, compared to other countries. There is a range of frequencies within each region. A high prevalence of hypertension is seen in Mongolia and Pakistan (low in Korea and Singapore); diabetes mellitus in Papua New Guinea, Pakistan, and Mongolia (low in Vietnam, Timor Leste, and DPR Korea); hypercholesterolemia in Japan, Singapore and Brunei (low in Nepal, Timor Leste, and DPR Korea); inactivity in Malaysia (low in Nepal and Lao PDR); obesity in Brunei, Papua New Guinea, and Mongolia (low in Timor Leste, Cambodia, and Bangladesh); tobacco smoking in Indonesia (low in India). In general, hypertension, diabetes mellitus and tobacco smoking tend to be more prevalent among men, whereas hypercholesterolemia, inactivity and obesity tend to be more prevalent among women [3; 9; 11; 13; 23; 28; 29].

According to Tashkent-hospital based studies, hypertension was the most prevalent risk factor for ischemic stroke (89%). The other most frequent aetiological factors were atherosclerosis in 73%, including their combinations in 36%, diabetes mellitus in 32%, and heart diseases in 36%. Physical inactivity was prevalent in 64% of patients. Stress was one of the main risk factors (67%), especially in men and in atherothrombotic (76.2%) and lacunar strokes (65.8%). Sleep disorders contributed to stroke in 49%, independently of sex [16; 17].

Trends. Globally, between 1990 and 2013, there was a rise in the number of deaths, survivors, and events associated with stroke. However, the significant increase in the associated deaths and DALYs lost were not significantly different between developing and developed countries [6]. Stroke-related mortality has been decreasing in East-Asian countries such as Japan, Korea, Taiwan, and the urbanized areas of China [11]. This may be due to the better risk factor control and stroke care in these countries. However, the age-standardized stroke incidence, in general, has remained relatively constant.

In Uzbekistan, according to the WHO (2014), cardiovascular diseases accounted 54% of total mortality 184.000, especially in males.

In South-Asian countries such as India, Pakistan, and Bangladesh, and in developing countries in South-East Asia, such as Cambodia, Indonesia, Lao PDR, and Malaysia, with the better control of infectious diseases, life expectancy will be prolonged. With the economic transition of these countries, towards achieving "developed country" status, risk factors such as hypertension, diabetes mellitus, hypercholesterolemia, obesity, and cigarette smoking will become more prevalent, raising the incidence of stroke. However, due to insufficient healthcare fa-

cilities in these developing countries, the mortality will be high, and the number of disabled survivors will also rise [3]. The decrease in high mortality, incidence and morbidity, observed predominantly in high-income countries, reflects the significant impact of the economic status of a country on health. This pattern of high incidence and falling mortality is likely to raise the prevalence of stroke in those countries. This problem may be compounded by the presence of fewer caregivers, as these countries also have low birth rates [3].

Conclusions

Stroke remains a devastating disease in the world despite major improvements in management over recent decades, which has contributed to better outcomes in patients. Although the incidence has been stable or has decreased, the ageing population will lead to a dramatic increase in the absolute number of stroke cases.

The global burden of stroke has the largest contribution from Asia, as in these countries, there are disparities in the healthcare provisions, and this will continue to pose a challenge to disease control. As life expectancy increases, with the aging of Asian populations and reduction in mortality due to infectious diseases, and the rise in the prevalence of vascular risk factors among economies in transition, the stroke burden in Asia will surely rise. Governments and healthcare workers need to work together, with an informed public, to stem this growing epidemic.

Based on the up-to-date reliable data from the excellently-performed GBD study and WHO, as well as large, recently-conducted studies from most Asian countries and our own studies, this paper summarizes and compares the main epidemiological data on stroke in Asia, including Uzbekistan, that could be helpful to clinicians, researchers and healthcare workers.

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FORENSIC EXAMINATION OF FRACTURES OF THE BONES OF THE NOSE

Abstract: The presence of age, sex and regional features, the variety of fractures of the bones of the nose and its septum are shown. As a result, in the forensic medical examination of the FNB, the nature and extent of lesions, features of the anatomical structure of the nose bones, possible anomalies in their development, concomitant diseases, possible complications and consequences of trauma are taken into account.

Keywords: fractures of the nose bones (FNB), orbit, septa.

There is a big difference in the indices of the causes of nasal trauma, including fractures of the nose bones (FNB), in the studies of different authors. Similar data are also noted for sex and age indicators [1; 2; 3]. In this regard, the solution of problems associated with fractures of the nose should be carried out constantly taking into account the regions, possible new situations, seasonality.

The prevalence and diversity of FNB has led to a large number of studies of this type of trauma, which have not dried up to date. However, a number of problems concerning forensic medical examination still remain insufficiently studied. They concern the insufficient degree of study of morphological features of injuries, methodological approaches to forensic diagnostics and expert evaluation of post-traumatic disorders [4].

To understand the mechanism and extent of injury, researchers again and again turn to the anatomical structure of the nose. The nose is formed by the front and back bones, as well as the front and rear cartilages. The twin nasal bones, the frontal bone and the processes of the upper jaw form the support for the cartilaginous skeleton. Although most of the structures of the nose are cartilaginous, if damaged, a fracture of his bones occurs. Since the supporting nasal septum has the shape of a natural cone, it becomes more and more thin near the tip of the nose and is more prone to fracture in this place [5].

It should be noted that the nasal cavity of brachycephalic, mesocaculum and dolichocephalic differ in the height and width of the nasal passages in different sections [6]. There are also racial features of the facial structure. Taking into account nationality and ethnic characteristics, four types of external nose are distinguished: 1) the eastern type, characteristic of the peoples of Asia; 2) the Caucasian type is leptoric; 3) Negroid type – platinum; 4) European type, in which three basic forms are distinguished: straight, convex-vaulted (high and narrow back of nose), concave-deepened (broad and low back of nose) [7]. Apparently, the nose of small size is less susceptible to fracture than large.

Since the bones of the wasp are flat and thin, their fractures are often multi-lobed. Together with the nasal bones, fractures of the frontal processes of the maxilla can occur. Nasal bones are damaged when struck both in the front and on the side. When exposed to the side, the brittle edge of the pear-shaped opening can crack. With a strong impact, the nasolobic joint is broken, and the nose pyramid is shifted to the side. In addition to lateral displacement, there may be a bony abrasion and a flattening of the back of the nose. If the blow falls directly in front of the root of the nose, then the nasal bones in both their upper third may become occluded. There are also options such as subsidence of the nasal bones with the formation of a flat pad or the introduction of them between the frontal processes of the upper jaw [8]. The variety of anatomic features of the nose, undoubtedly, increases the number of FNB options for trauma.

Since criminal trauma remains a frequent cause of FNB, and clinically it is possible to diagnose only in half (55.3%) of patients, in many cases it is necessary to perform instrumental examination. Lateral radiography of the bones of the nose makes it possible to diagnose fractures in the region of the back of the nose (nasal bones). In the area of the lateral rays of the nose, the ultrasound of the bones of the nose is the more accurate method for diagnosing the FNB, since it allows to detect lateral displacement of the fragments. The most accurate method of investigation is computed tomography, which is indispensable for the diagnosis of combined fractures of the skull [9]. However, computed tomography can not be used as the final diagnostic mechanism for septal fractures. Differences between the results of X-ray studies and findings during surgery were found [10].

The prevalence of concomitant FNB fracture of the septum varies between 34% and 96.2%. Adequate treatment of such fractures is important for preventing complications such as posttraumatic nasal congestion and deformity of the nasseptal

septum [11]. Fractures of the nasal septum in combination with simple injuries to the nasal bones are usually not recognized and remain untreated at the time of injury. Despite the fact that traumatic defects of the septum are diverse, there are certain patterns of displacement of fragments, depending on the mechanism of injury, which can be clarified in 75.2% of cases [12].

Traumatic nasal injuries include a wide range of possible complications, prompt recognition and timely treatment are the key to good functional and aesthetic results [13]. FNB should be considered in conjunction with the subsequent consequences in the form of blood aspiration and asphyxiation. In these cases, SCPs cause serious damage to health. The decision of the question of deliberate infliction of harm to health or through negligence is in the competence of the investigative authorities [14]. To formulate a forensic diagnosis of FNB, accompanied by the ingress of blood into the respiratory tract, it is necessary to take into account the nature of the trauma (isolated or combined type of fracture). In addition, the presence or absence of concomitant damages and conditions is taken into account. From pathogenetic positions, a detailed analysis of the sequence and relationship of nosological forms and syndromes that could lead to the onset of a fatal outcome should be carried out [15; 16].

A feature of FNB is that they often lead to functional and aesthetic problems even after treatment. The most common facial cosmetic defects are associated with the consequences of FNB [17; 18]. Especially this problem is aggravated with combined injuries. Since the bony naso-orbital-etmoid complex is a three-dimensional brittle anatomical structure, damage to this region can lead to severe facial dysfunction and development of ugliness [19].

Injuries to the nose and perinasal area often occur simultaneously. With FNB, damage to adjacent structures, such as the orbit, the medial angle of the optic gap, and the skeleton of the middle zone of the face, can occur, they can be missed or misdiagnosed, leading to incorrect primary processing and subsequent secondary deformations. Three types of such traumas are widespread: nasomaxillary fractures, limited naso-orbit-lattice fractures, and severe central facial trauma with naso-orbit-lattice fractures [17].

Thus, forensic medical examination of FNB should take into account the nature and extent of damage, features of the anatomical structure of the bones of the nose, possible anomalies of their development, concomitant diseases, possible complications and consequences of trauma.

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AN INVESTIGATION OF INDICATORS OF SOME CYTOKINES IN PATIENTS WITH CUTANEOUS LEISHMANIASIS IN THE PROCESS OF TREATMENT

Abstract

The study of aspects of pathogenesis, diagnosis and treatment of cutaneous leishmaniasis is a very urgent problem in Uzbekistan, as the region is an endemic zone of the disease.

Background: The study of the state of the level of some signal molecules – cytokines and their dynamics as a result of pathogenetic treatment in patients with cutaneous leishmaniasis with the use of domestic medicinal product "Mexidol".

Methods: Clinical examination was carried out in 112 patients with cutaneous leishmaniasis who received inpatient treatment at the "Republican Specialized Scientific Practical Medical Center of Dermatovenerology and Cosmetology" of the Republic of Uzbekistan. The levels of cytokines IL-4, IL-6, IL-8, TNF-α were determined by the method of enzyme-linked immunosorbent assay (ELISA). Statistical analysis was carried out using Student's t-test.

Results: The results of the research showed that, with cutaneous leishmaniasis, there is an imbalance in cytokine indices, which depends on the clinical form and severity of the disease. The obtained data after the end of the traditional method of treatment in blood serum in patients with ulcerated leishmaniasis showed a tendency to decrease the content of proinflammatory cytokines – IL-6, IL-8 and TNF-α and a tendency to increase anti-inflammatory cytokine – IL-4 in comparison with data before treatment ($p > 0.05$). Comparative analysis of traditional and complex methods of treatment of cutaneous leishmaniasis revealed significant changes in favor of the use of complex treatment with Mexidol.

Conclusion: Thus, the developed complex method of treatment of patients with cutaneous leishmaniasis with the use of Mexidol and the external agent Fargals showed high therapeutic effectiveness in comparison with the traditional method of treatment. Since, this method of treatment contributed to the positive dynamics of clinical picture of the disease and restoration of detected violations of cytokine indices. This method of treatment can be recommended for further practical use as one of the pathogenetically grounded methods of treatment of cutaneous leishmaniasis.

Keywords: cutaneous leishmaniasis, cytokines, immunomodulators.

Introduction

In Uzbekistan, cutaneous leishmaniasis is one of the most common parasitic diseases that have a large specific gravity in the regional pathology. Quite high prevalence of zoonotic cutaneous leishmaniasis is noted in Turkmenistan and Uzbekistan, where tens and hundreds of new cases of the disease are registered annually in endemic areas [1; 2; 3].

Recently, an interest in synthesis, secretion of cytokine molecules, their receptors, natural antagonists has grown significantly and is of great importance due to the possibility of their use for the purpose of determining etiopathogenesis, diagnosis, monitoring of the effectiveness of treatment [7].

Despite a wide range of preventive measures that serve to reduce morbidity, it is not always possible to ensure its complete elimination, and therefore the problem of treating patients with cutaneous leishmaniasis remains one of the most important problems in dermatology today [4; 5; 6; 9].

In this regard, the search for new effective drugs, for treatment of patients with cutaneous leishmaniasis is a very urgent issue [8; 10; 11; 12].

Methods

The influence of the developed method of treatment and traditional therapy on the indices of some cytokines (IL-4, IL-6, IL-8, TNF-α) was studied in 112 patients with cutaneous leishmaniasis. 38 patients with tuberculous cutaneous leishmaniasis (14 patients received traditional and 24 complex therapies), 52 with ulcerated leishmanias (21 patients received traditional and 31 complex therapy) and 22 patients with ulcerated leishmanias

with tubercles of seeding with lymphangitis (6 patients received traditional and 16 – complex therapy).

Cytokines in the blood serum were determined by the method of enzyme immunoassay (EIA). The test systems developed at the State Scientific Research Institute of Highly Pure Biopreparations (SPb) were used for determining the cytokines.

The results of the research were statistically processed using standard methods of variational statistics using the Student's t-test using the Excel-Office-2010 application program on a Pentium IV computer.

Results and discussion

Our previously conducted studies have shown that with cutaneous leishmaniasis in the serum of blood, certain violations of cytokine indices are detected. The revealed violations of cytokine indices depend on the clinical forms of the disease. In mild forms (tubercle form and ulcerated leishmanioma), the content of cytokines studied varies less, and in severe forms (ulcerated leishmanias with tubercles of seeding with lymphangitis) cutaneous leishmaniasis is greater.

Taking into account the abovementioned, we used the "Mexidol" drug to restore the detected disorders in cytokine indices in the complex of therapy for patients with cutaneous leishmaniasis and locally used the "FarGals" drug for accelerating the healing of wounds.

Mexidol (2-ethyl-6-methyl-3-hydroxypyridine succinate) was developed by the Institute of Biochemical Physics named after N. M. Emanuel, the Scientific Research Institute of Pharmacology of the Russian Academy of Medical Sciences and the All-Union Scientific Center for the Safety of Biologically Active Substances. Mexidol is an inhibitor of free radical processes, a membrane protector. The drug improves microcirculation and rheological properties of blood, reduces platelet aggregation, which has an antitoxic effect and increases the regenerative potential of tissues.

FarGals was developed for the first time in Uzbekistan, the composition of the drug is aqueous extract from the medium of cultivation of autotrophic iron-oxidizing bacteria. It has a pronounced antimicrobial effect and reliable wound healing activity.

Meksidol was used intramuscularly at 100 mg twice a day for 14 days.

FarGals: locally in the form of applications, in dilution with distilled water in a ratio of 1:1, 2 times a day for 20 days.

The results of the study showed (Table 1) that in the serum of patients with tubercle cutaneous leishmaniasis after the end of treatment with a traditional method, there is a tendency to decrease the concentration of IL-6, IL-8 and TNF-α ($p > 0.05$) to an increase in IL-4 ($p > 0.05$) compared to pretreatment data. This indicates that traditional therapy does not have the expected positive effect in restoring the observed disorders in the cytokine indices of patients with tubercle cutaneous leishmaniasis.

Table 1. Comparative analysis of the effect of therapy conducted on cytokine indices in patients with tubercle cutaneous leishmaniasis (M±m)

Cytokine status indicators	**Method of therapy**	
	Traditional therapy n = 14	**Complex therapy n = 24**
IL-4 (pg/ml)	1.67 ± 0.16	1.67 ± 0.12
	1.88 ± 0.15	2.02 ± 0.11**
IL-6 (pg/ml)	190.50 ± 3.90	190.44 ± 3.59
	180.63 ± 3.83	173.27 ± 3.46*
IL-8 (pg/ml)	92.73 ± 2.25	92.03 ± 2.65
	84.70 ± 2.19	77.09 ± 2.64*
TNF-α (pg/ml)	32.17 ± 2.72	30.14 ± 1.84
	28.04 ± 2.43	21.72 ± 1.45**

Note: in the numerator – data before treatment;
in denominators – data after treatment
p – reliability of data with respect to indicators before treatment
**– p < 0.05; **– p < 0.01*

When studying the effect of complex therapy on cytokine indices in patients with tubercle cutaneous leishmaniasis, it was revealed that after the treatment with this method, the content of IL-6 ($p < 0.05$), IL-8 ($p < 0.05$) and TNF-α ($p<0.01$), the onset significantly decreased compared to pretreatment data. Along with this, in patients of this group after treatment, the concentration of IL-4 significantly increased ($p < 0.01$) in relation to the data before treatment (Table 1). It should be noted that after the treatment with this method, the IL-4 index reached the control value.

In patients with ulcerated leishmanias after the traditional method of treatment in the serum, there is a tendency to de-

crease the content of IL-6, IL-8 and TNF-α ($p > 0.05$) and to increase IL-4 ($p > 0.05$) in comparison with the data before the treatment. This indicates that the traditional method of therapy also fails to achieve the expected positive result in restoring the imbalance in the cytokine indices of patients with ulcerated leishmanias (Table 2).

A study of the effect of the complex treatment on cytokine indices in patients with ulcerated leishmanias showed that after the treatment with this method in serum, the concentration of cytokines IL-6, IL-8 and TNF-α significantly decreased with respect to the data before treatment ($p < 0.05$). In patients of this group after treatment, the level of IL-4 significantly increased ($p < 0.01$) compared to the data before treatment (Table 2). However, they did not reach the indicators of control value.

Table 2. – Comparative analysis of the effect of the conducted therapy on cytokine indicators in patients with ulcerated leishmanias (M ± m)

Cytokine status indicators	**Method of therapy**	
	Traditional therapy n = 21	**Complex therapy n = 31**
IL-4 (pg/ml)	1.48 ± 0.09	1.58 ± 0.11
	1.62 ± 0.07	1.82 ± 0.09**
IL-6 (pg/ml)	183.87 ± 3.55	183.55 ± 3.01
	177.72 ± 3.34	172.85 ± 2.74*
IL-8 (pg/ml)	88.58 ± 2.77	83.63 ± 2.55
	83.15 ± 2.80	74.84 ± 2.42*
TNF-α (pg/ml)	30.61 ± 2.05	26.45 ± 1.91
	26.96 ± 1.83	22.39 ± 1.53*

Note: in the numerator – data before treatment;
in denominators – data after treatment
p – reliability of data with respect to indicators before treatment
**– p < 0.05; **– p < 0.01*

A similar situation was revealed when studying the effect of applied methods of therapy on cytokine indicators in patients with ulcerated leishmaniomas with tubercles of seeding with lymphangitis.

Table 3. – Comparative analysis of influence of the conducted therapy on cytokine indices in patients with ulcerated leishmaniomas with tubercles of seeding with lymphangoites (M ± m)

Cytokine status indicators	**Method of therapy**	
	Traditional therapy n=6	**Complex therapy n=16**
IL-4 (pg/ml)	1.43 ± 0.22	1.49 ± 0.14
	1.61 ± 0.20	1.82 ± 0.13*
IL-6 (pg/ml)	196.32 ± 6.33	203.72 ± 5.12
	191.20 ± 6.25	186.54 ± 6.60
IL-8 (pg/ml)	94.14 ± 3.20	99.62 ± 4.43
	88.85 ± 2.88	87.55 ± 3.95
TNF-α (pg/ml)	41.56 ± 3.04	38.64 ± 3.31
	37.67 ± 2.84	31.68 ± 3.04

Note: in the numerator – data before treatment;
in denominators – data after treatment
p – reliability of data with respect to indicators before treatment
**– p < 0.05;*

The obtained data showed (Table 3) that in the serum of blood in patients with ulcerated leishmaniomas with tubercles of seeding with lymphangites after the traditional method of treatment, there is also a tendency to decrease the content of IL-6, IL-8 and TNF-α and a tendency to increase IL-4 compared with the data before treatment ($p > 0.05$).

When studying the effect of complex treatment on cytokine values in patients with ulcerated leishmaniomas with tubercles of seeding with lymphangitis, it was revealed that after treatment with this method in serum, the concentration of cytokines IL-6, IL-8 and TNF-α decreased compared to indicators before treatment, however they were statistically

unreliable ($p > 0.05$). Along with this, in patients of this group after treatment, the concentration of IL-4 significantly increased ($p<0.05$) with respect to the data before treatment. However, they did not reach the values of the control group (Table 3).

Conclusion

Thus, the complex method of treatment for patients with cutaneous leishmaniasis developed by us helps to restore the detected violations of cytokine indices. However, this method of treatment has a more effect only in patients with tubercle cutaneous leishmaniasis, and in patients with ulcerated leishmaniomas and ulcerated leishmanias with tubercles of seeding with lymphangites, complete recovery of the detected cytokine indices is not achieved. In this regard, it is advisable to conduct a repeat course of therapy in patients with these clinical forms of cutaneous leishmaniasis.

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FRONT IMPRESSIONS OF SMALL PANCRE WITH RECONSTRUCTION OF MUSCULAR SLOT IN PATIENTS WITH LOCALLY EXTENDED UTERINE CERVICAL CANCER

Abstract: The immediate and immediate results of pelvic exenteration were studied in 32 patients with MR cervical cancer who underwent anterior exenteration of pelvic organs with a muscular flap reconstruction of the pelvic floor. The reasons that have a significant impact on the development of postoperative complications, the advantages of pelvic floor plastic, which reduces the incidence of postoperative complications, are analyzed.

Keywords: cervical cancer, pelvic exenteration, reconstructive-plastic surgery.

The possibilities of treating patients with locally advanced cervical cancer (MR cervical cancer), with continued growth and recurrence of the disease are very limited, and the results of the currently available therapeutic approaches are not satisfactory [1]. More than a third of patients with untreated, recurrent and MR cervical cancer do not go beyond the pelvic floor until death, and they rarely metastasize. These patients are more likely to die from bleeding from a disintegrating tumor, uremia, intestinal obstruction or cachexia [3].

This circumstance prompted surgeons to develop multivisceral resections and superextended operations, which include the exenteration of pelvic organs. Despite the fact that for some time this operation was the object of considerable criticism, now it is recognized as a method of choice for the treatment of those patients who will not be helped by other methods of therapy. The technical complexity, the high incidence of intra- and postoperative complications, the large postoperative lethality, the unsatisfactory quality of life of the operated patients, the difficulties of rehabilitation, as well as the significant level of economic costs with low treatment effectiveness, is causing a negative attitude among oncologists [4]. But the technique of implementation is improved and a decrease in mortality and complications is noted, and encouraging indicators of 5-year survival are accumulating. In this regard, it seems relevant to improve the development and implementation of effective techniques for reconstructive-recovery operations of the pelvic floor of exenteratics of pelvic organs.

Purpose of the study. To study the immediate results of treatment of patients after anterior exenteration of the pelvic organs with a one-stage plastic pelvic floor with a muscle flap.

Material and methods of investigation. The analysis of the nearest results of treatment of 32 patients with MR cervical cancer (T2b-4N0–1M0) was performed, which was performed by anterior excretory of the pelvic organs (EMT) with a one-stage pelvic floor plasty with a muscle flap from 2005 to 2014 on the basis of the RHCM Ministry of Health of the Republic of Uzbekistan and the Tashkent city oncology dispensary. The age of patients ranged from 32 to 61 years, the average age was 46.5 years. Morphologically, squamous cell carcinoma was diagnosed in 29 patients (90.6%), adenocarcinoma in 3 patients (9.4%).

All examined patients underwent a thorough preoperative examination: ultrasound of the abdominal cavity and small pelvis, MRI of the small pelvis and retroperitoneal space with contrast, CT of abdominal and thoracic organs, excretory urography with retrograde cystography, cystoscopy, rectosigmoscopy. An important aspect of the preoperative examination was the determination of the degree of spread of the tumor process to neighboring organs.

The results are their discussion. All examined patients underwent anterior exenteration of the pelvic organs (EMT), with a one-stage plastic reconstruction of the pelvic floor with a muscular flap, as well as bilateral aorto-iliac and tazovoobturator lymphadenectomy. One surgeon performed all operations. Indications for EMT were: recurrent bleeding from the genital tract, discharge of urine from the vagina (vesicovaginal fistulas), hematuria, chronic pain syndrome, ureterohydronephrosis with one or two sides, extremely low quality of life. The duration of the operation was from 2 hours 43 minutes to 8 hours 05 minutes, depending on the type of urine diversion produced. Methods of withdrawal of urine and duration of surgery directly depended on the clinical situation and intraoperative findings.

Given the relatively high operational and anesthetic risks, the decision to perform such a traumatic operation was usually taken by a doctor's consultation, after a thorough explanatory

conversation with the patient and her relatives after receiving their consent for the operation.

Ureterocutaneostomy (UCS) was performed by 15 (46.9%), Brikker 9 (28.1%) and colonic urinary reservoir with controlled evacuation in 8 (25.0%) patients with MR SFS

All examined patients underwent reconstruction of the pelvic floor after exenteration with a muscle graft. In our study, a flap from the lower half of the left rectus abdominis muscle on the feeding stem (VRAM flap) was used to reconstruct the pelvic floor. The muscles in the form of a cascade, the postoperative field, the so-called "empty pelvic floor" formed after EMT, were cross-linked by vikrilov or catgut threads, which prevents and / or reduces the formation of complications such as lymphocele and pelvic abscesses, pelvic hernias, intestinal obstruction, due to the translocation of loops of the intestines into the cavity of the small pelvis and adhesion to the walls of the small pelvis, small intestinal fistulas, rectal-vaginal fistulas.

As can be seen from the table, the most frequent complications were suppuration of the postoperative wound and pyelonephritis, 12.5% and 15.6% of cases, necrosis of the displaced muscular flap was observed in 9.4% of cases of patients. The frequency of development of the above complications, in our opinion, is related to the intra-operative technical difficulties that have taken place due to pronounced and fibrotic changes in the small pelvis. Two patients (6.3%) complained of difficulties in self-cate- geration, and 1(3.1%) developed a small intestine obstruction, which was resolved in a conservative way. Fatal outcome occurred in 1(3.1%) of the patient, the cause of death – pulmonary embolism.

Conclusions: The applied procedure for reconstructing the pelvic floor after pelvic exenteratics, especially with the formation of a large intestine urinary reservoir with controlled emptying, is the most optimal volume of surgical intervention, reduces the risk of early postoperative complications such as intestinal obstruction, rectal-vaginal fistulas, small abscesses pelvis and pelvic hernia, which significantly improves the quality of life of patients.

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THE SIGNIFICANCE OF PREOPERATIVE RADIATION THERAPY IN THE TREATMENT OF UTERINE BODY CANCER, DEPENDING ON P53 AND BCL-2

Abstract:

Actuality: Endometrial cancer occupies the first place in the structure of oncological pathology, the rate of growth of incidence rates of endometrial cancer is higher than those of other malignant tumors of the reproductive system in women.

Objective: to determine the value of preoperative brachytherapy in patients with endometrial cancer, depending on the state of the mutant gene p53 and the regulator of apoptosis bcl-2.

Methods: We studied 105 patients with stage I–II endometrial cancer for the period from 2006 to 2016. Immunohistochemical method was used to study the genes of apoptosis p 53 and bcl-2 in materials taken during scraping of the uterine cavity, as well as the endometrium of operated uterus preliminarily subjected to pre-operative radiotherapy on the apparatus "Moulti Soursce BEBIG".

Results: Analysis of survival data of patients showed a significant advantage of patients receiving preoperative brachytherapy. 5-year disease-free survival in the control group was 60 ± 8.6%, while in the main group there was 89 ± 9.9%, respectively ($p \leq 0.05$).

Conclusion: brachytherapy to split the mutant p 53 gene and regulator (inactivator) of apoptosis of bcl-2 in intact tissues prior to invasive manipulation of endometrial cancer in patients.

Keywords: endometrial cancer, brachytherapy, immunohistochemistry, p 53, bcl-2.

Endometrial cancer is a tumor with a complex mechanism of malignant transformation of the uterine epithelium, in the occurrence of which play a roleendocrine-metabolic disturbances caused by the damage to neurohumoral systems responsible for the correlation between various organs of the reproductive and endocrine systems [2; 3; 9].

The study of the regularity of the appearance of endometrial tumors and the nature of organ / out-of-organ dissemination, as well as an analysis of the causes of the development of relapses and metastases of endometrial cancer, significantly weakened the opinion about the relatively "benign" course of malignant tumors of the uterus body. It has been shown that even within a single clinical stage of the disease, the results of treatment can vary widely, depending on the risk factors [1; 5; 8].

Evaluation of the results of treatment of endometrial cancer indicates a high efficiency in the initial stages of combination therapy, which allows achieving a 5-year survival rate in 85–95% of patients with stage I, 65–70% with stage II and only 29% with stage III [2; 4; 5; 9].

Analyzing data on the frequency of local tumor recurrences (in 10–15% of patients), regional and distant metastases (in 12–27% of patients), which are the main causes of mortality from cancer of this localization [1; 6; 7], it is necessary to state that the possibility of radiotherapy in the treatment of endometrial cancer has not yet been fully realized.

Last decades made significant changes in radiobiological, methodological and even strategical approaches to radiation therapy as one of the main special methods of antitumor treatment of malignant neoplasms of the female reproductive system and, in particular, endometrial cancer.

The aim of the study is to determine the value of preoperative brachytherapy in patients with endometrial cancer, depending on the state of the mutant gene p 53 and the regulator of apoptosis bcl-2.

Materials and methods

The study analyzed the data of 105 patients with stage I–II endometrial cancer treated at the Tashkent City Oncology Dispensary for the period from 2006 to 2016. The medical history, polyclinic cards, protocols of operations, the description

of surgical preparations, histological and immunohistochemical conclusions were studied.

Morphological confirmation of the diagnosis was obtained in all 105 patients with endometrial cancer. In the study we used the materials from scraping the uterus cavity, as well as the endometrium of the operated uterus, previously subjected to pre-operative radiotherapy on the apparatus "Moulti Soursce BEBIG".In the study of histological preparations were taken into accountthe following factors: the nature of tumor growth, the depth of invasion in the myometrium, the necrosis focus in the tumor, and the degree of malignancy of the tumor.

A mutant apoptosis gene of p 53 and an apoptosis regulator of bcl-lymphocytes were studied using an avidin-biotin peroxidase method (ABC kit, Vector Laboratories, Burlingame, CA) and using mouse antibodies, anti-human monoclonal antibodies, clone D07 (DAKO, Copenhagen, Denmark) 2.

All patients were divided into 2 groups: I – the main group of patients comprised 60 patients, who received preoperative brachytherapy in a total focal dose (TFD) of 20 Gy, followed by surgical intervention in the volume of extirpation of the uterus with appendages within 24–48 hours. After the operation, all patients received intracavitary radiotherapy up to 40 Gy on TFD, as well as remote gamma therapy on the "TERABALT" device in a TFD of 40–50 Gy.

II – a control group was made up of 45 women who, after scraping the uterine cavity and verifying the diagnosis, immediately underwent surgical treatment, after which they received combined radiation therapy (remote gamma therapy TFD = 40–50Gy + intracavitary radiotherapy TFD = 30–40Gy).

For every patient, a special card was inserted, which included 97 signs characterizing the features of the organism, the disease, the treatment performed and the follow-upresults. The received data were entered into the memory of a personal computer PC Pentium IV and processed using a set of application programs. The computation and comparison of the reliable differences in the average values, as well as the comparison of the reliability of the differences in the event frequencies (using the Student's t-test), were carried out using a package for computer analysis of SAS.

Statistical analysis of the data was carried out using the standard Statistica software package (version 7.0, Statsoft Inc., USA). Survival analysis (using the Kaplan-Mayer method) and evaluating the reliability of differences were performed using a log-rank test using the "Survival" program. Differences were considered reliable at $p \leq 0.05$.

Results and discussion

In the main group endometrioid adenocarcinoma was diagnosed in 41(68.3%) patients, of which a highly differentiated adenocarcinoma was observed in 19(31.6%), moderately differentiated in 16(26.3%), low-grade in 6(10.5%) patients, respectively. Rare forms of uterine cancer have also been observed, such as glandular-squamous cell carcinoma in 9(15%), serous-papillary carcinoma in 10(16.6%) patients, respectively. In the control group, the histological distribution of patients was carried out according to the following: endometrioid adenocarcinoma – 27(60%), of them highly differentiated in 20(44.5%), moderately differentiated in 5(11.1%) patients, low-grade in 2(4.4%) of the patient, glandular-squamous cell carcinoma – 11(24.4%), serous-papillary carcinoma in 7(15.6%) patients, respectively.

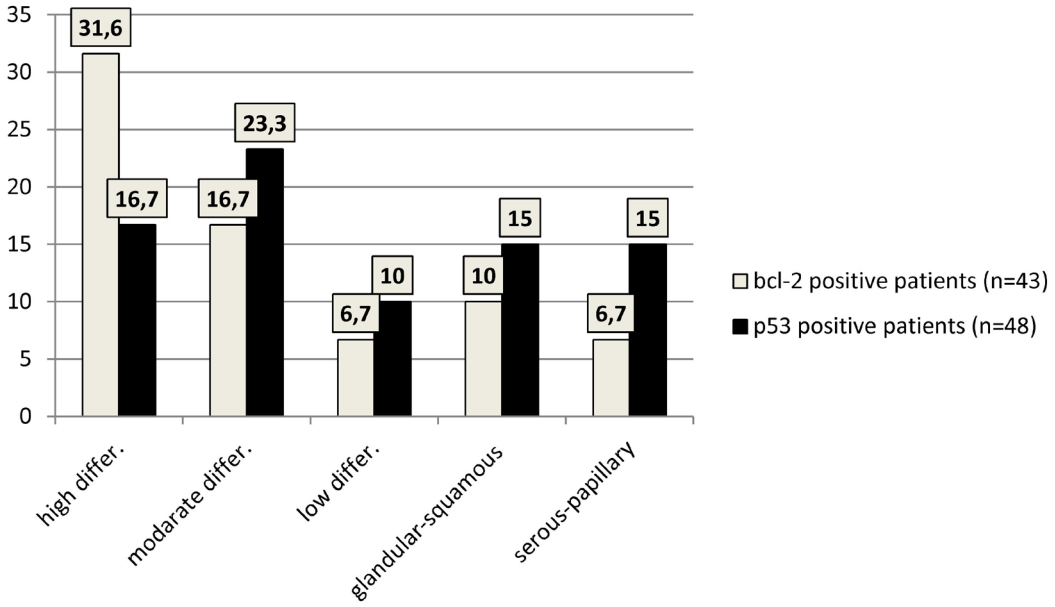

Figure 1. Distribution of patients depending on the histological type of bcl-2 and p 53 positive patients

In the main group from 60 patients 43(71.6%) patients were positive with bcl-2, 19(31.6%) of them highly differentiated, 10(16.7%) moderately differentiated, 4(6.7%) low-grade adenocarcinomas, 6 (10%) glandular-squamous carcinomas, and 4(6.7%) serous-papillary carcinomas. At the same time mutant p53 was detected in 48(80%) patients. The distribution of these 48 p53 expressed patients was as follows: 10(16.7%) – highly differentiated, 14(23.3%) – moderately differentiated, 6(10%) – low-grade adenocarcinoma, 9(15%) – glandular squamous cell carcinoma, 9(15%) – serous-papillary carcinoma.

In the control group from 45 patients 21(46.7%) patients with endometrioid adenocarcinoma were bcl-2 positive, (17(37.8%) – highly differentiated, 2(4.4%) – moderately differentiated, 2(4.4%) – low-grade adenocarcinoma) and 4(8.9%) patients with glandular-squamous cell carcinoma and 6(13.3%) patients with serous-papillary carcinoma were positive. Expression of p 53 was detected in 39(86.7%) patients (except for 6 patients with highly differentiated adenocarcinoma).

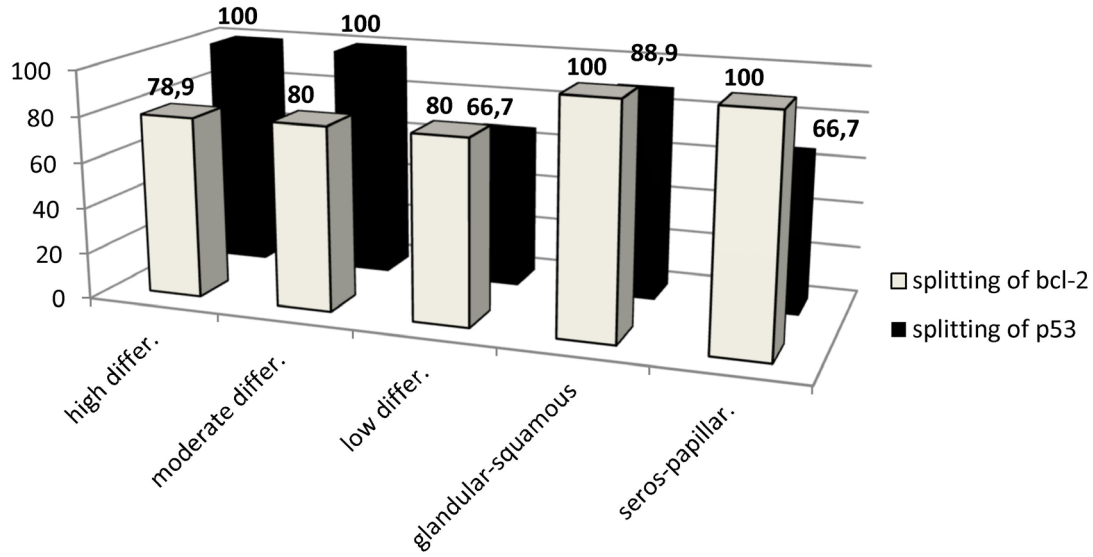

Figure 2. Distribution of patients depending on the splitting of bcl-2 and p 53 genes after predoperative brachytherapy.

In the analysis of postoperative materials, it was revealed that after the preoperative brachytherapy in 15 patients with (78.9%) highly differentiated, 8 patients with moderate (80%) and low-grade adenocarcinoma, and in all patients with rare forms of cancer of the uterus, the tumor became bcl- 2 negative. Also splitting of the mutant p 53 gene was detected in 87.5% of patients (except for 2 patients with low-grade adenocarcinomas, 1 patient with glandular-squamous adenocarcinoma, 3 patients with serous-papillary adenocarcinomas) ($p \leq 0.05$).

In the study of postoperative materials in the control group, it was found that the values of bcl-2 and mutant p 53 remained the same as in endometrial scraping, i.e. without changes.

Analysis of survival data of patients showed a significant advantage of patients in the main group. 5 – year recurrence-free survival in the control group was 60 ± 8.6%, while in the main group there was 89 ± 9.9%, respectively ($p \leq 0.05$).

In the control group, 14 patients had relapsed disease, 3 lung metastases and 2 bone metastases for 3 years. In the main group, 3 patients had metastases in the bone, 3 patients with metastases in the lungs and 1 patient with a recurrence of the vaginal stump with accumulation of ascites fluid.

Conclusion: According to the results of immunohistochemical staining of sections for the study of Bcl-2 protooncogene, Bcl-2 positive tumors were mainly found in high- and moderate differentiated endometrioid adenocarcinomas (62%) and glandular-squamous cell carcinomas (78%).

Mutant p 53 was detected in serous-papillary tumors 1.3 times more often than in endometrioid adenocarcinoma ($p < 0.05$). When studying the degree of malignancy of the endometrioid adenocarcinoma, p 53 was directly correlated with a low degree of tumor differentiation (G3).

In preoperative brachytherapy, disease-free survival of patients increases to 89 ± 9.9%, compared with patients who did not receive neoadjuvant intracavitary radiation therapy. This is explained by the possibility of brachytherapy to cleave the mutant p 53 gene and regulator (inactivator) of apoptosis of bcl-2 in intact tissues prior to invasive manipulation of endometrial cancer in patients. Also, the transportability of tumor

cells and, consequently, the danger of their intraoperative dissemination decreases, at that time increasing the indices of the disease-free period and overall survival.

Conflicts of interest: The authors received no financial support for their research, and they report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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DYNAMICS OF THE QUALITY OF LIFE OF WOMEN WITH GRAVES' DISEASE, DEPENDING ON THE DURATION OF THE DISEASE

Abstract

Materials and methods: We examined in total 69 women with GD. The mean age of patients was 28.3 ± 6.2 years (Me 28 years, IQR24.0–33.0). According to the duration of the disease, all women were divided into the following groups: 1-group, patients with GD with duration of disease up to 3 years, *n* = 49 (71.0%), 2-group, patients with GD with duration of disease from 3 to 5 years, *n* = 20 (29.0%). The control group included 35 women without thyroid disease. All patients received thyreostatic drugs. The average dose of thyreostatics was 20–30 mg per day. Treatment with thyreostatics was carried out under the control of free thyroid hormones and TSH levels in blood serum.

For the assessment of QoL, patients used a short version of the health questionnaire (MOS36-Item Short-Form Health Survey – MOS SF-36)/ Statistical processing was carried out using computer programs Microsoft Excel, STATISTICA 6 and Biostat.

Results. We found that irrespective of the duration of the disease can be seen a significant decrease in QoL in women with GD compared to the control group of patients. However, in patients with a duration of GD of 3 to 5 years, QoL is also significantly lower compared to the patients with a duration of GD up to 3 years. The lowest QoL indicators, not exceeding 50 points in the group with a duration of GD up to 3 years were noted on the scale of physical role functioning, whereas in the group with a duration of GD from 3 to 5 years on the scales of physical functioning, physical role functioning, bodily pain, social role functioning.

We found that with GD duration up to 3 years (group 1) and 3 to 5 years (Group 2) the physical component of health is reduced by 30.2% and by 44.7%, respectively, due to the impact on the ability to perform various physical activities. So the decrease in physical functioning compared with the control group in patients 1 and 2 groups were 26.4% and 38.3%, respectively. The disease had a negative effect (component RP decrease compared with the control group, by 35.8% and 46.0% respectively) on the daily activity of the person (work, daily duties).

Index of the pain intensity effect on the daily activities was reduced by 27.6% and 38.1%, respectively. All this reduced patients' subjective assessment of their health (respectively by 31.1% and 38.3%). The parameters of the physical component of QoL in women with a duration of GD of 3 to 5 years were lower than with a shorter duration of the disease.

The indicators of the psychological component of the health of QoL in patients with GD are statistically significantly lower in all scales of the questionnaire compared to the control group of patients.

The indicator of the vitality scale (VT by 35.5% in patients of group 1 and 41.2% in patients of group 2) was initially lower than the mean value in control in both groups of the examined patients, which indicates a decrease in vital activity in patients because they have cardiovascular and neurological changes.

In the analysis of the components of the psychological component of health, moderately low values of QoL were observed (32.7% reduction in group 1 and 39.5% in group 2), which indicates to restriction of social contacts, decreasing of the level of communication due to deterioration of the emotional and physical state, limitation of daily activities, caused by deterioration of the emotional state.

The lowest level in comparison with the clinical control was the level of role functioning, caused by the emotional state of patients (38.3% reduction in group 1 and 42.8% in group 2). The level of social functioning, mental health, and role functioning, were not high because of the emotional state of patients. Mental health of patients was below the control values (30.5% in group 1 and 38.1% in group 2).

Thus, the assessment of QoL of women with GD showed that patients in the stage of decompensation of thyrotoxicosis significantly reduced physical and mental health components compared with those in the groups of compensation for thyrotoxicosis and control patients group.

Keywords: Thyroid diseases, Graves' disease, hyperthyroidism, quality of life, woman, duration of the disease.

Relevance. Graves' disease (GD) is a disease caused by excessive secretion of thyroid hormones, usually clinically manifested by diffuse enlargement of the thyroid gland and occurs with a frequency of 23 cases per 100 thousand population, and recently there has been an incidence increasing [5; 7; 9].

Lately, the concept of quality of life (QoL) is used more commonly in scientific research and clinical practice [1; 4; 6]. Currently QoL indicators become an independent criterion for evaluation of effectiveness of a particular treatment method and complement the results of clinical and instrumental studies. Questionnaires – questionnaires allow a patient to evaluate subjective views about the quality of his life, and allows to a doctor – to get more objective information, subject to formalized processing [2; 6; 10].

Usually, during the conservative treatment, despite the ongoing therapy, a large number of patients with thyrotoxicosis remain for a long time in a state of decompensation. Compensation of thyrotoxicosis is accompanied by an improvement in QoL [8; 9].The prevalence of depression in patients with thyrotoxicosis can reach 40%, which is often accompanied by psychomotor retardation and a moderate decrease in cognitive functions [5; 8]. The doctor usually evaluates the effectiveness of thyrotoxicosis treatment and the stage of compensation according to changes in the clinical picture, as well as the level of thyroid-stimulating hormone (TSH) and thyroid hormones in the blood serum. However, patients are more interested in a state of their health and their work capacity during the treatment. In other words, patients are interested in the quality of life after the treatment [1; 3; 8].

Purpose of the study: To compare the quality of life parameters in patients with GD, depending on the duration of the disease.

Materials and methods: A total of 69 women with GD were examined at the clinic of the Republican Specialized Scientific and Practical Medical Center of Endocrinology named after academician Yo. Kh. Turakulov. The mean age of patients was 28.3 ± 6.2 years (Me 28 years, IQR24.0–33.0). The research did not include patients with endocrine ophthalmopathy.

After receiving informed consent, all patients underwent a clinical and laboratory (determination of thyroid hormone levels and TSH) and instrumental examinations (thyroid ultrasound).

According to the duration of the disease, all women were divided into the following groups: 1-group, patients with GD with duration of disease up to 3 years, n = 49 (71.0%), 2-group, patients with GD with duration of disease from 3 to 5 years, n = 20 (29.0%). The control group included 35 women without thyroid disease.

All patients received thyreostatic drugs. The average dose of thyreostatics was 20–30 mg per day. Treatment with thyreostatics was carried out under the control of free thyroid hormones and TSH levels in blood serum. In addition to thyreostatics, was prescribed detoxification drugs and, if necessary, symptomatic treatment.

For the assessment of QoL, patients used a short version of the health questionnaire (MOS36-Item Short-Form Health Survey – MOS SF-36) [14]. 36 questions of the questionnaire are grouped into eight scales: physical functioning (PF), role functioning (RP), bodily pain (BP), general health (GH), vital activity (VT), social functioning (SF), role emotional functioning(RE) and mental health (MH).The scores of each scale range between 0 and 100, where 100 represents total healthiness. All scales form two indicators: physical (PH) and mental (MH) components of health. All the data for each subscale is calculated using a special key protected by International copyright [15]. The results are presented in the form of scores of 8 scales formulated in such a way that a higher score indicates a higher level of Qo L.

Statistical processing was carried out using computer programs Microsoft Excel, STATISTICA 6 and Biostat. Quantitative indicators are presented in the form of M ± SD, as well as medians (Me) and 25 and 75 percentiles (IQR). Differences between groups were considered statistically significant at $P < 0.05$.

Results. During the analysis of the results we found that women complained of heart palpitations (34.8%), weakness and sweating (33.3%), increased excitability and emotional lability (30.4%), tearfulness (21.7%), anxiety (15, 9%), sleep disturbances (14.5%), attention deficit disorder (8.7%).

We found that irrespective of the duration of the disease can be seen a significant decrease in QoL in women with GD compared to the control group of patients. However, in patients with a duration of GD of 3 to 5 years, QoL is also significantly lower compared to the patients with a duration of GD up to 3 years (Table 1).

The lowest QoL indicators, not exceeding 50 points in the group with a duration of GD up to 3 years were noted on the scale of physical role functioning, whereas in the group with a duration of GD from 3 to 5 years on the scales of physical

functioning, physical role functioning, bodily pain, social role functioning.

These indicators reflect a decrease in the assessment of patients with GD of their health, limiting daily physical activity due to severe palpitations, weakness, and tremor. The presence of clinical manifestations of GD affects the psychological and physical components of health.

Table 1.– Indicators of the physical and mental components of quality of life of the patients with GD (according to SF-36), in points

SF-36 scales	Control, n = 32	Duration of GD, years		p_1	p_2
		Up to 3-years, n = 49	3 to 5 years, n = 20		
Physical functioning (PF)	76.4 ± 9.1	47.2 ± 8.2	56.3 ± 16.1	< 0.0001	**0.02**
Physical role functioning (RP)	76.6 ± 10.3	49.2 ± 18.4	41.4 ± 11.7		0.08
Bodily Pain (BP)	80.3 ± 8.0	56.0 ± 14.2	50.1 ± 5.7		0.08
General Health (GH)	81.2 ± 8.9	49.7 ± 9.7	58.1 ± 15.8		**0.03**
Vitality (VT)	81.4 ± 8.7	53.9 ± 7.9	61.7 ± 13.8		**0.02**
Social role functioning (SF)	84.4 ± 11.2	50.3 ± 17.4	46.6 ± 7.7		0.37
Emotional role functioning (RE)	81.4 ± 9.6	49.9 ± 11.7	56.1 ± 10.9		**0.04**
Mental Health (MH)	80.6 ± 9.8	52.5 ± 15.2	47.9 ± 8.1		0.21

Note: P_1 – reliability in relation to the control; P_2 – reliability in relation to the group with the duration of GD up to 3 years.

We found that with GD duration up to 3 years (group 1) and 3 to 5 years (Group 2) the physical component of health is reduced by 30.2% and by 44.7%, respectively, due to the impact on the ability to perform various physical activities. So the decrease in physical functioning compared with the control group in patients 1 and 2 groups were 26.4% and 38.3%, respectively. The disease had a negative effect (component RP decrease compared with the control group, by 35.8% and 46.0% respectively) on the daily activity of the person (work, daily duties).

Index of the pain intensity effect on the daily activities was reduced by 27.6% and 38.1%, respectively. All this reduced patients' subjective assessment of their health (respectively by 31.1% and 38.3%).The parameters of the physical component of QoL in women with a duration of GD of 3 to 5 years were lower than with a shorter duration of the disease.

More than half (55.0%) of the patients in group 2 indicated that due to their poor physical condition, they are limited in daily exercise (room cleaning, going to the grocery store, walking on stairs, carrying of weights) because of – palpitations, tachycardias and weaknesses, which are accompanied by a violation of hemodynamics.

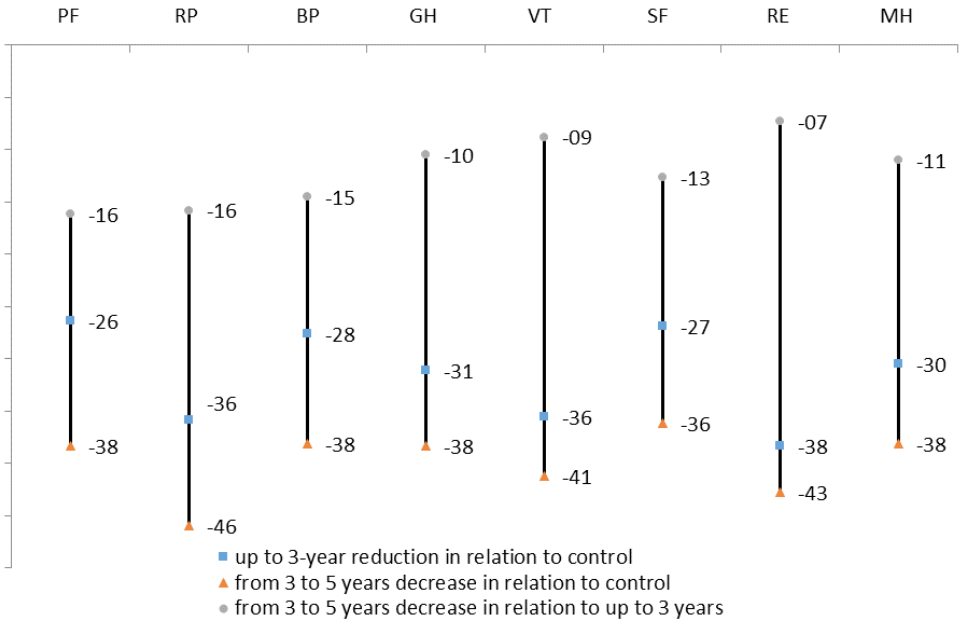

Figure 1. Quality of life in patients, depending on the duration of the disease

The indicators of the psychological component of the health of QoL in patients with GD are statistically significantly lower in all scales of the questionnaire compared to the control group of patients.

The indicator of the vitality scale (VT by 35.5% in patients of group 1 and 41.2% in patients of group 2) was initially lower than the mean value in control in both groups of the examined patients, which indicates a decrease in vital activity in patients because they have cardiovascular and neurological changes.

In the analysis of the components of the psychological component of health, moderately low values of QoL were observed (32.7% reduction in group 1 and 39.5% in group 2), which indicates to restriction of social contacts, decreasing of the level of communication due to deterioration of the emotional and physical state, limitation of daily activities, caused by deterioration of the emotional state (Fig.1)

The lowest level in comparison with the clinical control was the level of role functioning, caused by the emotional state of patients (38.3% reduction in group 1 and 42.8% in group 2) The level of social functioning, mental health, and role functioning, were not high because of the emotional state of patients. Mental health of patients was below the control values (30.5% in group 1 and 38.1% in group 2).

Thus, the assessment of QoL of women with GD showed that patients in the stage of decompensation of thyrotoxicosis significantly reduced physical and mental health components compared with those in the groups of compensation for thyrotoxicosis and control patients group.

Discussion

The goal of this study was to compare QoL values with the duration of GD. The data obtained indicates that statistically significant differences between the values of the control group and comparison groups were noted for all QoL scales on the SF-36 questionnaire ("physical functioning" and "mental health").

The lowest QoL indices not exceeding 50 points in the group with a duration of GD up to 3 years were noted on the scale of physical role functioning, whereas in the group with a duration of 3 to 5 years on the scales of physical functioning, physical role functioning, bodily pain, social role functioning.

Self-assessment of QoL is a key indicator in assessing the lifestyle and level of health. It was found that among patients with the duration of the disease up to 3 years, 20.4% of the respondents consider QoL to be good, 65.3% – satisfactory. In the group of women with GD duration from 3 to 5 years, QoL was considered to be good at 25.0% and satisfactory at 60.0% of patients. Perhaps the best evaluation of QoL by women in the second group is associated with an improvement in the thyroid status on the background of treatment.

Törring O. et al [12] in a prospective study evaluated the factors associated with the choice and satisfaction of treatment against a background of different types of therapy for GD, and also analyzed QoL after treatment. 64% of patients received only thyreostatics, 11% – radioiodine therapy and 25% received total thyroidectomy. It was found that the most important factors in the choice of treatment were the following: the impact on everyday life, concerns about the use of radioactive iodine, the possibility of depression or anxiety, doctor's recommendations. Levels of satisfaction were high in all three types of treatment. One year after treatment QoL was higher than in patients without treatment and comparable to other international studies [12].

We found that with GD duration up to 3 years (group 1) and 3 to 5 years (Group 2) the physical component of health is reduced by 30.2% and by 44.7%, respectively, due to the impact on the ability to perform various physical activities. Therefore, the decrease in physical functioning compared to the control group in patients on 1 and 2 groups were 26.4% and 38.3%, respectively. The disease had a negative effect (component RP decrease compared with the control group, by 35.8% and 46.0% respectively) on the daily role of the person (work, daily duties).

Our data are confirmed by other researches. In a prospective cohort study, Cramon P. et al. [13] QoL was assessed in patients with GD and toxic nodular goiter in the background of various therapies before and after treatment. The baseline scores in patients with GD and toxic nodular goiter were significantly worse than in the general population and in the thyroid scale and in all SF-36 scales. All QoL scores on the thyroid scale improved significantly during treatment, while the results for SF-36 improved only in a few indicators. In patients, significant treatment effects were observed in three indicators of thyreoscale (symptoms of thyrotoxicosis, fatigue, total QoL) and moderate effects of SF-36 scale (anxiety, emotional susceptibility, impaired daily life). The conclusion of this study was that thyrotoxicosis causes severe changes and general violations of QoL and these changes persist even after treatment [13].

Conclusion. GD is one of the most common endocrine diseases, it has a great social importance not only because of its negative impact on the body, including the nervous system but also because of the high financial costs of its diagnosis and treatment. It is known that, in the majority of patients receiving conservative treatment, frequent relapses of thyrotoxicosis are observed, which can serve as one of the reasons for worsening of the overall well-being of these patients and a decrease in their quality of life. The expediency of a multidisciplinary approach to the timely diagnosis and treatment of thyrotoxicosis becomes especially important for correcting of upcoming mental and emotional disorders and improving the quality of life of patients.

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INFLUENCE OF SOME I-APF ON CYTOPROTECTION MECHANISMS IN INDOMETHATSIN-INDUCED GASTROPATHYARTHRITIS

Abstract: On the experimental model of indomethacin-induced gastropathy in rats, the effect of ACE inhibitors, omeprazole, saitotec and their combinations on the mucosal barrier of the stomach was studied. It was found that with indomethacin-induced gastropathy indomethacin significantly suppresses the synthesis of insoluble glycoproteins in the mucous barrier and reduces the number of functioning mucus cells. ACE inhibitors have a cytoprotective effect in the treatment of indomethacin gastropathy. The most effective was captopril, the cytoprotective effect of which is equal to that of omeprazole and saitoteka.

With the combined use of omeprazole with ACE inhibitors and with the cytotext their cytoprotective pharmacodynamic effect increases as additive synergism. The most effective combination of omeprazole with captopril and omeprazole with saitotekom.

Keywords: indomethacin, gastropathy, cytoprotection, treatment.

One of the most important problems associated with the use of non-steroidal anti-inflammatory drugs (NSAIDs) is their damaging effect on the gastrointestinal tract, which can lead to serious complications. According to various sources, gastroduodenal side effects can be observed in 20–40% of patients who regularly take NSAIDs. In 10–30% of them with esophagogastroduodeno-scopy ulcers of the stomach and duodenum are detected. In this connection, in the last decade, special attention has been paid to the problem of the safe use of NSAIDs, the prevention and treatment of gastrointestinal side effects. However, methods for the prevention and effective treatment of NSAID-induced gastropathies have not been fully developed [3].

Prospective drugs for treatment are angiotensin converting enzyme (ACE inhibitors). It has been established that they stimulate the synthesis of prostaglandins. We assumed that they have a similar effect in the gastrointestinal tract. This can be confirmed by the results of a study by A. A. Gidoyatova et al. [5], who noted the ulcerative effect of enalapril and reniteca in the treatment of patients with heart failure with concomitant peptic ulcer. Similar data are cited by S. A. Alekseenko et al. [2] who established the ulcerative effect of enalapril in patients with hypertension and concomitant peptic ulcer.

Purpose of the study. Comparative evaluation of the effect of some ACE inhibitors, misoprostol, omeprazole and their combinations on the mucosal barrier of the stomach in indomethacin gastropathy in animals with experimental rheumatoid arthritis.

Object and methods of research. The effect of ACE inhibitors, omeprazole, misoprostol and the combination of omeprazole with ACE inhibitors and misoprostol on the gastric mucosa was studied in 78 male rats with a mixed population of 160–200 g, which were on the usual diet of the vivarium. The animals were divided into 13 groups of 6 animals each: 1st group – intact, 2nd group – animals with experimental rheumatoid arthritis (ERA), 3rd – animals with ERA and indometacin gastropathy (GERA), 4th – GERA + H_2O (without treatment), 5th – GERA + enalapril, 6th – GERA + lisinopril, 7th – GERA + + captopril, 8th – GERA + omeprazole, 9th – GERA + misoprostol, 1– I – GERA + omeprazole + enalapril, 11th – GERA + + omeprazole + lisinopril, 12th – GERA + omeprazole + captopril, 13th – GERA + omeprazole + misoprostol.

The preparations used were administered per os in the form of an aqueous suspension in 10 days in the following doses: enalapril 10 mg/kg, lisinopril 8 mg/kg, captopril 7.5 mg/kg, omeprazole 50 mg/kg, misoprostol 0.2 mg/kg. In a combined application, the same doses were used. The experimental model of rheumatoid arthritis was reproduced with a single injection of 0.2 ml Freund's adjuvant in the animal's back right foot. Indomethacin-induced gastropathy was induced by administration of indomethacin per os as an aqueous suspension at a dose of 2.5 mg/kg for 5 days.

The state of the mucosal barrier of the stomach was assessed by determining the content of fractions of insoluble glycoproteins

(NGP). To conduct biochemical studies, animals were sacrificed by one-time decapitation under ether anesthesia. The stomach was removed, purified, washed with cold saline solution, and the prednis was removed. Then the mucous layer was scraped, weighed and suspended in distilled water at a rate of 30 mg/ml.

The content of sialic acids in the suspension was determined by the method of L. I. Linevika To determine fucose in the suspension, the NSG was used by the method proposed by P. D. Rabinovich et al. [6]. The protein content was determined by the O. H. Lowry [7].

The results were processed using Student's t-test by a standard Microsoft Excel software package. Differences were considered significant at $p < 0.05$.

The results of the research and their discussion. Table 1 presents the results of a study of the content of NHP fractions in the gastric mucosa in animals with GERA and the efficacy of the use of ACE inhibitors, omeprazole, misoprostol and their combinations with omeprazole. As the studies have shown, with ERA, the content of NGP fractions remains practically unchanged. In animals with indomethacin GERA, a significant decrease in NGP fractions was observed. The content of sialic acids in them was lower than in animals with ERA by 69.5%.

The content of fucose and protein decreased respectively by 55.5% and 48.1%. These results were significantly lower than in the control group.

ACE inhibitors, omeprazole and misoprostol have a positive effect on the content of NHP fractions in the gastric mucosa. In animals treated with enalapril, the content of sialic acids was higher than in rats without treatment by 60.8%, fucose – by 34.5%, protein – by 29.7%. Similar results were obtained in animals treated with lisinopril and omeprazole.

In the treatment of GERA, captopril and misoprostol were the most effective. In animals treated with captopril, the content of sialic acids in comparison with the group without treatment increased by 136.2%, fucose – by 69.7%, protein – by 37.4%. However, despite a significant increase, the content of the studied NGV fractions remained lower than in the control group.

In the group with misoprostol, the content of sialic acids increased by 183.3%, fucose – by 87.3%, protein – by 44.1%. In the combined use of omeprazole with other drugs, the potentiation of their cytoprotective effect was recorded as an additive pharmacodynamic interaction.

Table 1. – The content of NHP fractions in the gastric mucosa with indomethacin gastropathy in animals with experimental rheumatoid arthritis

Group of animals	Sialic acids mg per ml of suspension	μg per ml of Fucose suspension	mg per ml of suspension Protein
Intact	4.12 ± 0.158	6.73 ± 0.125	15.22 ± 0.655
ERA	3.84 ± 0.155	6.25 ± 0.153	14.72 ± 0.593
GERA	1.22 ± 0.067	2.78 ± 0.100	7.65 ± 0.257
GERA + H2O (without treatment)	1.38 ± 0.072	2.85 ± 0.121	8.55 ± 0.352
GERA + enalapril	2.22 ± 0.047*	3.82 ± 0.089*	9.92 ± 0.400
GERA + lisinopril	2.47 ± 0.085*	4.12 ± 0.051*	10.12+0.397*
GERA + captopril	3.27 ± 0.041*	4.82 ± 0.106*	11.75 ± 0.546*
GERA + omeprazole	3.52 ± 0.089*	4.12 ± 0.076*	10.22 ± 0.343*
GERA + misoprostol	3.92 ± 0.122*	5.32 ± 0.089*	12.32 ± 0.483*
GERA + omeprazole + enalapril	4.32 ± 0.074*	5.98 ± 0.147*	12.88 ± 0.584*
GERA + omeprazole +lisinopril	4.52 ± 0.105*	6.72 ± 0.220*	13.98 ± 0.625*
GERA + omeprazole + captopril	5.98 ± 0.155*	8.72 ± 0.173*	16.78 ± 0.500*
GERA + omeprazole + misoprostol	7.37 ± 0.133*	10.85 ± 0.466*	19.62 ± 0.569*

*Note: * $p < 0.05$ compared to data of animals with GERA without treatment*

In the group of animals treated with omeprazole with enalapril, in comparison with the group GERA + H_2O, the content of sialic acids increased by 213%, fucose – by 110.5%, protein – by 50.8%. Almost the same interaction was observed in the treatment with omeprazole with lisinopril.

In groups of animals treated with omeprazole with captopril and omeprazole with misoprostol, the interaction of the preparations was more significant. The data obtained significantly exceeded the control values. In the treatment with omeprazole with captopril, the content of sialic acids, fucose and protein increased by 333.3%, 207% and 96.5%, respectively. In the group of omeprazole with misoprostol, the level of these fractions increased by 433.3%, 281.7% and 129.6%, respectively. These results significantly exceeded the control figures.

Discussion. It is established that in full functioning NGP sialic acids and fucose play a special role. These carbohydrate components provide elasticity and viscosity of the mucous barrier. The results obtained from animals with GERA allow us to

state that damage to the mucous barrier of the stomach is due to a decrease in the synthesis of NHP and its functional insufficiency, which is characterized by a change in rheological properties. In the literature, the negative effect of indomethacin on the mucosal barrier is due to inhibition of COX enzymes, suppression of prostaglandin production and subsequent disturbance of microcirculation. We assumed that this mechanism is not the only one. Probably, one of the reasons for the damaging effect of the drug is a disturbance in the bioregulatory system of L-arginine-nitric oxide as a universal mechanism in triggering mutually conditioned pathogenetic mechanisms of cell damage.

In the literature, there are convincing data on the ulcer healing effect of enalapril [2; 5]. The authors associate it with the stimulation of the synthesis of prostaglandins. We assume that this is one of the mechanisms of the positive effect of the drug, which is a consequence of the corrective effect of the drug on the NO-formation system. Studying the effect of captopril and lisinopril on the state of the gastric mucosa in patients with arterial hypertension and osteoarthritis, who take NSAIDs for a long time, E. L. Nikonov found that ACE inhibitors have a positive effect not only on the cardiovascular system, but also improve the morphofunctional parameters of the gastric mucosa S. Alekseenko et al. [2] argue that the mechanisms of the positive effect of preparations of the group of ACE inhibitors on the gastric mucosa require further study. Perhaps, they are associated with an increase in the level of endogenous prostaglandin E_2 and its cytoprotective effect.

Among the ACE inhibitors that we used, captopril had the best cytoprotective effect, probably due to the presence of the sulfhydryl group in the chemical structure. As is known, the sulfhydryl group necessary for the synthesis of prostanoids and activation of the prostaglandin receptors affects the permeability of membranes and adheres to free radicals. This is confirmed by Nafeesa Mohd Ismail et al. [8] who studied the effects of captopril and ranitidine on the content of prostaglandin E_2, malonic dialdehyde and the activity of glutathione reductase on the model of aspirin-induced gastropathy in rats. It was found that in contrast to ranitidine, captopril increases the level of glutathione reductase, prostaglandin E_2 and significantly reduces the content of malonic dialdehyde in the gastric mucosa. It is known that natural amino acids containing sulfhydryl (L-cysteine and methionine), as well as sulfhydryl-containing drugs, prevent erosion in the rat caused by ethanol caused by ethanol. This indicates the protective effect of sulfhydryl compounds on the gastric mucosa, as well as the possible mediated effect of these on gastric cytoprotection induced by prostaglandins.

The results obtained by us with the use of misoprostol are consistent with the data of other authors [4]. As R. A. Abdulkhakov [1], misoprostol, like endogenous prostaglandins, has the ability to enhance the formation of mucus and bicarbonate secretion, improve blood flow, stimulate the regeneration of the epithelium of the gastric mucosa, reduce the production of hydrochloric acid.

Conclusions

1. With indomethacin-induced gastropathy, the drug significantly suppresses the synthesis of insoluble glycoproteins in the mucus barrier.

2. ACE inhibitors have a cytoprotective effect in the treatment of indomethacin gastropathy. The most effective of them is captopril, the cytoprotective effect of which is equal to that of omeprazole and misoprostol.

3. With the combined use of omeprazole with ACE inhibitors and misoprostol, their cytoprotective pharmacodynamic effect increases in the form of additive synergism. The most effective combination of omeprazole with captopril and omeprazole with misoprostol.

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APPLICATION MAGNIT LAZER THERAPY WITH LAZER ACUPUNCTURE PATIENTS WITH INFANT CEREBRAL PALSY

Abstract: The operated patients with Infant Cerebral Palsy (ICP) Magnit Lazer Therapy (MLT) was appointed on a following formula: capacity – 6 vt, frequency – 80 Hz, an exposition– 32 s, on one field daily, a technique is contact and stable (through a gauze bandage), course of treatment – 10 procedures. The magnetic nozzle by intensity of a magnetic field 50 m Tl is applied. After effecting to the injured area of a skin was carried out laser reflex therapy. For these purposes by the same device with acupuncture nozzle A-2 a following technique was used: capacity – 8vt, frequency of 1500 Hz, an exposition 16 s, on 1 TA, 6–8 TA, daily, course of treatment – 6 procedures. Decrease in percent of early postoperative complications.

Keywords: cerebral palsy, children, laser acupuncture, magnit lazer therapy, treatment.

Surgical treatment is powerful facility in a complex of regenerative treatment of disturbances of motor functions at patients with infantile cerebral paralysis [5].

The success of operative intervention is connected as with a correct choice of a way of operation, technics of performance, and with postoperative carrying out of patient with ICP. A primary task of the postoperative period is that healing of a wound was without complications for preventive maintenance of cheloid cicatrix. For these purposes, basically, physiotherapeutic methods of treatment are used [1].

Combined application of a constant magnetic field (CMF) and laser radiation has received the name MLT. The combination of these two methods is not the usual sum of affection, and is characterized synergetic-resonant, that renders more expressed effect on an organism (3). Considered joint application of the laser and CMF together increases metabolic processes, stimulates formation of macro power molecules of ATP, mitotic activity of cells, microcirculation, weakens processes of thrombus formation [1; 3; 4]. MLT has a powerful absorptive effect that exceeds effect of lidase [4].

The author believes that laser affective on zones of acupuncture identically to ancient Chinese method of warming up and cauterization with wormwood cigars, and laser reflex therapy in affection on TA during 30–60 s, equivalently to 20–30 minutes of acupuncture.

The aim of the work was to study the effectiveness of MLT and Laser Acupuncture (LA) in patients with ICP.

Materials and methods. Work is based on the analysis of results of application MLT with LA on operated patients with ICP in the Republican Children's Psychoneurological Hospital. In hospital, MLT and LA are being applied since 2003. In total MLT with LA were received by 215 patients, 3440 procedures are released.

MLT on area of stitches with laser acupuncture under the special scheme from device "Mustang-016" is carried out from third day after operation. The laser therapy device (model 016) has a set of fixed frequencies, the timer in an automatic mode, scale indicator impulse capacity of radiation and a set of additional nozzles.

MLT was prescribed on a following formula: capacity – 6Вт, frequency – 80 Hz, an exposition 32 s on one field, a technique is contact, stable (through a gauze bandage), daily, and course of treatment – 10 procedures. The magnetic nozzle by intensity of a magnetic field 50 мTl is applied.

Technique of MLT: Before procedure, perform a toilet and surgical management of stitches. A radiator moved above the focus along a neurovascular bunch or a nerve from the center to periphery or on perimeter of the focus from periphery to the center, from healthy sites of a skin. Number of fields is determined by character of operative intervention. For example, at operation myotomy of adductor muscles of a hip with neuroectomy motor portion of n.obturatorius int. effect on 4 fields, at operation Eggers – on 8 fields, at operation Stoffel II in popliteal area – on 6 fields, at Achilles tendon plastics – on 6–8 fields (depending on a technique of operation).

After effect on the focus of damage of a skin, the laser reflex therapy is carried out. For these purposes, the same device with acupuncture nozzle A-2 by a following technique is used: capacity– 8Vt, frequency of 1500 Hz, an exposition 16s on 1TA, 6–8 TA, daily, course of treatment – 6 procedures.

Zones of acupuncture are given in order of effect on them:

– On Monday, Wednesday, Friday: GI 4 (khe-gu), E 36 (tsu san lee) – symmetrically, VG 12 (chjunvann);

– On Tuesday, Thursday and Saturday: MC 6 (nay guan), RP 6 (san inn zsyao),– symmetrically, VG 12 (chjunvann).

To the base recipe 2–3 TA is added depending on character of operative intervention.

At operation tenomyotomy of adductor muscles of a hip with neuroectomy of motor portion of n.obturatorius int. effect on extrameridional and new points: BM 83, BM 85, H 57 that promotes decreasing of a pathological tone of adductor muscles of a hip.

At operation Eggers affect points VB34 (yanleenzuan), E 35 (du bi), BM (khaodeen), E 32 (futuu), RP 9 (inn leenzuan) to stimulate the quadriceps muscle of a thigh, on points V 37 (inn mann), V 38 (fuucee) for a relaxation of flexor muscles of tibia.

After Stoffel-II operation effect on points V 56 (chenzsen), V 57 (chenshan) promotes relaxation of the triceps muscle of a tibia.

At Achilles tendon plastics effect on new point'sH 84, H 89 is added, that corrects position of feet and improves a support on them.

At all kinds of operative intervention, effect on new points H 81, H 82 is directed to increase strength of lower extremity muscles.

Results and discussion. With application MLT and LA the tone of muscles of hands and somewhat muscles of legs has noticeably decreased. Because of it movements in extremities, and in hands purposeful capture of subjects, manipulation have noticeably improved. With introduction, MLT and LA were noted:

1. Decrease in intensity of pains in the first days after operation that has allowed reducing application of anesthetizing aids;

2. Reduction of an oedema and other signs of an inflammation, period of antibacterial therapy have been reduced from 7 till 5 days;

3. Acceleration of healing of postoperative wounds for 2–4 days is faster;

4. Decreasing in percent of early operational complications (suppurations and suture sinus) up to 4%. According to the literature at operation myotomy of adductor muscles of a hip with neuroectomy motor portion of n. obturatorius int., in connection with defect of tissues after dissection contracted muscles the cavity which is filled with stagnant blood is formed; this long existing hematomas detain healing of a wound and are the good environment for development of an infection;

5. Decreasing of formation of cicatricle contractures and keloidcicatrices;

6. Shortening the period of hospitalization of a patient in surgery department.

MLT is considered ideal in a combination with LA for postoperative rehabilitation of this contingent of children-invalids. The combination of these two methods is not the usual sum of affection, and is characterized synergic-resonant, that renders more expressed effect on an organism. Combined application of the laser and CMP increase metabolic processes, stimulate formation of macroergic molecules ATP, mitotic activity of cells, and weakens processes of thrombus formation. MLT is powerful absorptivemethod that exceeds effect of lidase.

Besides LA has following advantages than acupuncture:

1) Painlessness of a method that is very important for children and their parents;

2) Noninvasive and aseptic;

3) An opportunity of affect through gauze and plaster bandages;

4) Takes not much time.

Thus, MLT became an integral part of a complex of the postoperative rehabilitation actions affecting result of surgical treatment in patients with cerebral paralyses. The method accelerates process of healing of a postoperative wound and promotes decreasing of period, purchasing of new motor skills in patients with ICP. MLT with LA are tolerable by patients and practically have no contra-indications.

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USE OF DERMATOGLYFICS IN DETERMINING THE PERSONALITY AND THE PROBABILITY TO SUICIDE IN FORENSIC MEDICINE

Abstract: As a result of a forensic medical dermatoglyphic study, the corpse corresponded to the age obtained using the traditional set of expert methods (odontoscopic and radiological), and the character of the above dermatoglyphic indices was the establishment of signs indicative of a predisposition of this person to committing suicide.

Keywords: Dermatoglyphic, suicide, odontoscopic, predisposition.

In recent years, dermatoglyphics has been widely used in Uzbekistan and abroad as an information method for evaluating the individual and group properties of the human body [3]. The main directions of its practical application in forensic medicine: identification of the individual, predisposition to genetic diseases.

More rarely, this method is useful in determining the predisposition of a person to various genetic diseases and committing suicide [1; 2; 3].

The purpose of this study was to develop dermatoglyphic criteria for assessing personality and predisposition to commit suicide.

We give an example of the study of dermatoglyphics in the work of forensic experts of the Main Bureau of Forensic Medical Examination of the Ministry of Health of the Republic of Uzbekistan.

In the Yunusabad district of Tashkent, the corpse of an unknown man of 30–40 years of Asian nationality with signs of violent death in a hanged state was found on the territory of the construction of a residential house.

For the proper qualification of this crime and obtaining information about the identity of the deceased, it was necessary to establish the age, as well as the propensity for suicide, because in the decision on the appointment of examination was the question of the possibility of suicide.

According to the data of odontoscopic examination (predicting the "tooth age according to the degree of abrasion of the masticatory surface of the teeth in accordance with Gerasimov's method), the age corresponds to the age range from 30 to 45 years.

To clarify the age, X-rays of both elbows in the straight and lateral projection and both knee joints in a direct projection were made. X-ray data: "Bone" age corresponded to the range from 35 to 43 years.

The results of the conducted studies made it possible to draw a final conclusion about the age of the victim. However, in connection with the special importance of the case under investigation, it was required, at the insistence of the investigation, to carry out an examination with a change in all currently available techniques and to answer the question of the possibility of suicide. For examination, fingerprints of the victim were obtained, obtained with the help of computer programs for scanning the palmar and foot surfaces and changing dermatoglyphic techniques [3].

Age prediction was performed on the papillary relief of the fingers according to the method of Bogichenko [1].

The results of the research showed that the signs of the structure of papillary patterns reflected in them were studied in each print: the types of patterns of the orientation of the fluxes of the papillary lines, the crest count, the height of the patterns, the density of the papillary lines, the rudiments of the lines, the white lines, the scars, etc. According to the study, the minimum age is 35 years, the maximum permissible age is 39 years.

The predisposition to suicide was determined by the papillary relief of the fingers and both feet of the victim. The results of the study showed that in the fingerprints of palm and palmar and foot patterns, the areas of aplasia (absence) of papillary lines, hypoplasia (underdevelopment) and dysplasia (disturbances of normal course and interposition) are absent.

There are traces (linear scars) of previous injuries. The dermatoglyphic phenotype was characteristic for the representative of Asian nationality, with more typical for the

southern regions (the general phenotype WL is absent, the absence of A-patterns).

Signs of habitual professional activity are not determined.

Decoding of dermatoglyphic signs was carried out according to the international dermatoglyphic classification, according to which 61 dermatoglyphic parameters reflecting finger (crest count and type of patterns on each finger), palmar and foot patterns (palmar (stop) ridge count, presence and location of palmar lines A, B, C and D, the value of the angle atd, the nature of the figures on the tenus and gopotenuse and in the interdigital fields), i.e. almost all the elements described in medical dermatoglyphics.

Thus, as a result of the forensic dermatoglyphic study, the age that was obtained with the help of the traditional set of expert methods (odontoscopic and radiographic) was consistent with the character of the above dermatoglyphic indices was the establishment of signs indicative of the predisposition of this person to committing suicide.

In the course of further investigative actions, it was revealed that this subject was identified by relatives, the age of the passport (38 years), and also in his house was found a note in which he pointed to the reasons that led him to commit suicide.

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FACTORS FOR PERSISTENCE OF CANDIDA ALBICANS, DEFINED IN PATIENTS WITH ORAL MONILIASIS OF ORAL CAVITY

Abstract: The questions concerning the structure, synthesis, function, production and level of lactoferrin in various biological fluids of the human body are considered. The works evaluating the pathogenetic, diagnostic and prognostic significance of this protein.

Keywords: candidiasis, mucous membrane of an oral cavity, actoferrin, candidiasis stomatitis, social and demographic characteristics**.**

At candidiasis of an oral cavity there are created the conditions for a long fungic persistence as a result of features of formation of an immune response of host [5; 8]. Along with it, long experience (persistence) of fungus in an organism of patients can be caused by their properties. In a persistence Candida means their indifference to influencing external factors of physical and chemical nature, ensuring stable antagonistic effects in a biocoenosis and conservation of viability of population due to acquisition of fastness to protective mechanisms of the host [2; 14]. Candida are able to inhibit the factors of natural resistance of an organism of the host, such as lysozyme, complement, histon-like proteins, cationic protein of platelets. This remote mechanism of immunosupression of the host, promotes long survival (persistence) of pathogenic and opportunistic fungus in a macroorganism [1; 6; 7].

Objective of research: studying of persistent potential of various strains of Candida fungus allocated at patients with oral moniliasis of oral cavity on the basis of a research of their anti lactoferrin and anti antilysozyme activity.

Materials and methods. Strains of Candida fungus were emitted from patients and conditionally healthy people by means of a sterile tampon from absorbent cotton with the subsequent washout by the distilled water. Then the tampon was placed in a sterile test tube with 2 ml of the distilled water [Araviyskiy et al., 2004]. They have made calculation of number of cells in washout from 1 tampon in 1 ml of the distilled water. Identification of fungus was carried out after that, when in medium of Saburo they received colonies answering macro – and to micromorphological features of yeast-like fungus.

At selection in group of clinically significant strains, there were taken into consideration the clinical implications of a disease and identification of Candida in quantity exceeding 10^3 KOE/ml. A group of clinically insignificant was made by strains from patients without clinical signs of a candidiasis at which less than 10^2 KOE/ml of Candida was noticed. In total 244 strains of Candida fungus allocated at patients with clinically diagnosed oral moniliasis of mucous of oral cavity (MOC) Candida *including C.albicans*. 153 strains; C.tropicalis – 26, C.globrata – 24, C.crusei – 22 and C. Gulermonde-19. As control there have served 109 strains of Candida fungus allocated at patients without pathology of MOC *including: C.albicans* 90 strains; C.tropicalis – 5, C.globrata – 5, C.crusei – 6 and C. Gulermonde–4 strains (Table 1). All strains of Candida fungus were divided into groups taking into account the clinical diagnosis.

There were studied 353 strains of Candida fungus, from them 244 strains selected from patients with a candidiasis of MOC and 109 clinical strains received at people from group of comparison. The studied strains are received at bacteriological inspection of 173 patients with a oral moniliasis, from them 15 with acute pseudomembranous oral moniliasis (In 37. 00); 20 – acute erythematic oral moniliasis (in 37.01); 47 – a chronic erythematic oral moniliasis (in 37.02) and 91 – a chronic erythematic oral moniliasis (At 37.03), 150 patients of comparable gender and age without symptoms of pathology

of mucous oral cavity made group of comparison. The diagnosis of oral moniliasis was established on classification accepted by World Health Organization, MKB-10 (1997).

Patients are examined by a mycologic method, carried out identification of marked-out cultures on morphological, tinctorial, cultural and enzymatic properties according to guide to mycologic researches. Selected strains were carried to types of Candida, *including C.albicans*. 153 strains; C.tropicalis – 26, C.globrata – 24, C.crusei – 22 and C. Gulermonde-19 strain. As control there were used 109 clinical strains of fungus, identical on specific and patrimonial accessory, received in group of comparison *including: C.albicans* 90 strains; C.tropicalis – 5, C.globrata – 5, C.crusei – 6 and C. Gulermonde-4 strains.

Studying of anti lactoferrin activity of microorganisms (ALFA) was carried out by the method based on determination of residual quantity of lactoferrin in incubation admixture by means of an enzyme immunoassay (IFA) [4]. Antilactoferrin activity was expressed in absolute values (ng/ml) of lactoferrin inactivated by microorganisms. Anti antilysozyme activity of microorganisms it (ALA) determined by a photometric method [5]. Anti antilysozyme activity of microorganisms was expressed in mkg/ml, estimating residual activity of enzyme after an incubation of the supernatant of the studied culture and solution of antilysozyme concerning the test culture of Micrococcus lyteus.

Statistical analysis of data is made on the personal computer by means of the STATISTICA program (Data analysis software system, StatSoft) version 6.0. Results of researches are presented in the form of average ± a standard deviation (M ± SD). Comparison of continuous sizes with normal distribution was carried out by means of Student's t-criterion. Differences between groups were considered as statistically significant at $p < 0.05$.

Results and discussion. The conducted researches showed wide circulation of factors of a persistence (antilactoferrin and antilysozyme activity) at the fungus allocated at patients with oral moniliasis of oral cavity (tab.1).

Antilactoferrin and anti antilysozyme activity was taped at 92.31–100% of Candida strains at patients with oral cavity candidiasis; at the people from group of comparison the antilactoferrin and antilizotsim activity is found in 60,0–88,89% of selected strains. At larger prevalence of adhesive ability at the strains selected at a difference oral cavity candidiasis in comparison with group of control weren't essential (p>0,05). The strains of fungus selected at patients with oral moniliasis were characterized significantly by larger ALFA, than the cultures of these microorganisms received at the people of group of comparison ($P \leq 0.05$).

Strains of *C.albicans* selected at patients with a oral moniliasis had ALFA within 23.72 ± 1.01–36.22 ± 1.62 ng/ml and significantly ($P \leq 0.05$) surpassed activity of this factor of the strains received at the people of group of comparison – 16.32 ± ± 0.70 ng/ml. Cultures of C.tropicalis which are marked out at a oral moniliasis had a little smaller ALFA within 11.88 ± ± 0.42–20.32 ± 1.02 ng/ml, similar strains in group of comparison had ALFA 8.71± 0.42 ($P \leq 0.01$); corresponding ratios for C.globrata made 8.33 ± 0.37 ng/ml – 14.51 ± 0.66 ng/ml against 6.52 ± 0.32 ng/ml ($P \leq 0.01$); C.crusei – 8.56 ± ± 0.40 ng/ml – 17.81 ± 0.80 ng/ml against 6.77 ± 0.34 ng/ml ($P \leq 0.01$) and C. Gulermonde-7.62 ± 0.35 ng/ml – 12.33 ± ± 0.52 ng/ml against 4.42 ± 0.21 ng/ml ($P \leq 0.01$). Antilactoferrin activity of cultures of *C.albicans* at patients with a candidiasis not only authentically surpassed indicators of activity of ALFA at the people of group of comparison, but also there was statistically significantly ($P \leq 0.01$) above indicators of antilacitoferrin activity of other types of Candida. Strains of fungus of C.albicans received at patients with oral moniliasis differed in more appreciable ($P \leq 0{,}01$) in antilysozyme potential both in comparison with similar strains of control, and with S.'s strains of nonalbicans. ALA allocated at patients strains of C.albicans fluctuated within 10.32 0.42–16.82 0.71 mkg/ml, and at cultures which are marked out at the people of group of comparison, this indicator was equal to 4.32 0.21 mkg/ml. Size of ALA cultures of C.tropicalis allocated at oral moniliasis had ALA within 7.90 ± 0.30 mkg/ml – 13.81 ± ± 0.53 mkg/ml, similar strains in group of comparison had ALA 3.61 ± 0.14 mkg/ml ($P \leq 0.01$); the corresponding ratios for C.globrata made 5.88 ± 0.23 mkg/ml – 10.05 ± 0.42 mkg/ml of mkg/ml against 2.11 ± 0.09 mkg/m of mkg/ml of l ($P \leq 0.01$); C.crusei – 4.52 ± 0.40 mkg/ml – 7.03 ± ± 0.80 mkg/ml against 1.82 ± 0.07 ($P \leq 0.01$) and C. Gulermonde-4.33 ± 0.19 mkg/ml – 8.03 ± 0.30 mkg/ml against 2.23 ± 0.08 mkg/ml ($P \leq 0.01$).

Lactoferrin and antilysozyme are one of components of immune system of an organism, take part in system of nonspecific humoral immunity, regulates functions of immunocompetent cells [4; 6; 9; 12]. LF is developed by epithelial cells of mucosas. This multipurpose glycoprotein is found in mucous allocations, a basic function of this molecule consists in protection mucous from eczopathogen [2; 10; 13]. Further it was established that LF which is synthesized and collected by neutrophils [11] is effectively used in protection of an organism against enteral infections [5; 14; 15].

Thus, at a candidiasis of an oral cavity there are differentiated Candida fungus differing with an expressed persistent potential. High level of antilysozyme and antilactoferrin protection at the fungus allocated at a candidiasis can promote aggravation of colonization of mucous patients of an organism with opportunistic fungus and development of an invasive candidiasis of oral cavity and other organs, Existence of factors of persistence at the fungus, occupying the patient's organ-

ism, can also contribute to development of long inflammatory comorbid infections at candidiasis of oral cavity.

Conclusion. 1. At oral moniliasis significantly there is more noted conditionally-pathogenic microorganisms having persistence factors: antilactoferrin and antilysozyme activity, at the same time rising of activity of factors of a persistence, along with C.albicans is found in strains of C.tropicalis, C.globrata, C.crusei and C. Gulermonde that defines their pathogenetic importance in development of a candidosis infection of an oral cavity.

Table 1.– Prevalence of antilactoferrin and antilizimic activity in strains of microorganisms isolated from patients with candidal stomatitis

Form Candida		Control	Antilactoferrin activity ng / ml					control	Antilizimic activity mkg / ml				
			acute		chronic				acute		chronic		
			In 37.00	in 37.01	in 37.02	in 37.03	exacerbation		in 37.00	in 37.01	in 37.01	in 37.02	exacerbation
C.albicans	1	90	13	15	40	85	72	90	13	15	40	85	72
	2	80 / 88.89	1 / 100,0	15 / 100,0	40 / 100,0	85 / 100,0	72 / 100,0	80 / 88.89	13 / 100,0	15 / 100,0	36 / 90,0	84 / 100,0	72 / 100,0
C.tropicalis	1	5	2	3	5	16	12	5	2	3	5	16	12
	2	3 / 60	2 / 100,0	3 / 100,0	4 / 80,0	15 / 93,75	12 / 100,0	3 / 60	2 / 100,0	3 / 100,0	4 / 80,0	15 / 93,75	12 / 100,0
C.globrata	1	5	1	1	9	13	15	5	1	1	9	13	15
	2	4 / 80,0	1 / 100,0	1 / 100,0	9 / 100,0	12 / 92,31	15 / 100,0	4 / 80,0	1 / 100,0	1 / 100,0	9 / 100,0	12 / 92,31	15 / 100,0
C.crusei	1	6	1	1	1	13	12	6	1	1	1	13	12
	2	3 / 50,0	1 / 100,0	1 / 100,0	1 / 100,0	13 / 100,0	12 / 100,0	3 / 50,0	1 / 100,0	1 / 100,0	1 / 100,0	13 / 100,0	12 / 100,0
C.gulermonde	1	4	1	–	2	16	11	4	1	–	2	16	11
	2	3 / 75,0	1 / 100,0		2 / 100,0	15 / 93,75	11 / 100,0	3 / 75,0	1 / 100,0		2 / 100,0	15 / 93,75	11 / 100,0

Note: 1 – total strains; 2 – with antilactoferrin and antilysimic activity

Table 2.– Antilactoferrin and antilizocimic activity of microorganisms, isolated from patients with candidal stomatitis

№	Form Candida	Control	Antilactoferrin activity ng / ml				
			acute		chronic		
			In 37.00	in 37.01	in 37.02	in 37.03	exacerbation
1.	C.albicans	16.32 ± 0.70	28.62 ± 1.35°	30.31 ± 1.25°	23.72 ± 1.01•	26.81 ± 1.25°	36.72 ± 1.62•°
2.	C.tropicalis	8.71 ± 0.42*	12.81 ± 0.56•*	13.42 ± 0.60•*	11.88 ± 0.42°*	12.03 ± 0.60•*	20.32 ± 1.02•°*
3.	C.globrata	6.52 ± 0.32*	10.52 ± 0.47•*	9.61 ± 0.41•*	8.33 ± 0.37°*	10.22 ± 0.48•*	14.51 ± 0.66•°*
4.	C.crusei	6.77 ± 0.34*	9.80 ± 0.99°*	10.33 ± 0.35°*	9.08 ± 0.43°*	8.56 ± 0.40°*	17.81 ± 0.80•°*
5.	C.gulermonde	4.42 ± 0.21*	10.20 ± 0.44°*	8.52 ± 0.38°*	7.62 ± 0.35°*	8.07 ± 0.33°*	12.33 ± 0.52•°*

№	Form Candida	control	Antilizimic activity mkg / ml				
			acute		chronic		
			in 37.00	in 37.01	in 37.02	In 37.03	exacerbation
1.	C.albicans	4.32 ± 0.27	12.32 ± 0.52°	14.41 ± 0.66°	11.88 ± 1.01•	10.32 ± 0.42°	16.81 ± 0.71•°
2.	C.tropicalis	3.61 ± 0.14	9.52 ± 0.35°*	8.88 ± 0.38°*	8.07 ± 0.25°*	7.90 ± 0.30•*	13.81 ± 0.53•*°
3.	C.globrata	2.11 ± 0.09	7.30 ± 0.33•*	6.40 ± 0.25°*	5.88 ± 0.23•	4.04 ± 0.17•*	10.05 ± 0.42•*°
4.	C.crusei	1.82 ± 0.07	5.22 ± 0.39°*	5.92 ± 0.33°*	4.66 ± 0.30°*	4.52 ± 0.22°*	7.03 ± 0.37•*°
5.	C.gulermonde	2.03 ± 0.08	7.32 ± 0.27°*	6.62 ± 0.27°*	5.81 ± 0.27°*	4.33 ± 0.19•*	8.03 ± 0.30•*°

Note: • – P < 0.05 in relation to the control;
•– P < 0.05 in relation to C.albicans; ° – P < 0.05 in relation to the chronic form*

2. At the chronic course of disease there are found out high activity of factors of a persistence of Candida fungus that defines high probability of development of a recurrence of a disease.

3. Strains of C.albicans have higher antilactoferrin and antilysozyme activity.

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Section 8. Pedagogy

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WAYS TO ACHIEVE SPIRITUAL SELF-REALIZATION OF FUTURE SPECIALISTS

Abstract: The article deals with the issues of self-realization of future specialists' personality and the ways to achieve it. It is shown that self-realization is considered along with concepts "self-organization", "self-affirmation", "self-regulation" and "self-improvement". Future specialists' self-realization is defined as a process of harmonious development of the personality in conjunction with the property of the professional-practical and spiritual experience, as well as the opening and realization of their own potential, which constantly evolving, which promotes the implementation of individuality with the help of future specialists' own efforts.

Keywords: self-realization, spirituality, spiritual health, self-actualization of personality, outlook, students.

Reforming the education system sets new requirements for the future education specialists training in the 21st century. Modern socio-economic, scientific, technical and cultural society development has set the task to highschool to form not only a genuine professional, who has deep professional skills, but who is at the same time a highly spiritual personality. The problem of self-realization is the subject of interdisciplinary research and it is considered by specialists from different fields like philosophy, sociology, psychology and pedagogy. Self-realization is considered along with the concepts of "self-organization", "self-affirmation", "self-regulation" and "self-improvement" (A. Derkach, V. Zazykin, I. Kornilova, N. Kuzmin, V. Markin, L. Rybalko, E. Saiko, I. Semenov, etc.). Scientists believe that it is important for a person, not only the processes of self-realization, but also their direction.

In the classical pedagogy the problem of self-actualization was considered by A. Disterweg, I. Pestalozzi, M. Pirogov, V. Sukhomlinsky, K. Ushinsky, etc. It should be noted that in self-knowledge, self-affirmation and creative activity of human it is manifested not only the desire for self-realization, but also the spiritual essence at the same time [1; 2]. I. Bech notes that self-realization as a personal entity is the central characteristic of a person, it is the level of his or her development, where his or her "I" practically improves itself. Based on the teachings of A. Maslow, A. Torshevskaya argues that one of the most important aspects of self-actualization and self-actualization of personality is the problem of spirituality [3].

The purpose of this work was to study the spiritual self-realization of future specialists. Tests was carried out among students-valeologists of V. N. Karazin Kharkiv National University. The research was conducted according to the methods: "The level of spiritual self-realization of human" by M. Udovenko and "Self-discovery" by S. Dzhurard.

The results showed that the subjective assessment of the spiritual self-realization level of the valeology students' personality from the first to the fifth courses is growing. If the first year students show the results when 8% of them have quite a low self-realization level and 92% have an average self-realization level, then the second year students do not show low level results, 80% of them have an average level of self-realization and 20% have a high level of self-realization. The third year student show that their the level of self-actualization is increasing, because the average level have 71% of the students and the high level have 29% of the students, among the fourth year student the average level have 75% of the students and 35% have the high level. For students of the fifth year the high level of self-realization is 42% [5].

A more detailed study of the test results showed that in the investigated life spheres students have different subjective assessments of the self-realization process. Self-knowledge, self-realization, awareness of their feelings, self-correlation with the requirements of society, profession, faith, family, self-affirmation and self-expression are important for the individual's spiritual world formation.

Thus, relying on theoretical philosophical, axiological, psychological and pedagogical scientific approaches and practical researches, self-realization of future specialists can be defined as a process of harmonious development of personality

with the acquisition of professional-practical and spiritual experience, as well as the disclosure and realization of the constantly evolving potential, what promotes the implementation of individuality through the future professionals' efforts.

Spirituality - Health - Society. In accordance with the modern outlook, the holistic approach extends to understanding not only the interactions between "Human-Environment", but also relationships "Human-the Universe", "Human-State", "Human–Society", etc.

Harmonious interaction with humanity, i.e. with society, and with nature, provides the optimal level of physiological systems functioning and body health, respectively (Table 1). Table 1 shows the relationship between the energy center (endocrine gland) of a person at the different Living organization levels.

Table 1. – The causal-system connection between the human energy center (endocrine gland) at different society and nature organization levels

Glands	Activity of glands	Human activity – way of life	Surrounding world
Epiphysis	Harmonization of human bio-rhythms with the surrounding world	Searching for the life meaning (target orientation)	Nature
Hypophysis	Prioritization (delegation of functions)	Education of values (priorities)	Humanity
Thyroid gland	Metabolism – management and composition the body elements	Creation (of a product that is necessary for society)	State
Thymus	Immunity (adaptation)	Education, culture	Society (public institutions)
Pancreas	Power supply	Work	Group, collective
Gonadi	Creation	Creating a family, interpersonal relationships	Family
Adrenal glands	Mobilization, mineral exchange	Preserving of life	Material conditions of life

Understanding of spiritual life is in the realization of "I" in the system "Human – the Universe". For this purpose, a person must do a great deal of internal work: to make a choice between spiritual perfection; clear all the bodies; to develop consciousness, which is a place of the spirit action; to show consistency, loyalty and stability on the road (some call this way "rule of the three "c"– constancy, consistency, continuity); to cover the main aspects of spiritual development: faith, knowledge, creativity and the way [4].

Spiritual health is realized by: achieving a certain level of the worldview formation; the formation of a semantic sphere – the goal of life; formation of vital principles and universal values; the formation of the intellectual sphere through the development of logic and intuition, providing a culture of thinking based on the acquired knowledge; formation of emotional volitional sphere, providing a culture of emotions, behavior, conscience freedom.

Conditions for the formation of spirituality include the positive thinking relationships with positive actions, wisdom, will and love. Ways of human spiritual development should include: in education – the spiritual orientation in all kinds of learning predominance; in self-perfection and self-development – consistent moral, ethical and moral degrees of self-transformation.

Table 2. – Mutual influence of various health components in the hierarchical society line

Human	Society
Purposefulness	Ideology
Morality	Hierarchy of values
Creativity	The level of socio-economic development
Adaptability	Science and culture development level
Efficiency	Employment of population
Emotional stability	Level of intercollective integration
Physical endurance	Health Indicators

If physical health depends on natural and biological rhythms, then spiritual health depends on moral and ethical laws observance. According to the of the of the spirit and soul components analysis, as well as the role of spirituality in the health formation, it is of interest to consider the manifestation, germination and mutual influence of various components of

health in the hierarchical society line (Table 2). As a decoding of the interaction and human and society interaction are given data on what factors, at what levels and how they affect the health (Table 3). Analyzing these data, we can make a clear conclusion that spiritual values and worldview are crucial in the human health formation and development.

Table 3. – Human health formation factors and their connection with health components

Factors	Components of human health
Worldview	Purposefulness
Values	Morality
Traditions (Stereotypes of behavior)	Creativity
Living conditions	Adaptability
Intelligence	Efficiency
Psychotype	Emotional stability
Genotype	Physical endurance

Ways of forming spiritual health include: spiritual cleansing; ensuring a minimum number of negative emotions; not committing bad deeds; acquisition of positive thinking skills, purity of thoughts; knowledge of the ten commandments and life after them; tracking the essence of words; bad habits deprivation, bad language prevention; a combination of gymnastics for the body with gymnastics for the soul, which you need to train by the accomplishment of good deeds and comprehension of your actions.

The development of spiritual health characterizes such qualities and abilities of a person: the ability to spiritual communication and interaction; humanistic orientation towards harmonious development and self-improvement; the development of character traits of a purposeful, creative development, high moral character; development of self-consciousness of highly spiritual person; development of a responsible attitude towards organism.

Our system of education should develop these qualities and abilities of spiritual health, it should actualize the humanistic transformation of education, education and education. As previously indicated, in the State Education Standard of Ukraine, these issues are intended to cover such courses as "Health Fundamentals", "Physical Culture and Physical Rehabilitation", "Reproductive Health", "Valeology" and others that are in general branches of valeology. The result of valeological education and training should be the formation of knowledge about the theoretical and practical issues of health, awareness and spirituality of the individual life program, which is expressed in: ability to determine the place of health and spiritual values in the life values system; the ability to bear responsibility for health; the ability to realize oneself with a person that is adequate to his biological gender, age, and individual characteristics; ability to choose; formation of skills of adequate self-examination and self-control; ability to plan and forecast; the ability to correctly set the goal and highlight the "steps" of personal growth; the ability to highlight the main thing, quickly make adequate decisions that will have an impact on the effectiveness of human life; forming a sense of personal significance in the family, at work, among friends; ability to have positive thinking technologies; the ability to master the emotion culture technologies.

All this is the spiritual self-realization of future specialist. Thus, self-realization of future specialists can be defined as a process of harmonious development of personality in with the acquisition of professional-practical and spiritual experience.

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INNOVATIVE EDUCATIONAL TECHNOLOGIES IN THE HIGHER EDUCATION SYSTEM OF GEORGIA

Abstract: Today the special attention is paid to development of innovative capacity of the higher education. Innovative educational technologies mean purposeful, intelligent change of pedagogical activity (and managements of this activity) through development and introduction in educational institutions pedagogical and administrative innovations: new content of training, education, management; new ways of work, new means, new forms of organization.

This article shows the understanding of innovations in the higher education of Georgia and through consideration the main characteristics forming "a portrait of innovative educational institution". Various levels of innovations depending on degree of novelty of elements of educational practice are allocated. Constructive characteristics of innovations, which can act as criteria of innovations in education are described. Activity, design, competence-based innovative educational approaches and technologies corresponding to them are considered.

Keywords*:* innovations, innovative educational technologies, activity approach, competence-based approach, project.

Today one of the main tasks set for a modern educational institution is the search, creation, introduction of educational innovations aimed at satisfying the public-state order and the needs of the participants in the educational process.

We will reveal key characteristics that form the "portrait of an innovative educational institution", by which we mean the Georgian Technical University.

GTU, as an innovative educational institution, is competitive. This means that the university is capable of integrating various educational programs, is capable of "exporting" educational services and has a demand for these services, is provided with competent personnel, and implements corporate training opportunities.

GTU, as an innovative educational institution, is a leader. This characteristic indicates the active role of the university, the leading positions in the educational space of Georgia and Tbilisi, the existence of stable links with external, including foreign, partners.

GTU, as an innovative educational institution, is comfortable, safe, has a full infrastructure package (medicine, food, sports, media library, psychological and pedagogical support, information center, etc.), openly participation of scientific, professional communities, the public.

GTU, as an innovative educational institution, conducts innovative activities, that is, it develops and uses new educational technologies, new programs and methods that lead to new educational results. At the same time, our university is not only a teaching organization, but also a learning organization that implements internal corporate training, dissemination of advanced pedagogical experience.

At the same time, the law "On Higher Education in Georgia" (https://www.tsu.ge/data/file_db/PR/kanoni-umaglesi-ganatlebis.pdf) says that innovation activity is focused on improving the scientific, pedagogical, educational, methodological, organizational, legal, financial and economic, personnel, material and technical support of the education system.

As such a new type of educational practice can act different technologies, techniques, organizational forms, sets of tasks, forms of evaluation, and so on.

Depending on the degree of novelty, we distinguish between different levels of innovation:

I level – when the developed educational product is fundamentally new, has no analogues, characterized by objective novelty,– this is the highest level, which ideally is an innovation;

II level – if there is an improvement of a well-known educational product, it undergoes significant changes, there are elements of novelty in it – then talk about modernization in education;

III level – if there is application known in the new conditions and with new goals, then there is an adaptation of the known to the given modern conditions.

In real educational practice, innovation is often interpreted as an antonym of the traditional approach, focused on reproductive education, the assimilation of finished samples,

concepts, actions, as a way out of typical, often encountered methods, methods, methods of teaching.

In connection with what has been said, we believe that the essential characteristics, and hence the criteria for innovation in education, are:

1. Relevance, reflecting the degree of novelty for modern science and practice, the timeliness of studying this problem, establishing links with important aspects of various problems of the present, the level of study of the selected problem, the inadequacy of problem development in existing studies, the need to study the problem in new perspectives.

2. Novelty, manifested in qualitative originality, the presence of significant features that distinguish this work from similar ones, in the originality of the put forward concept, idea, hypothesis.

3. Technologicality: the degree of development of the technology implementation, a description of the material and technical conditions of implementation, the degree of development of financial and economic feasibility of implementation, a description of possible difficulties in using and ways to overcome them.

4. Practical significance, revealed through demand, confirmed by the analysis of consumer demand and / or recommendations of authoritative experts, the possibility of distribution and use in mass practice.

5. Efficiency: an innovative product should have an effect (economic, social, individual), can manifest itself at the level of students, teachers, universities, is determined by the possibility of fixing the results of using the product.

Given the above, the innovation policy of an educational institution can be conducted in three interrelated directions:

1. Updating the content, which involves not so much mastering the subject knowledge, as development of competencies, adequate to modern practice. This content should be well structured and presented in the form of multimedia training materials, which are transmitted using modern means of communication.

2. The introduction of modern methods of teaching – active methods of forming competencies based on the interaction of learners and their involvement in the learning process, and not only on the passive perception of the material.

3. Creation of a modern training infrastructure, which includes information, technological, organizational and communication components.

Various innovative educational approaches are used as a methodological basis for the innovative policy of the GTU. Let's consider some.

Activity approach. The main ideas of this approach are expressed by the following theses. The human psyche is inseparably linked with its activities and activities. In this regard, the goal of training is not the arming of knowledge, not the accumulation of knowledge, but the formation of the ability to act with knowledge of the matter. Thus, educational activity acts as a means of developing the learner, gaining knowledge. In addition, the National Center for the Development of Education in Georgia requires the formation of personal and socially significant activities, for example, research and design.

The project approach suggests the organization of the project activity of students on various subject and interdisciplinary content as a way of achieving various didactic goals.

Project activity is a joint educational, cognitive, creative activity that has a common goal, agreed methods, methods of activities aimed at achieving a common concrete result of activities. As follows from the definition of project activity, its characteristic features are: personality-oriented interaction, the complex nature of work, creativity, variability, alternativeness, author's position.

Problem. Work on the project is always aimed at solving some problem. As a problem, one can consider a theoretical or practical question that requires study and resolution. The identification of a problem is most often associated with the emergence of a contradiction, which results in a state of intellectual embarrassment.

Designing is a purposeful activity focused on achieving a certain result, which includes: the formulation of goals, the specification of tasks, the distribution of activities between stakeholders, finding a way to solve the problem through solving problems, receiving and presenting the result.

The product is an objectified result with system integrity. The final product of the project activity of students can be presented in different forms: web-site; analysis of sociological survey data; business plan; electronic newspaper, magazine; bill; collection; design – layout; model; a package of recommendations; flyer; virtual or real excursion, etc.

Presentation of the process of implementation and the result of the project in oral (report, speech, etc.) or in writing (article, abstract, report, research paper, etc.).

Thus, the basis of the project method is its focus on the result. At the same time, we can talk about the external result presented by the finished product, which can be seen, comprehended, applied in practice, and the internal result, which manifests itself in the acquisition of experience in project activities.

Taking into account the identified specific characteristics of the projects, we will outline the following basic requirements for the organization of the project activity: the existence of a significant task (problem); planning actions (product type, presentation form, etc.); search for information, which will then be processed, comprehended, presented; formation of competences; summing up subtotals, discussions; public presentation of the product.

Design can be carried out on the subject content with didactic purposes, for solving quasi-professional problems with the purpose of complex formation of professional competences, for solving socially significant problems.

The project, as a form of innovative activity, forms an active, independent and proactive position of students; develops general skills and abilities: research, design, reflexive; realizing the principle of linking learning with life, forms competences; priority is directed to the development of cognitive interest.

• ***The competence approach*** is closely related to previous approaches and is aimed at the integrated development of knowledge and practices that ensure the successful functioning of a person in key spheres of life in the interests of both himself and society as a whole, the state. The knowledge, acquired in this case, is characterized not so much by the number of known facts as by the ability to apply them in the professional field, in related fields, and sometimes in situations in which the relationship between the problem and the objective knowledge is not clearly traced. Therefore, the modern educational process should consist not only in transferring the subject knowledge to students who have a long-term perspective of their use, but in demonstrating the application of this knowledge to solve current professional and quasi-professional problems, as well as creating conditions for students to solve such problems independently in the learning process.

These innovative approaches require the introduction of a new direction of evaluation activity – an assessment of the personal and interpersonal achievements of students. The introduction of the evaluation of personal achievements ensures the development of the following personality components: the motivation for self-development, the formation of positive benchmarks in the structure of the self-concept, the development of self-esteem, volitional regulation, responsibility. The named categories of results can be evaluated only by means of specific technologies. In this regard, today in the system of higher education the understanding is growing that the standard procedure for assessing achievements in the education of students does not allow us to grasp the many competences, skills and skills that students need to form in order to ensure their successful life and professional strategies after graduating from the university. The standardized procedures used can not assess the ability of learners to perform assignments in real life situations, and even they are a limitation for the development of the most important behavioral skills and competences that are in demand today in vocational education, in most jobs and in everyday civil life.

Given the existing contradiction between the construction of the modern educational process and the lack of an adequate evaluation system, a portfolio is based on an analysis of the forms of authentic assessment as most appropriate to the personal educational outcomes of students as an optimal way to organize a cumulative rating system. It is a way of recording, accumulating and evaluating the work, the results of the students, testifying to its efforts, progress and achievements in various fields over a certain period. In other words, it is a form of fixation of self-expression and self-realization. Portfolio provides the transfer of emphasis from external evaluation to self-assessment. A significant characteristic of the portfolio is its integrativity, which includes quantitative and qualitative assessments, involving the cooperation of the student, teacher and employer in the course of its creation, and the continuity of the replenishment evaluation.

Portfolio allows you to take into account the results achieved by students in a variety of activities – educational, research, project, social, communicative, professional, etc.

Depending on the purposes of creating and using the portfolio, its type and structure can be different. The most common are:

a. A portfolio of documents containing certified individual educational achievements;

b. A portfolio of the author's works reflecting the main forms and directions of his educational, creative and social activity;

c. A portfolio of reviews, including the characteristics of the student's attitude to the various activities (presented teachers, potential employers, managers of practices, employees of the supplementary education system, etc.), as well, as written self-analysis of the student himself.

Features of the technology of portfolio formation allow us to distinguish its following functions in the educational process:

a. Diagnostic (the dynamics of indicators for a certain period of time are fixed);

b. Goal-setting (supports educational goals set by standards);

c. Motivational (encourages learners, teachers and parents to interact and achieve positive results);

d. Substantial (maximally reveals the whole range of achievements and types of work performed);

e. Developing (ensures the continuity of the process of development, training and education from the course to the course);

f. Teaching (creates the conditions for the formation of the foundations of qualimetric competence).

So, the portfolio is a means of qualitative and multilevel assessment of competences, measuring individual progress of students, self-presentation for employers, and therefore an important element of the activity, design, competence approach to education.

Summing up, we note, that the considered innovative approaches and corresponding educational technologies contribute to solving the following urgent problems of modern higher education:

1. Effective mastering of knowledge; the formation of practical research skills, allowing to make professional decisions;

2. Transition from the accumulation of knowledge to the creation of mechanisms for independent search and skills of research activities;

3. Formation of value orientations of students' personality;

4. Increasing cognitive activity; development of creative abilities;

5. Creation of didactic and psychological conditions conducive to successful social adaptation of students.

So, today, innovations in education are no longer separate phenomena, not random findings. Innovations have become a system that determines the vector of the development of the educational space of Georgia in general and the Georgian Technical University, in particular.

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GEOPOLITICAL CHANGES IN LATIN AMERICA: ARGENTINA AND URUGUAY

Abstract: In the present paper, a short analysis of the geopolitical system of the modern world is described with the example of such countries of Latin America as Uruguay and Argentina. The author gives several, the most significant events in the history of these countries, which had a significant effect on their development.

Keywords: geopolitics, development, geography, relationships, Latin America, Argentina, Uruguay.

The current stage in the development of geopolitics reflects a transitional stage in the formation of a new system of international relations and it is characterized by the need to analyze the global distribution of forces and the search for options for its subsequent dynamics.

The configuration of regions and interregional spaces is changing. Entire states disappear from the World map; new national and regional centers are emerging. Each state, to varying degrees, has its own interests in the international arena. However, the study of political processes is directly tied to the territory on which they flow, and any generalization requires a specific analysis.

When analyzing the definition of force in the world arena, as a rule, relations between political actors of power, or states, are taken into account. Since these political units are defined by the territory and the relations between them are determined, among other things, by spatial relations, geography plays an essential role there [1, 26].

The 21st century is the time of the historical rise of the developing countries. The processes taking place in Latin America confirm it. Over the past decade, many states in the region have strengthened economically, modernized their internal socio-political structures, benefited from the fruits of globalization, and strengthened their positions in the world arena. The changes affected different areas and markedly transformed the regional political and economic context.

The people of Latin America for more than three centuries were in colonial dependence on Spain and Portugal, later joined by England, Holland and France. They become independent subjects of international politics only at the beginning of the nineteenth century, after the outbreak of the war for independence and the formation of sovereign states [2].

The end of the 20th century, of course, made changes in the geopolitical system of the force fields of the continent. New processes in politics and economy have emerged and are being activated, which are largely due to the acceleration of scientific and technological progress, the formation of trans national companies, i.e. globalization of all spheres of social life of the planet. An important feature of these changes is that all countries of the world are drawn into their orbit. And, Latin America fully experiences the positive, as well as negative, impact of the new unknown situation.

Today, the free countries of the continent have difficulties in economic development. They are looking for ways to integrate into the world economy, like internal causes — stagnation in the economy of Latin America, non-competitiveness of their products in the world market, unsustainable economic development, rising unemployment, inflation, social tension, etc.; and the most important external reason is the globalization of the world economy as one of the key global economic processes of our time [2].

In this paper, we give a brief analysis of the changes that have occurred in the geopolitical situation in Latin American countries, like Argentina and Uruguay.

The geopolitical identity of Argentina was largely formed in the context of state ideology, which promoted the ideas about

the territories lost in the XIX century. One of the country's foreign policy constants may have been the assertion that the country lost vast territories on the continent as a result of the expansion of neighboring states or provincial separatism. It has been used in the official discourse of Buenos Aires for decades regardless of the type of regime or government in power. Apparently, the idea of the "lost territories" is rooted in the same period of state consolidation and the implementation of the national construction project, which required the formation of a new national identity in the absence of religious, linguistic and cultural differentiation. One way to achieve this goal was to believe that the country "lost" significant territory because of its ambitious neighbors, which deprived the country of its legitimate inheritance from the metropolis.

Shortly before the First World War, Argentina was considered one of the most prosperous and wealthy countries in the world. Suffice it to say that Argentina, in terms of per capita income, was on par with France and Germany and was significantly ahead of countries such as Italy and Spain. Neighboring Brazil lagged behind Argentina five times, and Japan, one of the world leaders of the late XX century, almost three times.

To understand how significant Argentina's economic success was, it suffices to say that the metro in Buenos Aires was launched as far back as 1913, and the city itself was compared to Chicago.

The reasons for Argentina's then success are simple. First, at her disposal were almost unlimited spaces of free fertile land. Secondly, a relatively high level of education among the population has opened up opportunities for the use in agriculture of technology leading at that time. As a result, migrants who settled in the Latin American country quickly made it an exporter of grain, wine and meat to virtually all regions of the world.

Changes for the worse began in Argentina during the global crisis of 1929. The collapse of the American stock exchanges and the Great Depression that followed in the United States and Europe, first of all, hit the producers of raw materials, including agricultural ones. At the same time, Argentina initially did not hurt as much as the neighboring countries: by the mid-1930s, it had been able to return to sustainable economic growth for a short time.

Accustomed to a certain standard of living, the Argentines were not ready for several years of "tightening the belts." As a result, the power in the country was captured by the military junta, which mainly defended the interests of big capital, especially the British. The change of power was accompanied by riots, exacerbated the contradictions in the society and the growth of the economy did not help.

In 1943, Argentina experienced a new military coup. It played a key role in the history of the country because he gave way to the big politics of one of the most controversial figures in Latin America of the XX century – Juan Peron, an officer who in the new government took the post of Minister of Labor. Peron promoted the adoption of new legislation in the interests of the working class, and it became one of the most progressive at the time in the world. After Peron's victory in the presidential elections in 1946, Argentina went along the social-democratic path of development.

Since then, the Argentine economy is developing somehow. In the mid-2000s, however, it was possible to return to growth due to another round of raw material prices, but the new global crisis again interrupted this movement. The government, which no one now wants to lend, has resorted to "unorthodox" practices such as the nationalization of the oil industry and the actual withdrawal of private pension savings.

As a result, for 2013, Argentina per capita GDP is two and a half times less than Italy and Japan. Lagging from such developed commodity countries as Australia and Canada, is increasing every decade. Even in comparison with neighbors (which since then was also worn fairly), Argentina looks weak. In 1913, its GDP was 3.8 thousand dollars (1990) per capita, while Chile – less than 3 thousand dollars, and Brazil – and at all 800 dollars. After a hundred years, Argentina and Brazil are on the same level (11.5 and 11.3 thousand dollars), but Chile is way ahead: the per capita income in the state on the other side of the Andes exceeds 15 thousand dollars [2].

Why the modernization of Argentina in the XX century was a failure? It seems that the mistakes did not lie in the choice of specific economic prescriptions. Yes, the Social-Democratic orientation of Peron and the Peronists after half a century seems to be a wrong decision, but in fact, at the same time most of the countries of Western Europe went also, where there was nothing like Argentine shocks. The same can be said about the reforms of the 1990s: neoliberalism has significantly helped the US or Asian countries, and in Argentina it crashed.

Most likely, the degradation of Argentina is not connected with the economy, but with politics. The lack of democracy and the prevalence of oligarchic interests, on the one hand, and thoughtless populism, on the other, throwing extremes to extremes, the management of the economy by incompetent military personnel – all this in the sum and gave a sad result.

In Europe, states could afford socialist practices, because they had behind their back powerful traditions of local self-government. In Argentina, however, the power was too centralized, there were not enough checks and balances to it. As a result, now there is no reason to say that Argentina will one day regain the economic power of the beginning of the 20th century and again become, if not a global, then at least a regional leader.

Recently, the international press has focused on Uruguay and appreciated a number of factors that make the country attractive and relatively untypical in the Latin American context

today: a small, magnificent territory of fertile lands; political and economic stability; friendly and relaxed lifestyle; progressive tax, social security and other strategies (for example, the legalization of abortion, the consumption of marijuana and homosexual marriage); accounting of foreign investments; Improving poverty, unemployment, underemployment and inequality, and a modest president, whose simple, modest habits and standard of living have not changed since coming to power.

Demographers argue that Uruguay is an atypical case in other respect, too: it did not go through peaks of population growth and an early decline in mortality and birth rates gave it a demographic profile more similar to the advanced countries than to its developing neighbors, though still sharing with the latter the same struggle to overcome economic underdevelopment. Such demographic evolution contributed to a generalized perception of a lack of population problems and, consequently, to the absence of specific policies. Problems existed, though, compounded today by a low fertility rate, concentration of population in a small coastal area and few cities, low immigration inflows, and continuous population ageing and emigration. Internal migration from the countryside to the coast has historically been the first step in a long journey that extends beyond the country's borders as a significant part of the total population moved subsequently abroad. Thus, in terms of migration flows Uruguay passed from being a receiving country up to the 1950s to a sending country since then and depopulation became a structural problem [4].

However, it is not until the mid-2000s that the magnitude of the emigration problem was acknowledged and both population and migration issues entered the governmental agenda and political discourse.

Uruguayan governments have, indeed, made considerable efforts to reach citizens living abroad. Following the global trends, several initiatives were put forward: a new discourse on renaming the diaspora and its role in the nation; updating legislation to institutionalize the rights of migrants; new bureaucratic units responsible for migrants' affairs; a number of linkage programs for attracting migrants from the motherland and the promise of including and expanding participation in political life through extra-territorial voting rights. The emphasis on communication and absentee voting rights promised not only to strengthen government bonds, but also to make an effective concept of citizenship that transcends territorial boundaries and redefines the idea of the nation. Nevertheless, this initiative could not overcome the political and social opposition. Most likely, this year it will be restored as the national elections approach.

Among other lessons, Uruguay shows that the direction of state emigration policy requires the political commitment of concrete participants to prosperity. It is not the state as a unitary apparatus or political parties, but specific individuals and offices that politically push for transnational initiatives. The emigration policy also requires articulation between symbolic and rhetorical initiatives and concrete measures to grant rights and the participation of emigrants. The patria peregrine label (country of the Sacrament), designed to emphasize that emigrants are still part of the nation, was too vague, did not resonate with the Uruguayans' double obligations abroad and did not give them identity, which jeopardized the chances of their creation as subjects and interlocutors. The use of this terminology also calls into question the conceptualization of the problem and political intentions, since it involves redefining boundaries when in fact the political and social ideas about the people are still strongly tied to the territory in Uruguay. As the discussion on non-territorial voting rights illustrates, two points of view remain: official political discourse emphasizes the concepts of national identity and unity, a collective commitment to national construction and a sense of responsibility for the destiny of the country, even if it is at a great distance; on the contrary, other political and social actors argue that the physical presence on the territory at the time of the suffrage ultimately contributes to the strengthening of ties between the state and the interrogation that those who are physically absent make decisions about the lives of those who actually suffer the consequences of decisions.

Bureaucratic practices are a major obstacle to policy consistency and sustainability, as well as society's low capacity to exert strong pressure or push for its agenda. Thus, the sustainability of emigration policy in the long run is contingent not only on state's capacity to reform itself but also on society's ability to acquire a greater voice and more organizational capacity as well as to engage broader sectors with the re-construction of national membership along pluralistic and non-territorial lines.

In sum, Uruguay is a critical case to study emigration policies because, in contrast to other cases, discursive mechanisms have included but not targeted elites exclusively, new re-conceptualizations of the citizens abroad failed to re-incorporate them into the nation, state strategies have not prioritized financial flows but political issues and, rather than capitalizing on migrant transnational networks overseas, the state implemented a top-down, state-led model on diverse migrant organizations that largely backfired [4].

To sum up, the modern interpretation of geopolitics is much broader than the traditional study of the interdependence between the state of the states on the map and their internal politics or behavior on the world stage. To understand the constants and variables of international politics, as well as geopolitical codes of individual states, it is necessary to take into account a number of intangible factors that affect not only

the national, but also the geopolitical identity of specific countries. The geopolitical identity of the country, which is still largely due to geographical determinism, is a combination of a complex of factors (historical, socio-cultural, ideological, economic) and acts as a kind of projection of its self-perception to the outside.

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LAND BORDER DELIMITATION OF REPUBLIC OF KAZAKHSTAN: PRACTICAL KNOWLEDGE OF BORDER POLICY FORMATION

Abstract: This article studies the land border delimitation process of sovereign state of Kazakhstan during the disintegration of bipolar world. It analyses the main stages of the system of bilateral treaties and agreements between two neighboring states under international law and principles of nonmilitary resolution of the territorial disputes in a manner that safeguards the interests of all states and ensures security in the border region.

Keywords: National Border, Kazakhstan, region, delimitation, border policy, security, concept, border security.

The sovereignty status achieved by Kazakhstan in 1991 brought colossal changes in every sphere of life – political, economic, social, cultural – and created an overarching objective of creation and implementation of new paradigms of state-legal system of independent republic for scientists, diplomats and politics; theoreticians and practitioners to accomplish.

Complex domestic and foreign political situation in Kazakhstan, similar to that of other newly independent states that emerged on the territories of former Soviet Union, was a natural consequence of centrifugal tendencies of the nineties.

"The history decided for Kazakhstan to be the epicenter of world politics after the disintegration of bipolar world. New states have emerged from the former superpower and among them, ours had the special place. At the whim of fate, we received particular attention not only because of our vast territories or rich natural resources or great diversity of ethnic groups, but, primarily, due to nuclear power inherited by us from the USSR" [1, 187]. The recently emerged republics were divided by administrative borders, but only the state borders of the USSR were, in fact, recognized by the international law. Therefore, territorial claims among new republics as well as territorial disputes between those republics and their neighbor states were very common.

The Republic of Kazakhstan is located at the center of Eurasia, with most of it territory being part of Asia and some of it – of Europe. "The territory of the state is 2.724.902 km^2, which means it is in 9th place in the world and the second place after Russia among the CIS-member states and is the largest state in the territory of the Cooperation Council of Turkic-Speaking States. It has coastline on the inland Caspian and Aral Seas and, having no access to the open sea, is the largest state in the world with such a geographical feature" [2]. The vast territory of Kazakhstan differs significantly in natural, climatic and geographical conditions which influence security of state borders and border policy, as well as form specifications of interactions with neighboring states.

The republic of Kazakhstan shares land borders with 5 states of the world, the length of which is more than 14 thousand kilometers, including: with Russia – 7591 km; with Uzbekistan – about 2351 km; with China – 1783 kilometers; with Kyrgyzstan – 1242 kilometers; with Turkmenistan – 426 kilometers [3, P. 297]. On the Caspian Sea, Kazakhstan shares borders with four states: Russia, Turkmenistan, Iran and Azerbaijan. In fact, the state border of Kazakhstan is supposed not to divide, but, in fact, to unite Europe and Asia. The most important geopolitical feature of Kazakhstan is that since ancient times it is located at the crossroads of the main transit trade arteries between the West and the East: Jade Road, Lapis Lazuli Route, Steppe Route and Great Silk Road.

The unique geopolitical position of Kazakhstan and its economic, social, demographic and ethnic features of its border regions, as well as wide range of threats to its national interests and to state border security give special significance and scientific novelty to the theoretical work and practical implementation of answers to the issues of the state border policy and their development.

The decisions took to resolve territorial disputes between republics of the former USSR and their neighbors gave border policy of sovereign Kazakhstan implementation as a part of its foreign policy strategy. The most difficult challenge was the absence of legally and internationally recognized borders. In accordance with the Agreement establishing the Commonwealth of Independent States of December 8, 1991 and the Almaty Declaration of December 21, 1991, the administrative

borders between the former republics that were formed at the time of the collapse of the USSR were recognized as state borders. The next stage was the legal recognition of the border by the means of a system of bilateral treaties and agreements in accordance with international standards.

Apart from the issue of state borders with CIS-member states, Kazakhstan also faced the most complex issue of the state border with China, which was inherited from the USSR. The disputed territory consisted of several disputable sections of the border, with a total area of 844 square kilometers. The negotiations were also attended by representatives of the Russian Federation, Kyrgyzstan and Tajikistan and lasted more than two years. The dispute was finally resolved in September 1996 with ratification of the China-Kazakhstan state border treaty. As a matter of fact, in this negotiation process Kazakhstan, having no theoretical conceptual provisions of its border policy, was forced, based on the personal positions and opinion of President Nursultan Nazarbayev, to develop its foundations in practice right away. A compromise decision was taken on the disputed territories: 53% went to Kazakhstan, 47% – to China. "For the first time, as Nursultan Nazarbayev said, in the history of Republic of Kazakhstan, the legal and recognized by China border was established – a border that signifies peace and cooperation" [3, 315].

It is worth noting that the signing of this treaty, as well as the Supplementary Treaties of 1997, 1998 on the China-Kazakhstan border, received an ambiguous evaluation among political scientists, experts in ethnopsychology and various public and political figures. Supporters saw this as an act the elimination of the possibility of territorial conflicts and a solid foundation for long-term mutually beneficial prospects for cooperation between Kazakhstan and China in all fields. "Nevertheless, opponents saw those concessions as a betrayal of national interests, a violation of the Constitution of Kazakhstan and a dangerous precedent that could be exploited by neighboring states in territorial disputes" [4]. It is surprising, but the process of delimitation between republics of former Soviet Union was a longer one and it lasted for more than 13 years.

The State Border Act of the Republic of Kazakhstan, adopted in January 1993, noted in article 2: the Border Policy of the Republic of Kazakhstan (redrawn in 2002 and 2007) that "the Republic of Kazakhstan … is guided by the security objectives … by the interests of mutually beneficial all-round cooperation with adjacent states, the principles of peaceful, non-violent resolution of border disputes" [5].

The Memorandum on the Maintenance of Peace and Stability in the Commonwealth of Independent States adopted at the Almaty Summit in February 1995 confirmed the common willingness of the participating states to respect the territorial integrity, inviolability of borders, and to stop any manifestations of separatism, nationalism, chauvinism and fascism. The delimitation of the Kazakhstan-Kyrgyzstan and Kazakhstan-Turkmenistan borders were established on the basis of the administrative-territorial division that has been preserved since the times of the USSR. The following documents were signed in 2001 in Astana: on July 5 – Kazakhstan-Turkmenistan border treaty; on December 15 – Kazakhstan-Kyrgyzstan border treaty.

The process of delimitation of the southern border with Uzbekistan was not as easy. 96% of the border line of Kazakhstan-Uzbekistan border was established by Kazakhstan-Uzbekistan border treaty signed on November 16, 2016 in Astana. The decision on the territorial allegiance of four disputed areas was hampered by pressure from the Kazakhstan media and opposition on the issue of Turkestanets and Bagys settlements, located on the border with the South Kazakhstan Region with the predominant majority of the Kazakh population. The Treaty on certain sections of the interstate border, signed on September 9, 2002, put an end to the disputed issues and demonstrated the diplomatic skills of the staff of the Kazakhstan and Uzbekistan Foreign Ministries. "… Bagys settlement with the adjacent territory, as well as the Arnasay Dam, joined Kazakhstan (Uzbekistan received equivalent in territories), Turkestanets and three settlements with predominant Uzbek population located at the junction of the Kyzylorda Region and the Republic of Karakalpakstan joined Uzbekistan" [4; 3].

The most time consuming process was the process of Kazakhstan-Russia land border delimitation, which took more than 50 rounds of negotiations to sign the treaty. It was primarily due to the length of border. Secondary, former administrative border between Kazakh Soviet Socialist Republic and Russian Soviet Federative Socialist Republic was more schematically drawn than similar borders of Kazakhstan with Kyrgyz, Uzbek and Turkmen Soviet Socialist Republics. This created disputable areas on the borders of the Chelyabinsk and Kostanay regions, the East Kazakhstan region and the Altai. The negotiation process that began in August 1999 has been resolved on January 18, 2005 by signing of Kazakhstan-Russia border treaty.

The delimitation process of land border of Kazakhstan (no treaty on division of Caspian Sea was signed) and neighboring CIS-member states ended by legal confirmation on August 26, 2005 of Concept for Border Policy Coordination amongst the States of the Commonwealth of Independent States, which is based on fundamental principles of mutual respect of state sovereignty, equality and territorial integrity, inviolability of State borders, and the peaceful settlement of border disputes, full cooperation in security and protection of state borders of CIS-member states, respect for human and civil rights and

freedoms, full cooperation in security and protection of state borders of CIS-member states, recognition of the importance of cooperative decisions in the protection of state borders, an integrated approach to the implementation and protection of state interests in the border areas of CIS-member states [6].

The legal basis of the Concept was formed with use of universally recognized norms and principles of international law, international treaties and agreements on state borders concluded by the CIS-member states, and their national legislation.

The cooperative border policy in the document was defined as part of the domestic and foreign political agenda of the CIS-member states, strategically aimed at creating an integrated border security system, prevention of actions against territorial integrity and sovereignty, in security and protection of state borders, of common and national priorities, ensuring security in all levels – personal, social and state, development of all around mutually advantageous cooperation in border areas. For this purposes, it was decided to "implement a set of political, diplomatic, operational, military, regime, legal, administrative, financial, border, law enforcing, social and other measures" [6; 4].

For the first time in diplomatic practice, the main directions of the coordinated border policy were clearly defined and concretized, conditioned by the prevailing at that time dominant domestic and foreign policy challenges and threats to national security at the regional and state levels [6; 5].

Consequently, the adoption of the Concept for Border Policy Coordination completed the process of legal establishment of complete Kazakhstan land border along its entire perimeter and its demarcation began. The importance of this cannot be overestimated; President of Kazakhstan Nursultan Nazarbayev wrote in his book "Era of Independence": "not all of newly emerged independent states could do it, not all of them established mutually confirmed borders" [3, 296].

The institutional establishment of the state border has become an external goal of the internal state of polyethnic Kazakhstan, which respects the need for free expression of will. It is said in an old legend of the time of Modu Chanyu's rule: when the ruler of another tribe demanded from Modu his favorite horse and one of his concubines, he ignored the protests of his advisors and gave in to demands, explaining that no horse or concubine is more important than peace with neighbor. However, the ruler saw a weakness in this and sent a messenger to Modu, declaring that the abandoned land which belonged to Xiongnu and lied between the chains of mutual border posts is not used by Xiongnu and should be given to him. Modu asked his advisors on the matter and they told him, that this land is not used and can be given or not to this ruler. Modu said in extreme anger: "Land is the foundation of the state: how can you give it away?" All who advised to give up the land were beheaded [7].

This parable reflects the sacred attitude of nomadic tribes of the old to the land. Today, thanks to Kazakhstan's well-balanced border policy, a zone of good-neighborliness and security has been created in the region and relations with neighboring states have a solid foundation of the norms of internationally recognized treaties, non-military settlement of disputes and conflicts, parity of long-term priorities in the name of peace and prosperity.

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Section 10. Psychology

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INDIVIDUAL PECULIARITIES OF STUDENTS WITH MANIFESTATIONS OF INTERNET ADDICTION

Abstract: Individual characteristics of university students with manifestations of Internet addiction (17–18 years, n = 90) and with different signs of functional asymmetries were studied. For the study, F. Zimbardo's "Temporal Perspective" test was used, the study of individual characteristics was conducted using the R. Cattell test (Form A). To investigate asymmetries, the criteria of partial dominance by A. R. Luria. During the statistical processing, factor analysis was used, which made it possible to establish significant factors of asymmetry and individual features linking to the manifestations of Internet addiction.

Significant individual differences were found – a higher level of Internet addiction is associated with the predominance of right hemisphere dominance and a greater focus on the present and the past.

Keywords: Internet addiction, interhemispheric asymmetry, individual features, temporary perception, students.

Introduction. The problem of the regulation of the psyche is one of the main in modern psychology [1–4]. Violation of regulation is considered dependent forms of behavior (so-called addiction). A pronounced manifestation of dependence and lack of autonomy are such features as accentuations and psychopathization of an individual according to an unstable type. In clinical psychology, addictive forms of behavior have been studied to a greater extent by the example of chemical addicts (chronic alcoholism, drug dependence). Modern research indicates a significant accumulation of signs of right hemispheric partial dominance in chemical addicts [2].

Recently, there have appeared papers dealing with the study of the features of interhemispheric asymmetries in Internet addicts of young age [5–6] (foreign studies on this topic are absent). The analysis of behavioral reactions in groups of Internet addicts showed that dependent behavior is more characteristic of right hemisphere subjects and ambidextres. For groups with right hemispheric specialization, various parameters of addictive implementation manifest themselves with a pronounced desire to violate norms and social rules [5]. Similar data were obtained in our papers [6].

The literature data show that the features of functional asymmetries, individual features and characteristics of psychological time in Internet addicts have not yet been investigated. To study the individual characteristics of the personality and the individual characteristics of psychological time in this category of persons, we conducted a study with students of the university.

Hypothesis. It is assumed that a higher level of Internet addiction is associated with the prevalence of right hemispheric dominance, which may also affect the specificity of temporal perception.

Methodology. In order to identify a possible connection between the Internet addiction and individual psychological characteristics in the sample of young subjects (the students of a sports university aged 18–17, n = 90), the following psychodiagnostic methods were applied:

1. Peculiarities of individual profiles of laterality, taking into account the signs of partial dominance by A. Luria (test "Map of lateral features" [7].

2. The degree of expression of the Internet addiction (test Kulakov S., 2004)

3. F. Zimbardo's "Temporary Perspective" test (taking into account the availability of data on individual characteristics of time perception in different variants of dominance of the right or left hemispheres) [2].

4. Individual psychological characteristics using the test R. Cattell (Form A).

Sample. As test subjects were students of 1–2 courses of sports school of 17–18 years, the sample size was 90 people.

Results of the study. Currently, the study is still ongoing, the findings are preliminary.

As a result of the use of factor analysis, 9 factors were identified (the completeness of factorization was 90%). The article analyzes the content of the factor "Normative behavior". It allows us to say that students with a predominance in the motor and analyzer spheres of right laterality (left hemisphere) are inclined to behave in accordance with generally accepted norms, are able to foresee the possible consequences of their actions, motivated to achieve future goals, are ready to sacrifice today's pleasures for the sake of success in the future, more disciplined. High scores on the "Normality of Behavior" scale (factor G) of the R. Cattell test and on the "Future" scale in F. Zimbardo's "Temporary perspective" were noted.

On the contrary, subjects with predominance in the motor and analyzer spheres of left laterality (right hemisphere) are subject to emotions, do not agree with generally accepted moral norms and standards, ignore duties, can act antisocially, impermanent, changeable, careless, lazy, independent, subject to the influence of chance and circumstances, unprincipled, irresponsible and unorganized. The indicators of temporal perception are more connected with the orientation toward the present and the past.

Discussion. The data obtained are in general consistent with the proposed hypothesis. Earlier, in our works, the manifestations of left hemisphere insufficiency in persons with addictive forms of behavior have already been revealed, which makes it possible to explain the weakness of predictive and regulatory functions [2].

We found that patients with chronic alcoholism tend to evaluate time as more discrete, less stressful and less pleasant (compared to healthy subjects). The temporal orientation of patients is characterized by a lesser connection with the present time and a greater orientation to the past. Patients with chronic alcoholism also have an abnormal distribution of individual laterality profiles.

The results of our study of drug addicts show that there are significant differences in the nature of the time orientations between drug users and healthy subjects. Drug addicts are more centered on the past and present, the future for them is less significant. At the same time, drug-dependent individuals experience time as less stressful (stretched, slow-flowing, empty and unorganized) and less emotionally pleasant compared to healthy subjects. Evaluation of drug addicted time as less pleasant is due to a greater connection of the right hemisphere with negative emotions. The predominance of right hemispheric functions in drug addicts can also explain the experience of time as less stressful, since the left hemisphere is associated with a higher level of activity, and the right hemisphere is associated with relaxation and relaxation. It has been established that left hemisphere individuals are more likely to underestimate and re-measure durations compared to right hemisphere individuals, who are more prone to overestimation and under-sampling of time intervals [2].

S. L. Rubinshtein wrote that one of the most important components of the personality structure is its orientation [1]. The amorphism and vagueness of life goals, the absence of a specific orientation of the individual, can be considered as the soil on which different states of dependence develop. It is noted that the lack of strong-willed regulation and independence most often suffer from persons with an accentuation of personality on an unstable type that easily fall under someone else's negative influence, often drop out of school or work, alcoholize or use drugs.

Conclusions. These studies indicate the weakness of regulatory processes in groups of Internet addicts and the accumulation of signs of right hemispheric partial dominance in their sample. Thus, previously obtained data on the accumulation of signs of right hemispheric dominance in chemical addicts (in young people with manifestations of chronic alcoholism or drug addiction) [2] can be extended to inteto-addicts, which indicates the weakness of the functions of arbitrary regulation in them and speaks about the features perception of time in this sample.

The results are preliminary in nature, since the bulk of the data is in the final stage of processing. However, they already testify to the presence of individual features of temporal perception in Internet addicts of a young age and can be used for the purposes of differential diagnosis [6].

The study was carried out with the financial support of the Russian Foundation for Basic Research, project No. 18–013–00856 A: "Individual characteristics of a person's mental health and his psycho-physiological prerequisites (on the example of studying the features of Internet addiction)".

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Section 11. Agriculture

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WAYS TO IMPROVE THE WATER AVAILABILITY OF IRRIGATED LANDS

Abstract: The development of the use of water resources for irrigation leads to a deficit of fresh water, which leads to an aggravation of the problem of the distribution of water resources, the problem of salinization of soil degradation and a decrease in the productivity of agricultural production. The article deals with collector-drainage waters of the Ferghana Valley, which can be an additional source of irrigation. Most of these waters are discharged from irrigation fields and groundwater from vertical drainage wells, which have a mineralization in the range 1.0–1.5 g/l and can be used for irrigation.

Keywords: water resources, hydrological, mineralization, drainage, water hydro-geological, region, problems, vegetation.

Introduction. In Uzbekistan, water resources play a decisive role in the development of the national economy of arid regions, they are the main limiting factor in achieving stable levels of social development. At the international conference devoted to the water problem in Tashkent and other forums, it is said about developing measures to protect the environment: it is necessary to consistently improve the protection of the republic's water resources; continue to implement a set of measures to protect water bodies, as well as improve the state of rivers and reservoirs; improve the efficiency of sewage treatment plants and installations; ensure the rational use of land and water resources. It is noted that at the present time various kinds of natural disasters are expected around the world, some of which are related to global warming. One of the inevitable consequences of this process, according to leading experts, scientists, will be the change in the existing hydrological cycle of regimes, which will cause various negative consequences depending on the geographic location of the region. Almost now we are witnessing that in Uzbekistan there is a sharp increase in the number of low water years, which leads to an aggravation of the problem of distribution of limited water resources and their use, problems of salinization of soil degradation and a decrease in the productivity of agricultural production [1, 30–35].

Materials and methods of investigation. These circumstances dictate the need to develop a scientifically grounded complex of water-saving, meliorative, ecological and other measures that ensure stable high yields of agricultural crops with the least expenditure of water and logistical resources, which determines the urgency of the problem.

The development of the use of water resources for irrigation and industrial needs leads to a deficit of fresh water, which is especially acute in Uzbekistan in recent years. At the same time, there is a rather large volume of collector-drainage water in the republic. Currently, in the Ferghana Valley, the total drainage of collector-drainage water is 80 m^3/s in the Fergana region, 36 m^3/s in the Andijan province, and 50 m^3 /s in the Namangan region.

Most of these waters are discharged from irrigation fields and groundwater from vertical drainage wells, which have a mineralization in the range of 1.0–1.5 g/l and, according to the assessment of the quality composition, are quite suitable for irrigation of crops (Figure 1).

However, the pumped water is discharged into the collector and, in case of possible use, is taken by the pumps already in the form of collector-drainage waters of deteriorated quality. Taking into account the fact that pumped water is an internal reserve of each farm, these waters could serve as an additional source of fresh water for irrigation during the growing season. The most promising are the farms of the Kuva, Rishtan and Altyaryk districts, where a sufficient number of vertical drainage wells are concentrated with an average production rate of up to 40–50 liters per second and with a mineralization of groundwater not exceeding 1–1.5 g/l. The use of pumped out water can be

carried out by transferring the vegetation irrigation of certain sections of the economy to full provision with pumped-out water. One of the important issues is the establishment of areas for which the volumes of pumped water are sufficient [2, 294].

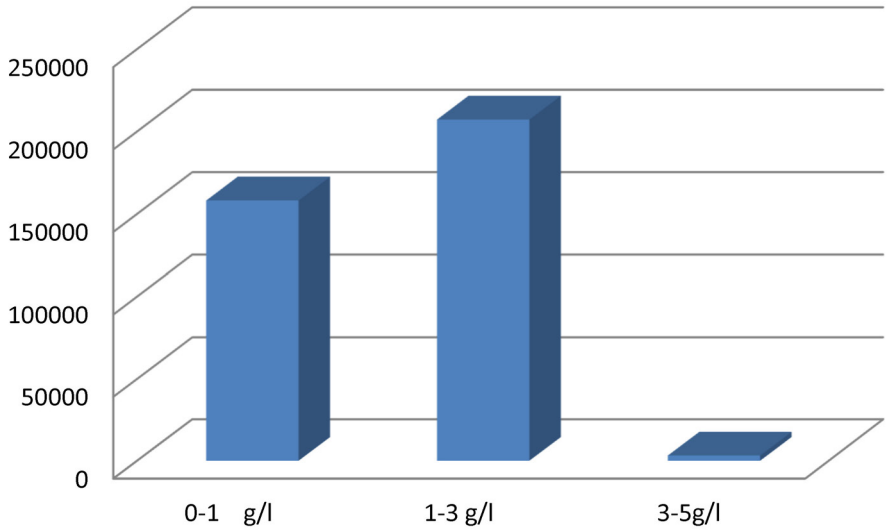

Figure 1. Mineralization of groundwater occurrence areas in the Fergana region

The possibility of transferring vegetation irrigation to the full provision of pumped-up water taking into account the hydro-geological and meliorative conditions of certain areas of the Fergana region is justified by the solution of the following issues:

– Identification of a zone with fresh groundwater horizons in conditions. The existing vertical drainage well system;

– determination of actual production rate of vertical drainage wells by zones fresh horizons of groundwater;

– evaluation of the meliorative state of irrigated lands;

– allocation of specific farms and areas of potential for translation vegetative watering pumped by existing water; Vertical drainage wells;

– evaluation of technical condition of vertical drainage wells;

– development for some farms of technology of transfer of vegetative watering with pumped-out water of vertical drainage.

In the region 1264 wells of vertical drainage are exploited. The condition of the low-water year provides for the maximum operation of the vertical drainage wells for the use of pumped water for irrigation. Forecast calculations of general and private water-salt balances are based on the operation regimes of vertical drainage wells in low-water years under which the maximum effect on the creation of favorable water-salt regimes of soils from the rational operation of drainage will be ensured.

Results of studies and their discussion. Taking into account the work of the vertical drainage wells and the technical condition of the horizontal drainage, and also on the basis of predictive calculations of water-salt balances for the conditions of the low-water year, the possible resources of collector-drainage waters are determined by regions and their qualities are estimated. Taking into account the quality of the collector-drainage water and the categories of drainage of the old irrigation zone, the volume of collector-drainage water is recommended for use in irrigation of crops in low-water years. In order to ensure uniform water availability, to reduce the damage to the harvest in the region based on calculations of the quantity and quality of mineralized waters, soil conditions with a planned linkage according to drainage categories, we recommended, on the basis of calculations, a redistribution of the water limit from the source between the areas within the established limit for the region.

By covering the deficit of irrigation water with drainage water and rational redistribution of the water limit from the source, the water availability in the districts between the districts is equalized and 50–70 percent, water availability in the region will increase from 0.68 to 0.98 percent.

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GYPSY MOTH (*LYMANTRIA DISPAR* L.) POPULATION IN UZBEKISTAN AND PATHOGENICITY OF THE NUCLEAR POLYHEDROSIS VIRUS

Abstract: In the period from 2015 to 2018, the population of the gypsy moth in the Tashkent region was in a state of transition from an active state to a rest state and a decrease in the degree of its damage was observed. Local isolates of the nuclear polyhedrosis of the gypsy moth are pathogenic with respect to the larvae of the host insect.

Keywords: gypsy moth, population, pathogenicity, nuclear polyhedrosis virus, Uzbekistan.

Introduction

The area of distribution of the gypsy moth, begins on the south of Scandinavia in Europe and extends through the Asian territory of Russia reaching the Khabarovsk Region and Far Eastern Federal District. Members of this species can also be found in the countries of North Africa, and in many countries of the Asia. Gypsy moth was brougt to North America in the XIX century and at present the area of its distribution includes a vast territory from the Atlantic to the Pacific oceans. A distincitve feature of the gypsy moth is that outbreaks of its mass reproduction occur periodically, once every few years. During the period of mass reproduction, it aggresively devours leaves of trees on several thousand hectares of areas, which leads to death of the affected plants. This insect damages practically all types of deciduous trees, as well as a number of coniferous species.

Overview

Over recent years, mass reproduction and spread of gypsy moth have also reached Uzbekistan. In 2012–2013, this species inhabited 500 hectares of the Ugam-Chatkal mountain range, causing great damage to various forest and fruit trees. There exists a possibility of its spread in the basin of the Chirchik river and other foothill areas. Despite the measures to combat the gypsy moth, this species continues to spread to other areas.

To stop this threat and save the ecosystem, it is important to develop environmentally friendly measures to stop the gypsy moth. Work has already been carried out to research the pathogenic virus of nuclear polyhedrosis that can be used against it and to develop a microbiological preparation on its basis. This research is based on the entomopathogenic virus *Borrelina repriens*, belonging to the genus *Borrelina* Paillot from the family Baculoviridae. Morphofunctional properties of the entomopathogenic virus *Borrelina repriens* were first studied by Bergold. In his opinion, the virions of this virus have a rod-like shape with size of 300 × 41 mμ, a five-sided polyhedral shape measuring 5–6 × 10 μm. Each size of the polyhedron has 4–8 virions (4–5 on average). The drug Virin-NSh was developed in Russia to combat the gypsy moth. The basis of this drug is the nuclear polyhedrosis virus, which penetrates into the larvae of the gypsy moth. During 1995–2001, this drug was used on the territory of more than 170 thousand hectares in the Novosibirsk and Tyumen regions of Russia, in the Altai Region, in the Pavlodar and Petropavlovsk regions of Kazakhstan. The disease caused by the virus of the nuclear polyhedrosis of the gypsy moth is well studied by scientists of the USA and European countries.

Research Technique

In Uzbekistan, study of entomopathogenic microorganisms of the gypsy moth have not been conducted. Therefore, samples were collected in the territory of the Bostanliq district of the Tashkent region. In 2015–2018, studies on the distribution of the gypsy moth, its population density and the pathogenic virus were carried out under stationary conditions in the Bostanliq experimental area of the Institute of Pomology, and along the main road Gazalkent-Sidzhak, Gazalkent-Charvak, Gazalkent-Khumsan, Gazalkent-Aktash. Forest and fruit trees affected by gypsy moth were studied. The dynamics of development of the gypsy moth and infection rate in its population by the nuclear polyhedrosis virus are revealed. For three years of the conducted studies, data was collected on the territory of more than 200 square kilometers in selected areas to study the state of the population of the gypsy moth in the zone of the Ugam-Chatkal National Park.

Larvae that have been collected in the field were contained in 1, 2 and 3 liter cans. Leaves of cherry, quince, apricot and apple were used as the food, and the suitability of them to feed the larvae was also studied. The infected and dead samples were studied separately from the main population. The samples turned into pupae were separated by sex and placed in separate cans. Hatched butterflies were transferred in pairs for reproduction.

Guidance materials were used for this study [1]. In laboratory conditions, the pathogenic effect on the larvae of the gypsy moth was studied on the isolates of entomopathogenic viruses chosen among them. The samples of the larvae

required for the experiments were obtained among the population grown under laboratory conditions. Samples were separately placed in double dishes and treated with a suspension of the microorganism studied by spraying in the required titres.

To prepare the virus suspension, insect samples infected with the virus were placed in a porcelain foot and diluted with distilled water in the required ratio and filtered. After determining the titer of the suspension obtained this way, it was added to the food of larvae that were kept not fed for some time. Samples of insects were observed until their death, or 5–20 days, after which the dead samples were counted. The dead samples were examined under a microscope.

Results

Based on the results of experiments conducted at the experimental area of the Institute of Pomology of Uzbekistan in the Bostanliq district, a developmental phenotype of the development of the gypsy moth in 2015 (Table 1) was completed. According to the collected data, the larvae of the gypsy moth hatch in the third decade of April. The period of development and growth of larvae continues until the first decade of June. On 3–6 of June the pupae has developed. In the second decade of June they turned into butterflies and began laying eggs starting from 16 of June.

Table 1.– Development phenology of the gypsy moth population in the Bostanliq district in 2015

Month	**April**		**May**			**June**			**July**
Third	II	III	I	II	III	I	II	III	
	E								
		L	L	L	L	L			
						P			
							I		
								I	
									E

Note: development stages of the insect: E – egg; L – larva; P – pupa; I – imago

According to the data received at the Bostanliq district experimental area of the Institute of Pomology, in 2015, fruit trees suffered largest harm from the gypsy moth. The trees had more than 3–5 eggs of gypsy moth. In summer, the number of larvae increased significantly and reached an average of 8–15 larvae on one branch.

During the next two years, the density of the gypsy moth population began to decrease in stationary experimental areas, the rate of eggs in 2016 was 1 egg for every 2–3 trees. Tree lesions of larvae of gypsy moth were not observed. In the beginning of June, larvae of butterflies that came from other territories appeared on branches of some trees. And in the third year of the study, (in 2017) eggs or larvae of gypsy moth were not detected in the experimental area. To determine the population of the gypsy moth, observations were made along the selected routes. Around the Gazalkent-Aktash, Gazalkent-Charvak-Khumsan routes at an altitude of 880–1025 m above sea level, the gypsy moth was not detected in quantities that could endanger the ecosystem. In the mountainous area above the Khumsan village, at an altitude of 950 m above sea level, trees that were affected by these insects have been discovered.

Therefore, it was established that in 2015–2018 in the territory of the Bostanliq district of the Tashkent region the population of the gypsy moth was experiencing a period of transition from an active state to a rest (remission), that is, an intensive reduction in the range of distribution and damage from the gypsy moth.

During the study, in 2015–2017, five isolates of the nuclear polyhedrosis virus were distinguished from the specimens of the gypsy moth larva and their pathogenic properties were studied. As a result of studies conducted in May 2015 on the experimental area of the Institute of Pomology in the Bostanliq district, specimens infected by the nuclear polyhedrosis virus were identified and harvested. In the course of the experiments, it was found that 9 specimens (12.5%) from total of 72 were infected with the virus. The discovered virus was named VNP-Ld-11. Also, from samples of later stage larvae of the gypsy moth that were harvested from fruit and forest trees along the road on the first chosen route Gazalkent-Charvak, and on the second route Charvak-Sidzhak, two isolates of the virus were discovered. In addition, during the study, two more isolates were discovered and were named VNP-Ld-44 and VNP-Ld-55 respectively. The pathogenic properties of isolates of the virus of the nuclear polyhedrosis of the gypsy moth, discovered in 2015–2016, in relation to the larvae of the insect host were studied. As the results showed, the pathogenicity of the isolate at 2.5×10^7 polyhedron/ml titer is 40.0 ± 7.3 and 59.1 ± ± 6.6%. Adjustment of the working titer of the isolate to the value of 1×10^8 polyhedron/ml increases the pathogenicity of VNP-Ld-44 and VNP-Ld-55 isolates and ensures the

larvae mortality rate of 83.3 ± 4.1 and 95.0% respectively. In general, the isolates showed a high pathogenicity relative to the larvae of the gypsy moth. The dead larvae showed signs of disease caused by these viruses.

Conclusion

In 2015–2018, the population of the gypsy moth in the territory of the Tashkent region experienced a period of transition from an active state to a rest (remission), that is, an intensive reduction in the range of distribution and harmfulness of the gypsy moth.

From the population of the gypsy moth scattered in the Tashkent region, isolates of the nuclear polyhedrosis virus were identified and the pathogenic properties of the virus against larvae of the insect host were researched.

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DEFORMABILITY OF THE PACKAGE OF MULTILAYER COMPOSITE MATERIAL OF THE WORKING PRESS ORGAN FOR WET-HEAT TREATMENT OF SEWING PRODUCTS

Abstract: In this article questions of application of composite materials for manufacturing of pillows of the press equipment for damp heat treatment of garments are considered. More attention was paid to the deformability of the cushion package, which was made of composite material.

Keywords: Fiberglass, deformation, beam, tension, formation, properties, efficiency, cushions, working elements, wet heat treatment.

The responsible stage in the design of machine parts is the justified choice of materials, taking into account the criteria for working capacity, strength, wear resistance, heat resistance, etc. When solving the problem of designing machine parts related to the requirements for reducing metal consumption and weight, energy intensity, construction cost, strength, durability and reliability machines the greatest. Efficiency is achieved when using composite materials. These materials are a two-phase composition of a soft matrix and the high-strength second-phase fibers distributed therein.

The physicomechanical properties of composite materials mainly depend on the properties of the components themselves and their volume combination, as well as the strength of the bond between them. In this case, the composite materials acquire properties that are not characteristic of the individual components that enter into their composition [1].

Based on the results of preliminary experimental studies on the properties of composite materials, a new technology has been developed for manufacturing a working organ (cushion) of press equipment for wet-heat treatment of parts of garments.

In the manufacture of pillows, a multicomponent (uniaxial, biaxial and triaxial) fibrous fiberglass material and reinforced filler-epoxy resin were used. Thus, it was possible to manufacture press cushions for most of the processed parts and components of the garment. In this case, the quality (accuracy of the reproduction of the three-dimensional form) of the details of the garment and the form-stability will depend on the design and economic parameters of the upper (punch)

and lower (matrix) part of the surfaces of the working organ of the press equipment.

The effectiveness of any technological machine is predetermined by the operability of its working body. Therefore, the study of the thermal and stress-strain state of the working member of the machine under operational loads causing various types of failure, as well as the study of kinematic and dynamic characteristics, represent an important aspect of ensuring equipment reliability.

Let's consider the analytical method of estimating the bending of a package of multilayer composite material, which is used for cushions of press equipment for WHT, the study of the rigidity and resistance to bending of multilayer bags is associated with modeling the bending process under operational loads. The development of analytical methods for calculating parameters that characterize the rigidity of a packet has theoretical and applied values, since it allows predicting the behavior of an object under loading under different initial (input) data.

As a model construction of a package of multilayer composite materials subjected to bending in the molding of garments, the model of a beam lying on a solid elastic base is most closely approximated. This beam is supported along its entire length by an elastic medium resisting the movements caused by the bending of the beam.

The loads acting on the beam are balanced by the reactance of the solid elastic foundation. In this case, the intensity of the reactions of the elastic foundation depends on the mechanical properties of the base, on the deflection of the beam and on the width of the supporting surface of the beam.

In accordance with the hypothesis of E. Winkler [2], the elastic base reaction, represented as a distributed force, is considered proportional to the deflection y:

$$q_R = -ky \tag{1}$$

where, k – is a coefficient of proportionality, depending on the linear rigidity of the elastic base and having the dimension H/m^2.

The Winkler elastic base is usually represented as an infinite set of independent elastically deflecting supports (springs with the same stiffness characteristics) located along the entire supporting surface of the beam (Fig. 2). If the width of the beam is equal to 6, then the proportionality coefficient can be represented in the form

$$k = bk_0 \tag{2}$$

where, k_0 is the coefficient of rigidity of the elastic foundation (bed stiffness coefficient) having the dimension H/m^3.

In the general case, when в is a function of z, then k becomes a function of z. Then the elastic base becomes the basis of variable rigidity, which can significantly complicate the problem of the elastic behavior of a beam on a solid foundation. Therefore, we consider the case of a constant value of k or a constant stiffness base along the length of the beam.

The deformation of the package of the multilayer composite material of the matrix of the WHT press equipment takes place under the influence of the forces applied to the punch during the shaping of the fabric during the manufacture of the main parts of the garment. Considering the deformation of one or several layers of the material packet with respect to the underlying layer, it is possible to apply the laws of deformation of the beam bending on an elastic solid foundation.

We use the well-known differential equation of the elastic axis of a beam of constant cross section

$$EJ_x y^{IV} = q \tag{3}$$

where, J_x is the moment of inertia of the section relative to the main central axis perpendicular to the plane of the bending moment; E – modulus of elasticity of the first kind; q is a uniformly distributed load. The shape of the axis of the curved beam is described by a curve of the fourth order.

To calculate the beam on an elastic solid foundation, it is necessary to take into account not only the external distributed load q, but also the distributed reaction forces of the solid elastic foundation q_k (1).

Then equation (3) takes the form

$$EJ_x y^{IV} = q - ky \text{ either } EJ_x y^{IV} + ky = q \tag{4}$$

We introduce the notation $k/(EJ_x) = 4\alpha^4$ and obtain

$$y^{IV} + 4\alpha^4 y = \frac{q}{EJ_x} \tag{5}$$

Equation (5) is a linear ordinary inhomogeneous differential equation with constant coefficients of the fourth order. The general integral of such an equation, because of its linearity, consists of the general integral of the corresponding homogeneous equation.

$$y^{IV} + 4\alpha^4 y = 0 \tag{6}$$

And any particular solution (y *) of the inhomogeneous equation (4)

The characteristic equation for (6) has the form

$$r^4 + 4\alpha^4 = 0,\ r^4 = -4\alpha^4 \tag{7}$$

Taking into account the roots of the characteristic equation and the particular solution (y *), the general solution of equation (5) can be represented in the form

$$\begin{gathered} y = e^{-\alpha z}(C_1 \sin\alpha z + C_2 \cos\alpha z) + \\ + e^{\alpha z}(C_3 \sin\alpha z + \cos\alpha z) + y^* \end{gathered} \tag{8}$$

If we rearrange the terms in (8) and introduce hyperbolic sines and cosines, we have a more preferable form for writing the solution of the equation:

$$\begin{gathered} y = C_1 \sin\alpha z \cdot sh\alpha z + C_2 \sin\alpha z \cdot ch\alpha z + \\ + C_3 \cos\alpha z \cdot sh\alpha z + C_4 \cos\alpha z \cdot ch\alpha z + y* \end{gathered} \tag{9}$$

where, $sh\alpha z$ and $ch\alpha z$ respectively, the hyperbolic sine and cosine.

The package of the multilayer composite is represented in the form of a bar of a rectangular cross-section, loaded in the middle by a concentrated force P. Let us determine the greatest bending moment.

If in any section of the beam to move vertically downward by a distance y within the elastic medium, then on the side of this medium there will appear a pressure equal to (the specific weight of the elastic medium). The intensity of the reaction forces will be

$$q_k = -\gamma by \tag{10}$$

where, b is the width of the rectangular section of the stack of the multilayer composite. Therefore, and, according to expression

$$k/\left(EJ_x\right) = 4\alpha^4 \text{ we have } \alpha = \sqrt[4]{\frac{\gamma b}{EJ_x}} \tag{11}$$

The proper weight of the beam is balanced by the reaction of the elastic medium, and therefore we set $q = 0$ in equation (5). Then, under the value of y, the displacement from the equilibrium approximation of the rod, occupied either at $P = 0$, should be reduced.

Since y*=0, according to the solution of (9) we have obtained:

$$\begin{gathered} y = C_1 \sin kz \cdot shkz + C_2 \sin kz \cdot chkz + \\ + C_3 \cos kz \cdot shkz + C_4 \cos kz \cdot chkz \end{gathered} \tag{12}$$

We successively differentiate this expression and find:

$$\begin{gathered} y = (C_2 - C_3)\alpha \sin\alpha z \cdot sh\alpha z + \\ +(C_1 - C_4)\alpha \sin\alpha z \cdot ch\alpha z + \\ +(C_1 + C_4)\alpha \cos\alpha z \cdot sh\alpha z + \\ +(C_2 + C_3)\alpha \cos\alpha z \cdot ch\alpha z \end{gathered}$$

$$\begin{gathered} y^{//} = 2C_1\alpha^2 \cos\alpha z \cdot ch\alpha z + \\ +2C_2\alpha^2 \cos\alpha z \cdot sh\alpha z - \\ -2C_3\alpha^2 \sin\alpha z \cdot ch\alpha z - \\ -2C_4\alpha^2 \sin\alpha z \cdot sh\alpha z \end{gathered}$$

$$\begin{gathered} y^{///} = 2(C_2 - C_3)\alpha^3 \cos\alpha z \cdot ch\alpha z + \\ +2(C_1 - C_4)\alpha^3 \cos\alpha z \cdot sh\alpha z - \\ 2(C_1 + C_4)\alpha^3 \sin\alpha z \cdot ch\alpha z - \\ -2(C_2 + C_3)\alpha^3 \sin\alpha z \cdot sh\alpha z \end{gathered}$$

To find the integration constants C_1, C_2, C_3 and C_4, we choose the application of the force P from the calculation of zb. For $z = 0$, by the symmetry conditions, $y = 0$. The transverse force Q to the right of the mean cross section is equal to $-P/2$, therefore $EJ_{xy}^{///}/z = 0$ for $z = l$, $M = EJ_{xy}^{///} = 0$ and $Q = EJ_{xy}^{///} = 0$

Thus, we obtain four equations for determining the constants $C_1 \ldots C_4$:

$$C_2 + C_3 = 0;\ C_2 - C_3 = -P/4EJ_x\alpha^3$$

$$\begin{gathered} C_1 \cos\alpha\ell ch\alpha\ell + C_2 \cos\alpha\ell sh\alpha\ell - \\ -C_3 \sin\alpha\ell ch\alpha\ell - C_4 \sin\alpha\ell sh\alpha\ell = 0 \\ C_1(\cos\alpha\ell sh\alpha\ell - \sin\alpha\ell ch\alpha\ell) + \\ +C_2(\cos\alpha\ell ch\alpha\ell - \sin\alpha\ell sh\alpha\ell) + \\ +C_3(-\cos\alpha\ell - \sin\alpha\ell sh\alpha\ell) + \\ +C_4(-\cos\alpha\ell sh\alpha\ell - \sin\alpha\ell ch\alpha\ell) = 0 \end{gathered}$$

Where do the values come from:

$$C_1 = \frac{P}{8EJ_x\alpha^3} \cdot \frac{sh^2\alpha\ell + \sin^2\alpha\ell}{sh\alpha\ell ch\alpha\ell + \sin\alpha\ell\cos\alpha\ell};$$

$$C_2 = -\frac{P}{8EJ_x\alpha^3};\ C_3 = -\frac{P}{8EJ_x\alpha^3};$$

$$C_4 = -\frac{P}{8EJ_x\alpha^3} \cdot \frac{ch^2\alpha\ell + \cos^2\alpha\ell}{\sin\alpha\ell ch\alpha\ell + \sin\alpha\ell\cos\alpha\ell};$$

The bending moment in the beam was determined in terms of the second derivative of the function y by the formula $M_{изг} = EJy^{///}$ or

$$\begin{gathered} M_{изг} = \frac{P}{4\alpha}\left(\frac{sh^2\alpha\ell + \sin^2\alpha\ell}{sh\alpha\ell ch\alpha\ell + \sin\alpha\ell\cos\alpha\ell}\cos\alpha z ch\alpha z - \right. \\ -\cos\alpha z sh\alpha z - \sin\alpha z ch\alpha z + \\ \left. + \frac{ch^2\alpha\ell + \cos^2\alpha\ell}{sh\alpha\ell ch\alpha\ell + \sin\alpha\ell\cos\alpha\ell}\sin\alpha z sh\alpha z\right) \end{gathered}$$

The maximum bending moment $M_{изг}^{\max}$ has a value at $z = 0$ and will be

$$M_{изг}^{\max} = \frac{P}{4\alpha} \cdot \frac{sh^2\alpha\ell + \sin^2\alpha\ell}{sh\alpha\ell ch\alpha\ell + \sin\alpha\ell\cos\alpha\ell} \tag{13}$$

With increasing length, the bending moment increases with a very long length and can be calculated from the formula:

$$M_{изг}^{\max} = \frac{P}{4\alpha} \tag{14}$$

where, is determined according to the expression (11).

It should be noted that the form of the bending moment diagram depends on the length ℓ. For a short beam length, the entire area of the bending moment diagram is above the z axis and does not change sign. For a longer beam, the bending moment diagrams change sign and part of the diagram is located below the z axis. The maximum bending moment (14) is capable of causing plastic (irreversible) deformations in the extreme zones of the beam if the operating loads (stresses) exceed the yield strength of the beam material:

$$\delta \geq \delta_T$$

Therefore, taking into account the maximum value of the bending moment, it is possible to write down the condition for carrying out the "bearing capacity" of the beam

$$M_{изг}^{\max} \leq \left[M_T\right] = \delta_T \frac{bh^2}{6} \tag{15}$$

where, $[M_T]$ is the permissible bending moment corresponding to the moment at which the normal stresses reach the yield stresses of the materials.

Condition (15) is of great practical importance, since it shows the limiting value of the bending stresses arising in the elastic deformation zone. The transition to the region of plastic deformations with increasing force P leads to an irreversible distortion of the contact surfaces of the working bodies of the press equipment for WHT made of a stack of multilayer composite material. As a result of inelastic changes in the surfaces of the shape-forming profile of the cushions of this equipment, the quality of the molded parts of clothing deteriorates, which is unacceptable when improving the advanced methods of manufacturing garments.

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PAPER WITH INTRODUCTION OF WASTE OF POLYACRYLONITRILE FIBER

Abstract: For the purpose of partial replacement of expensive raw materials in the conditions of "Toshkent qog'ozi" factory on the laboratory installation are received paper samples on the base of cotton cellulose and fibrous waste of the local industry. It is shown the possibility of obtaining the paper with introduction of modified solution waste of natural silk of polyacrylonitrile fibers with satisfied physic-mechanical and printing properties.

Keywords: Cotton cellulose, modification, silk, polyacrylonitrile.

1. Introduction

Nowadays the need for paper and cardboard production in Uzbekistan consists of approximately 120 thousand tons, in cellulose – 36 thousand tons. The local printing market consumes annually about 110 thousand tons of typographical and offset paper [1]. The activating in the country printing houses daily produce more than one million copies of printed materials. From 1872 registered mass media in the republic printing editions – 740, only 175 of them are newspapers [2].

Fast rates of development in publishing and printing business demands creation of new paper products and working out recommendation to their usage. In Uzbekistan there are no sufficient reserves of wood that defines relevance of production of fibrous semi-finished products from not wood vegetable raw materials in the paper industry. Meanwhile in the Republic, for production of paper and the cardboard are used imported cellulose and waste paper. But the high price of imported wood cellulose, and tendency of waste paper deterioration testify about necessity of searching of new types of cellulose- containing raw materials. For cellulose production the important source of raw material is to use as alternative to wood cellulose, received from annual grassy and perennial plants. At the same time the country has the considerable annually renewing cellulose-containing raw materials reserves of local one-year plants (cotton, ulyuk (waste of cotton), rice and wheat straw, cotton plant and etc.) are suitable for production of cellulose [3].

In cotton-processing enterprises are allocated 100–120 thousand tons of waste which can serve as valuable raw materials for different functions [3].

Technology of paper production from cotton cellulose in industrial scale is economical inexpedient. Addition in paper stock the waste of the textile and chemical industries will allow to solve a problem of effective and rational use of raw material resources, to save expensive cotton cellulose, to reduce prime cost of paper, considerably reduce the need for paper delivery from the outside.

It is known that in the Republic of Uzbekistan annually are produced more than 14 thousand tons of synthetic PAN-fiber (Nitron) which is developed from threefold interpolymer (92.5% of acrylonitrile, 6.0% of methyl acrylate, 1.5% of itaconic acid) a wet rhodonite made as the form of staple fiber and a plait. At the same time 25% of the produced fibers are used in the national economy of the republic, others 75% are exported [4].

Nitron is widely used in production of textile cloths, yarn, the knitted products which are applied to produce the top knitwear, carpets, dress and suit fabrics. Because of violations in production schedules, at start-up adjustment of equipment for other reasons a certain number of defects – accumulate in production the waste of PAN-fibers. Using of such waste in paper production helps to solve also important environmental problem of utilization of this waste.

2. Research of given problem

Producing preproduction models of paper and assessment of their quality were carried out in the test center on cellulose, paper, cardboard products – UZRITS SBKI, "Toshkent qog'ozi" Joint-stock company on the approved production schedules.

The technology of paper production with addition of synthetic fibers essentially does not differ from production of paper from vegetable fibers. Synthetic fibers have the specific features: they are in need of cutting of fibers at the certain length, to research of ways of receiving steady suspensions, in choice of binders for ensuring links between fibers in the course of formation of paper, its finishing [5].

In this work is developed the technology of receiving new types of the papers containing wastes of the cotton-processing and textile industry of Uzbekistan (fig. 1).

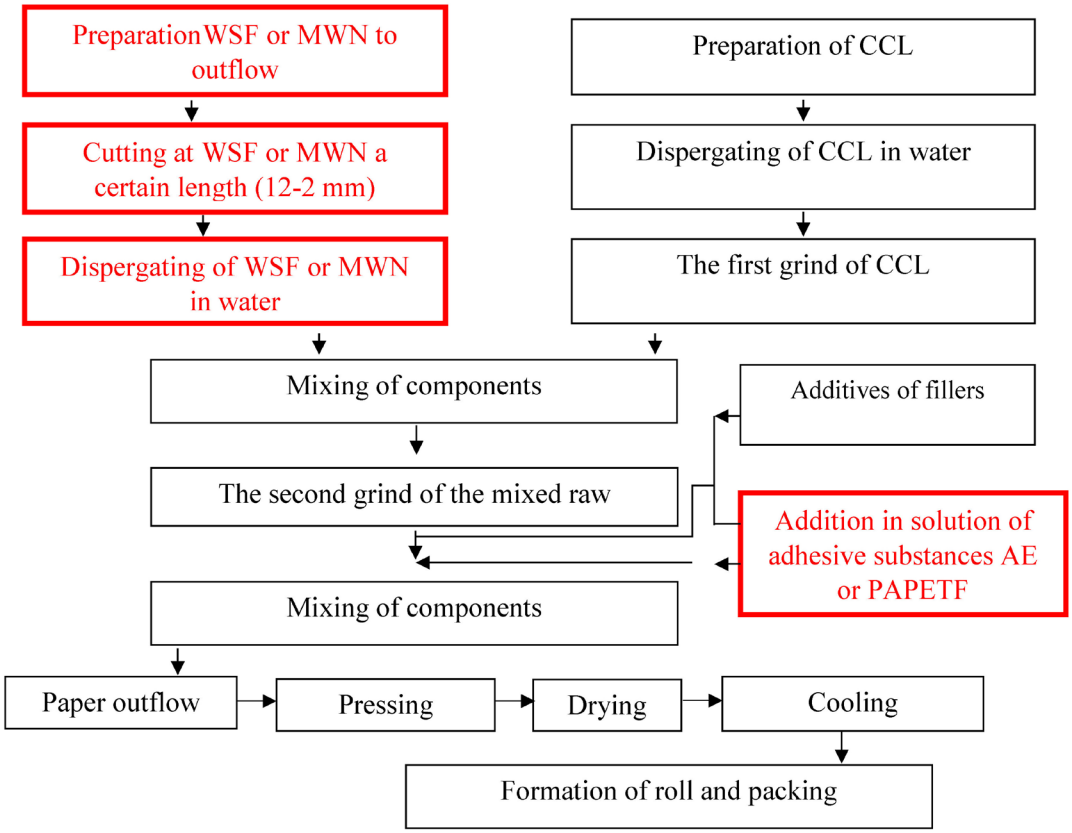

Figure 1. The production technology of new types of papers on the base of cotton cellulose from lint with introduction of waste of synthetic fiber

3. Results and discussion

Properties of ready paper are defined, first of all, by properties of initial fibrous suspension. It is of the greatest interest At technological forecasting of mechanical properties of standard sheet is the interrelation of durability the initial fibrous suspension and ready paper [6]. It is difficult to predict in advance durability of the paper consisting of several components, it is defined by durability as individual fibers, as durability of interfiber communications. In the search was studied the waste influence of synthetic fiber on paper strength indexes. Results of the made versions of experimental papers are given in (table 1).

Table 1.– Dependence of physic-mechanical properties of experimental papers on composition structure

Indicators	Options				
	1	2	3	4	5
Quantity of WSF * in pulp mass,%	0	5	10	15	20
Quantity of CCL * in pulp mass,%	100	95	90	85	80
Explosive length, m	3682	3585	3471	3314	2949
Explosive effort, N	31.0	31.0	32.0	26.0	15.0
Break, n.d.e	44	48	54	64	66
Ash-content,%	4.0	4.3	4.6	4.6	4.9

*Note: * WSF – Waste of synthetic fibers. * CCL – Cotton cellulose from lint*

Comparison of the received indexes allows to draw conclusion that in general inclusion of chemical fibers leads to decrease in paper strength indicators. It can be explained with the fact that at introduction of WSF breaks the supramolecular structure of cellulose as a result of rupture of intermolecular hydrogen links and because of molecular masses distinctions, polydispersion and polarity of macromolecules of synthetic polymers and celluloses. These data is agreed with literary data [7].

For ensuring strong clutch of fibrous massa we conducted research on introduction to paper composition of modified PAN-fiber (Nitron). At Chemical Technology department of Tashkent institute of textile and light industry is developed the technology of receiving new types of the modifying agents on the basis of natural silk waste, and technology of fiber modification [8].

Table 2. – Dependence of physic-mechanical properties of experimental papers on composition structure

Indicators	Options				
	1	2	3	4	5
Quantity of MWN * in pulp mass,%	0	5	10	15	20
Quantity of CCL * in pulp mass,%	100	95	90	85	80
Explosive length, m	3682	3634	3626	3608	3506
Explosive effort, N	31.0	31.0	31.8	30.4	30.0
Break, n.d.e	44	44	45	42	40
Ash-content,%	4.0	4.3	4.6	4.7	4.9

*Note: * MWN – the modified waste of Nitron*

Comparison of received indicators (table 2) allows to draw conclusion that in general inclusions of synthetic fibers lead to decrease of paper strength indicators, but in different degree. Assessment of mechanical durability with invariable weight of ≈ 80 g/m² it is ambiguous and shows that at introduction of fibrous waste up to 20%, strength indicators of paper decrease by 20%, however, these indicators remain in the limits provided by normative documents on offset paper [O'z DSt 1114:2006].

Comparison of properties shows that in the nature change of studied indicators there are essential distinctions. At increasing in contents, MWN over 15%, explosive length of composite paper decreases by 2%, but remains at the level equal for paper on the base of clean CCL. Introduction to paper composition of MWN up to 20% leads to decrease in strength indicators of paper of all on ~ 5%.

The received results of strength properties of experimental papers can be considered positive. Introduction to paper composition of MWN improve fibrillar structure of cellulose, enter with it chemical interaction at the level of hydrogen links.

WNS used for modification of PAN-fibers contains in the structure various polar functional groups – hydroxyl, carboxyl, amino groups and others. Macromolecules of natural silk contact with fibers of Nitron due to hydrogen and covalent links [9–10]. They, probably, form additional hydrogen and covalent links with cellulose. Thus, proteinaceous macromolecules of natural silk perform function of the connecting cellulose component with synthetic fibers.

4. Conclusion

Use of waste in textile industry as a part of paper compositions allows to level a number of the objective reasons obstructing the possibility of manufacture of paper production at the domestic enterprises, to solve the problem of consumption printing papers.

Thus, using of waste in textile and chemical industries, including synthetic fibers, partially solves the problem of deficiency of raw materials for paper production of in the Republic of Uzbekistan.

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METHODOLOGY OF CALCULATION AND EXPLORATION OF RUPTURE AT HYDRAULIC IMPACT

Abstract: A new technique for calculating the rarefaction during a hydraulic impact with allowance for dissolved air is presented. A satisfactory coincidence of the results of calculations by the formula of R. E. Trozyan and the proposed method with experimental data.

Keywords: hydraulic impact, rarefaction, dissolved air, rupture of flow continuity.

The presence of a small amount of undissolved and dissolved air in the water has a significant effect on the parameters of hydraulic impact (HI) in the pipes [1; 2], in particular, the values of maximum pressures and rarefactions in pressure systems during transient processes caused by a change in the operating mode of control devices.

In this paper we briefly outline some of the results of studies of slash (vacuum) in tubes with negative hydraulic impact. The case is considered when in a pressure stream only air dissolved in water is contained, which begins to be released from it when the absolute pressure P is lowered than the atmospheric P_t.

Isolation of water dissolved in water has a significant effect on the vacuum values at negative HI and, in particular, affects the formation process and the dynamics of discontinuity of the flow continuity [1–5].

The paper [1] gives a general formula for determining the speed of sound propagation in a pressure pipeline transporting a liquid with a small admixture of undissolved and dissolved gas and solid suspensions.

For the case considered in this paper, this dependence takes the form [3; 4]

$$a = \frac{\sqrt{\frac{E_ж}{\rho}}}{\sqrt{1 + m\frac{D}{e}\frac{E_ж}{E_T} + \kappa\frac{P_{атм}P_{кр}}{P^2}E_ж}}, \qquad (1)$$

where E and p are respectively the bulk modulus and the density of the liquid; D, e and E_m are, respectively, the diameter, wall thickness and modulus of elasticity of the material of the walls of the pipeline; K_r is a coefficient whose numerical values are given in [1–3]; $P_{кр}$ is the critical pressure at which the release of air dissolved in the liquid begins [1–3]; m is a parameter that takes into account the conditions for fixing the pipeline [1].

For $P << P_{кр}$ we have $\left(1 + \frac{D}{e}\frac{E_ж}{E_T}\right) \ll K_p \frac{P_{атм}P_{кр}}{P^2}E_ж$

Then together (1) we approximately obtain

$$a = \frac{\sqrt{\frac{E_ж}{\rho}}}{\sqrt{K_p \frac{P_{атм}P_{кр}}{P^2}E_ж}} = \frac{P}{\sqrt{\rho P_{атм} \cdot P_{кр}}} \qquad (2)$$

As a result of processing the experimental data, R. E. Trozyan [3] has

$$K_p \frac{P_{атм}P_{кр}}{P^2}E_ж \approx A \cdot E_ж \qquad (3)$$

Then instead of (2) we obtain

$$a = \sqrt{\frac{1}{\rho A}}, \qquad (4)$$

where the values of A are given in (Table 1).

Table 1. A

$0.75 \cdot 98.1 \le P \le 0.52 \cdot 98.1$ кПа	$0.52 \cdot 98.1 < P \le 0.35 \cdot 98.1$ кПа	$0.35 \cdot 98.1 < P \le 0.2 \cdot 98.1$ кПа
$4.3031 \cdot 10^{-5}$ (кПа)$^{-1}$	$1.03878 \cdot 10^{-4}$ (кПа)$^{-1}$	$3.64637 \cdot 10^{-4}$ (кПа)$^{-1}$

At the above values of A, in accordance with (4) we have the following values of a (see Table 2).

At $P < 0.2 \cdot 98.1$ kPa, in the first approximation, one can take $a_{IV} \le 25$ m/s.

The obtained values of the speed a (Table 2) allow us to approximately determine the vacuum (vacuum) values with a negative hydraulic impact.

The calculation is carried out in the following sequence.

1. The first interval of pressure change P_1: $P_1^* \ge P_I \ge P_2^*$, where $P_1 = 0.75 \cdot 98.1$ kPa; $P_2 = 0.52 \cdot 98.1$ kPa (see Table 1).

In accordance with the formula N. E. Jukovskiy We have

$$P_1 - P_1^* = \rho a_I (\vartheta_1 - \vartheta_{01}), \qquad (5)$$

Table 2. a

$0.745 \cdot 98.1 \le P \le 0.52 \cdot 98.1$ кПа	$0.52 \cdot 98.1 < P \le 0.35 \cdot 98.1$ кПа	$0.35 \cdot 98.1 < P \le 0.2 \cdot 98.1$ кПа
$a_{I} = 152.44$ м/с ≈ 150 м/с	$a_{II} = 98.1$ м/с ≈ 100 м/с	$a_{III} = 52.4$ м/с ≈ 50 м/с

Where

$$\vartheta_{01} = \vartheta_0 - \Delta\vartheta_1; \quad \Delta\vartheta_1 = \frac{P_{oa} - P_{кр}}{\rho \cdot a_{ж}}; \qquad (6)$$

$$a = \frac{\sqrt{\frac{E_{ж}}{\rho}}}{\sqrt{1 + \frac{D}{e} \cdot \frac{E_{ж}}{E_{т}}}}; \qquad (7)$$

ϑ_0 – the velocity of the fluid in the steady motion;

P_{oa} is the absolute pressure in the source of the negative impact with steady motion.

When PI = P_2^* and $\vartheta_I = \vartheta_1^*$ we get

$$\vartheta_1^* = \frac{P_2^* - P_1^* + \rho a_I \cdot \vartheta_{01}}{\rho a_I}. \qquad (8)$$

When $\vartheta_1^* < 0$ the value of the minimum pressure is determined by the formula

$$P_{\min_1}^* = P_1^* - \rho a_I \vartheta_{01}. \qquad (9)$$

When $\vartheta_1^* > 0$ .The calculation should continue, moving to the second interval of pressure change.

2. Second interval of pressure change P_{II}: $P_2^* \ge P_{II} \ge P_3^*$, where $P_3 = 0.35 \cdot 98.1$ kPa (see Table 1)

In this case

$$P_{II} - P_2^* = \rho a_{II}(\vartheta_{II} - \vartheta_1^*), \qquad (10)$$

whence with $P_{II} = P_3$ we have

$$\vartheta_{II} = \vartheta_2^* = \frac{P_3^* - P_2^* + \rho a_{II} \cdot \vartheta_1^*}{\rho a_{II}}, \qquad (11)$$

When $\vartheta_2^* \le 0$

$$P_{\min_2} = P_2 - \rho a_{II} \vartheta_1. \qquad (12)$$

At $\vartheta_2 > 0$ calculation it is necessary to continue, passing to the third interval of pressure change.

3. The third interval of pressure change PIII:

$$P3 \ge \text{PIII} \ge = (0.1–0.2) \cdot 98.1 \text{ kPa}$$

In this case

$$P_{III} - P_3^* = \rho a_{III}(\vartheta_{III} - \vartheta_2^*), \qquad (13)$$

whence for $P_{III} = P_{\min}^*$ we get

$$\vartheta_{III} = \vartheta_3^* = \frac{P_{\min}^* - P_3^* + \rho a_{III} \cdot \vartheta_2^*}{\rho a_{III}}. \qquad (14)$$

When $\vartheta_3^* \le 0$ we have

$$P_{\min_3}^* = P_3^* - \rho a_{III} \vartheta_2^*. \qquad (15)$$

You can also enter the fourth interval of pressure change, etc.

R. E. Trozyan, who conducted a negative hydraulic impact study, also received an approximate formula for determining the value of the vacuum height $h_{вак}$,, which is valid for the case when the deformation of the pipeline and liquid walls can be neglected [3]:

$$h_{вак} = H_{ат} - H_{кр} \cdot e^{-\frac{V_{01}}{A_m}}, \qquad (16)$$

where. $H_{кр} = \frac{P_{кр}}{\rho g}$; $H_{ат} = \frac{P_{ат}}{\rho g}$; $A_m = \sqrt{\frac{K_m \cdot P_{ат} \cdot P_{кр}}{\rho}}$ (17)

Calculations were carried out according to the proposed procedure with the determination of $h_{вак}$ by the formula

$$h_{вак} = 10 - \frac{P_{\min}^*}{\rho g}. \qquad (18)$$

The results of the calculations were compared with the experimental data of R. E. Trozyan [3]; D. N. Smirnova [3], V. S. Dikarevsky and A. E. Tatury [6], as well as with the results of calculations using formula (16).

A satisfactory agreement was obtained between the calculated and experimental values of $h_{вак}$.

To further verify the proposed procedure and the dependence (16), P. E. Trozyan in a wider range of changes in the initial conditions in the hydraulics laboratory of MGUP, special experimental studies were carried out to study the rarefaction under negative hydraulic impact.

The studies were carried out on a special installation, which consisted of a centrifugal pump of grade 4K-b, a horizontal steel pipeline 253.5 m long with an internal diameter of D = 70 mm and a wall thickness of e = 3 mm. At the beginning and at the end of the pipeline, pressure tanks were installed, with the help of which a different discharge height Hr was simulated. A negative hydraulic impact was created by the rapid closing of the cork valve with the help of the KMP-4AUZ solenoid, which provides the closing time of the crane T3 = 0.04 … 0.09 s with the recording of the crane closing process on the oscillograph.

The control equipment included a rarefaction sensor of a special design [7] complete with a Topaz-3 strain intensifier and a light beam oscillograph HO43.1. The pressure change at HI was recorded on an oscilloscope with a daily display of UF-67 photographic paper. The calibration of the rarefaction sensors was performed on a cavitation bench before and after each series of experiments.

Twenty-five experiments were carried out, including 5 variants with alternating change of one of the parameters affecting the characteristics of the HI.

The experiments were carried out under the following initial conditions:

1. the speed varied within (0.5 … 2.5) m/s;

2. The head Hr varies in the interval (10 … 30) m with a step $\Delta H_г$ = 5 m.

The flow rate Q for steady motion was measured by a three-dimensional method with a triple repetition of the measurements.

When carrying out the research, it was applied with a technique generally similar to that described in [6; 7].

The processing of the oscillograms was carried out using calibration graphs of the rarefaction sensors.

After obtaining experimental values $h_{вак}$, comparative calculations were carried out according to the proposed procedure and formula (16). R. E. Trozyan for the conditions of the conducted experimental studies. In (Fig. 1), the curves for $h_{вак} = f(\vartheta_0)$ $H = 20$ m are given as an example (Fig. 2) shows the results of comparison of calculations with experimental data.

As follows from this comparison, a satisfactory coincidence of the results of calculations by formula (16) and the proposed method with experimental data is obtained, which confirms the hypothesis that it is necessary to take into account the process of air release in calculating the negative HI.

Calculations of HI with allowance for dissolved air should be performed according to the method described in [1].

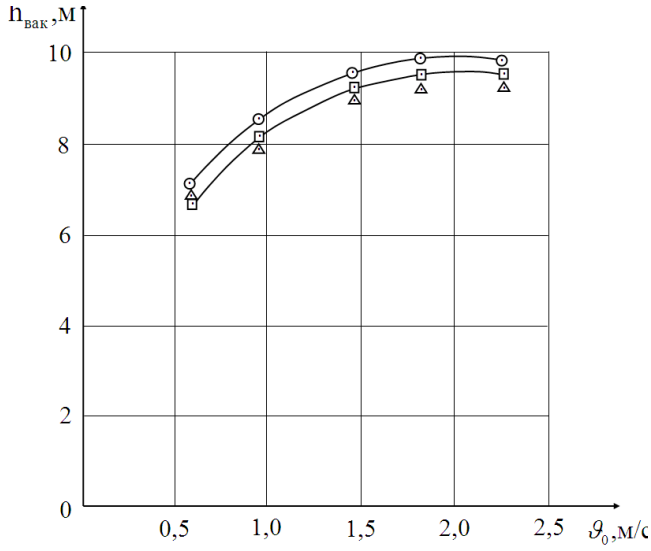

Figure 1. Comparison of the experimental data with the results of calculations for Hr = 20 m:

△ △ – experiment at $\varphi = 0$

⊙–⊙ – calculations of R. E. Trozyan;

⊡–⊡ – calculations on the proposed methodology

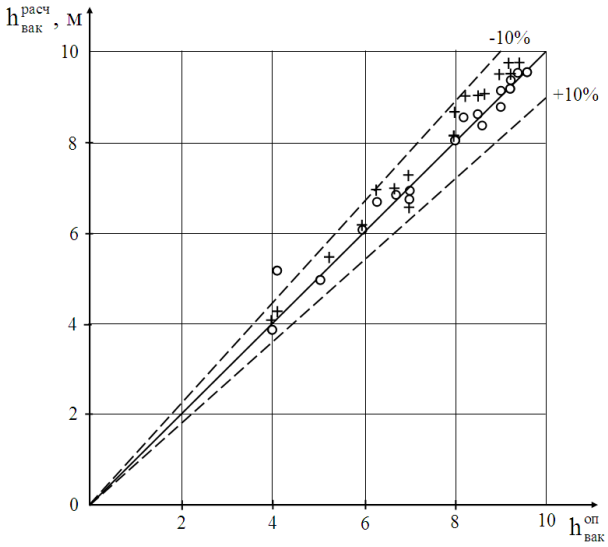

Figure 2. Comparison of the results of calculations with experimental data for H = 10 … 30 m:

⊙ – calculations based on the proposed methodology

+ – calculations by formula (16) R. E. Trozyan

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ON THE ISSUE OF METHODS OF MANAGING ADAPTIVE-MELIORATIVE REGIMES OF TECHNOGENICALLY DISTURBED AGROLANDSCAPES

Abstract: This article outlines the technogenic loading of the agrolandscape hydroland improvement systems.

Keywords: Landscape, agrolandscape, irrigation norms, retrospective analysis, technogenic disturbance, hydrochemical regime.

In order to determine the level of man-caused disruptions in natural systems, a retrospective analysis of the development of irrigated agriculture was carried out. Such an analysis is necessary, firstly, to establish the main contradictions between productive activities and the natural environment that led to the current environmental crisis and degradation, and second, to develop a concept and strategy for the reconstruction of systems on technogenic-disturbed natural complexes and determine the ways of escape from the crisis. For this, the approach of Zh. S. Mustafaev and A. Ryabtsev [9, P. 241] with amendments and additions to it that take into account the methodology for analyzing the ameliorative state of irrigated land in Uzbekistan [1, P. 65].

At present, methods for the equivalent comparison of disparate indicators are used to assess the technical level of design solutions in land reclamation science [2; 3].

Therefore, to assess the level of technogenic disturbance of agrolandscapes, it is possible to use indicators characterizing the relationship between the use of natural resources and changes in their components in the system of nature management [2; 4; 5]

– with agrotechnical development of the territory:

$$K_f = \frac{F_i}{F}, \quad (1)$$

here: F_i – area of the developed territory, ha; F is the area of natural or semi-natural ecosystems, ha;

– with the amelioration of agricultural lands:

$$K_o = \frac{O_p^{ф} - O_p^{э}}{O_p^{э}} \quad (2)$$

here: – the actual rate of water intake, m^3/ha; – soil-ecological permissible rate of water intake, providing an optimum ratio of heat and moisture in specific natural climatic zones, m^3/ha;

– when using water resources:

$$K_b = \frac{O_p^{ф} - O_c - O_p}{O_p^{ф}} \quad (3)$$

here: – sanitary release ensuring ecological stability in the lower reaches of river basins, m^3/ha; – volume of water intake for agricultural organizations, m^3/ha.

– when assessing changes in the hydrochemical regime of water:

$$K_C = \frac{C_i - C_e}{C_e} \quad (4)$$

here: – natural mineralization of river water to man's anthropogenic activity, g/l; – mineralization of river water, in the process of man's anthropogenic activity, g/l.

– when discharging return water into the water source:

$$K_d = \frac{Q_{dr}}{Q_b} \quad (5)$$

here: – actual specific water intake, million m^3; – collector-drainage and sewage, million m^3.

– when assessing the distribution of saline soils:

$$K_s = \frac{F_s}{F_i} \quad (6)$$

here: – the area of unproductive saline lands, ha.

– when assessing the mineralization of groundwater:

$$K_s^{см} = \frac{F_{см}}{F_i} \quad (7)$$

here: – areas with mineralization > 3 g/l of groundwater, ha.

– when assessing the depth of groundwater table:

$$K_s^{cc} = \frac{F_{cc}}{F_i} \quad (8)$$

here: – the area of land with groundwater levels < 2 m,ha.

For a demonstrative calculation of indicators of the level of technogenic disturbance of agrolandscapes, an analysis of the use of natural resources in the regions of the Syrdarya region was carried out (table 1. 2).

Table 1. – Dynamics of the use of natural resources and their impact on the components of the natural system in the regions of the Syrdarya region

Names of districts	Area, thousand hectares		Area of saline land, thousand hectares			Specific water intake, m³/ha			Mineralization of irrigation water, g/l
	F	F_i	F_s	$F_{см}$	F_{cc}	Q_b	Q_p	Q_c	C_i
Syrdarya	42.1	31.9	0.32	13.17	4.51	11037	5820	552	1.12
Gulistan	29.0	22.2	0.80	10.28	2.07	12003	6108	600	1.11
Saykhun	40.2	31.7	0.82	7.23	0.30	10716	5362	536	1.09
Mirzabad	45.4	33.8	14.58	33.96	6.45	7032	4219	352	1.30
Bayaut	39.0	35.4	2.41	16.05	1.07	10391	5497	520	1.25
Akaltin	42.2	36.0	2.56	26.09	7.60	6399	4027	320	1.16
Sardoba	45.7	41.5	10.41	31.32	14.76	8576	6005	429	1.16
Khovas	38.5	27.2	6.07	30.69	4.76	9164	6879	458	1.12

To assess the level of man-caused disruption of the natural system, one can use the generalized indicator K_{mn}, which is determined by the formula [2, P. 95; 4, P. 40; 6, P. 210]:

$$K_{mn} = 1 - \sqrt{\prod_{i-1i}^{n} K_i^i}, \quad (9)$$

here – $K_i^i = \exp(-K_i)$ – relative values of the level of technogenic disturbances of a natural object [7, P. 248].

Thus, the proposed methodological approach makes it possible to assess the level of man-caused disruption of agrolandscapes and the ecological safe rate of use of natural resources, to determine the reduction in resource intensity of production and increase its environmental friendliness, to form a qualitatively new methodology for inductive planning and strategies for managing natural processes in anthropogenic activities in technogenic disturbed natural systems.

Analysis of the soil-ecological state of agrolandscapes in the administrative regions of the Syrdarya region made it possible to reveal the following level of man-made loads on the natural system [8]:

Satisfactory man-made load on the natural system ($K_{кт}$= 0.3–0.65) [9, P. 266] – unsustainable functioning of the system as a result of cumulative manifestation of complex, long or relatively short-term processes with natural and anthropogenic components, which leads to a disruption of the dynamic or ecological balance of agricultural landscapes. It is necessary to direct the main efforts for the reconstruction of irrigation systems, increasing their efficiency and improving the irrigation technique, thereby reducing the load on drainage. This, in turn, allows to lower the level of groundwater to form automorphic and semi-automorphic regimes of soil formation, to reduce the removal of water and salts.

Table 2. – Assessment of technogenically disturbed agrolandscapes in the regions of the Syrdarya region

	Administrative districts							
	Syrdarya	Gulistan	Sayhkhun	Mirzaabad	Bayaut	Akaltin	Sardoba	Khovas
1	2	3	4	5	6	7	8	9
$K_f = F_i / F$	0.76	0.77	0.79	0.74	0.91	0.85	0.91	0.71
$K_o = (O_p^{ф} - O_p^{э}) / O_p^{э}$	0.13	0.49	0.36	–0.12	0.11	–0.27	0.06	–0.08
$K_C = (C_i - C_e) / C_e$	1.24	1.22	1.18	1.6	3.5	1.32	1.32	1.24
$K_S = F_s / F_i$	0.01	0.03	0.03	0.36	0.07	0.06	0.25	0.16

1	2	3	4	5	6	7	8	9
$K_b = (O_p^{ф} - O_c - O_p) / O_p^{ф}$	0.42	0.44	0.45	0.35	0.42	0.32	0.25	0.20
$K_d = Q_{dr} / Q_b$	0.65	0.71	0.76	0.77	0.40	0.67	0.47	1.11
$K_s^{см} = F_{см} / F_i$	0.14	0.08	0.01	0.16	0.03	0.19	0.36	0.12
$K_s^{см} = F_{см} / F_i$	0.41	0.40	0.23	0.83	0.44	0.66	0.76	0.79
$K_f^i = exp(-K_f)$	0.47	0.47	0.45	0.47	0.40	0.43	0.40	0.49
$K_o^i = exp(-K_o)$	0.88	0.61	0.70	1.13	0.90	1.31	0.94	1.08
$K_b^i = exp(-K_b)$	0.66	0.64	0.64	0.70	0.66	0.73	0.78	0.82
$K_C^i = exp(-K_C)$	0.29	0.30	0.31	0.20	0.03	0.27	0.27	0.29
$K_d^i = exp(-K_d)$	0.52	0.49	0.47	0.46	0.67	0.51	0.62	0.33
$K_s^i = exp(-K_s)$	0.99	0.97	0.97	0.70	0.94	0.94	0.78	0.85
$K_{SCM}^i = exp(-K_s^{см})$	0.66	0.67	0.80	0.44	0.64	0.52	0.47	0.45
$K_{SCC}^i = exp(-K_s^{cc})$	0.87	0.92	0.99	0.85	0.97	0.83	0.70	0.88
$K_{тн}$	0.38	0.40	0.38	0.44	0.52	0.38	0.42	0.41

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SUSPENDED LIQUID COMPLEX FERTILIZERS FROM UNEVAPORATED WET-PROCESS PHOSPHORIC ACID

Abstract: This article analysis techniques of the production of suspended liquid complex fertilizers from unevaporated wet-process phosphoric acid of phosphorites of the Central Kyzylkum. Suspending clays influence on the quality and physical and chemical properties of liquid complex fertilizers was studied. The optimum concentration of the addition of clay in the dispersed system is established. The degree of clarification of LCF and SLCF was studied.

Keywords: phosphate, liquid complex fertilizers, neutralization, suspended liquid complex fertilizers, bentonite clay, degree of clarification.

Introduction. Compared to solid complex fertilizers, liquid complex fertilizers (LCF) have many advantages, for this reason the production of LCF has been on a rise in recent years. When using LCF, it is possible to make the process of applying fertilizers to the soil fully mechanized and to evenly distribute the active substances, as well as apply herbicides, pesticides and microelements simultaneously with fertilizers. Initial expenses and material processing cost are significantly reduced in the production of LCF, since there are no stages of granulation, cooling, crushing, sifting, conditioning, and a large number of vehicles [1].

The calculations of research institute of fertilizers and insectofungicide show that liquid complex fertilizers have a higher economic viability than their solid complex fertilizers equivalent in content of active substances. For example, in estimating the initial components used to produce solid complex fertilizers, the resulted costs for the production of 1 ton of P_2O_5 in the mixed fertilizer produced on the basis of ammophos is 138% with respect to liquid complex fertilizers [2].

The results of research in the field of production and consumption of liquid fertilizers show an increasing significance of liquid fertilizers in agriculture. This is due to the fact that liquid complex fertilizers (LCF) and suspended liquid complex fertilizers (SLCF) do not dust, clod, have free flow, their quality parameters are not significantly affected by adverse climatic conditions during storage.

The most common among the commercially available liquid fertilizer forms are nitrogen-phosphate solutions containing 10% nitrogen and 34% phosphate expressed in terms of P_2O_5. The technology for obtaining LCF of 10–34 grade includes high-temperature ammoniation of superphosphoric or polyphosphoric acid with a concentration of 62–64% of P_2O_5, and a high content of nutrients that is provided by the polyols of P_2O_5. However, the main drawbacks of the known method are the use of expensive phosphoric acids, significant content of impurities, as well as an imbalance in the composition of LCF in terms of nitrogen and phosphorus content.

In this research [3], we proposed a method for obtaining a liquid complex fertilizer, including neutralization of wet-process phosphoric acid obtained from phosphorites of the Central Kyzylkum, to obtain a nitrogen-phosphorus nutrient solution containing 3.32–6.29% nitrogen and 16.00–16.22% P_2O_5. Their rheological properties were also determined [4].

Differentiation of LCF into liquid and solid phases, increase in the crystal size of the supersaturated solution, creates a number of difficulties in transporting, storing and applying fertilizers to the soil.

One of the ways to improve the physical and chemical properties of LCF is to obtain sufficiently stable disperse systems by adding various clays to LCF, resulting in the production of suspended liquid complex fertilizers (SLCF).

On the territory of Uzbekistan there are huge reserves of bentonite clays (about 200 deposits) which have a highly developed specific surface and a porous structure. Therefore, we studied the effect of suspending clays on the quality and physical and chemical properties of LCF, as well as the establishment of an optimum concentration of the additive in the suspension.

The purpose of this research is to study the production of suspended liquid complex fertilizers based on low-concentration wet-process phosphoric acid (WPPA).

Subjects and techniques of research. In the laboratory experiments, wet-process phosphoric acid that was obtained from the phosphorites of the Central Kyzylkum (CK) was used, with the following composition: 17.17% P_2O_5, 2.2% SO_3, 0.16% Ca, 0.22% Mg, 0.39% Fe_2O_3 and 0.53% Al_2O_3 produced by JSC "Ammofos-Maxam". The process of WPPA neutralization was carried out with gaseous ammonia in a special reactor with vigorous stirring at pH in the range from 3.5 to 6.5. Measurement of the pH value of ammoniated pulps was carried out using a laboratory ionomer I-130M with an electrode system consisting of ECL 63–07 (high stability electrode), EVL-1M3.1 (lanthanide tungsten electrode) and TKA-7 (thermal compensator) with accuracy of 0.05 pH units. After ammonization, the products obtained were analyzed for the content of various components [5].

As suspending agents bentonites of Kattakurgan and Navbakhor (PPD) deposit were used. The chemical composition of bentonites is given in (Table 1).

Table 1.– The chemical composition of bentonites

№	Bentonite deposit	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	MgO	MnO	CaO	Na_2O	K_2O	P_2O_5	SO_3	H_2O	CO_2
1.	Navbahor (PPD)	46.06	0.39	8.78	3	4.33	0.27	12.2	0.75	1.05	0.77	1.39	6	9.35
2.	Kattakurgan	57.89	0.71	16.71	5.19	2.9	0.03	1.12	1.68	3.92	0.14	< 0.1	6.17	< 0.2

Results and discussion. A 26% clay suspension was used because it has the highest effective viscosity and is characterized by the stability of the coagulation structure of the pulp. The weight ratio of AWPPA: BCS (ammoniated wet-process phosphoric acid to the bentonite clay suspension) varied in the range 100: (1–3). Determine the degree of clarification LCF without adding bentonite and with bentonite for 3 days. The results are shown in (Tables 2 and 3).

Tables 2.– The degree of clarification of ammoniated pulps over time (%)

№	pH	1 h	2 h	3 h	4 h	5 h	8 h	23 h	24 h	28 h	48 h	54 h	60 h	72 h
1.	3.54	3.92	4.85	4.96	5.77	7.69	15.38	36.54	36.54	38.46	44.23	44.23	44.23	44.23
2.	3.86	5.77	8.65	13.46	17.31	21.15	38.46	49.04	50.0	51.92	51.92	51.92	51.92	51.92
3.	4.26	3.85	5.77	6.25	8.65	11.54	26.92	42.31	43.27	44.23	46.15	46.15	46.15	46.15
4.	4.51	3.74	5.60	6.04	8.13	9.66	19.32	34.41	36.30	37.25	45.34	45.34	45.34	45.34
5.	4.95	3.52	4.85	5.77	7.69	9.54	20.15	42.01	42.01	42.27	44.15	44.15	44.15	44.15
6.	5.53	3.85	4.73	5.62	8.46	9.15	19.62	37.50	38.46	38.46	39.42	39.42	39.42	39.42
7.	6.07	3.56	3.92	4.32	8.05	9.00	18.28	38.11	38.76	37.85	38.22	38.22	38.37	38.37
8.	6.56	3.85	5.77	7.69	10.58	13.46	19.23	33.65	34.62	34.62	37.53	37.53	37.53	37.53

Table 3.– The degree of clarification of ammoniated pulps over time with the addition of bentonite (%)

AWPPA: BCS ratio	1 h	5 h	23 h	24 h	25 h	26 h	27 h	28 h	48 h	60 h	72 h
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
pH=3.54											
100:1(PPD)	3.25	6.11	24.6	24.68	24.71	24.75	24.8	24.8	29.73	29.73	29.73
100:2(PPD)	3.19	6.00	19.68	19.76	19.76	19.83	19.90	20.01	27.27	27.27	27.27
100:3(PPD)	2.89	5.73	16.32	16.34	16.39	16.44	16.62	16.64	25.58	25.58	25.58
100:1 (Kattakurgan)	2.19	5.01	20.2	20.23	20.25	20.32	20.45	20.52	25.27	25.27	25.27
100:2 (Kattakurgan)	2.06	4.94	18.42	18.45	18.48	18.53	18.60	18.74	23.26	23.26	23.26
100:3 (Kattakurgan)	1.04	3.65	15.61	15.64	15.65	15.69	15.72	15.80	22.77	22.77	22.77
pH=4.26											
100:1(PPD)	2.82	5.65	21.54	21.56	21.63	21.69	21.72	21.75	26.31	26.31	26.31

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
100:2(PPD)	2.71	5.49	19.77	19.77	19.82	19.84	19.88	19.90	25.77	25.77	25.77
100:3(PPD)	2.18	5.20	17.43	17.46	17.53	17.54	17.63	17.67	23.25	23.25	23.25
100:1 (Kattakurgan)	1.94	4.45	16.93	16.94	16.95	16.97	16.99	17.03	23.39	23.39	23.39
100:2 (Kattakurgan)	1.82	4.33	14.67	14.67	14.70	14.72	14.75	14.80	22.66	22.66	22.66
100:3 (Kattakurgan)	0.99	3.76	12.73	12.75	12.78	12.83	12.86	12.91	20.17	20.17	20.17
pH=4.95											
100:1(PPD)	2.10	4.91	20.11	20.14	20.17	20.18	20.23	20.31	25.42	25.42	25.42
100:2(PPD)	2.06	4.80	19.24	19.26	19.28	19.33	19.35	19.35	24.53	24.53	24.53
100:3(PPD)	1.00	3.62	17.02	17.04	17.08	17.12	17.12	17.15	22.75	22.75	22.75
100:1 (Kattakurgan)	1.07	3.76	16.35	16.35	16.38	16.38	16.40	16.40	22.56	22.56	22.56
100:2 (Kattakurgan)	1.04	3.45	14.00	14.02	14.02	14.06	14.06	14.06	21.45	21.45	21.45
100:3 (Kattakurgan)	0.84	3.52	12.10	12.14	12.14	12.16	12.16	12.18	20.12	20.12	20.12
pH=6.07											
100:1(PPD)	1.06	4.10	18.21	18.21	18.25	18.25	18.28	18.3	23.76	23.76	23.76
100:2(PPD)	1.03	4.02	17.51	17.51	17.51	17.59	17.63	17.63	22.89	22.89	22.89
100:3(PPD)	1.01	3.76	15.78	15.78	15.80	15.80	15.80	15.80	20.51	20.51	20.51
100:1 (Kattakurgan)	1.00	3.85	15.41	15.44	15.44	15.50	15.53	15.53	20.63	20.63	20.63
100:2 (Kattakurgan)	0.62	3.31	13.23	13.23	13.25	13.25	13.25	13.25	19.55	19.55	19.55
100:3 (Kattakurgan)	0.53	3.00	10.94	10.94	11.03	11.03	11.05	11.05	18.13	18.13	18.13

After settling the ammoniated pulps for 48 hours, the degree of clarification increased, and then it became rectilinear. For example, the degree of clarification of ammoniated pulp at pH = 3.54 for 2 days was from 3.92 to 44.23%, and at pH = 6.56 – from 3.85 to 37.53%.

The results in Table 3 show that sufficiently stable suspended fertilizers are obtained when a clay suspension is used – the Kattakurgan field.

The stability of the SLCF depends on the amount of clay added to the dispersed system. For example, with the addition of bentonite of PPD and Kattakurgan field at the ratio of AWPPA: BCS = 100: 1, the degree of clarification was 3.25 to 29.73% and 2.19 to 25.27%, and with the ratio AWPPA: BCS = 100: 3 – from 2.89 to 25.58% and from 1.04 to 22.77%, respectively. The degree of clarification of the SLCF after a period of time is less by 1.48–2.19 times than the LCF. It should be emphasized that the amount of suspending agent, equal to 3% by weight, is optimal. It should also be noted that the physicochemical processes occurring in the production of liquid complex fertilizers are primarily determined by the reactions of neutralizing phosphoric acid [6–14], which have been extensively studied.

Therefore, a method for producing suspended liquid complex fertilizers is proposed. It has been established that the properties of SLCF depend to a great extent on the type and amount of the applied bentonite clay suspension.

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DEVELOPMENT OF INFORMATION SUPPORT FOR DECORATIVE ELEMENTS FOR FASHION INDUSTRY OBJECTS

Abstract: databases of national decorative elements of a national suit are created. This allows in an automated mode to find and choose for further use a decorative element, a school of embroidery, the type of embroidery, ornament and size, to form sets of materials for the base of embroidery or for the application of special coloring polymer compositions.

Keywords: database, decorative element, embroidery, ornament, symbolism.

National products with decorative elements, their embroidery techniques, patterns, color embodiment have been improved from generation to generation. Embroidery has been and continues to be used in various types of products, especially at present the demand for canvas and finished products with embroidery is significantly increased. In each district, their ornaments and embroidered stitches were developed.

Currently, many entrepreneurs are trying to conduct business with modern information technologies in order to be competitive and unanimous over time. Therefore, it is required to place decorative elements on products not manually, but with the help of computer technologies. This will increase labor productivity, save time, and, most importantly, produce quality competitive products using various methods of applying polymer dyes to fabrics.

Silk-screen printing (printing method) on fabrics, in particular, on clothes is very in demand, and it dynamically develops its weighty place in the modern art market [1].

Silk-screen – only this method of printing allows you to apply the image to almost any kind of surfaces – fabrics, textiles, plastic, etc. This method is quite laborious, but it gives the best decorating effect, which is resistant to erasure and deformation. In addition, the image is clear, bright, with the ability to perform various color details.

There are several methods of printing, for example, thermotransfer and sublimation. Termontransfer – is a transfer of a drawing using heat-resistant paper or film. The image is first applied to the "intermediary" (paper) and then stains the fabric with a thermal press. The method is simple enough, it does not take much time, but such a coating does not withstand too aggressive media, so when washing, the pattern may become deformed or partially crumble. Sublimation – this method is similar to the previous one. However, sublimation involves the penetration of the dye between the fibers of the tissue as a result of heating and pressure. This significantly improves the quality of the application, and also preserves the brightness of the paints after many washes. However, sublimation can be applied only to artificial fabrics, satin or textiles. One of the drawbacks is that sublimation burns out of the sun, and the minus of this method is the exposure to the influence of the environment on cotton fabrics. The picture can be printed on fabric, or on finished textiles.

Modern sewing service enterprises are characterized by widespread introduction and practical use of all innovations related to computer technologies [2]. Nevertheless, not all fashion industry enterprises in Uzbekistan fully computerized the technological processes and production preparation processes. Hardly 40% of domestic sewing enterprises can afford to only partially introduce systems of computer-aided design and engineering preparation of production.

How to make it so that the process of preparing the production of new fashion products does not last long? Why are modern foreign fashion industry enterprises able to launch new products within 3–4 days, and our Uzbek enterprises delay this process for several weeks? One of the answers to this question can be a cardinal revision of the organization of production in general, and in particular the use of a comprehensive system of automated production training (KSAPP) and the development of scientific and software complexes in industries. The introduction of scientific and software complexes and CAD in production is constrained by a number of factors that take into account the specificity of production, the frequent replacement of the assortment with a small amount

of lots, the high cost of the applied CAD. For domestic enterprises, the prices of software and hardware are often too high.

Considering all the above factors, we offer Uzbek fashion industry entrepreneurs to use computer technologies both fully (in a complex) and partly (for starters). Namely: use "stuffing" to computerize the process of preparing clothing production from scratch.

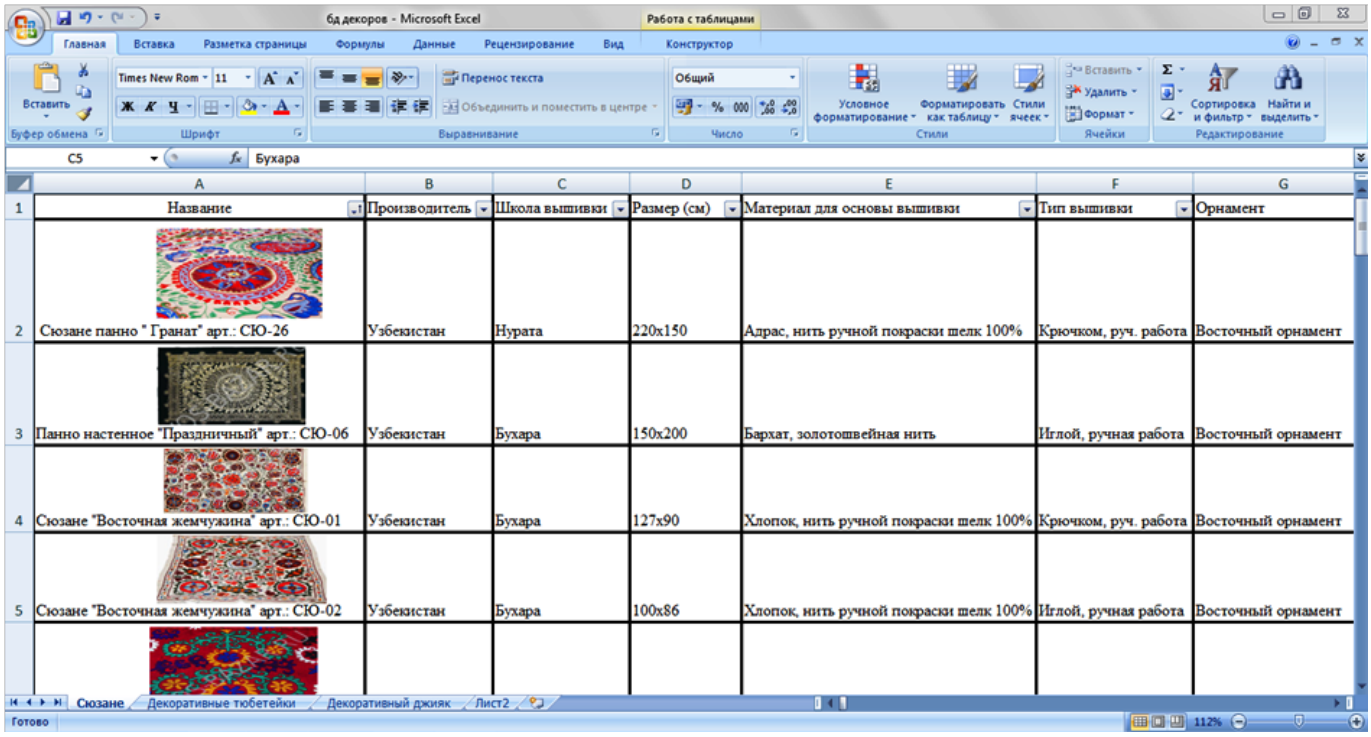
One of the components of CAD is information support [3]. An integrated information management software system (ISC) is of interest for an integrated control system for an object of the fashion industry. The basis (IPK) is unequivocally considered by the data banks and databases. The data bank is of great importance for dynamic systems, and databases are, in fact, the foundation for a data bank. Modern databases are developed in electronic form, using a variety of software and software "shell" [4]. The time and experience of many researchers of this sphere with various programs showed that the most universal shell for creating a database is a spreadsheet.

Electronic database of decorative elements is an important component of the design and technological preparation of production, which allows to speed up the process considerably. When developing the process for the manufacture of products, it helps to significantly reduce the time spent on selecting decorative elements. Reduction of the time for the selection of decorative elements is mainly possible due to the clear structure of the database itself, in particular, the operative choice of ornament, color, the type and school of embroidery and the design and technological approach, to decorate the product.

Consider the structure (interface) of databases. They are developed in MS Excel, as the most popular for Uzbek PC users and convenient for solved tasks of spreadsheet application. Each database is one *.xls format file, because The application MS Excel 2003 / MS Excel XP was used.

Comparing the EDS developed with primary sources, it should be noted the advantage of a detailed table of contents in each of them. The order and content of the sections, convenient for the paper document, have been carefully revised and adapted to the database format. As a result of processing, each of the databases received a clear structure of information, consisting of sections and methods of applying decors to products that meet modern principles and approaches in the technology of garments.

The use of the sheets of each database is simple enough, while it contains, for example, 48 kinds of embroidery items, of which 32 are suzane panels, 10 skullcaps, jijaks and silk-screen equipment. The top line of the table is fixed for the convenience of the user [5].



	Название	Производитель	Школа вышивки	Размер (см)	Материал для основы вышивки	Тип вышивки	Орнамент
2	Сюзане панно " Гранат" арт.: СЮ-26	Узбекистан	Нурата	220x150	Адрас, нить ручной покраски шелк 100%	Крючком, руч. работа	Восточный орнамент
3	Панно настенное "Праздничный" арт.: СЮ-06	Узбекистан	Бухара	150x200	Бархат, золотошвейная нить	Иглой, ручная работа	Восточный орнамент
4	Сюзане "Восточная жемчужина" арт.: СЮ-01	Узбекистан	Бухара	127x90	Хлопок, нить ручной покраски шелк 100%	Крючком, руч. работа	Восточный орнамент
5	Сюзане "Восточная жемчужина" арт.: СЮ-02	Узбекистан	Бухара	100x86	Хлопок, нить ручной покраски шелк 100%	Иглой, ручная работа	Восточный орнамент

Figure 1. Interface of the first sheet for the database on the decorative element (suzane)

The interface of the first leaf of the DB on suzane is a table divided into 7 parts: the name, embroidery manufacturer, school, size, material for the embroidery base, type of embroidery and ornament, as well as details of the garments applied decorative element (for example). The sheet with sections is supplemented with hyperlinks, the user, if nec-

essary, easily "flies" to the desired place of a long array with information. In addition, the first sheet with sections of this database is supplemented with generalized information with characteristics (there are enlarged types of suzane). Examples of the first sheet for these EDDs are shown in (Fig. 1).

Another significant difference and addition in the proposed database are details of garments with decoration. An example of the main table "Decorative jijak" is shown in Fig. 2, where a fragment of the decor application for a piece of garments is shown.

The next advantage and characteristic feature of the developed databases is the availability of directories on equipment and special adaptations.

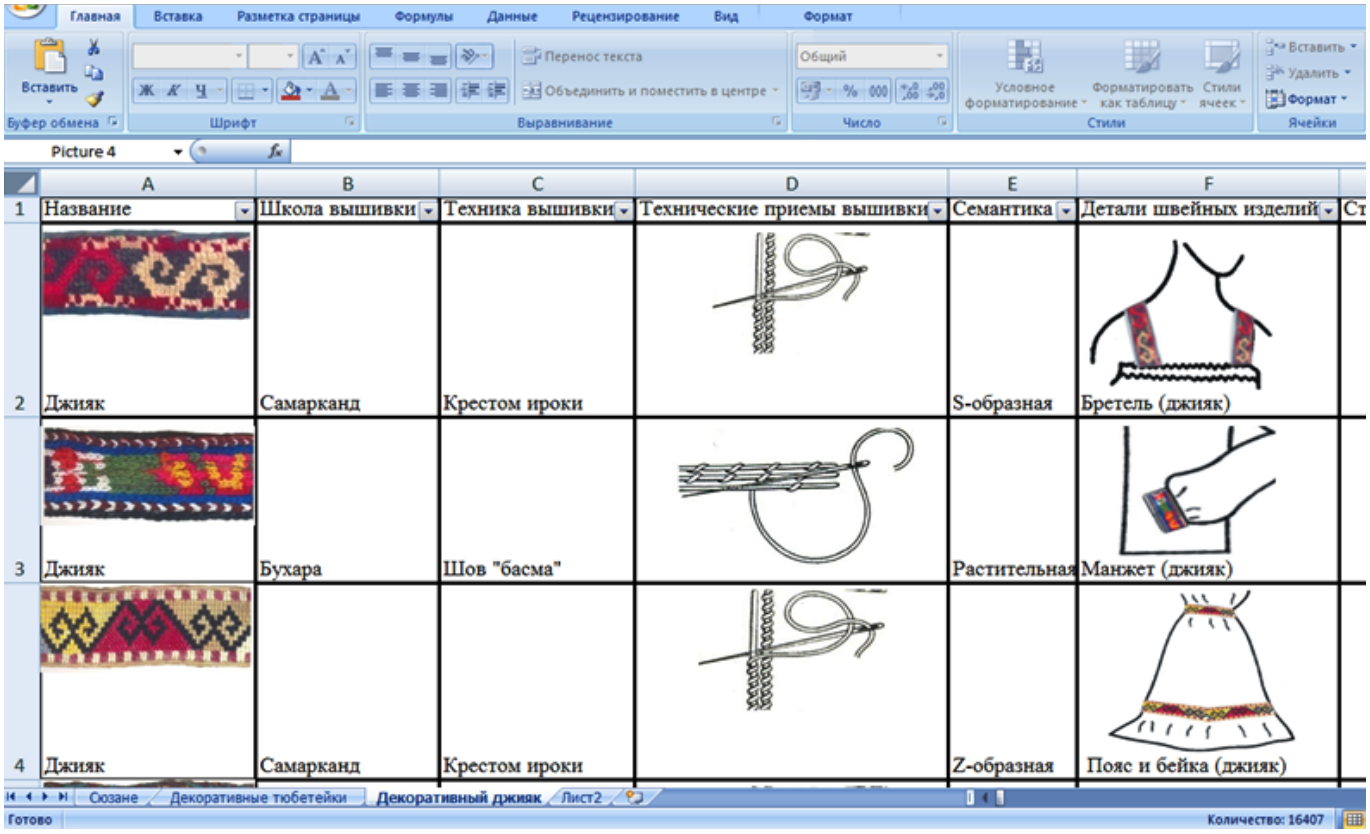


Figure 2. Interface of the second sheet for the database on the decorative element (jiak)

An extensive illustration, entered in each of the databases considered, allows you to easily and quickly choose a decorative element. In each base, the decors are presented in the form of a complete characteristic, which makes it possible to choose and immediately see how it looks on the products. And go to sections and select decors are performed quickly and easily. It should be noted that the proposed information is complete in each of the databases.

In conclusion, it should be noted the practical importance of the proposed work. Electronic databases can be used both for operating objects of the fashion industry, and for scientific and educational purposes. The introduction of the developed databases into the educational process has shown that productivity in the development of products with decorative elements increases more than 50%. Ready-made databases and the development of subsequent databases on our ideas is part of the full range of information support for garment production, and in particular sewing shops.

At the same time, it is characteristic that all these databases use a single or close interface, which has positively proved itself in previous works. This was confirmed by the results of testing the database in our educational and scientific and practical purposes. The uniformity of our software products allows us to use the database in the future as input data for the automated process program, so that production workers can use and perceive visually the databases developed by us. This base is due to the important role of the constructive and technological principle in arts and crafts and its direct connection with production.

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ANALYSIS OF FACTORS AFFECTING TO WORK FECUNDITY OF COTTON HARVESTING

Abstract: In the Republic of Uzbekistan, one of the most important tasks is the cultivation of cotton and the provision of mechanized harvesting of a ripe cotton. The provision of mechanized harvesting depends on the profitability of the machine harvesting in comparison with manual fees. The profitability of the machine harvesting is influenced by the cost of the machine, the productivity and the costs of machine harvesting. The performance is affected by the length of the rut, the reliability of the machine and other factors. It is known that the former collective and state farms were liquidated in the Republic of Uzbekistan and new farmer farms appeared instead of them. Along with this, long gons lost their existence. In this regard, this article examines the influence of gong length and other factors on the productivity of cotton harvesters.

Keywords: cotton harvesters, long gons, cotton fertility, fullness of terms.

One of the pressing problems of the cotton harvesting industry is the need to create a metamatic model of the factors influencing the performance of the cotton picker. Well know, the following parameters affect the performance of the machine:

Machine parameters – Speed of machine (V), cotton picking capacity bunk capacity (G_b), number of machine tool pumps (n), tonnage utilization ratio (k_b), cotton pellets (P).

Agrofone parameters are cotton yields (G_y), percentage of opened cotton pellets $(G_p : G_y)$, width between rows (B), field length (ℓ).

The balance of the shift work time is the full time spent on cotton harvesting in one shift (t), the time required to return the machine one-time return (t_{pz1}), the time spent for shedding cotton in the bunker (t_{pz1}) service and troubleshooting, which is defined by the following statement $t_{ost} = (t - t_o - t_{p31} - t_{pb1})$.

The values given above are based on the results of many years' testing, with the following limit values [1]:

– cotton yield is determined by agrotechnical calculations and $G_y = (2{,}0 \div 5{,}0) \cdot 10^3$, kg/ha;

– the share of cotton bottles opened in the machine harvest $G_p : G_y = (0{,}85 \div 0{,}95)$;

– the cotton packing of raw materials for the bunker is based on years of experience $\Pi = (0{,}86 \div 0{,}93)$;

– line width $B = 0{,}6м$ or $0{,}9\ м$;

– the length of the field area is determined by measuring and most of the time $\ell = (200 \div 700)$ m;

– the number of engines in the machine is entered into the machine's constructive parameters, $n = 2, 4, 6$;

– the return time for the 1-way rotation of the car is determined by the timing $t_{pb1} = (1 \div 3) \cdot 60$;

– the time spent using a single bunker to be determined by the timeline and $t_{pэ1} = (3 \div 5) \cdot 60$;

– gathering machine bunker capacity, taking into account the automatic concentration, enters the machine's constructive setting, $G_b = (750 \div 1250)$ kg;

– the capacity utilization rate of cotton in the bunker $k_b = (0{,}7 \div 1{,}0)$;

– based on the exact time spent in the collection of cotton raw materials [2]:

– in a shift $t = 8 \cdot 3600$ s;

– machine speed, machine equipped with vertical spindle machines $V = 1{,}07$ m/sec.

According to the above factors, the mathematical expression of the cotton harvest is as follows:

– bunker $(G_b \cdot k_b)$ the cost of cotton harvesting is the following:

$$L \cdot B \cdot n \cdot 10^{-4} \cdot G_y \cdot \left(\frac{G_p}{G_y}\right) \cdot \Pi = G_b \cdot k_b \qquad (1)$$

If $L = t_{01b} \cdot V$ let's say, t_{01b} – the main time spent to fill the bunker once:

$$t_{01b} \cdot V \cdot B \cdot n \cdot 10^{-4} \cdot G_y \cdot \left(\frac{G_p}{G_y}\right) \cdot \Pi = G_b \cdot k_b \qquad (2)$$

$$t_{01b} = \frac{G_b \cdot k_b \cdot 10^4}{V \cdot B \cdot n \cdot \Pi \cdot G_y \cdot \left(\frac{G_p}{G_y}\right)}, \text{ sec} \qquad (3)$$

N_{1b} – the number of cotton harvesting to fill the bunker one time:

$$N_{1b} = t_{01b} : \left(\frac{\ell}{V}\right) \qquad (4)$$

here: $\left(\frac{\ell}{V}\right)$ – basic time spent per pass, *s*;

According to the above, the basic time spent on filling a bunker one time, the total time spent on turning, rotating and shedding (t_{1b})will be as follows:

$$t_{1b} = \frac{\ell}{V} \cdot N_{1b} + N_{1b} \cdot t_{pb1} + 1 \cdot t_{pz1}, \text{ s} \quad (5)$$

The number of bunkers to be surveyed in one shift is as follows:

$$\frac{(t - t_{ost})}{t_{1b}} \quad (6)$$

The area to be filled up once for the machine bunker:

$$\left(\frac{L \cdot B \cdot n}{10^4}\right) = \left(\frac{t_{01b} \cdot V \cdot n \cdot B}{10^4}\right) \quad (7)$$

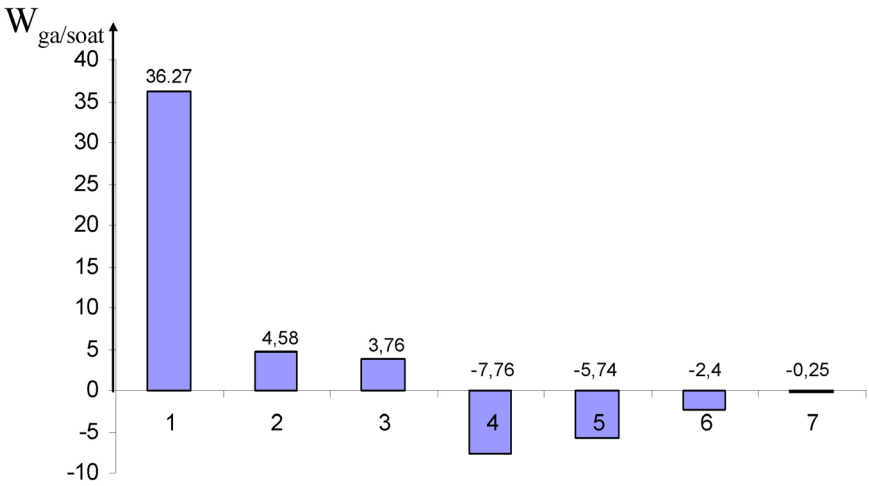
The purity of the cotton picking machine in one shift:

$$W_{kg} = \frac{(t - t_{ost}) \cdot G_b \cdot k_b}{t_{1b}}, [\text{kg}] \quad (8)$$

$$W_{ga} = \frac{(t - t_{ost}) \cdot t_{01b} \cdot V \cdot n \cdot B}{t_{1b} \cdot 10^4}, [\text{ga}] \quad (9)$$

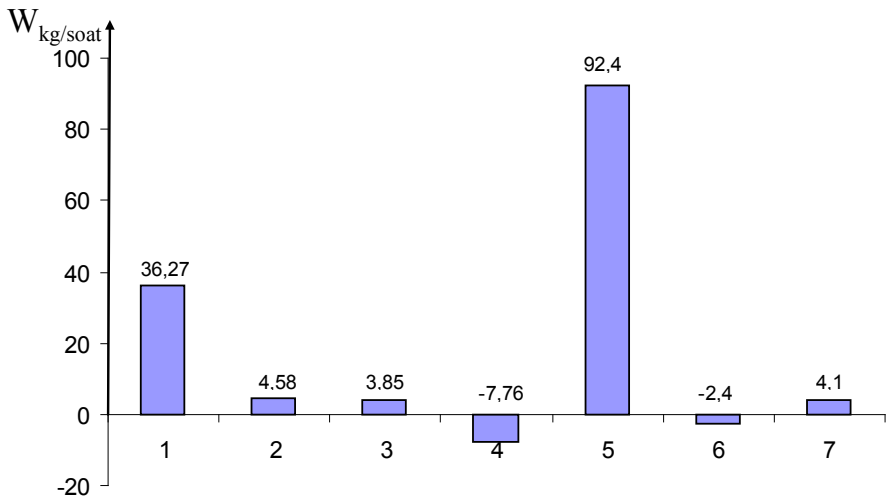
The Republic of Korea Patent Office Certificate is obtained from the computer program of this calculation method [3].

Based on (1) – (9) above, the following factors $\ell, G_b, k_b, t_{ost}, G_y, t_{p31}, \Pi$ The effect of the study on the quality of work is given in (Figure 1, 2).



$1-(\ell), 2-(G_b), 3-(K_b), 4-(t_{ost}), 5-(G_y), 6-(t_{p31}), 7-(P)$

Figure 1. Gastropaths for the importance of factors affecting seasonal workload ($W_{ga/hour}$) in cotton harvesting



$1-(\ell), 2-(G_b), 3-(K_b), 4-(t_{ost}), 5-(G_y), 6-(t_{p31}), 7-(P)$

Figure 2. Gastropaths for the importance of factors affecting seasonal workload ($W_{kg/hour}$) in cotton harvesting

Evidence suggests that factors that have a significant impact on the W_{ga} performance of the workplace: length of the field (ℓ), bunker capacity (G_b)and the volume of use of the bunker in the cotton pouring (k_b), total time spent for maintenance, maintenance, and other shifts in one shift (t_{ost}), cotton fertility (G_y), the time it took for a single bunker (t_{pz1})

and the completeness of the cotton harvested for the bunker (P) are included.

Factors affecting W_{kg} performance: cotton fertility (G_y), field length (ℓ), bunker capacity (G_b), completeness of the term (P), coefficient of use of bunker capacity (k_b), total time spent for maintenance, maintenance, and other shifts in one shift (t_{ost}), and the time it took for a single bunker (t_{pz1}) are.

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PRINCIPLES OF SYSTEM APPROACH TO ANALYSIS OF PRODUCTION IN AGRICULTURAL ENTERPRISES

Abstract: in this article the problems of develop a methodology principles of system approach bias to producing analysis of agricultural enterprises are given.

Keywords: system analysis, optimizing, modeling methods, information, mathematical and software supply.

Introduction

In modern methodology of scientific research of economic problems, the systemic approach acquires special importance. It is a general strategy for using scientific theory and methodology to solve complex problems, considered in interconnection and interdependence. In the basis of system approach the meaning "System" put. System in general meaning means the complex of connected elements which make the fullness [5; 6].

Systems are classified according to the method of formation, essence, attitude to the purpose, centralization, size, complexity, attitude to temporary changes, duration of functioning, specialization, predictability, interaction with the external environment and other characteristics [3].

The main properties of systems are given in the works [4; 7].

In this case the general features of system are defined with co-action of its elements states in proper condition.

If we proceed from the subject of our research, which assumes the application of the methodology of the systematic approach to the economic analysis of production as a system, them, in it, the object of analysis can be a separate element, a specific isolated subsystem, or, finally a whole system.

It is analyzing by connecting each other of simple elements of multi-objective analysis system [8].

The aim of economical analyzing of producing in agricultural enterprise is observed in differential style, in the circle of mentioned analysis. As simple elements of economical analyzing system of producing in agriculture some rates, for example, particular agricultural planting fertility of young groups of definite sex of particular animals breed and others com serve.

Nowadays the problem of increasing the efficiency and improvement of analysis quality of production of agricultural enterprises must be solved in the basis of systematic approach to complex considering of the economical processes and their condition, nature and learning evolution. In increasing the efficiency of distance analysis and sising the optimizing of systematic approach methodology, necessity of consideration of producing some methodological principle is directly connected. Methodology of producing the principles of systematic approach to enterprise production is given in the [1; 2] works.

Main part

In this work the tendency of much importance of principles of producing analysis of agricultural enterprises is given as following:

Principles of developing – is required much importance in the part system of analysis of real condition of agricultural production of enterprise and also in the part system of optimizing. By using it in analyzing it is composed of quality in complex improving the learning theory of economical processes and methodology, also, improvement of preparing methodology for transferring first information. It provides producing optimizing models in comparison optimizing the producing, in the case we com define the future development variants of whole system. Modeling methods of producing system can be improved in according to it.

Principle of structure – it provides structuring first information for real condition of agricultural producing, also for solving the optimizing problems.

It provides separating the autonomic information files according to the characters and functional tasks by taking into consideration this principle the structure of object analysis is learnt and proved, is transferred to separate sequentially properly with its structure, its proved of sequential transfer logic. In the base of structuring the object analysis, it is separated to the parts, according to them it is transferred autonomously. Analysis results of some parts are generalized and are used in solving the purposeful direction of distance analysis which previous constructed.

By taking into consideration this principle, organizations of information massifs which optimize the producing, transfer to purposeful direction to definite model.

Principles of complexity – provides the forming of information base which com give opportunity to act the comprehensive analysis the nature and real condition of object. This principle defines process elements transfer to models system which provides forecast whole process state as a system from the private models and can be acted in the complex of forecast models.

Principle of regulation – provides making the first information properly wish future forecast, also, distance analysis, single-dimensional, poly-dimensional, degrees of agricultural producing. By taking into consideration this principle, purposeful directions of optimization and analysis of the agricultural production will be determined in accordance with the changing conditions, as well as on the issues of future production efficiency.

Principle of variant – requires particular importance for planning and forecast. Because of the growing uncertainty about the future of system, various plans need to be developed to reflect the potential effects of potential advantages. The demand of this principle is always important. Development of this complicated system should be developed in the context of the future planning of production as a agricultural enterprise, taking into account the plan option, for example, the advantages and disadvantages of production. In this approach these variants con be classified according to the different quality characteristics. For example, in developing the producing of enterprise distance plan variant can be considered as the best optimistic in proper conditions. Plan variant which considers the improper conditions for producing con be included to the ineffective-pessimistic degree.

Principle to dynamics – impedes the dynamic development of agricultural production over the reporting period relative to the analysis of actual situation of agricultural production. This principle supports the necessity for acting the distance forecast of fertility in dynamic-future years or time intervals separated for future time. This demand can be acted in dynamic system of distance forecast.

Principle of universality – is especially important for the subsystems of analysis of the actual state of agricultural production. In accordance with this principle single classifiers and codifiers of background information are being developed for analysis, original data banks, and universal informational funds of universal purpose.

Principle of reliability – is fundamental important for the forecasting subsystems. The implementation of this principle is connected with the increase of reliability of one-dimensional, multidimensional, and through-forecasting. It involves the development of nondeterministic systems of forecasting models, as well as the information support for empirical calculation for them at enterprises, where the agricultural production is directly carried out. The requirements of the reliability principle apply to the development, as well as to the improvement of the methods of one-dimensional and multi-dimensional prediction with a given reliability.

Principle of optimality – is required much importance in optimizing the producing of agricultural enterprises. This principle demands the purposeful directions of o optimal solution planning to act completely, the many-variant counting to produce in according to the point of different purposeful directions. Here optimal variants of planning developed to be made which provides extremum of aim functions of optimal principle and describe numeral the purposeful directions of optimization.

Practicing this principle is connected wish the proving the optimizing criteria and choosing problem, and this comes them having much-purposeful characters of system development it of needs to take attention to the some points of efficiency.

The optimality of the model to meet the real-time adequacy of the optimally unsatisfactory choice will lead to a disadvantageous solution, and will lead to a breakthrough in the intended purpose of the forecasting.

Principle of efficiency – is directly connected with the analyzing the real conditions of agricultural producing, also optimizing the producing for efficiently working of enterprise. By taking this efficiency principle into consideration, producing the integral banks con be fulfilled for planning the producing of agricultural enterprise also for single dimensional, poly-dimensional and distance analysis of first information. Beside this, empirical calculations will lead to the reduction of time and material resources to the development of information, mathematical, software and technical support. They are implemented in the process of analyzing and optimizing the production of agricultural enterprise.

Conclusion

Taking into account these principles as much as possible in the conditions of their full implementation, it is a prerequisite for the quality of the analysis and planning of agricultural production in rural areas. It is possible to implement systematic mathematical modeling of economic processes by applying a logical, informational and algorithmic interconnected model of complex economic systems in the context of a systematic approach to the requirements of these principles

It is recommended that the methodological principles of systematic approach to production analysis of this agricultural enterprise be applied to scientific research in the systematic sequencing of different processes.

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HYDRAULIC OPERATING MODE OF THE WATER RECEIVING STRUCTURE OF THE POLYGONAL CROSS SECTION

Abstract: The article presents the results of laboratory studies of the irrigation pumping station carried out on the model of the vestibule to study the hydraulic operating conditions.

Keywords: pumping station, sediment, water supply, flow, pressure.

The receipt of guaranteed agricultural products by farms is largely dependent on water management facilities, which is associated with a reliable and uninterrupted workflow in these facilities.

Experience in the operation of pumping stations has shown that many of them work with the supply much lower than the design ones. The main reasons for this are the unsatisfactory hydraulic regime of the water intake structures and the wear of the elements of the flowing part of the pumps.

Research by a number of scientists has shown that inadequate cleaning of irrigation water leads to a decrease in water supply of pumping stations located on main canals – up to 73%, and to dead-end ones – up to 63%. In addition, the clogging of the gratings and the level difference of 0.1 m causes an increase in electricity consumption of up to 1.22 kWt/h per each cubic meter of water supplied, whereas in normal operation the consumption is 0.6 … 0.7 kWt/h. In the process of operating the systems, the difference in the co-retaining gratings can reach 0.3 … 0.5 m, which causes cavitation processes in the pump-power units, rapid wear of the impellers and the output of the pumping equipment [1, 9–10].

Design, operation and reconstruction of water intake structures of pumping stations require scientifically based hydraulic calculation and based on it the forecast of hydraulic flow parameters. Disruptions in the hydraulic mode of the vestibule cause its gradual silting up. This leads to a reduction in the supply of pumping stations, an increase in electricity consumption, and cavitation wear of impellers of pumping units [2, 12–18].

In some cases, the construction of new water intake facilities is not possible, which entails the need to select other alternative technical solutions to level the problems that arise in their operation, namely: the entry of bottom sediments into the receiving facilities and the unsatisfactory hydraulic operation of the outermost water intake chambers and, as a consequence, pumps below the design [3, 192–196]. The design of a number of water receiving structures built decades ago was carried out using computational methods that do not meet modern requirements. Therefore, in order to rationally operate old systems, it is necessary to update data on the operating modes that have taken shape on them and take them into account in the practice of water supply, environmental protection, and the use of deposits as meliorants [4, 62–72].

In this regard, when solving tasks to improve the operation of water intake facilities, it is necessary to carry out studies that make it possible to compare the projected mode of operation of pumping station facilities with those actually existing during operation, and also to obtain data on the regime that ensures its most efficient operation [5, 75–82].

To establish a favorable hydraulic mode of operation of the vestibule and water intake chambers, experimental studies were carried out on a laboratory installation in three variants. In these versions, the models of the pre-chamber are structurally executed in the same way: the central angle of the taper, the slope of the bottom, the depth of the inlet of the suction pipeline under the water horizon h_2 are the same and are set horizontally with respect to the rear wall of the chamber.

The air-chambers differ only in the width of the water intake chamber, for the 1-variant, the chamber width $b_{ch} = 2D_{en}$ in, and for the variant 2 it is equal to $b_{ch} = 1.2D_{en}$ in, where D_{en} in the diameter of the inlet part of the suction pipe. Therefore, the length of the pre-chamber is respectively L_{an} = 81 *sm* and L_{an} = 33 *sm*.

Experiments have shown that the spreading of the flow does not occur along the axis of the chamber, as a result of the flow around the bulls at an angle leads to the formation of swirl zones. The vortex zones are formed in the outer chambers in the joint mode of operation 5, 4(1 + 2 + 3 + 4), 3(1 + 2 + 5), 2(1 + 2), 2(1 + 3), 2(1+ 5) and 1(1) pumps. To prevent the funnel formation, it is recommended to install flow control devices at the entrance to the chamber, but they worsen the operating conditions of the camera. In addition, the oblique flow to the chamber leads to an increase in hydraulic resistance [3, 192–196].

According to a number of researchers, the sudden expansion of the flow leads to the formation of two corresponding characteristic sites: 1-the distance from the beginning of the expansion of the flow to the center of the vortex zones or its length is approximately 2/3 of the length of the vortex zones, in this section the flow gradually expands [2, 12–18].

The boundary of the transit flow is usually straight in plan, the line of bending relative to the axis of the channel is very small.

A. G. Solovyova at the laboratory installation carried out studies with various roughness's, changing the ratio of the channel width to the depth of the channel h in the ratio from 4 to 10 [6, 241–253]. According to her data, the angle φ between the channel axis and the transit flow in the first section varies from 20 to 80, with increasing roughness φ increases, and with decreasing ratio v/h the angle φ decreases. According to A. Averkiev, the length of the first segment is $\frac{2}{3}l_2$ [7, 84–88]. In our experiments, the 2nd site is located from the center of the vortex zone to the end of the expansion zone, its length is 1/3 of the length of the vortex zone. According to A. G. Solovyova, in this area there is a sharp expansion of the flow, the boundary of the transit flow is a curve line in the form of an ensemble.

In our studies, the expanded spreading of the flow occurs forcibly, we achieve in the experiments an extended flow motion, the boundary of the separation of the transit flow and the eddy zone does not have the form of a vertical section, so it is impossible to show in the plan what kind of line. Surface and bottom flow do not participate in the water supply of the receiving chambers, but in depth the layer of flow in the center is closest to the simple case to the expanding flow.

To activate the flow in the bottom of the vestibule and uniform spreading of the flow into the intake chambers, and also in order to reduce the entrance angle, a new design of the water intake structure of the polygonal cross section was developed (Figure 1 and 2).

The longitudinal slope towards the middle chamber along the bottom of the precautionary chamber is i = 0.1, adjacent to it from two sides 2 and 4 of the chamber with the bottom of the channel are connected along the longitudinal slope equal to 0.15, at the outer chambers 1 and 5 the longitudinal slope of the connection with the bottom of the channel is 0.2.

In addition, each longitudinal section has a transverse slope or in 3 chambers the longitudinal slope i_{ch} = 0, the right-hand ones 1 and 2 of the chamber have a lateral slope to the right equal to i_{ch} = 0.1, and the transverse slope on the left 4 and 5 of the chamber have the equal i_{ch} = 0.1. The slope of the bottom of the pre-chamber in this structure, together with the activation of the bottom stream, reduces the deposition of sediment in it. The slope of the cone in the plan is equal to α = 35° (Figure 1). The width of the water intake chamber is equal to $b_{ch} = 1.2D_{en}$ or is assumed to be the same as in the second variant, here the length of the pre-chamber is equal to L_{an}=32 *sm*.

The side walls of the outer 1 and 5 chambers with a supply channel are connected by means of a vertical wall. Therefore, the side walls of the vestibule in the initial part under the slope, then along the length gradually move into a vertical position. The cross-section of the vestibule is polygonal or represents the shape of a polygon (Figure 2).

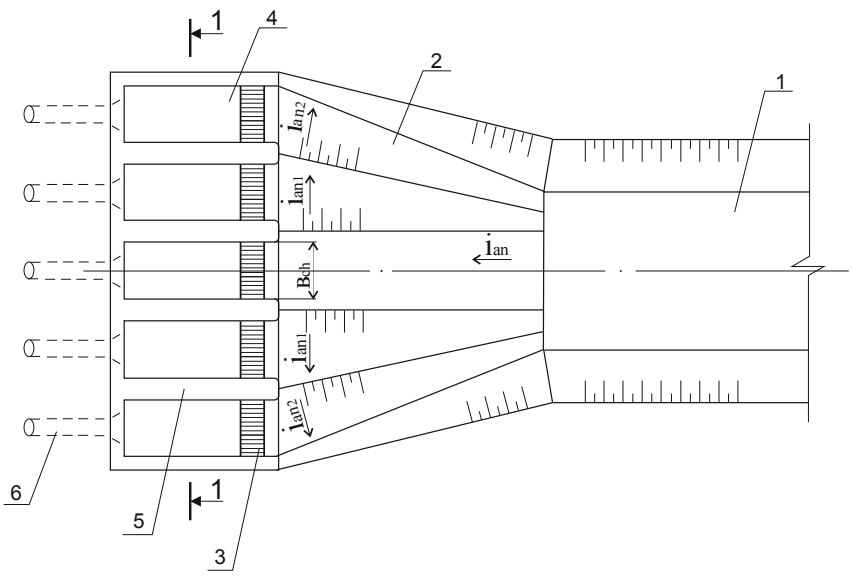

Figure 1. The plan of the water receiving structure of the polygonal cross section (option – 3): 1 – the inlet channel; 2 – the pre-chamber; 3 – service bridge; 4 – water intake chamber; 5 – bulls; 6 – suction pipe

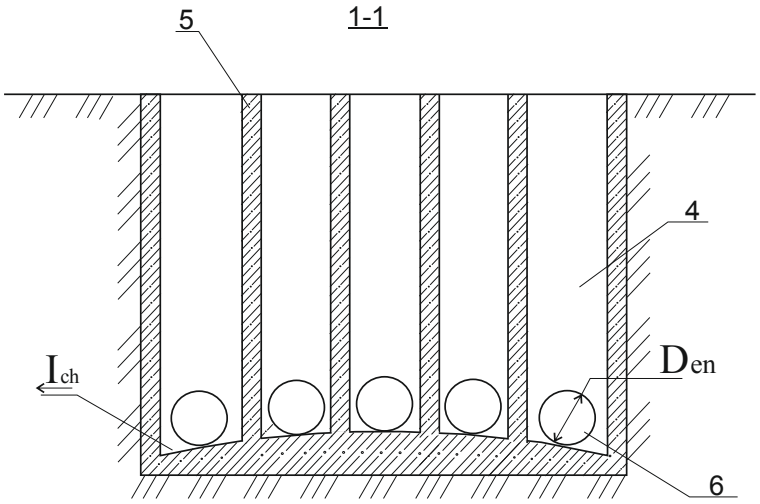

Figure 2. Cross-section of water intake chambers (option – 3)

Experiments have shown that the volume of the transit flow and swirls varies significantly in the 3rd version of the vestibule. The direction of the bottom stream located in the gap in the center of the vestibule coincides with the axis of the middle and outer chambers. This phenomenon is observed in all modes of operation of pumps. The angle of entry of the flow into the outer chambers is approximately 6 … 8°, determined by experimental means.

A slight flow around the camera affects the camera's operating mode. In all modes of operation of the pumping station in the central and outer chambers, the formation of swirl zones did not occur. This indicates the unstressed inlet of the flow into the receiving chambers. Determination of hydraulic resistance in the third option in the fore-chamber and water-intake chambers was carried out in the same way as in versions 1 and 2 [8, 58–59].

Table 1.– Hydraulic coefficient of resistance for the pre-chamber and water intake chambers with a polygonal cross-section

Coefficient resistances	Working Pumps			
	5 pumps	2(1 + 2) pumps	1(1) pumps	1(2) pumps
$\sum \xi_{t.b}$	0.567	0.542	0.69	–
$\sum \xi_{t.m}$	0.16	0.386	–	0.61
$\sum \xi_{t}$	0.363	0.464	0.69	0.61

The measured cross-sections are taken at the beginning of the 1-wing vestibule and the 2-yard is taken 10 cm deep from the inlet of the water intake chamber. In the 3-variant, under any operating conditions of the pumps, the flow spreads uniformly into the chambers, formation of swirl zones was not observed.

The results of the measurement showed that the coefficient of kinetic energy in the 1 and 2-dimensional sections relative to the 2-variant remained unchanged.

The 1st table shows the hydraulic coefficients of resistance of the receiving chambers and the pre-cameras in the joint and separate operation of pumps 5, 2 (1 + 2), 1 (1) and 1 (2).

The results of the conducted studies show that when 5 pumps work together, in the 3rd version the total coefficient of resistance is $\sum \xi_{t.b} = 0.567$, and in the second variant $\sum \xi_{t.b} = 0.7$, or a decrease in the coefficient The resistance was $\Delta \sum \xi_t = 0.133$. In the middle chamber, in the 3-variant $\sum \xi_{t.m} = 0.16$, and in the second variant $\sum \xi_{t.m} = 0.158$ or the decrease in the resistance coefficient is insignificant. The sum of the coefficients of resistance $\sum \xi_t = 0.363$ (in version 3) and $\sum \xi_t = 0.429$ (in the 2-variant), the reduction is $\Delta \sum \xi_t = 0.066$.

Operating pumps according to scheme 2 (1 + 2) and 1 (1) also showed a decrease in the resistance coefficient in the outer chambers. When the average pump 1 (3) was operating, the coefficient of resistance changed insignificantly.

At the site of the vestibule, water intake chambers, a reduction in the head loss is due to an improvement in the inlet conditions of the flow into the outermost chambers. Since the length of the vestibule is constant, the head loss in it relative to the 2 options is almost unchanged.

When carrying out the experiments in the third variant, the amount of sediment in the vortex zone relative to the two variants is 1.5 times, and in relation to the 1st variant it is 2.2

… 2.4 times smaller. Hence, the expansion of the flow in plan and vertically activates the bottom stream of the vestibule, reduces the degree of expansion of the transit flow and the degree of reduction in speed, and the deposition in it of sediments decreases. In the course of the experiments, the pump feed and head were measured. With simultaneous operation of 5 pumps, supply of an average of 3 pumps 5.6 l/s, 2 and 4 pumps, respectively, 5.48 … 5.61 l/s, in 1 and 5 pumps, respectively, 5.28 and 5.31 l/s.

This means that spreading the flow in the fore cabin creates a uniform distribution of the bottom stream into the water intake chambers and, by decreasing the angle of rotation at the inlet, the circulation near the suction pipeline disappears, the flow velocity of the flow is equalized, and the hydraulic resistances decrease. Therefore, the supply of the 3 pumps does not change, but for 1 and 5 pumps, relative to 3 pumps, 5.2 … 5.7%, and for 2 and 4 pumps, 1.6 … 2% less water supply. In the third variant, the supply of the extreme pumps 1 and 5 with respect to the 2 options is 5 … 5.5%, and in relation to 1 variant increases by 11 … 12%.

In the third variant, the areas of the swirl zones decrease, the activity of the bottom flow of the vestibule increases, and the flow spreads into the receiving chambers.

Proceeding from the foregoing, according to the design of the water receiving structure of the polygonal cross-section, the following conclusions can be drawn:

1) an unstressed inlet of the flow to all the chambers is ensured and the formation of the swirl zones is prevented due to the oblique entry of the flow into the outermost chambers;

2) when carrying out experiments according to the 3-variant, the amount of sediment in the swirl zone relative to the 2-variant is 1.5 times less, and relative to the 1-variant in 2.2 … 2.4 times;

3) the angle of the inlet of the flow into the outermost chambers is determined, which is within the range of 6 … 80, due to the improvement of flow spreading to the outermost chambers and the reduction of the vortex zone in the fore cabin, sedimentation is reduced;

4) when 5 pumps operate in the variant 3, the total resistance coefficient $\sum \xi_{t.b} = 0.567$, and in the second variant $\sum \xi_{t.b} = 0.7$ or the reduction in the coefficient of resistance is $\Delta \sum \xi_t = 0.133$;

5) with simultaneous operation of 5 pumps, the average 3-pump supply was 5.6 l/s, 2 and 4 pumps, respectively, 5.61 and 5.48 l/s, and 1 and 5 pumps, respectively, 5.28 and 5.31 l/s;

6) in the third variant, the supply of the extreme pumps 1 and 5 of the relative second variant increases in 5 … 5.5%, and in relation to the first variant in 11 … 12%.

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DUMP RIPPER FOR SOIL PROTECTION FROM WATER EROSION

Abstract: A dump ripper for soil protection from water erosion is proposed. It is established that the use of a dump ripper to reduce operating costs by 27.7%, fuel consumption by 24.5%, to increase labor productivity by 25.7% compared to existing plows.

Keywords: soil, water erosion, moisture conservation, ripper, loosening coefficient, two-tiered, comb, slope.

Introduction. Recently, erosion has caused a significant damage to the agriculture of Uzbekistan. Excessive soil treatment leads to the spread of wind and water erosion of soils. In Uzbekistan today, more than 70% of the sown areas are exposed to varying degrees of wind and water erosion [1, P. 16–19]. The most important measures to prevent soil erosion include the technology of soil treatment and technical means. But applied technologies and technical means for pre-tillage tillage in Uzbekistan not only does not prevent, but also contributes to the emergence and development of erosion processes [2, P. 71–73; 3, P. 115–117; 4, P. 58–63]. Since, the existing system of agriculture does not provide for measures to prevent wind and water erosion of soils. Consequently, the tasks associated with the development of soil-cultivating equipment that meet the requirements of measures to prevent water erosion of soils is very relevant [5, P. 81–84; 6, P. 86–88].

Objects and methods of research. The object of research is a dump ripper to protect the soil from erosion. The methods of system analysis and the rules of agricultural mechanics were used in the research.

Studies were conducted in 2017 in the Kashkadarya region of Uzbekistan. Stubble is a stubble of winter wheat. Type of soil – light gray. The average slope of the terrain is 7°. Humidity and hardness of the soil horizontally 0…10, 10…20, 20…30 cm was 8.1; 11.8; 13.4% and 2.21; 2.74; 3.19 MPa. Number of stubble residues 0.675 kg/m^2.

Results of the research. In order to prevent water erosion on sloping lands, the authors developed a technology that allows the step bottom of the furrow with large crests to be obtained at the bottom of the furrow, and crests on the surface of the field. The combination of subsoil ridges with superficial crests contribute to the complete retention and accumulation of soil water (especially after rainfall), respectively, water erosion is completely prevented.

To implement this technology, a two-tier dump ripper was developed with upper and lower ripping working organs [7].

The two-tier dump ripper (fig. 1) contains a frame 1, on which the working elements 2 and 3 are successively set in turn. Each working organ consists of a column 4 inclined in the transversely vertical plane and fixed on it a knife 5, a bit 6, a field board 7, and a ripping plate 8. The inclined part of the stand of the working member 2 is made with a lower height, and the inclined part of the working member 3 with a higher height. On each working organ 3 with a higher height is fixed the blade 9.

The two-stage blade ripper works as follows.

On the slopes of fields with a slope, the cultivation of the soil by the ripper is carried out across the slope. In the process of soil cultivation, the chisel 6 of the working organ 2 with a smaller height of the inclined part, penetrating into the arable layer, cleaves the soil shavings. The resulting cracks extend to the soil surface at a certain angle ψ. Moving ahead the chisel lifts the soil separate from the massif. At this point, a knife 5 of the rack 4 is being introduced into the zone of the deformed bit. The chipped soil, rising along it, enters the knife 5, then onto the loosening plate 8, with intensive destruction of the soil. This process is completed when the chips come off the working surfaces of the ripping plate 8 under the action of inertial forces and gravity forces. The chisel 6 of the working organ 3 with a greater height behind the working organ with a lower height of the inclined part of the rack 2 is inserted into the sub-plow layer below the plow sole, and under the action

of the knife and the ripping plate, the soil is loosely loosened. The blade 9 of the working organ 3 removes the top layer of the soil, which is in front of its stand, additionally loosens and wraps. The crests are formed on the surface of the treated field. This allows you to trap rainwater above the recess, as a result of which water is absorbed into it.

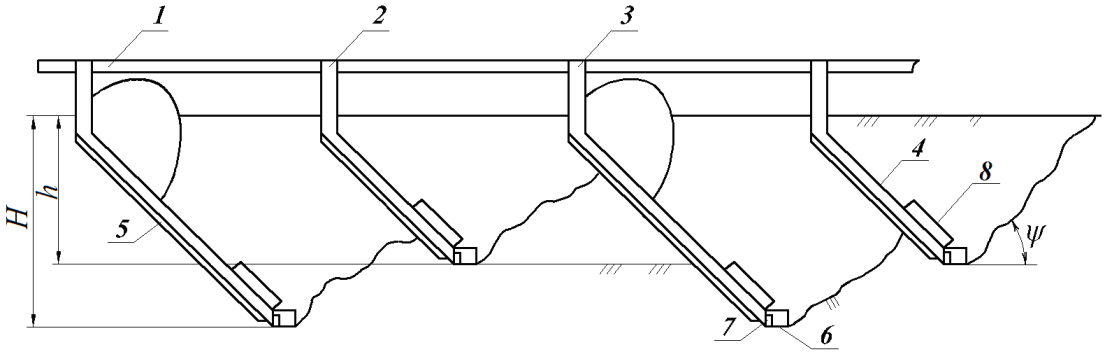

Figure 1. Technological process of operation a two-tier pile-up ripper

Thus, after the passage of the ripper, a stepped bottom of the furrow with a periodic groove (intrasoil ridges) intersecting the compacted sole and surface ridges is obtained. The combination of subsoil ridges with superficial crests contribute to the complete retention and accumulation of soil water (especially after rainfall), respectively, water erosion is completely prevented.

Based on the results of theoretical and experimental studies, an experimental two-level dump ripper was developed and manufactured and its production tests were carried out in comparison with plow PLN-4–35.

The results of the agrotechnical evaluation of the compared machines show that the dump ripper for the stability of the depth of soil cultivation, stubble conservation and the content of erosion-hazardous particles shows better results than plow PLN-4–35. When the dump ripper is working on the surface of arable land, crests are formed with a height of 12.1 cm, and at the bottom are also ridges. The distance between the ridges is 70 cm. The combination of the ridges of the furrow with the crests of the arable land surface helps to retain water and prevent the soil from washing off after rainfall, i.e. water erosion. At the same time, in the 0–5 cm layer, the amount of erosion-hazardous particles decreases by 1.87 times. The use of a dump ripper to reduce operating costs by 27.7%, fuel consumption by 24.5%, to increase labor productivity by 25.7% compared to existing plows.

The conclusion. It is established that the use of a dump ripper on sloping lands contributes to the retention and accumulation of soil water, and accordingly water erosion is prevented.

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HUMIDITY OF SAND AS BUILDING AND TECHNOLOGICAL CHARACTERISTICS OF NEW RESOURCE-SAVING TECHNOLOGY SOLUTIONS FOR FIXING SHIFTING SANDS

Abstract: The article describes the research methodology, results of experiments and discussion of the results, confirming the hypothesis of a new technological solution of fixing the moving sand to produce a significant resource-saving effect.

Keywor:

Introduction

Emulsions well impregnated in dry and in wet sand, however, the preparation of emulsions due to some difficulties: to obtain a homogeneous emulsion requires intensive mixing with water resins in the presence of surface-active agents (surfactants), and heated up to 70 °C [1; 2]. To do this, special arrangements apply.

Water-soluble binders, unlike high moil emulsions and binders, are prepared and applied easily, are more involved with sand during impregnation [3; 4]. Preparation and application of commercially available agricultural and road machines. At the same time, previously studied relatively expensive water-soluble substances or their clusters as an industrial waste in Uzbekistan absent [1; 2, 4–8].

In this regard, it seems urgent to develop new improved sand dune stabilization technologies based on the use of environmentally safe materials – industrial waste, by products of local production and fficient processing methods.

Research for new technological solutions

The study was carry out based on the new substance of the basic requirements [1–5] to the binder:

the ability to be absorbed into the sand to form after impregnation coagulation type of structure, nontoxicity, manufacturability, cost and availability.

Increased solubility dextrin and adhesive polymer KP-001 in cold water and an aqueous solution of high resistance allows their use as a binder in the preparation of the protective cover of binder sand [4].

Binding properties, high stability of the aqueous solution were the main parameters for the use of these materials as binders in order to secure the shifting sands.

1.1. Research method

Experiments carried out on the sands of the air dry and wet conditions. Humidity corresponds to the values allows the impregnation of sand and form a protective crust.

Samples protective crust resulting from the impregnation were test for compliance with criteria aggregate resistance to wind-sand flow.

Selection of the composition of the working solution for impregnation dextrin sand was study at different concentrations: 5%; 3%; and 2% (Figure 1).

Results and discussion

Elastic-viscos-plastic properties of the protective cover are key in ensuring its stability [1; 2; 4; 5]. A necessary and sufficient condition for the stability of the protective cover are two characteristics, focusing all the diversity of its properties: strength plastic the P m and the thickness of the crust h. The optimal structure correspond to the values of the P_m = (2.5–2.7) × 103 Pa, h = 5 mm. With an increase in the steepness of the slope for the smallest value of a continuous layer of plastic strength increases to the $P_m = 5 \cdot 10^3$ Pa. Protective crust of dextrin solution at maximum concentration and a minimum flow provides the required thickness of the protective cover; however, it is insufficient in plasticity – fragile and brittle. Consequently, when the quality requirements for the protective cover on the plastic strength $\left(P_m > 3 \cdot 10^3 Pa\right)$, the specific consumption of the solution can be reduced. To this end, the modification carried out with the addition of the solution of composition gossypol resin (WAN). Solutions of sand in this concentration range and binder flow provides one of the aggregates a protective cover, therefore, the study of the new method is a second criterion of $\left(P_m > 3 \cdot 10^3 Pa\right)$. There rise up of binder concentration to 2–2.5% in the dry sand and 3–3.5% in the wet sand plastic strength increases, but further its increase in concentration leads to a reduction in plastic strength.

The optimum composition of the solution in%:

- dextrin – 2.2; NaOH – 0.4; GS – 0.7; water – 96.7
- adhesive CP-001–2; NaOH – 0.4; GS – 0.7; water – 96.9.

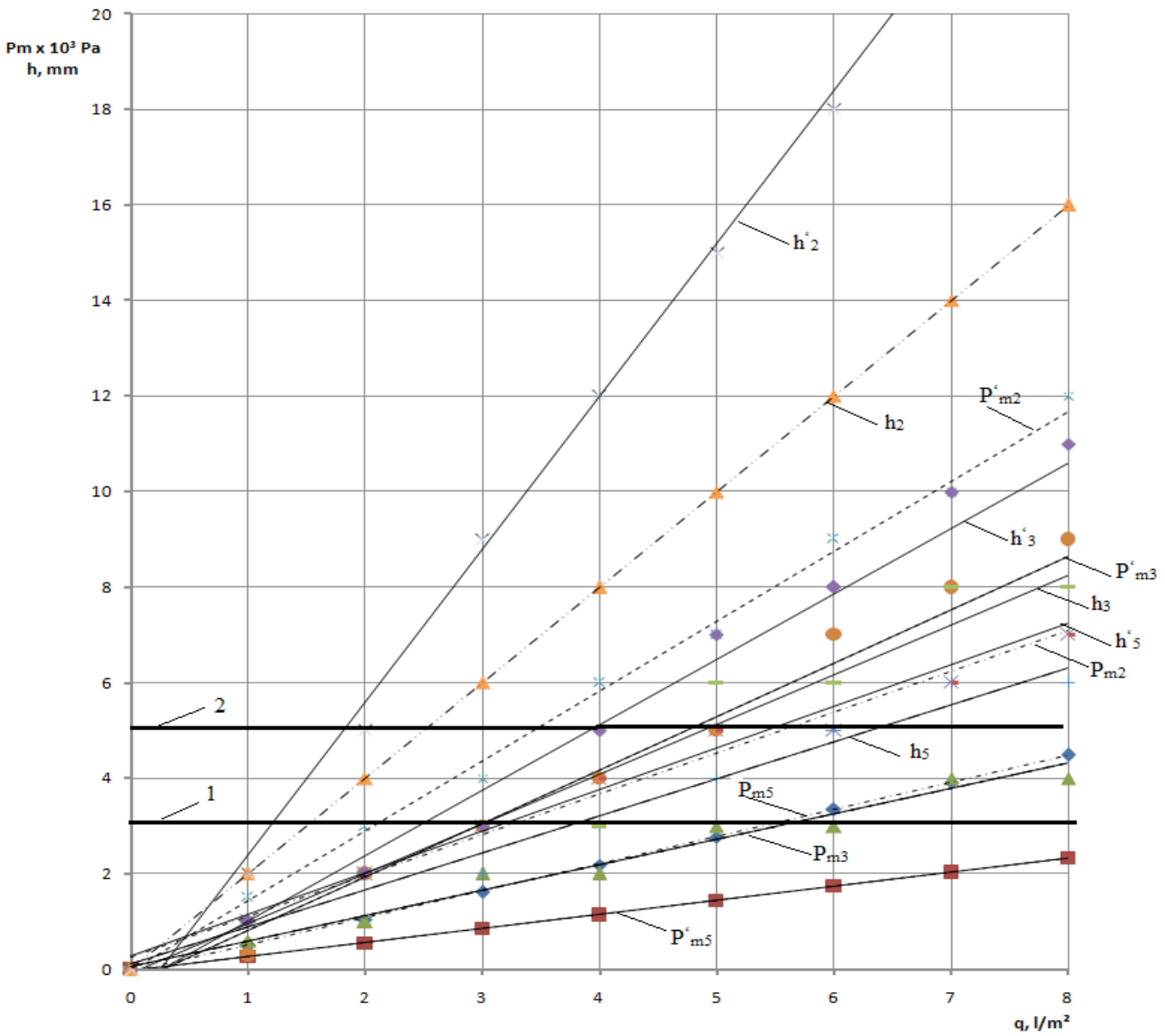

Figure 1. Plots of plastic strength P_m depth of impregnation *h* on the flow *q* dextrin binder solution: P_{m2}, P_{m3}, P_{m5} plastic protective peel strength, respectively peel strength 2%, 3%, 5% solution of dextrin on a dry sand; P^*_{m2}, P^*_{m3}, P^*_{m5} – plastic protective peel strength, respectively of 2%, 3%, 5% solution of dextrin on a wet sand; h_2, h_3, h_5 – thickness of the of the protective cover, respectively of 2%, 3%, 5% solution of dextrin on a dry sand; h^*_2, h^*_3, h^*_5 – the thickness of the protective cover, respectively of 2%, 3%, 5% solution of dextrin on a wet sand; 1 – necessary-sufficient condition for the stability of the peel strength of Pplastic the P_m; 2 – necessary-sufficient condition for the stability of the crust thickness protective cover *h*.

Cork obtained with the addition of the solution in the emulsion gossypol more plastic resin, thereby increasing its wind resistance. With an equal consumption of specific thickness peel solution on wet sand 1.5–2 times the thickness of the cake obtained in the dry sand, the thickness of the cover, in both cases must exceed the allowable thickness (5mm) for the aggregated demand of stability. Therefore, under the second condition $P_m > 3 \times 103$ Pa relative solution flow rate can be reduced.

Table 1 shows the formula depending on the strength and thickness of the plastic protective cover from the specific consumption of the solution obtained by the graphic interpretation of the results of experiments in Excel environment with a sufficiently high confidence level in the range of variation of 0.911–0.995.

Table 1.– Equations depending of technological settings protective cover from solutions of dextrin and polymeric adhesive KP-001

Solution of concentr ation,%	Dry sand		Wet sand	
	Pm, Pa	h, mm	Pm, Pa	h, mm
Protective crust from solutions of dextrin and sand				
5	P5 = 0.566q – 0.060	h5 = 0.775q – 0.109	P5 = 0.294q – 0.031	h5= 0.775q – 0.509
3	P3 = 0.532q – 0.065	h3 = 1.042q – 0.090	P3 = 1.120q – 0.312	h3 = 1.368q + 0.363
2	P2= 0.854q+ 0.254	h2 = 2q	P2 = 1.463q + 0.036	h2 = 3.2q – 0.08
Protective crust of the KP-001 solution of glue and sand				
5	P5 = 0.678 q + 0.75	h5 = 1.261 q – 0.166	P5 = 0.809 q + 0.916	h5 = 3.071 q + 0.75
3	P3 = 0.678x + 0.25	h3 = 1.595 q – 0.083	P3 = 0.75 q + 0.5	h3 = 3.202 q + 1.416
2	P2 = 0.595 q + 0.416	h2= 1.714 q	P2 = 0.666 q + 0.416	h2 = 3.428 q + 1.75

Conclusions

1. The new methods FFW using local cheap materials – CP-dextrin and 1 glue.

2. The equations depending on the strength of the plastic cover and the thickness of the specific consumption of different concentrations of the solution.

3. The possibility of using new technological solutions – consolidation of sand and glue dextrin KP-001 whereby the enlarged bank technology solutions.

4. The equations depending on the strength of the plastic cover and the thickness of the specific consumption of different concentrations of the solution.

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PREREQUISITES FOR THE DEVELOPMENT AND IMPLEMENTATION OF BUSINESS CLOTHES FOR SCHOOLCHILDREN

Abstract: the article presents the results of a survey of parents to identify the prerequisites for the development and implementation, as well as the formation of a rational wardrobe for business clothes for schoolchildren. In this case, after processing the questioning of parents about the main factor of future clothes, much attention is paid to socially-oriented issues of both the child and the family. As a result of the analysis of the research, recommendations were developed on the development and implementation of business clothes for schoolchildren, which gives an opportunity to improve the quality of products, social and economic effect.

Keywords: survey, premises, business clothes, schoolchildren, wardrobe, formation, color scale, social protection, age psychology.

At present, large-scale reforms of all aspects of the life of the republic are carried out by the state. One of the topical issues concerns the segment of youth policy, in particular the school uniform for students, taking into account the set of requirements [1].

The idea of returning the school uniform to educational institutions is becoming increasingly important. Today, in many schools, gymnasiums and lyceums, the school uniform becomes mandatory. The school uniform for girls and boys has many advantages:

– the smoothing of social inequalities, which can adversely affect the child's psyche;

– education in the child of internal discipline and good taste for an elegant business style;

– the formation of a sense of community and cohesion with the class, the school.

The school uniform, like any children's clothing, should be comfortable, practical, quality, to some extent, fashionable, and most importantly – it should be liked by the students themselves [2].

In recent years, this is not just a school uniform, but business clothes for schoolchildren are business school suits for girls and boys. The school uniform for girls includes such kinds of clothes as sundresses, complete sets, skirts, trousers, waistcoats, jackets, blouses, and for boys – jackets, pants, suits, vests.

Given the importance of this issue and to determine the wishes in the school uniform, a survey was conducted among the parents and the students themselves. The project involved about 1500 respondents. Respondents are mostly women (88.5%), their age is in the range of 18 to 60. But the majority are parents up to 45 years old (61.6%), 47.9% have two children, 28.3% have three children.

58.2% of the polled parents of boys want to see a school uniform as a set of pants and a vest, 27.8% want pants and a jacket. Also suggested options for the short with shorts for a hot period of the school year. Many talk about the practicality of knitwear in the school uniform [3].

More than half of the respondents speak about a facilitated form. The need for clothes of different types from different materials depends largely on the natural and climatic conditions. The composition of the wardrobe of the child, the number of products are determined mainly by the climatic features of the area.

Uzbekistan is located in a zone lying in the temperate and subtropical climatic zones, and is characterized by a hot, continental, arid climate.

Therefore, 34.6% of the parents of girls want to see the form of a set of skirts and vests, 31.1% of dress and sarafan, 25.5% – skirts and jackets. 65.9% that the shape should be up to the middle of the knee, 21.5% above the knee and 11.8% want a shape below the knee. Girls are urged to wear trousers for winter time.

There are differences in the requirements for clothing as part of the cash set of products from the urban and regional

population. This can be explained by differences in the way of life, mentality and the nature of the work of the inhabitants of the city and regions [4].

In this case, it is necessary to take into account the psychological influence of the color of the material. Gray, black, dark blue, dark green, olive and burgundy colors of the material are considered "official" colors that help to calm down and concentrate. And very bright colors cause irritation and distraction.

As for the color of the form, 46.9% of the respondents want a blue uniform, 22.2% are black, 21.1% want to see a combination of bright colors. 75.2% expressed a desire to see the school logo on the form. 59.9% would like to see the national element in clothing. Accessories in the form of a tie are advisable to enter the middle and senior level of the school for security purposes.

In addition, when choosing clothes, it should be taken into account that the child will have to sit at her desk for at least four hours. Therefore, one should not buy too "narrow" things, as well as clothes made from 100% synthetic fabric (warm in this dress will be hot, and in winter – cold).

An important indicator that reflects the social status of children is the level of physical and neuropsychic development. Without the definition of this indicator, the health assessment will be incomplete. The source of information about the physical state is the data of anthropometric measurements (length and weight of the body, chest circumference) obtained during medical examinations. The assessment of the achieved level of physical development and the degree of its harmony is carried out by comparing the obtained data with regional standards.

The poll also touched on the question of the sports form. 71.8% of the parents of the boys want to see a form for practicing physical culture complete with a T-shirt (or polo), sports pants and a sports jacket. There were suggestions to introduce shorts as a form option for a hot period [5].

60.5% of respondents also want to see the completeness of the sports form as boys (T-shirt / polo, pants and jacket), 19.2% prefer tunic and leggings, 4% t-shirt with a skirt pants above the knee. 37.6% consider blue color to be the most suitable color for sportswear. 26.7% turquoise, 14.5% red.

Junior school age is called the apex of childhood. In the modern periodization of mental development covers a period of 6–7 to 9–11 years.

At this age there is a change in the image and style of life: new demands, a new social role for the student, a fundamentally new type of activity – educational activity. At school, he acquires not only new knowledge and skills, but also a certain social status. The perception of one's place in the system of relations is changing. Changing interests, the values of the child, his entire way of life. The child is on the border of a new age.

From a physiological point of view, this is the time of physical growth, when children are rapidly rising, there is disharmony in physical development, it is ahead of the child's neuropsychological development, which affects the temporary weakening of the nervous system. There is increased fatigue, anxiety, increased need for movement.

The social situation in junior school age has its own characteristics. To them carry: educational activity becomes leading; the transition from visual-figurative to verbal-logical thinking is completed; the social meaning of the doctrine is clearly visible (the ratio of small schoolchildren to grades); the motivation for achievement becomes dominant; there is a change in the reference group; there is a change in the daily routine; strengthens a new internal position; the system of mutual relations of the child with surrounding people changes.

Perception is also characterized by involuntary, although elements of arbitrary perception are already encountered at preschool age. Perception is characterized by poor differentiation. In the younger school age, the orientation toward sensory standards of form, color, and time is growing.

Intensively developing self-awareness. The formation of the self-esteem of a junior high school student depends on the academic performance and features of the teacher's communication with the class. Of great importance is the style of family education adopted in the family values. Outperformers and some well-performing children develop an overestimated self-esteem. In poor and extremely weak pupils, systematic failures and low grades reduce self-confidence, in their capabilities. They have compensatory motivation. Children begin to establish themselves in another area – in sports, in music.

Value orientations in the name become the norm of life. It is important that the child accepts another type of address to him – by last name. This provides the child with self-esteem, self-confidence.

Now the priority in investments is increasingly shifting to those sectors where more stable and decentjobs are created. Including the garment industry. That is, the very development of the garment industry (including through state orders for school uniforms) will lead to the fact that more people will get employment, and accordingly fewer people will need social protection. Reducing the number of families covered by subsidies will allow increasing the size of subsidies that can be allocated to one family (that is, ideally poor families should receive from the state both school uniform and other children's breakfasts). And this will have a multiplying effect not only on children, equality and brotherhood, but also on stimulating demand for the products of national producers. These are the so-called spill-overeffects.

In general, it would be nice to calculate how much the state will need to spend on subsidies for the school uniform, and how much it will receive from creating jobs and education.

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THE ANALYSIS OF RESIDUAL FIBRATION OF SEEDS AFTER SAW GINNING

Abstract: In article are given the results of comparison tests of gins of different designs.It is analyzed the residual fibration of ginning seeds. It is established that not the full ginnng of seeds in saw gins. Single-chamber saw gins have much less residual fibration than in two-chamber gins.

Keywords: ginning, cotton-seed, fiber, seed, saw gin, working chamber, the flat end seed, the narrow end seed.

Introduction: Analyses of the conducted researches of the last decade in the field of a saw ginning of cotton-raw of foreign countries (the USA, China, India, etc.) and in Uzbekistan showed that development of a saw ginning went on the way of improvement of separate elements of saw gin design in particular of the working chamber, a grid-iron grid, the accelerator of rotation of the adobe roller, devices for exiting of the bared seeds from the middle of the adobe roller, etc. and also in the direction of increase quantity of saws on a shaft.

American companies "Lummus Cotton Gin Co.", "Moss Gordin Co.", "Hardwicke-Etter Co.", "The Murray Co." produce two-chamber gins with brush removal of fiber with different diameters of saws.

The Shandong Chinese-American firm (together with Continental Eagle USA) "Swan" on production of the cotton-processing equipment releases 80-saw, 96-saw, 139-saw and 171-saw two-chamber gins.

Now in Uzbekistan is produced single-chamber 130 – saw gins brand 5DP-130 with air removal of fiber.

Table 1. Main indicators of operating gin

№	indices	Company name				5DP-130	Gin CO. "Lebed"
		Lummus Cotton Gin Co.	Moss Gordin Co.	Hardwick Etter Co.	The Murray Co.		
1.	Productivity kg/mach. hour	1500	1250	1200	950	1250	1800–2300
2.	Gin type	Two-cameras.	Two-cameras.	Two-cameras.	Two-cameras.	One-cameras.	Two-cameras.
3.	Fiber cutting from saw teeth	brush	brush	brush	brush	air	brush
4.	Number of saw blades in the working chamber	1	1	2	1	1	1
5.	Diameter of the saw cylinder, mm.	305	407	305/286	547	320	420
6.	Rotational speed of the saw cylinder	830	700	650/695	545	730	620
7.	Number of saws on the shaft	170	161	252/252	142	130	171
8.	distance, Between sawing mm.	19.4	19.4	19.4	19.4	18	17
9.	The protrusion was drunk in the working chamber, mm	40	42	61/24	50,8	47–52	50
10.	Clearance between the bars, mm – in the working chamber – at the top – in the lower part	 3 13.1 8	 3 8 –	 3 4.2/4.0 7/5.5	 3 10 8	 3 4.5 5	 3 4.5–5 8–10
11.	Power consumption kW/h	55.2	36.8	55.2	36.8	75	75

The main technical characteristics of the existing gins are given in (table 1).

Apparently from the (table-1) the ginning devices manufactured in the USA have the following differences from gins 5DP-130:

– Removal of fiber from teeth drank – brush;
– the saw disk of big diameter is used;
– the quantity of saw disks are rather more;
– the accelerator of the adobe roller and the device for an additional conclusion of ginnng seeds is used;
– the expense of the electric power is less.

The main problems of process of a saw ginning is the excessive density of the adobe roller. In the working chamber of gin as a result of an untimely exit of ginning seeds, partial losses of fiber with ginned seeds.

In this direction a number of researches are conducted [1; 2; 3; 4] where there were attempts of decreasing in density of the adobe roller using the accelerator of rotation of the adobe roller, devices for exiting of the bared seeds from the middle of the adobe roller, the corresponding recommendations are made.

However, the problem of decreasing in density of the adobe roller in the working chamber of gin and acceleration of allocation of the bared seeds and also reduction of residual fibration of ginned seeds isn't solved. There was a need of deep studying of process of ginning and structure of the adobe roller for the solution of the problem in reduction time of staying of the bared seeds in the working chamber.

Now in the cotton-processing plants of the world are applied generally 3 types of the gin working chambers which are presented in (fig. 1).

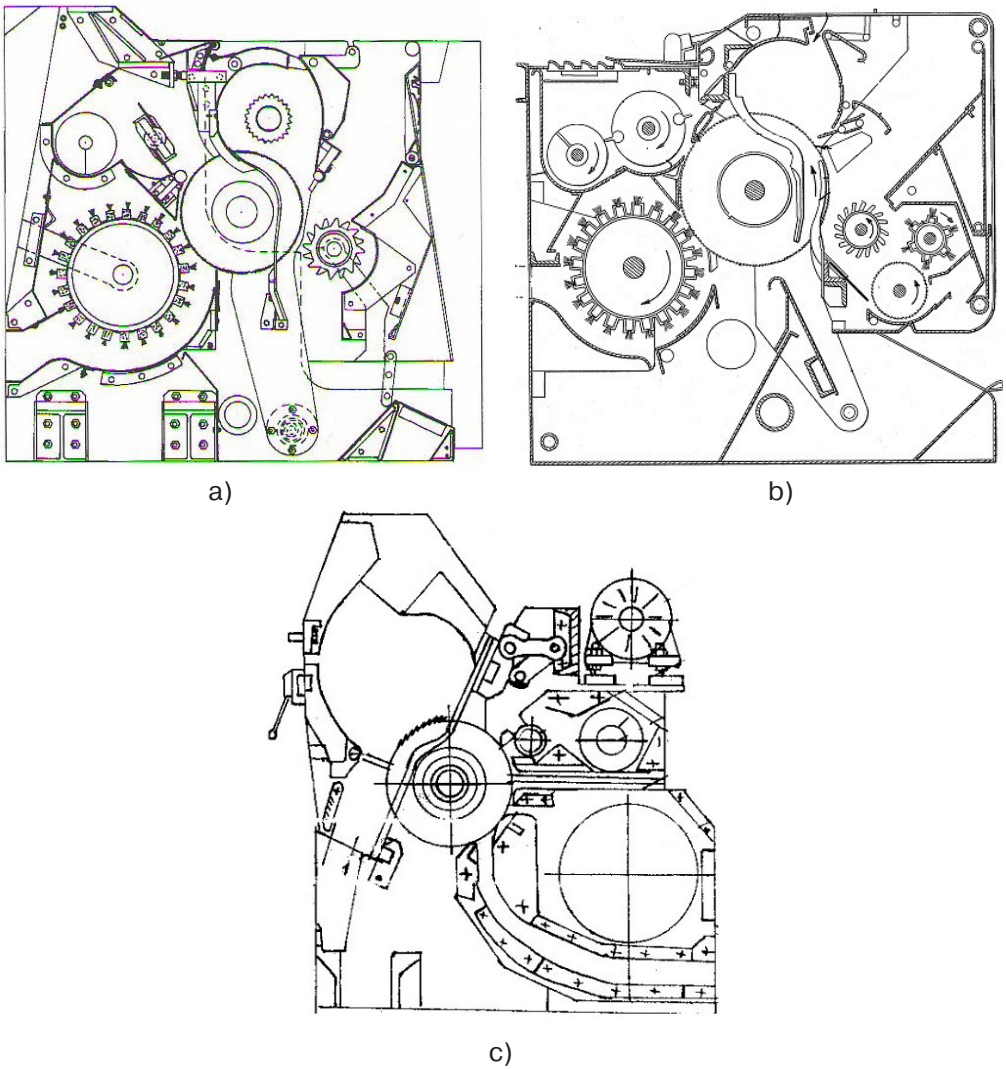


Figure 1. Lateral sections of saw gins working chamber:
a) MY-171 gin; b) Chinese two-chamber gin; c) gin 5DP-130

Objects and methods of the research. Objects of the research was taken saw gin of the MY-171 brand of the "Swan" company and the Chinese two-chamber gin without seed exiting device and also single-chamber gin 5DP-130.

Aim of the research is to study the design influence of gins on residual fibration of ginned seeds.

Experiments were made on cotton-raw S-6524 version, the II grade with humidity of 8,5% and contamination of 1.19%.

In 2 hours after start-up of gins simultaneously supply of cotton-raw is stopped and stopped a saw shaft and the working chamber rose up. Then it is opened an apron of the camera and by means of the special device were selected samples from the adobe roller 10 cm wide.

Results analysis. Taking into account earlier carried out research [5; 6; 7] it is established that fibers after ginning remains in different parts of seeds: in the flat end of seeds and in the narrow end, side parts of seeds. Proceeding from it, the fibration was determined by fractions. From sample were separated the remained fibers manually way and by weighing is determined the fibration of the seeds separated part. Results of research from five frequency are given in (fig. 1–4).

On MY-171 gin the seeds leaving through grid-iron grids and from the gin exiting device are analyzed separately. Average results of experiments from five frequency are given in (table 2).

Table 2.– Indicators of residual fibrillation of progenied seeds

№	Seed components	Indicators											
		Total mass of seeds, g			Weight of seeds without fiber, g.			Residual fiber, g.			Amount of seeds, pcs.		
		Gene MY-171		After the Gin 5DP-130	Gene MY-171		After the Gin 5DP-130	Gene MY-171		After the Gin 5DP-130	Gene MY-171		After the Gin 5DP-130
		After the grate	After the seed-discharge devices		After the grate	After the seed-discharge devices		After the grate	After the seed-discharge devices		After the grate	After the seed-discharge devices	
1.	the flat end seed	1.68	2.41	2.4	1.62	2.37	2.37	0.06	0.04	0.03	16	24	20
2.	the narrow end seed	12.31	19.83	20.59	12.06	19.5	20.43	0.25	0.33	0.16	113	182	166
3.	Lateral parts	1.57	1.21	–	1.51	1.16	–	0.06	0.05	–	14	12	–
4.	the flat end of seeds + in the narrow end	23.72	19.04	19.29	23.1	18.7	18.97	0.62	0.44	0.32	206	170	150
5.	the flat end of seeds + in the narrow end + lateral parts	10.79	6.82	5.4	10.29	6.52	5.26	0.5	0.3	0.14	94	61	45
6.	Seeds without fiber	–	0.66	2.39	–	0.66	2.39	–	–	–	–	6	20
7.	Total	50.07	50.07	50.07	48.58	48.91	49.42	1.49	1.16	0.65	443	455	401

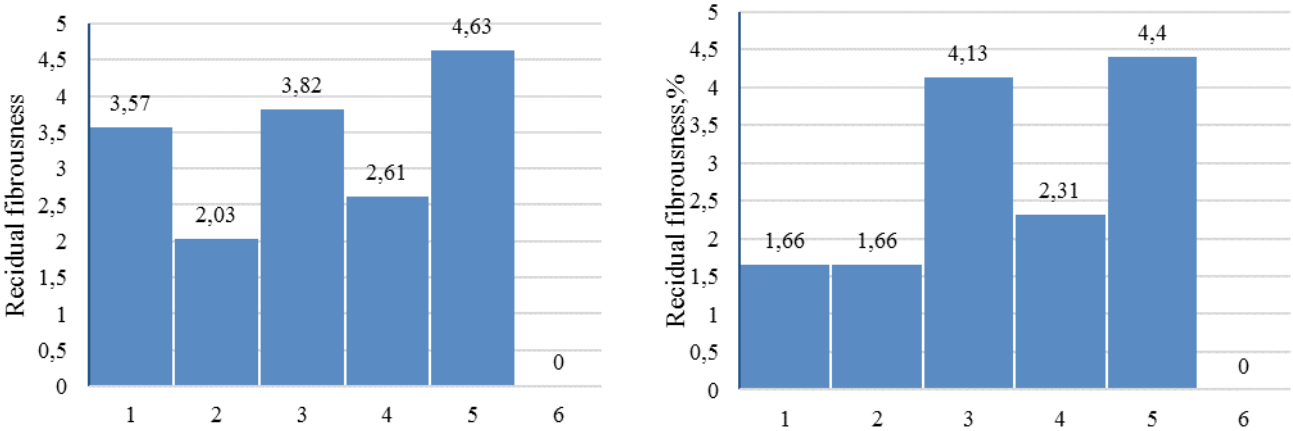


Figure 1. Residual fibration of seeds after MY-171 gin: a) The seeds leaving through grid-iron grids; b) The seeds leaving through seed leaving devices; 1 – the flat end of seed; 2 – the narrow end of seed; 3 – Lateral parts; 4 – the flat end of seeds + in the narrow end; 6 – bared seeds (seeds without fiber); 5 – seeds residual hairiness in different parts of a seed

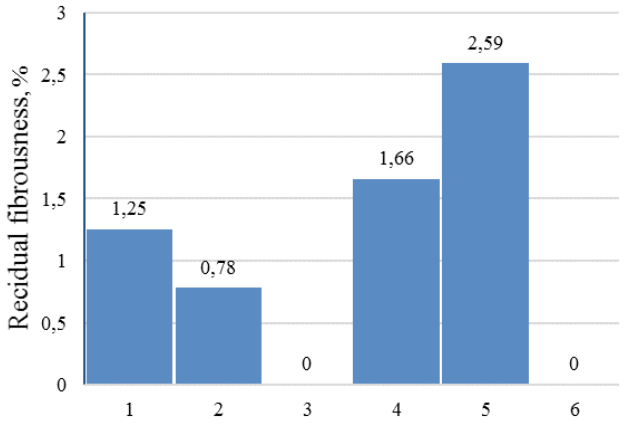


Figure 2. Residual fibrousness of seeds after gin 5DP-130

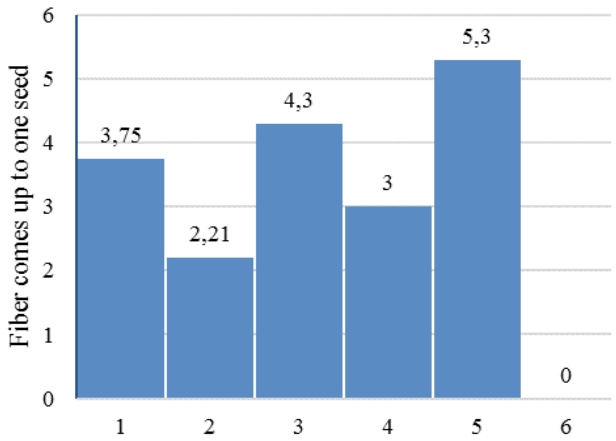
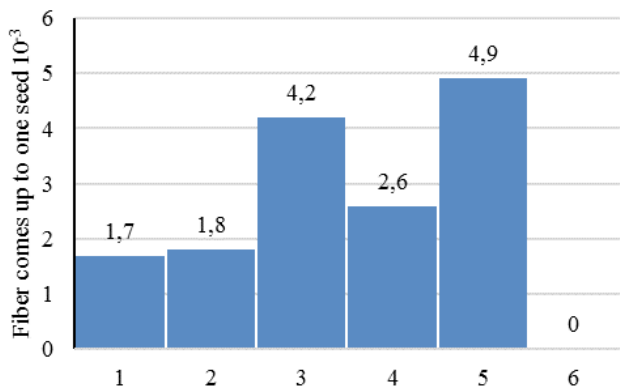


Figure 3. Residual fibrousness of singleseeds emerging through grate MY-171



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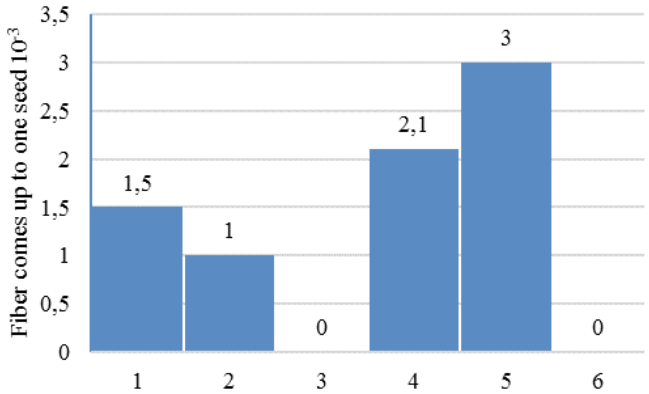

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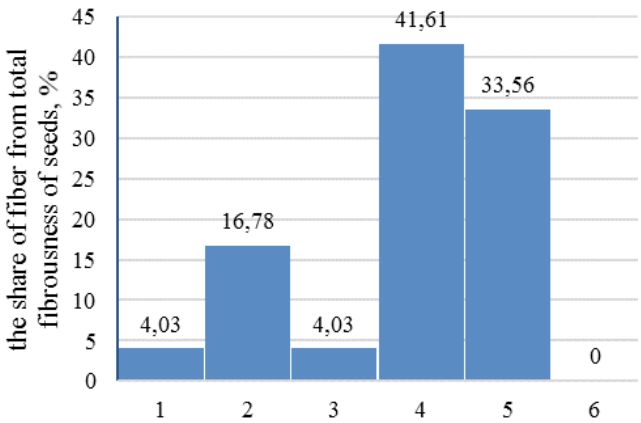
Figure 4. Residual fibrousness of single seeds after gin MY-171 and 5DP-130;
a) Gene MY-171, after the seed leaving devices; b) After the Gin 5DP-130



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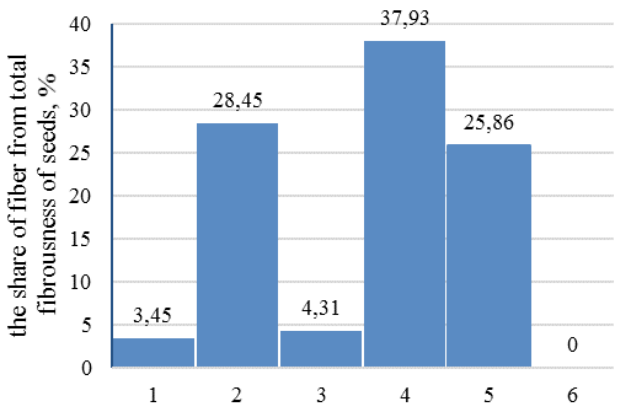


b)

Figure 5. The proportion of separated fiber seed particles emerging through the grate bars and the seed leaving devices of gin MY-171

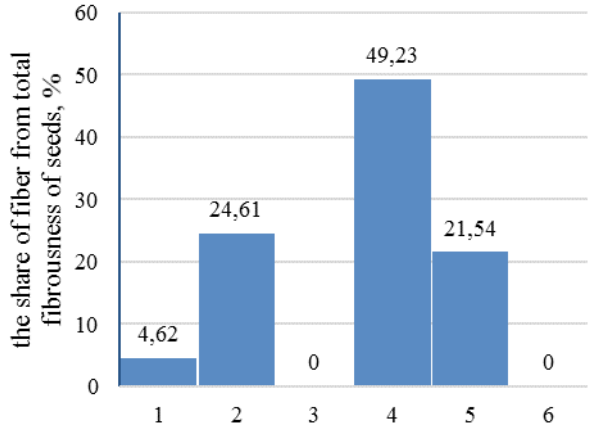


Figure 6. Share of fiber separated seed particles after gin 5DP-130

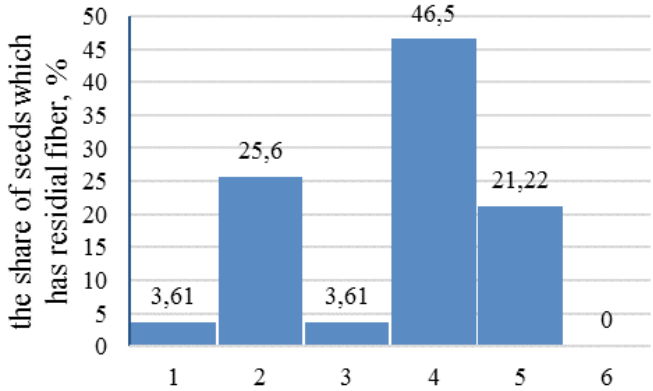
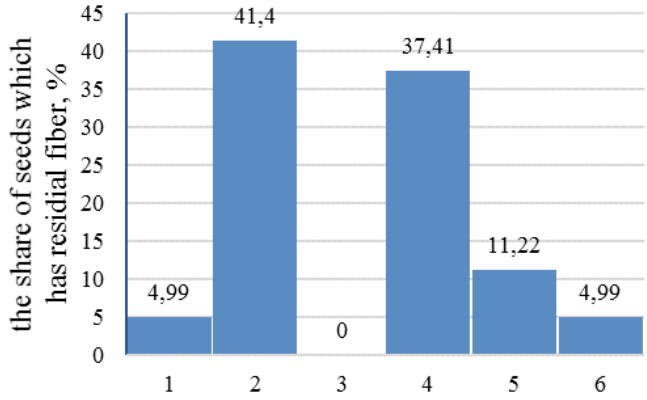


Figure 7. Proportion of seeds having residual fiber exiting through flat grate MY-171



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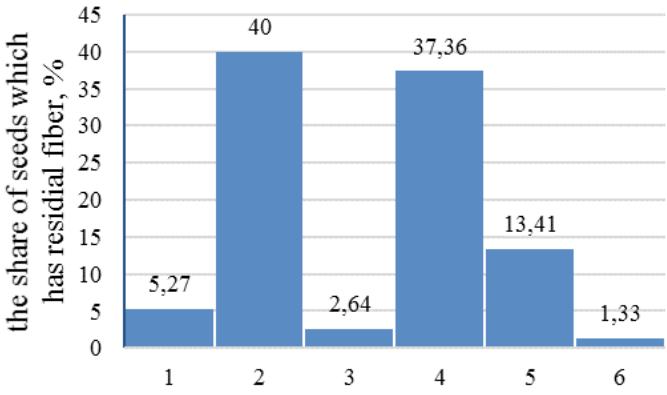

b)

Figure 8. Proportion of seeds having residual fiber after gin MY-171 and 5DP-130:
a) seeds coming out through the dehumidifying devices of gin MY-171; b) seeds after gin 5DP-130

We may see from the table –2 that partially fibers remain in all parts of seeds: the flat end of seeds, the narrow end and in a sidewall. After gin 5DP-130 in a sidewall of seeds there is no residual fiber.

Basic reason of a defective ginned micro-saw and chalaza part of seeds is the movement nature of seeds in the working chamber of gin. At rotation of the adobe roller probability of meeting with saw- teeth of the side part seeds is high therefore the wall of seeds separates quicker, chalaza and especially the narrow end parts of seeds does not often meet with saw teeth and therefore separating of fiber in this part happens slowly, in long period and not completely. Here it is also influenced the features of seeds, in particular rather less than length of fiber in the narrow end seeds more is the location density and the level of fiber fixing to the seed rather than side parts and on chalaza

From 1 to 3 figures are shown the residual fibration in parts of seeds after ginning, we may see that the minimum fibration is the seeds after ginning 5DP-130, then the seeds leaving through seed exit devices of MY-171 gin. The maximum residual fibration has "the flat end of seeds+the narrow end + in a sidewall "seeds then side parts of seeds leaving MY-171 gin through iron grids (4.63%), then seeds leaving through seed exit devices (4.4%) after them relatively more fibration side parts of seeds has after MY-171 gin. After gin 5DP-130 regarding "the flat end of seeds + the narrow end + in a sidewall " has more fibration (2.59%), and in a side part of fiber is absent.

The analysis of residual fibration of single seeds was also shown by identical results from the residual hairiness of separate parts (fig. 3 and 4). Changing character of sharing participation of separate parts of single seeds showed that in all variants relatively more residual fibration of hairiness has mixed parts (the flat end of seeds+ the narrow end + in a sidewall) seeds, then the sidewall (except 5DP-130). Here it is shown after gin 5DP-130 single seeds have the smallest amount of fiber.

For complete image was determined fiber shares in separate parts of seeds from the general residual fibration of seeds and the percentage content of separate parts of seeds which have residual fiber (fig. from 5 by 9).

It is shown, that in all options the considerable share of fiber remains in the part " the flat end of seeds+ the narrow end (according to 49.23% of 46,5% and 37.41%), " the flat end of seeds+ the narrow end + in a sidewall" (respectively 33.56%, 25.86% and 21.54%) and also in the narrow end (respectively 16.78%, 28.45% and 24.61%).

It should be noted that on MY-171 gin thanks to seed exit devices of seed arrangement in the adobe camera on the relation of saw teeth at rotation changes and at the same time the fiber separating in the narrow end and in the flat end happens better than on gin 5DP-130, i.e. seed exit devices positively influence on stripping of final parts of seeds.

From (Fig. 8 and 9) it can be seen that the number of seeds having residual fiber in the narrow end after the seed-exiting devices on the gin MY-171 and the gin 5DP-130 is more than the rest parts (40% and 41.4% respectively) and in the flat end of seeds+ the narrow end" (37.36, and 37.41% respectively), although the largest residual fibers are in the flat end of seeds+ the narrow end", which means smaller specific amount of fiber which is in individual seeds in the narrow end and in the flat end of seeds+ the narrow end ".

Residual fibrousness of ginned seeds is 1.3% (on the gin 5DP-130) and 2.98% (on the gin MY-171) is considered to raise, reducing fiber exit. To improve fiber exit, it is suggested regenerator RNS to capture pre-gin seeds and re-ginning them [7]. As our research shows, almost the whole weight of seeds after ginning has residual fibrousness, therefore there is no sense in their regeneration. The more effective option is two-chamber gin with using of gin regenerator 1DR-119 [6]. Gin regenerator 1DR-119 is designed for repeated ginning of the pre-ginned seeds.

Obtained results showed that, because of the high density of the raw roller on 5DP-130 gin, the pre-ginned seeds have less residual fiber content than on the MY-171 gin.

Conclusion: The analysis of the gin work MY-171 and 5DP-130 showed the following:

Almost all the pre ginned seeds are partially fibers on the flat end of seeds and on the narrow end, on gin MY-171 and in the side parts of the seeds, which reduces the fiber exit. On 5DP-130 gin due to the high density of the raw roller and the time of the seeds in the working chamber, the residual fiber of the pre-ginned seeds is much lower than on the MY-171 gin. Because of the seeds movement difficulty around their axis and the reorientation of their location in the working chamber with respect to the saw teeth, the possibility of grasping the fiber from the saw teeth located at the seed tips (in the flat end of seeds and on the narrow end) are minimal, which leads to incomplete seed ginning.

The residual fibrousness of seeds after ginning shows the usefulness of applying two-stage ginning with using gin regenerator 1DR-119 and conducting experimental research in this field to determine the rational regime of the second stage ginning.

The received results is shown, that because of the big density raw roller platen on gin 5ДП-130 pre-ginned seeds have smaller residual fibration rather than than on gin MY-171.

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INVESTIGATION OF FORMATION CONDITIONS PACKAGE AND ENSURING PILLARITY OF PILLOWS FROM COMPOSITE MATERIALS

Abstract: In this chapter of the dissertation work the questions of the use of composite materials that meet the modern requirements of industrial production, its varieties, composition, their properties, methods of obtaining composite materials, the effectiveness of their use in production conditions, including the use in the working bodies (cushions) of equipment for wet-heat treatment of parts of garments. Also given are information on the methods and mechanisms for forming a package of working elements (cushions) for wet-heat processing of garments when using composite materials.

Keywords: Composite materials, industry, composition, properties, efficiency, cushions, working elements, wet-heat treatment.

When modernizing the technology of making garments, it is necessary to save energy, raw materials, their secondary use, reduce the laboriousness of manufacturing products, solve problems aimed at expanding the range of products and improving its quality on equipment where parts and assemblies are made of new polymer composite materials.

The development of components or components of equipment from composite materials is not only related to its use in shaping and wet-heat processing of garments, but also to the formation of its structure and physical and mechanical characteristics, performed at the design stage of composite materials. Thus, the development of parts of equipment, for example, cushion press equipment for wet-heat treatment of composite materials is a promising and clear example of the triunity – the material, design and technology, because in the design and manufacturing processes provide the basic properties of the composite material. The greatest efficiency in the use of composite materials is achieved in solving problems of reducing metal consumption, energy intensity, improving strength, durability and reliability (specific strength), reducing weight and cost of structures, increasing technological productivity in combination with flexibility and versatility. For example, the use of composites in the production of aircraft is growing. Whereas in the production of Boeing 747 aircraft in 1969 only 1% of the components were made from composites, in the Voing 787 plane the proportion of composite parts is more than 50%. The use of composites allows the creation of more sophisticated aerodynamic designs and reduces the weight of the aircraft, which leads to savings of 4–6% of fuel [1]. The same example can be given endlessly in the automotive industry, in the activities of the management of housing and communal services, etc.

From the analysis of [1] it follows that the most effective and promising way of forming a package of the surface shell is a method based on deformation of the network structure.

Studies [1] showed that the shape attached to parts due to deformation of the network structure is not sufficiently stable, and requires additional fixing. The fixing of the bulk surface is

carried out mainly by means of edges and additional gaskets. Edge and additional gaskets do not provide fixation of the required surface and interfere with the process of forming the bag. The same mechanism can also be used for the formation of a rational package of cushion press equipment for wet-heat treatment of composite materials.

When analyzing the structure of deformed tissue sections [1] consisting of the main tissue and located at some angle of the adhesive pad, it is noted that a rectangular cell of the network structure of one system intersecting with threads of another system is divided into inactive triangles that limit the mobility of the packets.

It follows that the formed such a package system acquires high form stability and low mobility of the structure. Taking this into account, thus forming a package for any products, it is possible to achieve optimal properties (for transfer from anisotropic to isotropic state) necessary for the uninterrupted functioning of products made of composite materials, further in the dissertation work the possibilities of manufacturing press cushions for wet-heat treatment are considered.

The actual direction in improving the quality of garments is the improvement of the process and equipment for wet-heat treatment (WHT). The importance of the WHT is predetermined by the need for its use at various stages of the technological process of making garments (preliminary giving some parts or parts of details to the spatial form, interoperative WHT parts and assemblies, final finishing, etc.), which makes it easy to perform subsequent operations and generally effects on the quality of garments. The possibility of applying WHT for the manufacture of sewing articles by molding [1], which excludes multi-operation transitions and the costs of various resources associated with them, imposes a number of important requirements for the construction of working bodies – cushions of press equipment. First of all, this is due to the fact that all expenses for the design, manufacture and operation of airbags directly affect the cost of products, which should also be competitive in terms of quality and cost.

The existing designs of the working bodies of presses for the WTO, requires improvement, as they do not fully provide the final molding of products in accordance with the specified model, metal and with a large weight, energy-intensive, high construction cost. With a view to eliminating these drawbacks, a technology has been developed for manufacturing cushions for press equipment.

A package of multilayered composite material was used to make the pillows. When forming the package, it was taken into account that any fabric a priori possesses anisotropic properties, which under operating conditions under the influence of technological forces undergo non-uniform deformations in a plane normal to the acting load. Due to the inhomogeneous strain, a stress state arises that differs by different values of the main normal stresses δ_1, δ_2 and δ_3. In the case of a plane stress state, when $\delta_3 = 0$ (in the case of neglecting the thickness of the deformed body), we have $\delta_1 \neq \delta_2$.

In the case of creating a stack of multilayer composite material, it is important to arrange the layers relative to one another at a certain fixed angle, i. E. the angle between the strands of the system (layers) will be assumed to be $\beta = 15^\circ, 30^\circ, 45^\circ, 60^\circ, 75^\circ$ and 90°. In this way, a multilayer composite package can be used to determine the dependence of the strength parameters on the orientation of the layers of the package.

Further rotation of the layers relative to the previous layer repeats the similar arrangement of the filaments, but in the opposite direction.

Such an arrangement in the stack of layers of the composite material with a directed fiber orientation can create the prerequisites for providing conditions for equal resistance of any point of the loaded surface. This assumption is based on the fact that, in reality, in a networked multi-layered bag system, the filaments are positioned so close together that at any loaded point of the bag has the same picture of the arrangement of the warp threads. Therefore, the local deformation process, caused by biaxial stretching and taking place during the pressing of parts of clothing with the help of pillows in the WHT, should occur with the same degree of intensity. This will be possible if the surface layer of the cushions from the package of composite material is deformed elastically equally in all directions, i.e. showing the acquired isotropy and, as is customary in metal science, the quasi-isotropy of the material.

When the plane stressed state ($\delta_3 = 0$) is a particular case of a volumetric stress state, the principal stresses δ_1 and δ_2 are determined by the formulas: $\delta_1 = \frac{E}{1-\mu^2}(\varepsilon_1 + \mu\varepsilon_2)$

$$\delta_2 = \frac{E}{1-\mu^2}(\varepsilon_1 + \mu\varepsilon_1) \quad (1)$$

where the relative deformations 1 and 2 are respectively equal

$$\varepsilon_1 = \frac{\delta_1}{E} - \mu\frac{\delta_2}{E};\ \varepsilon_2 = \frac{\delta_2}{E_2} - \mu\frac{\delta_1}{E};\ \varepsilon_3 = -\mu\left(\frac{\delta_1}{E} + \frac{\delta_2}{E}\right) \quad (2)$$

It is important to note that the elastic characteristics of structural materials (E – modulus of elasticity, μ –coefficient of a punch) are applicable only for isotropic bodies. The elastic properties of anisotropic bodies (for example, single crystals) are characterized by a much larger number of constants – from 3 in the simplest case to 21 in the case of the most general form of anisotropy [2].

In the annex to textile materials, as shown by A. Solov'ev [3], the elastic modulus E should be considered as a modulus of relative rigidity (to the cross-sectional area S)

$$E = P/(\varepsilon S),$$

where, P – force; ε – relative deformation.

The ratio P/ε is usually called the stiffness of the material. Fibers and threads often undergo short-term and small stretches. So, if you give the fibers and yarns small elongations (up to 1%) and for a short (a few seconds) time, then the deformation in most of their species will be almost completely reversible and mostly elastic. The definition of modules under such conditions is completely correct and similar modules are often called initial ones, since they were obtained under the initial conditions of stretching. Such a module can be used to calculate the relationship between strain and stress in accordance with Hooke's law.

Thus, giving solid bodies isotropic properties makes it possible to use the mathematical apparatus of the theory of elasticity and plasticity to solve important applied problems to ensure the strength and load-bearing capacity of critical machine parts.

In accordance with the design scheme of the grid multilayer pack system, the forces in the rods act at different angles β and to determine the normal stress δ it is necessary to take into account the constant cross-sectional area of the yarn (rod). This problem can be simplified by considering a constant tensile load P within one rod, but causing different stresses (normal δ_i and tangential τ_i) in the plane of the section drawn at the same angles β = 15 °, 30 °, … 75 °. The position of the oblique section in the rod is determined by the angle β between the normal i to it and the x axis.

Because of the uniformity of the stress state in the rod, the stresses Pi along the oblique section are uniformly distributed, and they are parallel to the x axis. The area of the inclined section

where the relative deformations 1 and 2 are respectively equal

$$F_i = F / \cos\beta$$

From the equilibrium condition of the distinguished part

$$\Sigma X = -P + p_i F / \cos\beta = 0$$

It follows $P_i = \frac{P}{F}\cos\beta$ either $P_i = \delta\cos\beta$ (3)

Projecting P_i on the normal to the oblique section and its plane, we obtained

$$\delta_i = \delta\cos^2\beta \quad \tau_i = \frac{\delta}{2}\sin 2\beta \qquad (4)$$

Analysis of the dependences (2) shows that the normal stresses reach the greatest value at β = 0 (in cross sections); tangential stresses reach the greatest value at $\beta = 45^0$, with $\tau\max = \sigma/2$; The normal stresses acting in this section $\left(\beta = 45^0\right)$ are $[\sigma]\beta = 45^0 = \sigma/2$.

To analyze the stress state at the point of the rod section drawn at different angles β, it is expedient to calculate the values of cos2β and sin2β, which for a single external stress σ characterize the regularity of the variation of the normal σi and tangential stresses τ_i.

Experimental studies of deformations of the network structure of the tissue model were carried out using relief strings. Of these, meshes were made of 12 cells with sides of 20 mm. For preliminary deformation of the grid cells, the strings were fastened together so that the longitudinal strings were positioned relative to the transverse strings at an angle a = 45 °(network angle). Further, the transverse strings of one grid were fastened with strong threads with transverse strings of another grid at angles β equal to 15 ° and 30 °. Thus, a similarity of a composite material was created when all the reinforcing elements were fixed with the filler.

In this case, the normal stress σ almost twice exceeds the tangential stresses τ. Therefore, the destructive process is initiated by the action of normal stresses, which mainly cause brittle failure and plastic shear of the material is minimal. With an increase in the angle β from 15 to 30 °, the tangential stress, which is responsible for the plastic flow of structural materials, increases noticeably, and therefore it more intensively resists destruction until the exhaustion of the plasticity is exhausted. The most pronounced plastic deformations occur in the plane at an angle of 45 ° to the axis of the tensile (compressible) samples, forming the well-known Luders-Chernov lines.

Thus, on the basis of the foregoing, it can be concluded that an effective technology and design of a package of multi-layer composite material of a press tool for WTO components of garments has been created, differ in that it provides isotropic properties. Due to this, uniform strength, equal resistance to elastic deformations ands better retention of a given shape of the pillows are achieved. Therefore, the design of the cushions from the given composite material is able to significantly increase the efficiency of the press equipment for the WTO through the quality production of the details of clothing by molding.

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MODELING OF THE HEAT AND MOISTURE BALANCE OF THE HELIO-GREENHOUSE WITH THE PYROLYSIS HEATING INSTALLATION AND THE HEAT ENERGY UTILIZATION

Abstract: The physico-mathematical model of the heat and moisture balance of a solar heater with a pyrolysis heating installation under steady-state conditions is developed in the article. The developed mathematical model of thermal and material balances of the greenhouse allows to determine the heat load for heating and the required water flow for irrigation taking into account specific conditions.

Keywords: heat balance, helio-greenhouse, solar energy, pyrolysis installation, heat flow, heat, heating system.

Currently, much attention is being paid to the issues of energy saving and increasing the energy efficiency of thermal power systems for agricultural purposes. One of the ways to save traditional fuel and energy resources in agricultural facilities and facilities is the use of alternative and renewable energy sources (RES).

The production of fruit and vegetable products in the structures of protected soil requires high energy costs. In many countries of the world, for example in the Netherlands, Germany, energy consumption in greenhouses is 1 ÷ 1.5% of the national energy consumption and reaches 20 ÷ 35% of the total energy consumption in agriculture [1]. Energy costs in greenhouses are the determining factor for reducing the cost of greenhouse products. Now even in the developed countries of the world, the share of energy costs in the structure of the cost of vegetable products of protected soil is up to 70% [2]. In Central Asia, the energy intensity of vegetables grown in greenhouses is also very high. The production of 1 kg of vegetables in greenhouses consumed 10–13 kg.u.t. [3; 4].

Greenhouses are biological and heat engineering devices and they can be greatly improved if they are turned into solar greenhouses. Solar energy in an ordinary greenhouse is used mainly for the process of photosynthesis, in which plants absorb and accumulate up to 10% of the energy of the incident solar radiation [4; 5; 6]. The solar greenhouse itself is a passive solar heating system. The conducted studies show that the passive solar heating system of greenhouses in winter mode provides only 30% of the heating load [7; 8]. Simulation and study of the thermal balance of a solar greenhouse with a passive heat accumulator was considered in [9]. The authors in [10] presented the results of modeling the unsteady temperature regime of helio-heaters with short-term heat accumulators.

Thus, in the solar greenhouses, especially in the night mode, in winter an additional alternative energy source is required. World experience in the development of greenhouse production points to the need to introduce energy-saving technologies and heating methods on the basis of non-traditional renewable energy sources (NER).

With the purpose of solving the above-mentioned problems, we have developed a combined heating system for solar greenhouses with a pyrolysis heating plant and a heat recovery device (condensing heat of the condenser of the pyrolysis unit cooler).

To assess the effectiveness of the proposed system, let us consider the heat balance of a solar greenhouse with a pyrolysis heating installation (POU) and thermal energy utilization (UTE). In this case, the structure is considered as a single energy system, which includes heating, ventilation, humidification, utilization and accumulation of thermal energy and heat engineering of enclosing structures.

The computational scheme of the energy balance of the greenhouse with the UU and UTE is presented in (Fig 1).

Based on the developed calculation scheme, we compile a system of equations for the energy balance of the structure, which is a physico-mathematical model for the formation of the energy regime in the greenhouse.

The equation of the heat balance of the greenhouse as a whole has the following form:

$$Q_{ot} + Q_p + Q_{my} = Q_{ogr} + Q_{vent} + Q_{inf} + \\ + Q_{pos} + Q_{gr} + Q_{rast} + Q_{cond} + Q_{uvl} + Q_{dr} + Q_{eks}, \text{Vt} \quad (1)$$

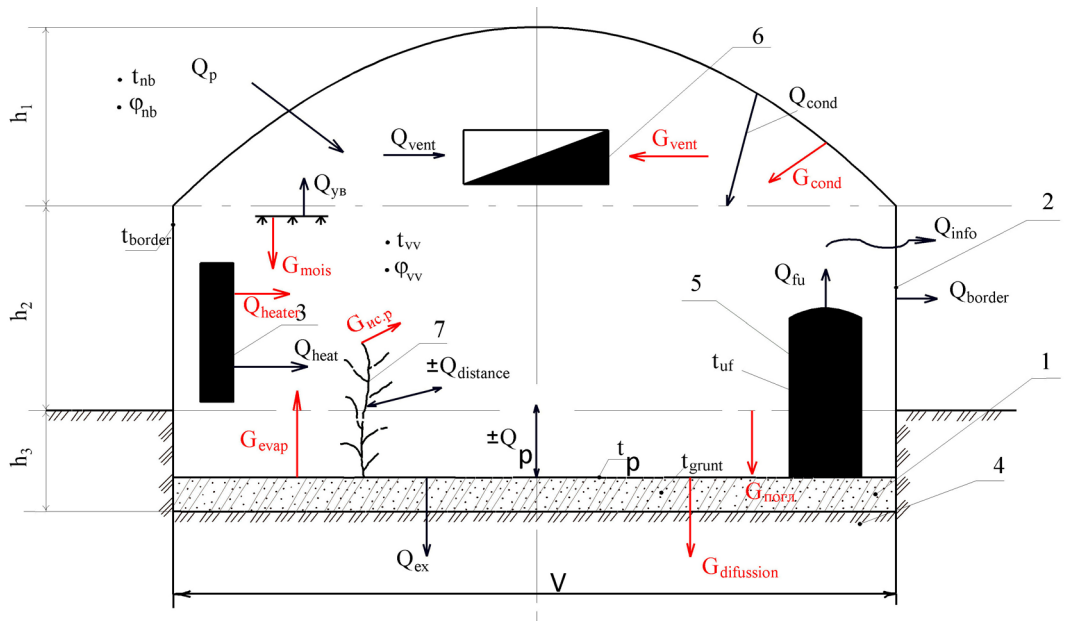

Figure 1. The calculation scheme of the energy balance of the greenhouse with pyrolysis heating installation and heat energy utilization; 1 – soil of the greenhouse; 2 – fencing; 3 – heating battery; 4 – subsoil ground; 5 – utilizer of thermal energy – heat accumulator; 6 – ventilation opening; 7 – plants

where, Q_{ot} – heat transfer (thermal power) of the heating system, *W*; Q_p – penetrating solar radiation, *Vt*; Q_{my} – heat flow from the heat energy recovery system, *Vt*; Q_{ogr} – loss of heat through the fence, *Vt*; Q_{vent} – loss of heat with ventilation air leaving the greenhouse through the exhaust ventilation opening, *Vt*; Q_{inf} – heat loss through leakage in the enclosure (infiltration), *W*; Q_{poc} – heat exchange with soil, *W*; Q_{gr} – heat loss through the ground, *W*; Q_{rast} – heat exchange with plants, *W*; Q_{kond} – is the heat released during the condensation of water vapor and the inner surfaces of the transparent coatings of the greenhouse, *W*; Q_{uvl} – heat, introduced by moisturizing water from the air humidification system, *W*; Q_{dr} – heat flux, released by breathing plants, *W*; Q_{eks} – operational heat inflows, *Wt*.

The heat balance equation for the soil surface in the greenhouse:

$$Q_{poc} = Q^n_{konv} + Q^n_{luc} + Q^n_{isp} + Q_n, Vt \qquad (2)$$

where, Q^n_{konv} – convective heat heat flow from soil to air in the working area of the greenhouse, Vt; Q^n_{luc} – the radiation is the radiant heat flux from the soil surface in the greenhouse, *Vt*; Q^n_{isp} – is the heat flux characterizing the heat expended on evaporation of moisture from the soil, *Vt*; Q_n – is the heat absorbed by the soil of the greenhouse, *Vt*.

The equation of heat balance on the surface of the fence of the greenhouse:

$$Q^{ov}_k + Q^{ov}_{luc} + Q^{ov}_{kond} = Q^{on}_k + Q^{on}_{luc}, Vt \qquad (3)$$

where, Q^{ov}_k – is the heat flux as a result of convective heat exchange of the inner surface of the enclosure with air in the greenhouse, Vt ; Q^{ov}_{luc} – radiant heat flux from the inner surface of the fence,; Q^{on}_k – he is the heat flux as a result of convective heat exchange of the outer surface of the enclosure with the surrounding air, Vt ; Q^{on}_{luc} – the radiation is the radiant heat flux from the outer surface of the enclosure, Vt ; Q^{ov}_{kond} – heat flow, which characterizes the evolution of heat during the condensation of water vapor on the inner surface of the enclosure, Vt .

Heat losses through the greenhouse fence can be determined from the heat transfer equation;

$$Q_{ogr} = KF_{ogr}\left(t_{nv} - t_{bb}\right), Vt \qquad (4)$$

or

$$Q_{ogr} = \frac{t_{ogr} - t_{nb}}{R_t} F_{ogr}\left(1 + \beta_{inf}\right), Vt \qquad (5)$$

where, K – is the heat transfer coefficient of the greenhouse fence, $\frac{Vt}{м^2 \cdot K}$; F_{ogr} – total greenhouse fence area, m^2; t_{nb} – temperature of outside air, °C; t_{bb} – air temperature in the greenhouse, °C; t_{ogr} – temperature of the outer surface of the enclosure of the greenhouse, °C; $R_t = R_{ozp} + \frac{1}{\alpha_н}$ – thermal resistance to the heat transfer of the enclosure, $\frac{m^2 \cdot K}{Vt}$; $\alpha_н$ – heat transfer coefficient of the outer surface of the enclosure, $\frac{Vt}{m^2 \cdot K}$; β_{inf} – coefficient of infiltration of outside air, for greenhouses can be taken equal to 0.2.

The radiant heat flux Q_{luc} I from the heat exchange between the soil surface and the inner surface of the greenhouse enclosure, provided that $t_{pog} > t_{ogr}$ and $\varphi_{12} = 1$ (all thermal ra-

diation from the surface of the soil 1 falls on the inner surface of the enclosure 2 of the greenhouse) is determined by the formula.

$$Q_{luc} = c_o \varepsilon_{np12} F_{pov} \left[\left(\frac{T_{pov}}{100} \right)^4 - \left(\frac{T_{ogr}}{100} \right)^4 \right], \ Vt \quad (6)$$

where, c_o – is the emissivity of the absolute black body, 5.67 $\frac{Vt}{(m^2 \cdot K^4)}$; ε_{np12}; – reduced relative coefficient of thermal radiation of the soil surface 1 and the inner surface of the enclosure 2 of the greenhouse; F_{pov} – the surface area of the soil 1, m^2.

Absolute surface temperatures and fences:

$$T_{pov} = t_{pov} + 273.15 \text{ K} \quad (7)$$

$$T_{ogr} = t_{ogr} + 273.15 \text{ K} \quad (8)$$

The convective component of the heat exchange between the internal air and the inner surface of the fence of the greenhouse 2 can be determined according to the Newton-Richmann law:

$$Q_k^{ov} = \alpha_{bn} \left(t_{bb} - t_{ogr} \right) \cdot F_{ogr}, Vt, \quad (9)$$

where, α_{bn} – coefficient of heat transfer from the inner surface of the enclosure of the greenhouse, $\frac{Vt}{m^2 \cdot K}$.

The heat flow from the outer surface of the enclosure to the ambient air is also calculated according to the law of convective heat transfer

$$Q_k^{on} = \alpha_{nap} \left(t_{ogr} - t_{nb} \right) \cdot F_{ogr}, Vt, \quad (10)$$

Loss of heat with outgoing ventilation air Q_{vent} is numerically equal to the heat flow that goes to heating the supply air entering the greenhouse through its ventilation opening, i.e.

$$Q_{vent} = G_b \left(i_{bb} - i_{nb} \right), Vt \quad (11)$$

or

$$Q_{vent} = G_b \cdot c_p \left(t_{bb} - t_{nb} \right), Vt \quad (12)$$

where, G_b – mass flow of supply air, participating in the air exchange of the greenhouse, kg/s; $i_{bb} - i_{nb}$ – respectively, the specific enthalpy of indoor and outdoor air, DJ/kg; c_p – is the specific isobaric heat capacity of air, $DJ/\text{kg} \cdot °\text{C}$.

The losses of heat through the leakage of barriers (infiltration) on the basis of experimental studies are calculated depending on the heat loss through the fence and constitute an average of 20% of heat loss through the fence:

$$Q_{inf} = \frac{a\left(t_{bb} - t_{nb} \right)}{100} \cdot Q_{ogr} \quad (13)$$

or

$$Q_{inf} = 0,2 \cdot Q_{ogr}, \ Vt \quad (14)$$

Convective heat exchange between the soil surface 1 and the internal air of the greenhouse obeys the Newton-Richmann law:

$$Q_{konv}^n = \alpha_{poc} \left(t_{pov} - t_{bb} \right) \cdot F_{pov}, Vt, \quad (15)$$

where, α_{poc} – soil is the heat transfer coefficient of the soil surface, $\frac{Vt}{m^2 \cdot K}$.

The heat flux consumed by the evaporation of moisture from the soil surface is determined by the formula

$$Q_{isp}^n = G_{isp}^n \cdot r, Vt, \quad (16)$$

Heat losses through the soil are calculated by the formula [4; 5]:

$$Q_{gr} = \frac{t_{pov} - t_{nb}}{R_r^{cp}} \cdot F_n \quad (17)$$

where, R_r^{cp} is the average resistance of heat transfer through the soil in the greenhouse.

The temperature regime of a helio-heater depends not only on the effects of solar radiation and heating and ventilation systems, but also on the interaction of the air environment with soil and plants.

Convective heat exchange, due to the temperature difference between plants and air, can be determined by the formula:

$$Q_{rast} = \alpha_{rast} \cdot F_{rast} \left(t_{rast} - t_{bb} \right), Vt, \quad (18)$$

where, α_{rast} – rest is the heat transfer coefficient from the plant surface, $\frac{Vt}{m^2 \cdot K}$; F_{rast} – surface of plants, m^2; t_{rast} is the average temperature of plants, °C.

Heat transfer by transpiration (evaporation of water by plant leaves)

$$Q_{isp}^{rast} = mrF_{rast}, Vt \quad (19)$$

where, m – speed of transpiration, $0,03 \div 0,3 \frac{g}{\left(m^2 \cdot C \right)}$; r – is the heat of vaporization, r = 2257 kDJ/kg.

The work also takes into account the influence of the heat of breathing of plants on the heat balance of the greenhouse. The heat flux released during the respiration of plants is calculated by the formula [11].

$$Q_{d.r} = 0,2\,s \cong 0,2\,Vt / m^2 \quad (20)$$

Heat generated by condensation of water vapor on the inner surface of a film coating

$$Q_{kond} = G_{kond} \cdot r, Vt, \quad (21)$$

where, G_{kond} – is the condensate flow rate, kg/s; r – latent heat of condensation, DJ/kg.

Heat that penetrates the humidifying air through the humidification system:

$$Q_{uvl} = G_{uvl.v} \cdot c_p \left(t_{uvl.v} - t_{bb} \right) \quad (22)$$

Operational heat fluxes are determined by the formula:

$$Q_{eks} = Q_{edv} + Q_{osv} + Q_{lyd} + Q_{pr}, Vt \quad (23)$$

where, Q_{edv} – heat inflow from the operation of electric motors of fans and pumps in the greenhouse, Vt; Q_{osv} – heat input from the lighting system, Vt; Q_{lyd} – heat input from working personnel, Vt; Q_{pr} – other operational heat fluxes, Vt.

Heat losses from electric motors of fans, pumps and other electrical equipment are determined by the formula [11].

$$Q_{edv} = N_e \cdot n, Vt, \quad (24)$$

where, N_e – electric motor power, *Vt*; *n* – the number of electrical equipment, pcs. Heat input from lighting [11]:

$$Q_{osv} = A \cdot F, Vt, \quad (25)$$

where, *A* – the amount of heat emitted by the lighting devices per 1 m² of the greenhouse area, *A* = 4 *Vt*/m²; *F* – is the area of the greenhouse, m².

Heat supply from working people in the greenhouse [11]:

$$Q_{lyd} = 350 \cdot m, Vt, \quad (26)$$

where, *m* – number of employees in the greenhouse; 350 *Vt* – heat dissipation from one person at an average intensity of work.

Heat flow from the surface of the heating batteries:

$$Q_{ot} = \alpha_{ot} \cdot F_{ot}\left(t_{n.ot} - t_{bb}\right), Vt, \quad (27)$$

where, α_{ot} – coefficient of heat transfer from the surface of the heating batteries, $\frac{Vt}{m^2 \cdot K}$; F_{0t} ; – the surface of the heating batteries, m²; $t_{n.ot}$ – average temperature of the surface of the heating batteries, °*C*.

Inflow of solar radiation inside greenhouses according to the formula [4]:

$$Q_p = q_p \cdot K_{prop} \cdot \alpha_n \cdot F, Vt, \quad (28)$$

where, q_p – the power of the total incident solar radiation, *Vt*/m²; K_{prop} – the transmittance of solar radiation of the light-impregnated greenhouse fence; a_n – coefficient of absorption of solar radiation of air; *F* – is the area of the greenhouse, m².

The amount of heat from the heat recovery system is calculated from the heat transfer equation:

$$Q_{ut} = K \cdot F_{ut}\left(t_{ut.v} - t_{bb}\right), Vt, \quad (29)$$

or

$$Q_{ut} = \alpha_{n.ut} \cdot F_{ut}\left(t_{st.ut} - t_{bb}\right), Vt, \quad (30)$$

where, *K* – is the heat transfer coefficient, $\frac{Vt}{m^2 \cdot K}$ F_{ut} – area of heat transfer of heat energy utilization, m²; F_{ut} – temperature of hot water in the utilizer, °*C* ;$\alpha_{n.ut}$ – coefficient of heat transfer from the heat recovery surface, $\frac{Vt}{m^2 \cdot K}$ $t_{cm.ym}$ temperature of the heat exchanger wall, °*C*.

The equation of the material balance of the helio-greenhouse can be represented by the following equation:

$$G_{isp} + G_{uvl} + G_{kond} = G_{vent} + G_{inf}, kg/s \quad (31)$$

where G_{isp} – evaporation of moisture from the soil surface, kg/s; G_{vent} – loss of moisture with exhaust air leaving the greenhouse through the ventilation line, kg/s; G_{inf} – loss of moisture from the greenhouse through air infiltration, kg/s; G_{uvl} – is the moisture inflow, i.e. the amount of moisture entering the greenhouse through the humidifying air, kg/s; G_{kond} – condition the amount of moisture released during the condensation of water vapor on the inner surfaces of the greenhouse fences, kg/s.

Evaporation of moisture from the soil surface can be determined by the mass transfer equation:

$$G_{isp} = G_{isp} = K_{op}\beta_p\left(P_{pov} - P_{bb}\right) \cdot F_{pov}, \ kg/s \quad (32)$$

where $K_{or} = \frac{F_{pov}^{or}}{F_{pov}}$ – soil irrigation coefficient.

If $K_{or} = 0$, then the irrigation of the soil is completely absent. If $K_{or} = 1$ – the entire soil surface is irrigated in the greenhouse; F_{pov}^{or} – is the area of the irrigated part of the soil surface, m²; F_{pov} – the surface area of the soil in the greenhouse, m². β_p – is the average mass-transfer coefficient of the soil surface, $\left(\frac{kg}{m^2 \cdot C \cdot Pa}\right)$; P_{pov} and P_{bb} – partial pressure of water vapor, respectively, at the surface of the soil and far from it, Pa.

The amount of moisture coming in with humidifying air (through the supply air duct)

$$G_{uvl} = W_{uvl}\left(d_n - d_\partial\right), \ kg/s \quad (33)$$

where $W_{увл}$ – moisture content of air after humidification, kg/s; d_n – isture content of air before humidification, kg/s; d_∂ – moisture content of air before humidification, kg/s.

The loss of moisture with the air leaving the greenhouse is determined by the following formula

$$G_{vent} = W_b\left(d_{bb} - d_{nb}\right), \ kg/s \quad (34)$$

where W_b – is the exhaust air flow in the ventilation system, d_{bb} – and d_{nb} – is the moisture content of the indoor and outdoor air, g/kg.

The equation of material balance on the soil surface has the following form:

$$G_{pol} = G_{pogl.r} + G_{isp}, \ kg/s \quad (35)$$

where G_{pol} – is the flow of water going to watering the soil, kg/s; $G_{pogl.r}$ – the expense of water absorbed by plants, kg/s.

Equation of material balance (31) and (35) is also an important condition for determining the temperature t_{bb} and relative humidity φ_{bb} in the internal air.

In (Fig. 2) shows the possible heat balance of the helio – greenhouse in the natural and climatic conditions of Karshi. The analysis of the obtained results shows that in the radiation – climatic conditions of Karshi, the energy supply of film solar heaters due to solar energy is 25–30% (in winter). Based on the calculations and experimental studies carried out, it is established that due to combined use of solar radiation and biomass energy, the heat demand of the greenhouse for heating is fully provided. At the same time, the heat recovered from the condenser of the pyrolysis plant covers 29.5 ÷ 44.7% of the heat load.

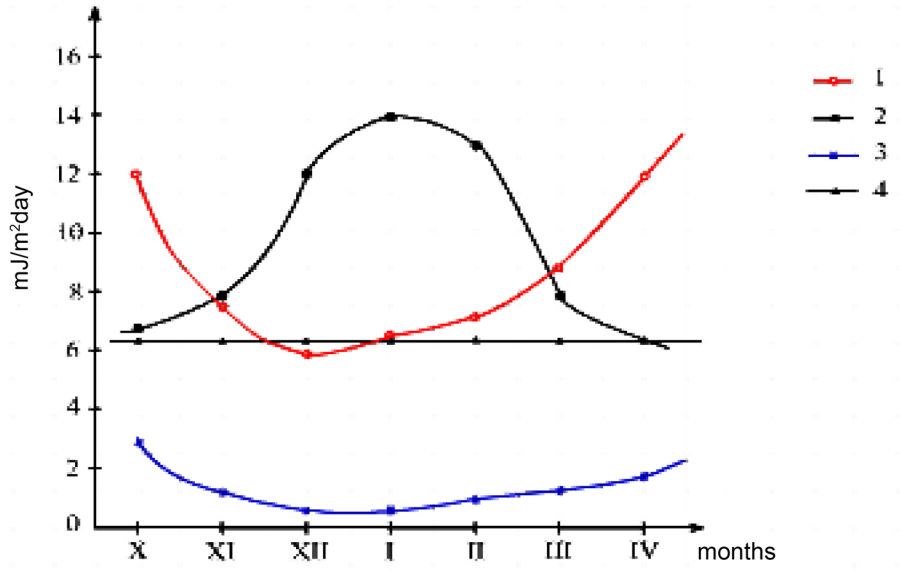

Figure 2. Dynamics of changes in heat fluxes in a helio-heater: 1 – total solar radiation (Qpr) is the simplest in a helio-heater; 2 – total heat losses (Qtp) in the greenhouse; 3 – solar energy absorbed by soil (Qpoc); 4 – heat supplied to the greenhouse from the heat energy reclaimer

The energy flows in the helio-heater under consideration are shown in (Fig. 3).

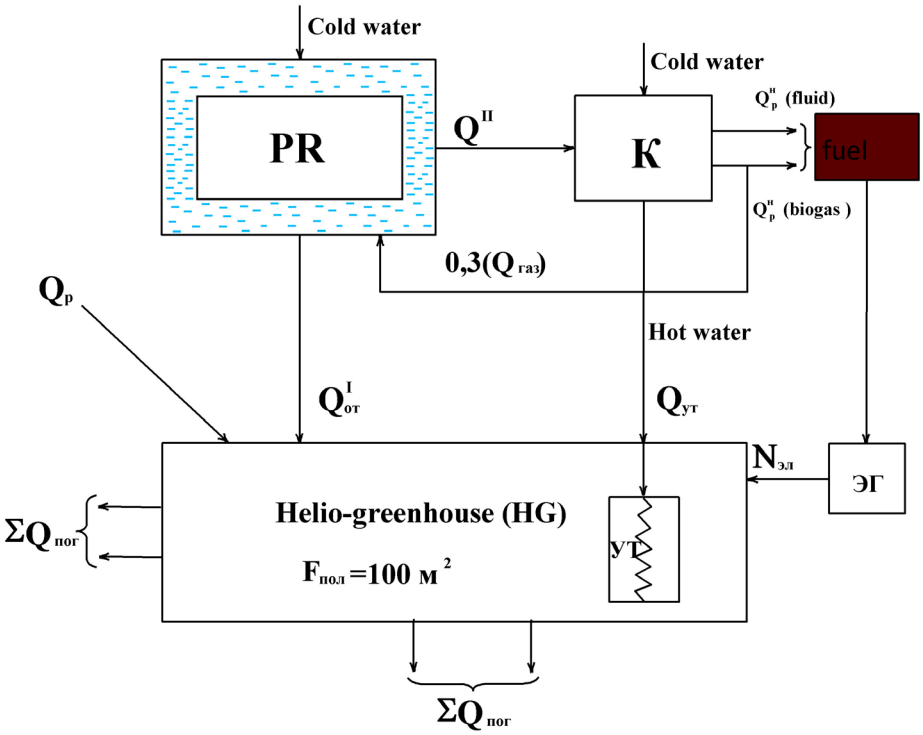

Figure 3. Scheme of energy flows in a helio-heater with a pyrolysis unit: PR – pyrolysis reactor-boiler; K – capacitor-cooler; UT heat recovery; EG power generator

Thus, the developed mathematical model of heat and moisture balance makes it possible to determine for the helio-greenhouse such important parameters as the required heat capacity of the heating system with a pyrolysis plant,

energy savings in the utilization of the VED pyrolysis plant, and the necessary water flow for irrigating the soil in a helio-greenhouse under specified specific conditions. The results obtained serve to establish and regulate the required thermal conditions of helio-heaters. It is established that the utilization of the thermal energy of the condenser of the pyrolysis plant for heating the greenhouse significantly increases the efficiency of the energy use of biomass.

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RESEARCH TEPLOFIZICHESKY PROPERTIES OF THE CLAP-RAW AND ITS COMPONENTS

Abstract: A preparation the basis comparative analysis the productivity of equipment various methods.

Keywords: coefficient of useful time, clap-raw, fibers, clamping device, formulas, speed, drying, productivity.

As is known, cotton-the raw unlike firm bodies, possesses hygroscopic and porous colloidal properties [1]. In the humidified condition and at thermal influence inside of a clap of raw kinds molecular and molar carry of a moisture and heat are possible all. Process of carry of heat in damp porous bodies is connected with process of carry of a moisture which inside of a body can be both in the form of a liquid, and in the form of pair. Thus of pairs in times is in rubbed also molecular balance with a liquid and consequently process can be considered evaporation as steam formation in the big vessel. Known scientific and applied works [1; 2] do not allow to receive satisfactory enough thermal and hygroscopic pairmeters a clap-raw. Therefore there was an imperative need in development of the techniques allowing objectively estimating parameters of a clap.

In the given work results experimental effort changes of a thermal capacity of a clap-raw and its components in dependence from temperature and humidity are resulted. Measurement of a thermal capacity was spent in vacuum-pneumatic a calorimeter with discrete input [3]. The copper tight calorimeter in volume of 10 sm-3 is used. An error of definition of a thermal capacity in an interval of temperatures 30–1500 °C no more than 0.5. Thus, however, measure -ÑÔ not a true thermal capacity, and an average thermal capacity on a temperature interval ΔT.

$$C = \Delta Q / \Delta T$$

ΔQ The final quantity of heat brought to the sample (Dj), $\Delta T = T_2 - T_1$ –

The final increment of temperature caused by it about T_1 and T_2 –

Temperature of the sample before heating; This value of a thermal capacity carry to average temperature

$$T_{sr} = (T_1 + T_2)/2$$

Temperature of the sample before heating; This value of a thermal capacity carry to average temperature (kg).

$$C = C_{obraztsa} / m$$

At measurements the specific thermal capacity of the sample is defined:

$$C = C_n - C_0 / m$$

C_0 the C_n –

Thermal capacity of the filled calorimeter $(Dj/\text{kg} \cdot \text{K})$,– heat capacity an empty calorimeter (Dj/K).

Technique of carrying out of experiment following: the-calorimeter is filled with known object on weight (cotton-seed, a cotton-fiber, seeds, etc.), and weighed on analytical weights; the-calorimeter is located under a vacuum cap and is made from-rolling in current of 10–20 minutes. After eviction a calorimeter again –*ÑÔ* on analytical weights if within the limits of exactness analytical weights – that the calorimeter is considered change of a lump tight. Further measurement of a thermal capacity on standard techniques is made.

In figure 1–3 curves experimental fibers (fig. 2) and the lowered seeds (fig. 3) from temperature are presented is dependent to a specific thermal capacity of a clap-raw (fig. 1), at different wet. To the dependence show, that in an interval of change of temperature.

In drawing 1–3 curves of experimental dependences of a specific thermal capacity of a clap-raw (fig. 1), fibers (fig. 2) and the lowered seeds (fig. 3) from temperature are presented at different wet. The received dependences show, that in the range of change of temperature $30^0 C < T < 100\ ^0 C$ the thermal capacity of a clap of a raw and a fiber increases linearly, and at temperature from above 100 °C it sharply increases, that is connected with change of their structural properties at heats. It is necessary to notice, that in difference from known references [1; 2], change of a specific thermal capacity of a clap-raw in a temperature interval 20–90 With makes an order of 15%, and in the range of 20–150 With – more 45%.

Let's enter density of a clap of a raw and its components (a fiber, the lowered seeds) in the modular condition, defined under formulas

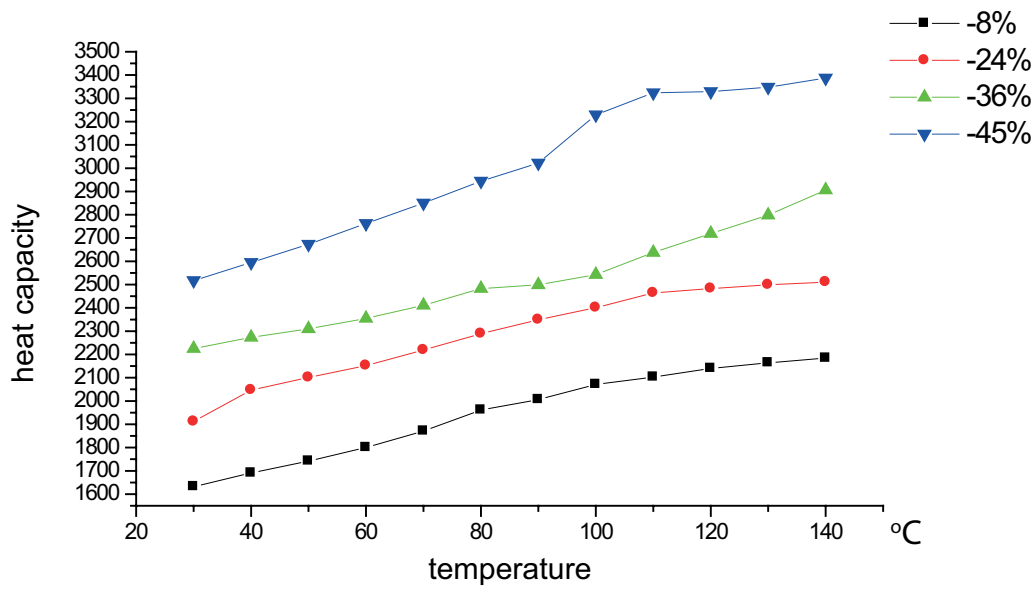
$$\rho_{ax} = m_1\rho_1 + m_2\rho_2 + m_4\rho_4,$$

$$\rho_{ax} = m_1\rho_1 + m_3\rho_3 + m_4\rho_4$$

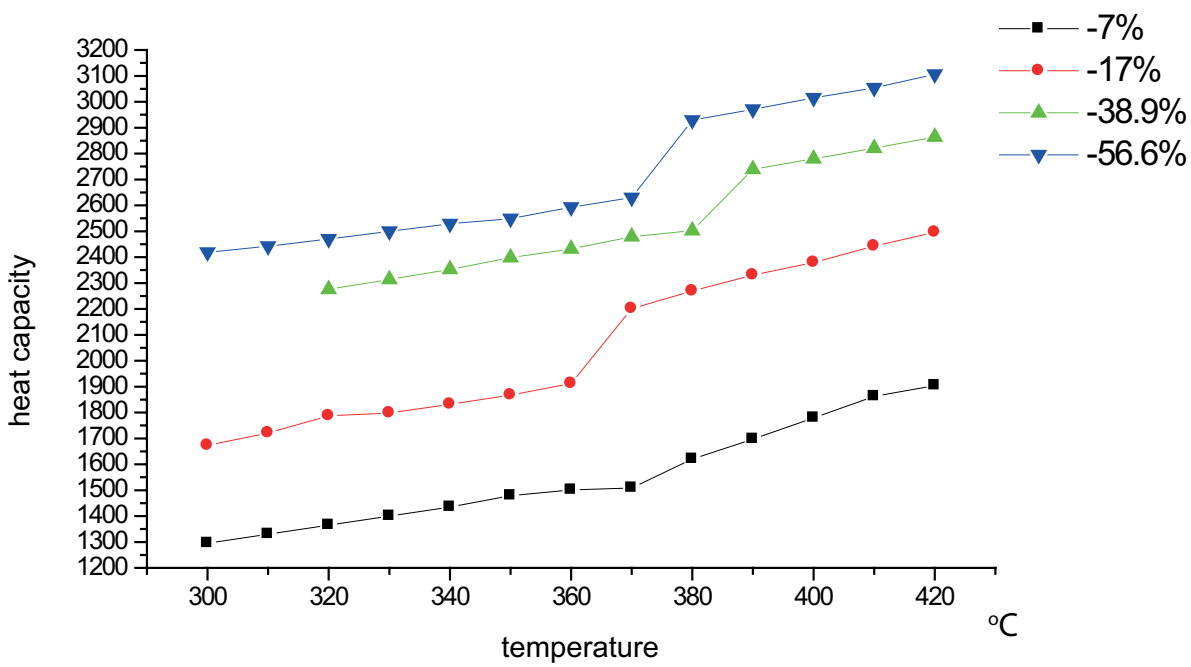
where ρ_1, ρ_2, ρ_3 and ρ_4 – True density of air, fiber, seeds and water; m_1, m_2, m_3 and m_4 – according to their concentration in unit shares, and $m_1 + m_2 + m_3 + m_4 = 1$ For a raw clap, $m_1 + m_2 + m_4 = 1$ for fiber, $m_1 + m_3 + m_4 = 1$ for seeds.

On $T > 100\ ^0C$ Size m_4 will correspond concentration of water as a part of steam.

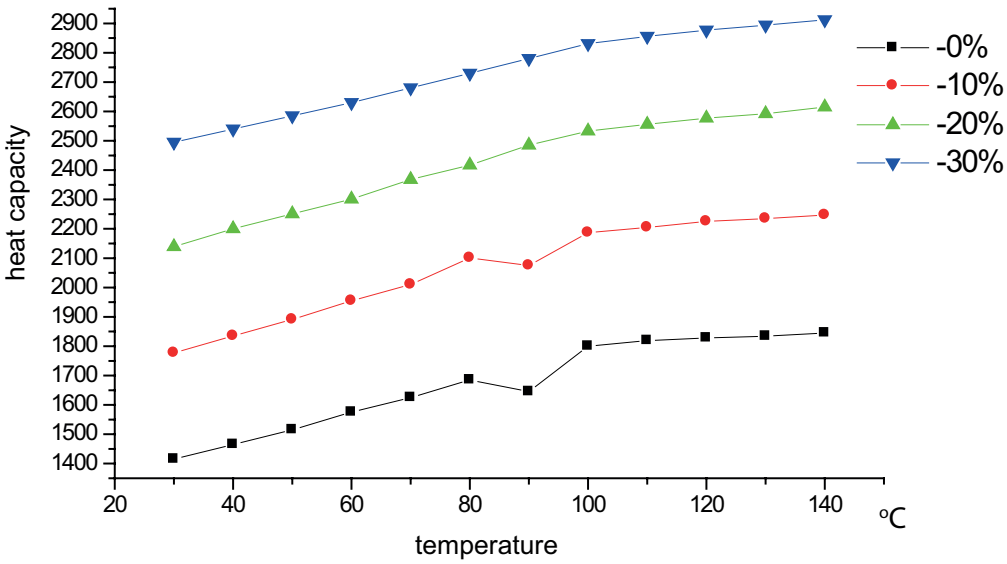
As experiences were spent at constant density of a clap of a raw and its components in modular condition $\rho_{ax} = 110 kg / m^3$, $\rho_{av} = 76 kg / m^3$, $\rho_{as} = 76 kg / m^3$ to temperature and humidity change there is under different laws a redistribution of concentration of air m_1, fibers m_2, seeds m_3 и of water m_4 as a part of a clap of a raw and its components.



Drawing 1. Dependence of a thermal capacity of a clap-raw on temperature at different (humidity in%; thermal capacity Dj/kg)



Drawing 2. Dependence of a thermal capacity of a cotton fibre on temperature at different moisture (humidity in%; thermal capacity Dj/kg)



Drawing 3. Dependence of a thermal capacity of the lowered seeds on temperature at various temporize (humidity in, thermal capacity Dj/kg)

This can explain significant change of behavior of curves near to a point where water completely turns in pairs. It is necessary to note also, that the condition of thermodynamic balance comes after end internal теплообменных processes, about differently in a clap a raw and its components. It circumstance, on visible leads to essential difference from each other curves dependences of a thermal capacity of a clap of a raw and its components on themes and humidity. The analysis of these curves shows, that dependence of a thermal capacity on temperature practically submits linear, or is more exact to the square-law law. In this connection experimental curves for thermal capacities a damp clap-raw, a fiber and seeds all over again we shall present by means of the general dependence [4] $C_p = aT^2 + bT + c$, (1) where a, b и c – the constants depending on humidity u and defined from an extreme функционал of a square-law deviation

$$S = \sum_{i=1}^{N} (y_i - aT_i^2 - bT_i - c)^2,$$

Where y_i – skilled values of a thermal capacity at temperature T_i for the fixed humidity of a material, N – quantity of experimental points. The relative divergence of skilled data of a thermal capacity with its values calculated under the formula (1) was estimated under the formula

$$\Delta_i = \frac{\left| y_i - aT_i^2 - bT_i - c \right| 100\%}{y_i}$$

Practical application of the formula (1) causes inconvenience as factors a, b и c implicitly depend on humidity u. Therefore we enter the formula containing obvious dependence of a thermal capacity from humidity. Dependence (1) we will present in a kind

$$C_p = (k_2 u^2 + k_1 u + k_0)(a_* T^2 + b_* T + c_*), \qquad (2)$$

Table 1. Comparison of skilled data of change of a thermal capacity cotton -a raw from temperature at various values of humidity with results of calculations under formulas

	$a_* = -0.0130$, $b_* = 8.561$, $c_* = 1817.86$, $k_2 = 0$, $k_1 = 0.01207$, $k_0 = 0.68$									
	$W = 8\%$ $a = -0.0234$, $b = 9.3221$, $c = 1351.81$					$W = 24\%$ $a = -0.0332$, $b = 11.06$, $c = 1624.85$				
T^0C	Experiment	Formulas(1)	Pogr. Δ_i (%)	Formulas (2)	Pogr. Δ_i (%)	Experiment	Formulas (1)	Pogr. Δ_i (%)	Formulas (2)	Pogr. Δ_i (%)
1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***
30	1632	1610	1.323	1602	1.835	1912	1926	0.771	2000	4.625
40	1691	1687	0.223	1661	1.747	2047	2014	1.608	2074	1.350
50	1742	1759	0.997	1718	1.329	2101	2095	0.294	2146	2.156
60	1800	1826	1.491	1774	1.433	2152	2169	0.786	2215	0.161
70	1871	1889	0.994	1827	2.321	2219	2236	0.783	2282	0.303

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
80	1961	1947	0.678	1878	4.187	2289	2297	0.358	2346	0.121
90	2006	2001	0.243	1928	3.880	2340	2351	0.101	2466	0.280
100	2071	2050	1.022	1975	4.611	2401	2399	0.086	2466	0.112
110	2103	2094	0.434	2021	3.910	2464	2440	0.980	2523	1.623
120	2140	2133	0.316	2064	3.550	2483	2474	0.357	2577	4.768
130	2164	2167	0.181	2105	2.715	2499	2502	0.111	2628	5.194
140	2184	2231	0.636	2144	1.811	2511	2522	0.469	2677	6.641
	$W = 36\%$ $a = 0.0277$, $b = 1.202$, $c = 2178.02$					$W = 45\%$ $a = -0.0231$, $b = 12.662$, $c = 2116.77$				
T° C	Experi-ment	Formu-las(1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)	Experi-ment	Formu-las (1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)
30	2225	2239	0.629	2299	3.337	2517	2476	1.635	2523	0.252
40	2273	2270	0.114	2384	4.906	2595	2586	0.337	2616	0.845
50	2310	2307	0.114	2467	6.791	2673	2692	0.713	2707	1.284
60	2355	2349	0.218	2546	8.125	2762	2793	1.139	2794	1.178
70	2411	2397	0.544	2623	8.789	2850	2890	1.395	2878	1.002
80	2483	2451	1.270	2696	8.602	2944	2981	1.280	2959	0.524
90	2499	2510	0.463	2767	10.74	3022	3068	1.554	3037	0.499
100	2543	2575	1.267	2835	11.49	3229	3151	2.396	3111	3.636
110	2638	2645	0.281	2900	9.939	3324	3229	2.838	3182	4.245
120	2719	2721	0.079	2962	8.947	3329	3303	0.779	3251	2.343
130	2798	2802	0.158	3021	7.985	3348	3371	0.712	3316	0.957
140	2906	2889	0.577	3077	5.909	3387	3435	1.446	3378	0.274

Table 2. Comparison of skilled data of change of a thermal capacity of a fiber from temperature at various values of humidity with results of calculations under formulas (1) and (2)

	$a_* = 0.0406$, $b_* = -0.7894$, $c_* = 1894.28$, $k_2 = -0.003$, $k_1 = 0.0287$, $k_0 = 0.5178$									
	$W = 7\%$ $a = 0.0335$, $b = -0.8156$, $c = 1310.19$					$W = 17.6\%$ $a = 0.0365$, $b = 1.375$, $c = 1593.16$				
T° C	Experi-ment	Formu-las(1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)	Experi-ment	Formu-las (1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
30	1295	1315	1.611	1342	3.680	1673	1667	0.339	1773	6.017
40	1330	1331	0.085	1357	2.039	1721	1707	0.833	1792	4.171
50	1365	1353	0.871	1377	0.903	1787	1753	1.884	1819	1.816
60	1400	1382	1.301	1403	0.231	1798	1807	0.516	1853	3.098
70	1435	1417	1.243	1435	0	1832	1868	1.996	1895	3.465
80	1479	1459	1.337	1472	0.457	1867	1937	3.757	1944	4.168
90	1501	1508	0.465	1515	0.954	1912	2013	5.285	2001	4.694
100	1509	1563	3.607	1564	3.653	2201	2096	4.758	2066	6.122
110	1620	1625	0.345	1619	0.082	2269	2186	3.623	2138	5.761
120	1697	1694	0.150	1679	1.065	2331	2284	1.989	2217	4.853
130	1779	1769	0.506	1745	1.917	2379	2389	0.452	2305	3.109
140	1862	1852	0.524	1817	2.439	2443	2502	2.424	2400	1.771
	$W = 38.9\%$, $a = 0.0401$, $b = -1.1413$, $c = 2221.32$					$W = 56.75\%$, $a = 0.0524$, $b = -2.576$, $c = 2452.47$				

T° C	Experi-ment	Formu-las (1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)	Experi-ment	Formu-las (1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)
1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***
30	2210	2223	0.595	2251	1.854	2419	2422	0.141	2251	6.938
40	2235	2239	0.214	2275	1.801	2442	2433	0.353	2275	6.821
50	2276	2264	0.508	2309	1.454	2470	2455	0.614	2309	6.507
60	2314	2297	0.730	2352	1.666	2500	2487	0.528	2352	5.891
70	2353	2337	0.656	2405	2.235	2529	2529	0	2405	4.872
80	2398	2386	0.480	2468	2.929	2549	2582	1.300	2468	3.161
90	2432	2443	0.456	2540	4.460	2593	2645	2.028	2541	2.018
100	2479	2508	1.166	2622	5.780	2630	2719	3.403	2622	0.286
110	2502	2580	2.833	2713	8.462	2929	2804	4.270	2714	7.343
120	2739	2661	3.143	2814	2.765	2971	2900	2.429	2815	5.252
130	2780	2750	1.073	2925	5.228	3015	3004	0.357	2926	2.966
140	2821	2846	0.920	3045	7.959	3054	3120	2.165	3045	0.269

Table 3. – Comparison of skilled data of change of a thermal capacity lowered cotton-growing from temperature at various values of humidity with results of calculations under formulas (1) and (2)

	$a_* = 0.0242$, $b_* = 8.468$, $c_* = 1709.95$, $k_2 = 0$, $k_1 = 0.016$, $k_0 = 0.75$									
	$W = 0\%$ $a = -0.0211$, $b = 7.787$, $c = 1188.44$					$W = 10\%$ $a = -0.0285$, $b = 9.341$, $c = 1507.74$				
T° C	Experi-ment	Formu-las(1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)	Experi-ment	Formu-las (1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)
1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***
30	1415	1402	0.886	1456	2.945	1777	1762	0.826	1767	0.538
40	1465	1465	0.023	1507	2.900	1835	1835	0.042	1829	0.322
50	1515	1524	0.594	1554	2.619	1891	1903	0.663	1886	0.246
60	1575	1578	0.219	1598	1.476	1955	1965	0.543	1939	0.808
70	1625	1629	0.225	1638	0.811	2010	2021	0.596	1987	1.111
80	1685	1674	0.613	1674	0.623	2101	2072	1.348	2032	3.297
90	1645	1716	4.342	1707	3.779	2075	2117	2.055	2071	0.175
100	1800	1753	2.556	1736	3.542	2187	2157	1.375	2106	3.675
110	1819	1787	1.741	1762	3.152	2205	2190	0.657	2138	3.062
120	1828	1816	0.633	1783	2.436	2225	2218	0.297	2163	2.744
130	1834	1841	0.397	1801	1.764	2235	2240	0.249	2185	2.193
140	1845	1862	0.918	1816	1.561	2247	2257	0.447	2203	1.929
	$W = 20\%$ $a = -0.0254$, $b = 8.823$, $c = 1883.34$					$W = 30\%$ $a = 0.0181$, $b = -7.075$, $c = 2284.86$				
T° C	Experi-ment	Formu-las (1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)	Experi-ment	Formu-las (1)	Pogr. Δ_i (%)	Formu-las (2)	Pogr. Δ_i (%)
30	2139	2125	0.647	2078	2.843	2495	2480	0.567	2389	4.205
40	2200	2196	0.199	2150	2.241	2540	2539	0.041	2472	2.666
50	2251	2261	0.443	2218	1.465	2585	2593	0.326	2549	1.366
60	2301	2321	0.880	2280	0.905	2630	2644	0.544	2687	0.337
70	2368	2376	0.358	2337	1.303	2680	2692	0.432	2746	0.247
80	2417	2427	0.397	2389	1.161	2730	2735	0.191	2679	0.592
90	2485	2472	0.537	2436	1.989	2780	2775	0.170	2800	0.711

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
100	2533	2512	0.834	2477	2.210	2831	2812	0.628	2847	0.580
110	2556	2546	0.371	2513	1.670	2856	2844	0.402	2889	1.160
120	2577	2576	0.026	2544	1.264	2877	2874	0.115	2924	1.664
130	2592	2601	0.349	2570	0.836	2894	2899	0.182	2954	2.097
140	2615	2621	0.218	2591	0.914	2912	2921	0.317	2978	2.285

In tables 1–3 values of constants a, b, $c.$, a_*, b_*, c_*, k_2, k_1, k_0 And the given thermal capacities depending on the temperature, received by practical consideration and results of calculations under formulas (1) and (2) for times-personal values of humidity are presented. From data follows, (2) value of a constant is practically equal the formula to zero that will be coordinate with the formula offered in work [1]. Close to each other values have factors and at different влажностях separately for a clap of a raw and its components, and factors, and have near values only for a clap of a raw and seeds (tab. 1 and 3), that specifies the general character of change of their thermal capacity from temperature and its moisture.

Conclusions

1. The experimental technique of measurement of a thermal capacity of a cotton-raw and its components depending on temperature and humidity is developed.

2. By the analysis of experimental data it is established, at constant density of a clap of a raw and its components, occurs redistribution concentration of air and a moisture in their structure which can influence to a course of curve dependences of a thermal capacity from temperature and humidity

3. Empirical formulas for calculation of a thermal capacity of a clap-raw and its components, approximating experimental dependence are offered by linear or square-law functions.

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PREREQUISITES OF IMPROVEMENT OF METHODS FOR ESTIMATING THE ADJUSTMENT OF TEXTILE MATERIALS AND DEVICES FOR THEIR IMPLEMENTATION

Abstract: This article analyzes the existing methods for assessing the movement of yarns of textile materials and devices that perform these indicators and suggests ways to improve the assessment methods one of the main indicators that determine the quality of textile materials.

Keywords. Textile materials, extendibility, fibers, structure, yarn, density, warp threads and weft.

The sliding of the threads depends on the kind of fiber, the structure of the yarn and fabric, the ratio of the thickness of the warp and weft threads and their density, the type of fabric finishing and other factors. In the tissues, as a rule, the warp threads along the weft threads are displaced. Therefore, we can assume that the displacement of the filaments occurs in the extreme phase of the structure of the tissue, that is, with a rectilinear arrangement of the weft. The ratio of the thickness of the warp threads and the weft affects the degree of expansion of the yarns in the fabric. It has been found that, the greater the difference in the thickness of the main and weft yarns, the more the fabric has the ability to spread.

Finishing operations, such as singing, cutting, and broadening, increase the isolation of threads in the fabric and increase the possibility of mutual displacement of filaments. Accretion and roll fixes the threads and reduces the mobility of the yarns in the fabric. Displacement of threads is mainly characteristic for silk fabrics, both artificial and synthetic. In tissues, the structure of which provides strong mutual cohesion and friction of the threads, the threads do not move. Studying the research of specialists of this process – the branching of threads in the tissues showed that the separation of the filaments occurs as a result of the combined effect of the tangential resistance between the threads and the stretching of the tissues.

Sliding of filaments occurs in the lateral seams, the seams of the darts, on the elbows, at the armhole arm, ie, in those areas where the tissue experiences, as was said before, the combined action of friction and stretching. Sliding reduces the appearance of the product and shortens the period of its wear. From fabrics subject to sliding, in order to avoid premature deterioration of products, it is not recommended to make products that fit tightly around the figure. To reduce the spacing of filaments in the seams, the frequency of the stitch is increased, so that the frictional force between the yarns of the fabric increases and their ability to shift is reduced.

Based on this, the existing methods and devices for assessing the vulnerability of textile materials were analyzed.

In work [1] the device for measurement of parameters of a sliding of threads of textile materials is offered. This device can be used to determine the spread ability of yarns of textile materials. Devices for measuring the sliding properties of yarns of textile materials include fixed and conditionally movable clamps for fixing the sample to be examined, means for loading it in the form of a gear motor with a drive controlled by a processor through a microcontroller and a coupling unit, a movable carriage, a needle-bearing comb, a sample that includes optically active elements and a webcam associated with the processor, as well as means for measuring the amount of loading. The means for measuring the loading amount are made in the form of a strain-gauge measuring system of the diaphragm type, which is connected to the processor through a microcontroller and a coupling unit. The invention provides an increase in the reliability of the device and an increase in the accuracy of evaluating the parameters of the sliding properties of filaments, and also increases the service life (Fig. 1).

A device for measuring the sliding properties of yarns of textile materials, comprising a stationary and conditionally movable clamps for fixing a sample to be examined, means for loading it in the form of a drive motor driven by a processor via a microcontroller and a coupling unit, a movable carriage, a needle comb, sample strings containing optically active elements and a web camera connected to the processor,

as well as means for measuring the loading amount, scheesya in that the load magnitude measuring means are in the form of a strain gauge diaphragm type measuring system connected to the processor through the interface unit and microcontroller.

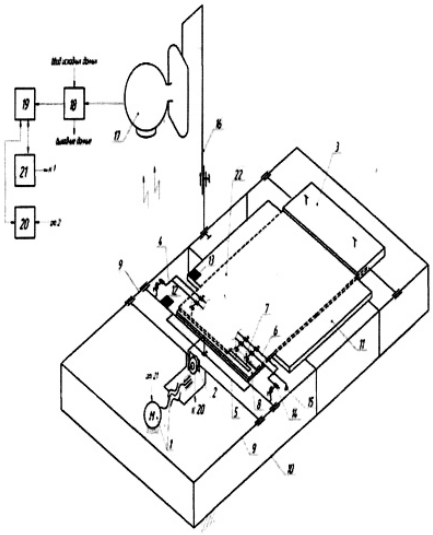

Figure 1. Device for measuring the parameters of sliding of threads of textile materials

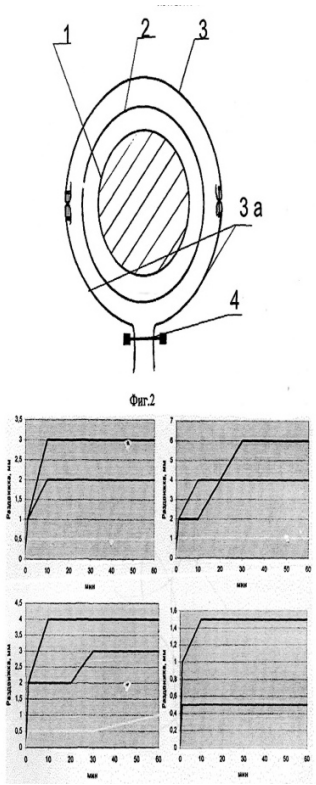

Figure 2. Scheme of the method for estimating the anisotropy of the sliding ability in the seams of garments

This device has not found wide application because of the complexity of operation and not the accuracy of the measurement.

There is a way to estimate the anisotropy of the sliding ability in the seams of garments [2].

The method for determining the anisotropy of the sliding ability of filaments in the seams of textile materials includes preparation and marking of samples, fixation by clamping, loading, measurement of the slide and changing the linear dimensions of the sample. The sample is a "chamomile" formed by stitching 8 "petals" in the form of strips 50 * 110 mm, cut at different angles to the warp threads, onto a circular specimen with a diameter of 150 mm with marking in different directions after placement on a cylindrical crossbeam covered with a material (Fig. 2).

After suspension of the load to the clamp, the displacement of the filaments from the seam and the change in the linear dimensions are measured, and the anisotropy of the sliding ability and changes in linear dimensions, judging by the change in the sliding ability of the filaments in the seam and the change in linear dimensions as a function of the direction (α). The invention makes it possible to evaluate the spreadability of filaments in seams in various directions by cutting and gives information on changes in the linear dimensions of materials when sliding in the joints occurs.

Method for determining the anisotropy of the movement of filaments in the seams of textile materials, including the preparation and marking of samples, fixation by clamping, loading, measurement of the separation and changes in linear dimensions of the sample, characterized in that the sample is a "chamomile" formed by stitching 8 "petals" 50 * 100 mm, cut at different angles to the warp yarns, onto a circular sample with a diameter of 150 mm with marking in different directions (α), fixing the sample with a clamp is alternately for each direction after azmescheniya on a cylindrical bar, covered with pictures, after the hanging load to terminal measure the displacement of yarns from the seam and change in linear dimensions and anisotropy razdvigaemosti and changes in linear dimensions is judged by the change razdvigaemosti yarns in the seam and the change in linear dimensions depending on the direction (α). In this case, the marking of the round samples and the cutting out of rectangular samples are carried out in various versions that are typical for the direction of the seams in clothing, for example 0 °, 45 °, 90 °, 135 °, 180 °, 225 °, 270 °, 315 ° or 15 °, 60 °, 105 °, 150 °, 195 °, 240 °, 285 °, 330 ° or 30 °, 75 °, 110 °, 155 °, 200 °, 245 °, 290 °, 335 ° to the longitudinal direction of the material, the load is 9 daN and corresponds to the maximum operational load in the clothing, and the loading time is 30 minutes.

This method and the device also does not differ in accuracy and does not correspond to the actual operating conditions of garments.

A device was also proposed for assessing the movement of yarns of textile materials [3].

This device can be used to determine the spreadability of yarns of textile materials. The apparatus for assessing the movement of threads of textile materials comprises means for fixing the sample to be examined, means for loading the sample to be examined, in the form of a geared motor load, a measuring means for loading and moving the threads, and a processor that is connected to a geared motor via a microcontroller and a coupling unit. The measuring means for loading and moving the threads comprise a movable carriage with a needle comb and are provided with optically active elements and a web camera installed to read load values and transfer the threads and transfer them to the processor. The invention provides a structural simplification of the measurement system, while increasing the accuracy of the evaluation of the separation of threads of textile materials (Fig. 3).

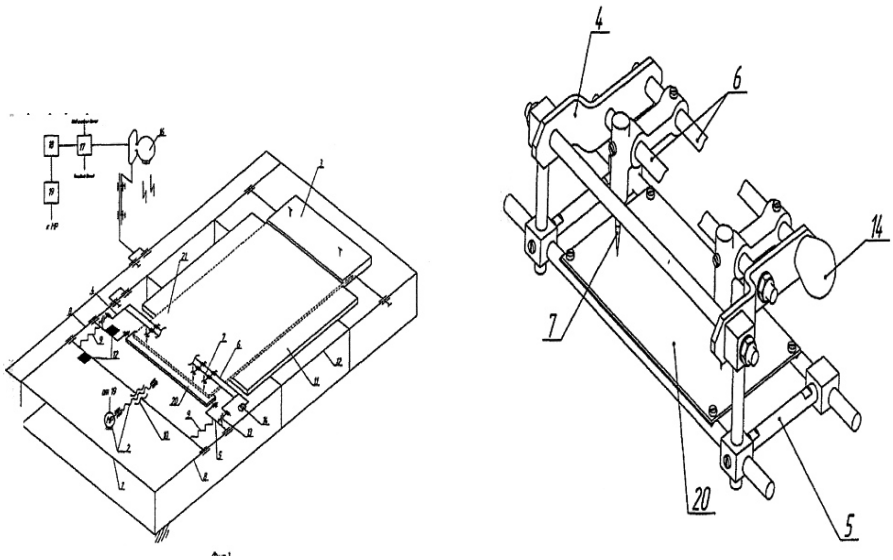

Figure 3. Device for assessing the movement of threads of textile materials

A device for evaluating the spreadability of yarns of textile materials, comprising means for fixing and loading the test sample, measuring means for loading and moving the threads, characterized in that it is provided with a processor, and as a loading means comprises a motor-reducer configured to control the loading amount, wherein means for measuring the magnitude of loading and movement of the threads comprise a movable carriage with a needle comb and are provided with optically active elements and a web camera, ennymi to read the values of the loading and moving filaments and transferring them to a processor and which, via the microcontroller interface unit associated with the motor-reducer.

The proposed in this work also does not provide the accuracy of measuring the sliding ability of threads in textile materials and does not differ from previous works by the accuracy of measurements.

Thus, based on the foregoing, it can be concluded that the proposed methods and devices do not provide the required accuracy and ease of operation, which is why they are not widely used. The proposed method and device due to the use of computer technology and a high-precision device will ensure an increase in reliability of the device and an increase in the accuracy of evaluating the parameters of the sliding properties of threads, and also increases the service life, allow us to evaluate the spreadability of filaments in seams in various cutting directions and provides information on the variation of linear dimensions of materials with the occurrence of sliding in the seams, provides a structural simplification of the measurement system, while increasing the accuracy awns evaluation razdvigaemosti filaments of textile materials.

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PHYSICAL AND CHEMICAL PROPERTIES OF THE IMPARTED COPOLYMERS OF COLLAGEN AND POLYACRYLIC ACID

Abstract: Some physicochemical properties of synthesized graft copolymers of crude skin and polyacrylic acid are determined. The dependence of molecular weight, solubility, density and thermal properties of copolymers on the ratio of components and synthesis conditions was established.

Keywords: collagen, acrylic monomer, initiator, graft copolymers, inoculation.

Among various ways of copolymerization the grafting as a method of synthesis of composition high-molecular substances and materials of a special purpose has special value [1–8]. Establishment of regularities of receiving, physical and chemical and mechanical characteristics of graft copolymers of natural polymers with the functional and fissile monomers, taking into account specific properties of polymeric compositions, is an urgent problem of chemistry and polymer technology. Researches of regularities and the mechanism of synthesis of graft copolymers and on receiving reinforced films on the basis of a collagen and the poly(acrylic acid) [9–11] are earlier conducted. The real work is devoted to definition of dependence of a molecular mass, solubility, density and thermal properties of copolymers from a ratio of components and conditions of synthesis, processes of the copolymers occurring when heating.

Object of a research is collagen, the ethylene carboxylic acid (ECA) and the potassium persulphate (PP). For receiving collagen solution wastage of a skin of animals is cut on pieces by the Z-4 sizes of mm and is located in capacity. In capacity 5% solution of sodium hydroxide at a mass ratio is poured a skin: solution-1:4. Pieces of a skin bulk up in alkali liquor within 72–24 clocks. Then solution is mixed before formation of the homogeneous mass, warming up if necessary, up to the temperature of 60 of °C. Solution is sifted through a bolter the sizes of cells of 0.05–0.1 mm. Add an acetic acid for the purpose of neutralization to screened solution torn: 7 + 0.2.

Potassium persulphate – $K_2S_2O_8$, the initiator of polymerization, shallow crystals of white color, is well dissolved in water.

The acrylic emulsion – milky-white liquid with a slight cream shade without visible stratification. pH =6.0–8.5. the viscosity ratio not less than 1.75 mass fraction of a residual monomer (acrylate methyl) of no more than 0.35%.

Synthesis of graft copolymer of a collagen was carried out in the three-necked flask supplied with a mixer, the thermometer and a reflux condenser in nitrogen current. Solution of a collagen, joint stock company and the personal computer loaded into a flask, mixed in the thermostat. On reaching particular time the flask was taken out from the thermostat, cooled to ambient temperature, the reaction mixture was poured out in a glass with ethanol. The residual monomer and homopolymer are dissolved in ethanol, and copolymer is not dissolved. The received copolymer was washed out several times ethanol and dried up to the constant weight in desiccators.

The results of scientific research have shown that fabrics recommended for use as fire-resistant materials change their properties over time, that is, fire of the tissue is observed in the event of a fire. The main reason for this is the incomplete penetration of antiprin into the tissue, as well as the fact that methods of imparting fire resistance to the material with the recommended flame retardants have not been investigated.

A disadvantage of the known method is not the strength of the bonding of the impregnated flame retardant composition to the textile substrate, which results in loss of the flame retardant properties of the material being processed [1].

To improve the fireproof properties of the material, taking the basis of collagen, the technology of absorbing into the fabric was developed. To improve the interaction of the surface of the tissue with the flame retardant composition, several methods of pretreating the tissue have been tested [2].

The first way, textile material was previously treated with 0.5%, 0.75%, 1%, 2% and 3% sodium hydroxide solution.

The second way, textile material was preliminarily treated with 0.5%, 0.75%, 1%, 2% and 3% sodium sulfate salt, based on the weight of the fabric solution of sodium hydroxide.

The third way, the textile material was previously treated with 0.5%, 0.75%, 1%, 2% and 3% surfactant solution OP-10.

The fourth way, textile material was previously treated with 0.5%, 0.75%, 1%, 2% and 3% hydrochloric acid, taken with respect to the weight of the tissue.

Processing is carried out in the following technological sequence:

Impregnation (according to the selected mixture), T = 18–200 C, time 30–60 seconds. Spin 80–90%. Rinse (in clean cold water), then squeeze (until the remainder is 5–10%). Drying at 60–800 °C, the time is 10–15 minutes.

After the processes were carried out according to a given technological sequence, the fabrics obtained by each method were impregnated with a flame retardant composition of the same composition. The composition of the composition contained acrylic emulsion, polyacrylamide, carbamide, boric acid, ammonium hydrogen phosphate. To assess the effect of pretreatment, the tissue was exposed to direct fire. The results of the tests are shown in (Table 1).

The test results clearly demonstrate the advantages or disadvantages of one or another pre-treatment method. Treatment with a solution of sodium sulfate and a surfactant has little effect on the fire resistance of the fabric. Treatment with a solution of hydrochloric acid is generally not acceptable the tissue is destroyed after treatment. A positive result is the treatment with a solution of sodium hydroxide. Some samples do not ignite even with prolonged exposure to direct fire.

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Preliminary alkali treatment of the tissue allows dissolving waxy substances present on the surface of the tissue, which prevents the penetration of the fire retardant composition into the interior of the tissue, and subsequent washing allows them to be removed, resulting in the surface of the tissue being cleaned. Due to this, the fire retardant composition is well impregnated with a cloth, its strong binding to the textile base is achieved [3].

He processed material at a temperature of 18–20 °C for 30–60 seconds is impregnated with a 2–3% aqueous solution of alkali, for example, sodium hydroxide, squeezed to a residue of 80–90% moisture. Then washed in cold water, squeezed to a residue of 5–10% moisture, dried for 10–15 minutes at about 80–100 °C. After that, the treated material is impregnated with a flame retardant composition containing the following components: 3–5% boric acid, 10–15% acrylic emulsion, 20% collagen solution 12–18 ml, 0.02–0.025% potassium persulfate, the balance water.

Table 1. – Dependence of resistance to direct fire from tissues treated with a flame retardant composition from the pretreatment method

Substance pretreatment	**Concentration of substance and test result**				
	0.5%	**0.75%**	**1%**	**2%**	**3%**
Sodium hydroxide	The fabric caught fire after 20 sec	The fabric caught fire after 20 sec	The fabric caught fire after 30 sec	The fabric did not catch fire	The fabric did not catch fire
Sodium sulfate	The fabric caught fire after 5 sec	The fabric caught fire after 5 sec	The fabric caught fire after 6 sec	The fabric caught fire after 10 sec	The fabric caught fire after 15 sec
Surface-active agent	The fabric caught fire after 5 sec	The fabric caught fire after 10 sec	The fabric caught fire after 10 sec	The fabric caught fire after 15 sec	The fabric caught fire after 20 sec
Hydrochloric acid	Observed fabric destruction				

Boric acid and collagen solution serve as a fire-resistant component, acrylic polymer-water-insoluble film-former and binder. Potassium persulfate serves to form active sites of graft copolymerization.

Impregnation with flame retardant composition is carried out at 40–50 °C for 30–60 seconds, then it is wrung out, followed by pressing to a humidity of 5–10%, then for 10 minutes it is subjected to heat treatment at 120–130 °C.

Various combinations of substances were tested, the most studied of which are presented in (Table 2).

The tests carried out at the boundary values of the concentration of the components allow us to conclude that when the concentration of acrylic emulsion is less than 10%, boric acid is less than 3% and a solution of collagen is less than 12%, the fire resistance of textile materials deteriorates. With an increase in the concentration of acrylic emulsion above 15%, boric acid above 5% and a collagen solution above 18%, the fire resistance does not change, but the rigidity of the textile material increases [4].

Another important aspect is that the composition of the antiprin used to impart fire resistance to the fabric should not be poisonous. In addition, the fuel must also be harmless. If the composition of the antirene is not poisonous, this will expand the scope of its application. Given that the proposed flame retardant is a natural product, we can say that it meets the above requirements.

One of the characteristic features of fires in textile enterprises is a sharp increase in temperature at the beginning of the fire and the emission of thick smoke. This increase in temperature and thick smoke does not give employees the opportunity to extinguish the fire at the initial stage.

Table 2. – The composition dependence of the fire retardant treatment and the treated tissue

The substance in the composition	**The number of the composition and the amount of substances in it**			
	1	**2**	**3**	**4**
Boric acid	3 g	5 g	10 g	5 g
Carbamide	5 g	5 g	10 g	
Acrylic emulsion	5 ml	10 ml		
Polyacrylamide, 3% solution		10 ml	20 ml	20 ml
Collagen	20 ml		20 ml	40 ml
Ammophos	5g			
Test result	The cloth caught on fire	The cloth caught on fire after 10 sec.	The fabric did not catch fire	The fabric did not catch fire

The smoke emitted during combustion consists of substances called "normal gas" (oxygen, nitrogen, carbon dioxide, water vapor and carbon monoxide (II) or carbon monoxide). In the event of a fire, oxygen is sharply absorbed and the level of oxygen in the air decreases. Due to lack of oxygen, a person does not feel these changes physically and can not take the necessary measures.

Table 3. – The results of testing samples of textile materials for fire resistance

№	**The dimensions of the sample, mm**	**The mass of the sample, м: g.**		**Mass loss, %**	**Time of exposure to combustion, sec.**	**Ignition time, sec.**	**The result**
		Before the test	**After the test**				
1.	2.8·10	2.35	2.1	11	10	3	Smolder
2.	2.8·10	2.4	2.2	8	10	–	Does not burn
3.	2.8·10	2.6	2.5	4	10	–	Does not burn
4.	2.8·10	2.75	2.6	5	10	–	Does not burn
5.	2.8·10	2.9	2.7	7	10	–	Does not burn
prototype				12–13			

The toxicity of carbon monoxide, released from the combustion of products, is that, when combined with hemoglobin, it forms carboxyhemoglobin. In this case, there is a shortage of oxygen in the human body. If the level of carbon monoxide in the inhaled mixture exceeds 0.1%, a person begins to feel bad. If 0.5% of carbon monoxide is contained in the air and the person breathes this air, it results in death in 20–30 minutes, if 1% of carbon monoxide (II) is present, then within 1–2 minutes. When studying the burning of loose cotton waste, the concentration of gases in the mine was: nitrogen 78.9%, oxygen 19%, carbon monoxide 1.7%, and carbon oxide 0.4% [5].

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Section 13. Transport

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DIAGNOSTICS OF ASYNCHRONOUS ELECTRIC MOTORS ON THE BASIS OF SPECTRAL ANALYSIS OF AMPLITUDE-MODULATED STATOR CURRENT

Abstract: Continuous diagnostics of asynchronous electric motors is described in the article by spectral analysis of amplitude-modulated current of the stator, due to the faults of its elements and units.

Keywords: electric motor; asynchronous; amplitude, diagnostic, method, amplitude.

Introduction

A study of current trend in development of methods for diagnosing electrical equipment has recently shown that the methods based on the analysis of electrical parameters of operating equipment, for example, by measuring the current of the stator of asynchronous motor (AM), are the most preferred ones. Improvement of the circuitry and application of microprocessor technologies broadens the possibilities of practical implementation of spectral analysis and algorithms based on the theory of optimal filtration to obtain more accurate results on technical condition of AM [1; 2; 3; 4; 5; 7; 8].

Previous studies concentrated on various methods of the diagnostics and maintenance of asynchronous electric motor with use of mathematical modelling. The research conducted by Cunkas and Akkaya [9] covered the comparison of three different induction motors with the same motor of other type. The first motor was designed optimally with three-phase squirrel-cage system. The method of modelling for optimization was genetic modelling with focus on three dimensions: torque, cost and efficiency. Moreover, study by a group of experts and researchers as Kolpakhchyan, Shaikhiev, Kochin [10] covered the identification of asynchronous traction motor characteristics of a locomotive. Their study found certain limitation of the rotation of the traction motor given the different power input, like inverter type.

In the study of Liudvinavičius and Lingaitis [11], authors analyzed different aspects of the operation of asynchronous motor including the frequency regimes, speed regulation and factors affecting the stable operation of the motor. The authors suggested to use so called method of vector control in the design of a locomotive including algorithmic control. Likewise, American Public Transport Association recommended various practical methods for maintenance and evaluation of the work of electric motors of locomotives with special focus on issues as manufacturer recommended maintenance intervals, operating space, information about past performance and usage, analysis of failures and testing in near to real-life conditions [12].

Unfortunately, in available sources, the studies on operating frequency range of the analyzer and the harmonic components of current stator are not carried out, as well as the measurement range in decibels, and, most importantly, the mathematical processing of the level of individual harmonics in real time, taking into account that the periodic deterministic useful signal of static analysis characterizing the malfunction of AM elements, is additively mixed in practice with stationary white noise with a minimum signal-to-noise ratio; and the structure and parameters of smoothed out, optimal or predictive filter synthesized on a computer are not defined.

In this paper, an attempt is made to eliminate these shortcomings. The presence in the spectrum of AM stator current of characteristic frequencies of a certain magnitude indicates the presence of faults to its electrical or mechanical units and other actuators connected with it.

Methods

Measuring shunts and Hall sensors are used as a current sensor. The most preferable for measurement of AM stator current, in our opinion, is the magneto-optical sensor, the sensor manufactured by Airak, the measured range of which is 0.003–30 kA in current, the frequency band is 5–5000

Hz. From the sensor output, the reproduced curve through AC amplifier is fed to a frequency harmonics analyzer, for example, of 2031 type (manufactured by Bruel Kjaev); its operation is based on a fast Fourier transform in real time at frequencies up to 2 kHz [6]. The duration of the current recording must be within the time required for spectral analysis at a frequency of no less than 0.01–0.03 Hz.

In the aspect of spectral analysis of AM continuous diagnostics, the problem consists in finding the law and distribution of the output quantity (the current consumed according to the known law of distribution of the input quantity) and the a priori target data, or, in terms of statistics, the passage of stationary or non-stationary random signals through a linear circuit.

The problem is formulated as follows. A stationary random signal at $t = \infty$ is fed to the input of a linear system with generalized complex transfer function $K_0(j\omega)$, its mathematical expectation and the correlation function $B_1(\tau)$ are assumed to be known; it is necessary to find the correlation function $B_2(\tau)$ and the mathematical expectation of random function at the circuit output [7; 8].

Let the mixture of uncorrelated periodic deterministic signal $s(t)$, occurring as a result of damage to electrical or mechanical units of the AM and interference $n(t)$, act on consumed current of the motor,

$$x(t) = s(t) + n(t) \quad (1)$$

Consider an example where the signal $s(t)$ occurs due to static or dynamic eccentricity of the rotor relative to the stator, i.e. when the distance between the length of the stator bore and the rotor is not equal along the whole circumference and as a result the magnetic flux inside the air gap changes, resulting in a characteristic modulated in amplitude stator current:

$$x(t) = s(1 + M_{am}\sin(\Omega t))\cos(\omega_0 t + M_{fm} + \varphi) + n(t), \quad (2)$$

where S – is an amplitude of the modulated signal; n – rotation speed of the rotor; M_{am} – modulation depth, $\Omega = n/60$ (r/s) – modulation frequency; ω_0 – is an angular frequency of the motor power supply, φ – an initial angle of shear; $n(t)$ – a random function having the normal distribution law with mean value of $m_{1n}(t)$, variance $\sigma_n^2(t)$.

For the diagnostic analysis, it is necessary to find according to (2) the mathematical expectation $m_{1x}(t)$, the variance of the output process $\sigma_n^2(t)$ and to write the law of distribution of the spectral probability density $W_x(t)$.

It is obvious that

$$m_{1x}(t) = m_{1n}(t) + s[1 + M_{am}\sin\Omega t]\cos(\omega_0 t)M_{fm}\lambda(t) + \varphi \quad (3)$$

$$\sigma_x^2(t) = \sigma_n^2(t) + D_s = \sigma_n^2(t). \quad (4)$$

Taking into account that the spectral function contains information about certain relations between the amplitudes and modes of oscillations of different frequencies and bearing in mind [7], we get

$$W_n(n) = \frac{1}{\sqrt{2\pi}\sigma_n(t)} \cdot \exp\left[-\frac{[n - m_{1n}(t)]^2}{2\sigma_n^2(t)}\right]$$

For the sum $x(t)$ we obtain

$$W_x(x,t) = \frac{1}{\sqrt{2\pi}\sigma_n(t)} \cdot \exp\left[-\frac{\{x - [m_{1n}(t) + S(1 + M_{am})\sin(\Omega t)\cos(\omega_0 t) + M_{fm}\lambda(t) + \varphi]\}^2}{2\sigma_n^2(t)}\right] \quad (5)$$

Transforming expression (5) into a series and taking into account that the intensity of spectral components is determined by spectral density $F(j\omega)$, calculated by the formula of direct Fourier transform $F(j\omega)\int_{-\infty}^{\infty} W_x(x,t)e^{-j\omega t}dt$ for each term of the series, we obtain

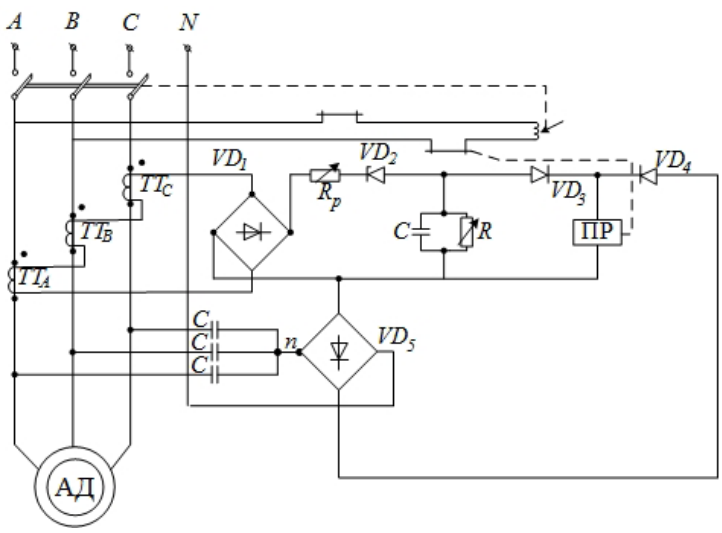

Figure 1. Spectrum of AM current in the presence of an eccentricity

$$F(\omega)=\frac{\sigma_\lambda^2}{\alpha}e^{-\sigma_f^2}\left\{\sigma_f^2\sum_{n=0}^{\infty}\frac{\left(\sigma_f^2\right)^n\left(n+D_\varphi\right)}{n!\left[\left(n+D\varphi\right)^2+\Omega^2\right]}+\left(1-2\sigma_f^2\right)\times\sum_{n=0}^{\infty}\frac{\left(\sigma_f^2\right)^n\left(n+1+D_\varphi\right)}{n!\left[\left(n+1+D\varphi\right)^2+\Omega^2\right]}+\sigma_f^2\sum_{n=0}^{\infty}\frac{\left(\sigma_f^2\right)^n\left(n+2+D_\varphi\right)}{n!\left[\left(n+2+D\varphi\right)^2+\Omega^2\right]}\right\} \quad (6)$$

where $\sigma_\lambda^2=\sigma_\lambda^2 M_{am}^2$; $\sigma_f^2=\sigma_\lambda^2 M_{fm}^2$; $D_{cp}=\frac{1}{4\alpha}N_\varphi$; N_φ – is a phase fluctuation; M_{am}, M_{fm} – are the depth of amplitude and phase modulation, respectively; $\Omega=(\omega-\omega_0)/\alpha$, $\omega>0$. α – is an independent random variable with zero mathematical expectation $m_\alpha=0$ $D_\alpha=\sigma^2$.

The graphs of function $F(\omega)$ using the parameters of AM traction of 1 TB262-OGA02 type are shown in (Fig. 1).

Experimental studies have been carried out on a three-phase asynchronous electric motor of 1TV262 type [2].

For example, if the rotor bars or the parts of the squirrel cage ring of tractive AM are damaged, the stator current will be modulated in amplitude with a slip frequency s. This modulation increases in the event of damage to the rotor. Obtained by the Fourier integral transform, the spectrum of the modulated stator current in amplitude with damage to a different number of rotor bars is shown in (Fig. 3), from which it can be seen that the rupture of the bars is accompanied by the appearance of side components with a double slip frequency in fundamental harmonic.

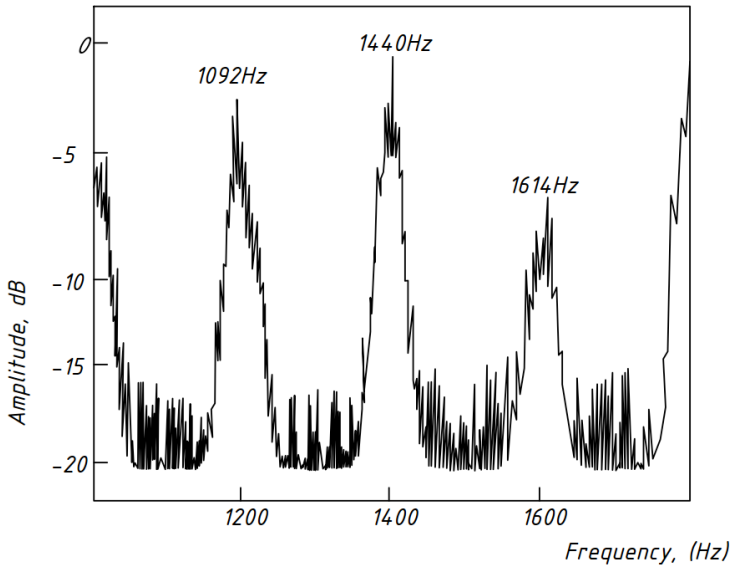

Figure 2. BP current spectrum in the presence of eccentricity

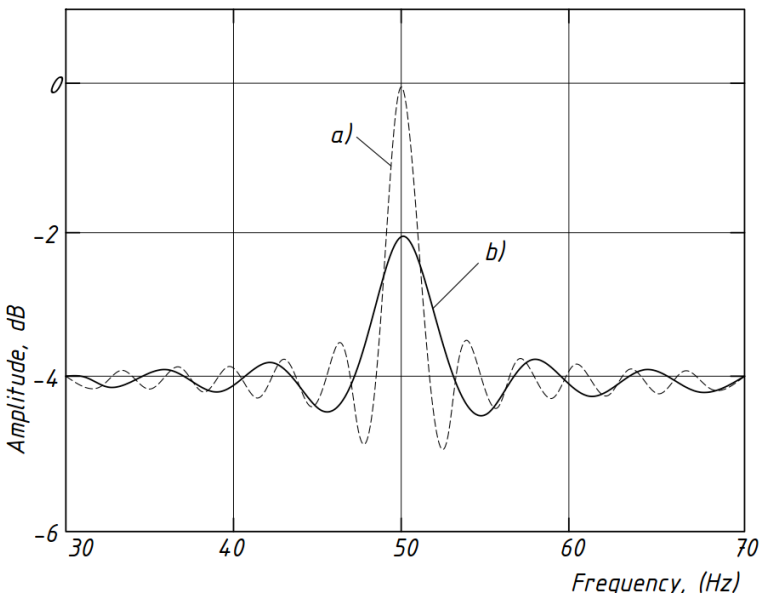

Figure 3. Current spectrum in case of damage to (a) four and (b) six rotor bars

Because of the presence of noise and quantitative-qualitative characteristics in deterministic signal that determines the state of refuse unit of AM, the evaluation of its implementation does not coincide with the true implementation. Therefore, it is necessary to determine the parameters of the optimal filter by the criterion of the maximum signal-to-noise ratio at its output, from which one or another condition of AM can be identified. As an example, consider the case where the incoming signal has a component in the form of a random process $n(t)$, which is a stationary Gaussian white noise with a density spectrum $S_n(\omega) = N_0/2$, $-\infty < \omega < \infty$. The complex frequency response of the filter that maximizes the signal-to-noise ratio at its output can be described in the following form [8]

$$K_0(j\omega) = kI(j\omega)^* e^{-(j\omega)T}, \quad (7)$$

where k – is a certain constant; $I(j\omega)^*$ – a function complex-conjugated with the spectrum $I(j\omega)$, for example, of periodic input signal $i(t) = I_m sim(\omega t)$ at $0 \,''\, t \,''\, t_u$, to which any non-sinusoidal value can be equivalent; this value arises from the defect of any unit of the engine, its spectrum expressed in the form:

$$I(j\omega)^* = \int_{-\infty}^{\infty} i(t) e^{-j\omega t} dt = \frac{K_0}{2} \cdot \frac{I_m \cdot \frac{\pi t_u}{2} \cos\frac{\omega t_u}{2}}{\left(\frac{\pi}{2}\right)^2 - \left(\frac{\omega t_u}{2}\right)^2} e^{-j\frac{\omega t_u}{2}} \quad (8)$$

If the observation interval coincides with the pulse duration i.e. $T = \tau_u$, then

$$K_0(j\omega) = \frac{I_m \cdot \frac{\pi t_u}{2} \cos\frac{\omega t_u}{2}}{\left(\frac{\pi}{2}\right)^2 - \left(\frac{\omega t_u}{2}\right)^2} \left(1 - e^{-j\frac{\omega t_u}{2}}\right) \quad (9)$$

The structural scheme of above mentioned optimal filter is shown in (Fig. 4).

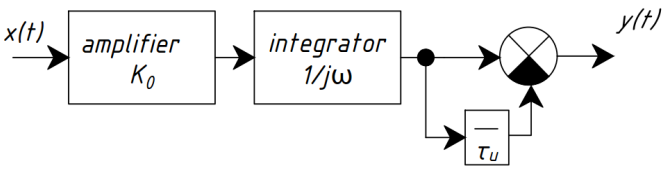

Figure 4. Structural diagram of the optimal filter

Define the signal at filter output, keeping in mind that its impulse response has the form [9]

$$h_0(t) = K_0 S(T - t) = K_0 S(\tau_u - t) \quad (10)$$

so,

$$S_{exit}(t) = \int_0^t h_0(\tau) S(t - \tau) d\tau = K_0 \int_0^t S(\tau_u - \tau) S(t - \tau) d\tau \quad (11)$$

The maximum value of $[S_{exit}(t)]_{\max}$ found from the condition $\frac{dS_{exit}(t)}{dt} = 0$ is reached at $t - \tau_u$ and is equal to $[S_{exit}(t)]_{\max} = K_0 E$, where E – is an energy of signal $S(t)$.

Variance at the output of the optimal filter is

$$D_{exit} = \sigma_{exit}^2 = \int_{-\infty}^{\infty} S_n(\omega) |K_0(j\omega)|^2 d\omega \quad (12)$$

Hence the maximum signal-to-noise ratio is

$$a = \frac{[S_{exit}(t)]_{\max}}{\sigma_{exit}} = \frac{K_0 E}{\sqrt{\frac{K_0^2 N_0 E}{2}}} = \sqrt{2EN_0} \quad (13)$$

Expressions (6, 7, 13) from a practical point of view make it possible to more accurately determine the difference between the amplitudes of spectral components associated with technical state of AM units.

Current and voltage measurements and their spectral analysis must be carried out at regular intervals, depending on the results of preliminary experiment. Results of the analysis are compared and checked by the dynamics of fault development over time, and the residual engine life is determined.

The application of the proposed method will fully realize the technology of electric motors maintenance on the actual state; it will ensure a reduction in damage from emergency failures due to early detection of defects.

Malfunction diagnosis of electric motor is unambiguously carried out and related to the characteristic spectral components of the frequencies, for example, to dangerous motor overloading by a small difference in amplitude between the main, 3rd and 5th harmonics of the stator current; to bearing damage – at frequencies that are multiples of the rotor speed of rotation; to stalling of the rotor – a characteristic beating, i.e. amplitude modulated stator current with rotor speed; the presence of coil-winding short circuit in the stator – at fundamental harmonic of the stator current.

Conclusion

Described methods of diagnostics, processing and analysis of the results of AM technical condition on the basis of the analysis of spectral components of the stator current make it possible to increase the reliability of technical solution to maintain operational reliability by a combination of measured parameters and to study the evolution of technical condition and to reduce the probability of unreasonable withdrawal.

The use of magneto-optical sensors with broad dynamic range in amplitude and frequency for measuring the currents of high-power AM, and further processing on a computer, operating in real time and based on a fast Fourier transform makes it possible to apply powerful mathematical tools in processing measurement data.

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Section 14. Physics

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A SINGLE-QUANTUM SHIFT PHOTOCURRENT IN PIEZOSEMICONDUCTORS

Adsract: The spectral and temperature dependence of the shift photocurrent in piezosemiconductors is calculated, which is due to the carrier current shift in each act of interaction of electrons with photons.

Keywords: electrons, photons, temperature, shift photocurrent, semiconductors.

At the present time, two mechanisms of the LPhGE have become known: the ballistic mechanism due to the asymmetry of the processes of scattering, photoionization and recombination [1–3] and the shift mechanism associated with the shift of the center of gravity of the wave packets of photoexcited electrons during quantum transitions [4].

A linear photovoltaic effect (LPhGE) is understood as the photoelectric effect caused by the appearance of a photocurrent in homogeneous piezoelectric crystals under uniform bighting. The polarization dependence of the resulting photocurrent density ($\vec{j}$), proportional to the light intensity (I), is described by the phenomenological relation

$$j_\alpha = I\chi_{\alpha\beta\gamma}\frac{1}{2}\left(e_\beta e_\gamma^* + e_\gamma e_\beta^*\right) \qquad (1)$$

Here $\vec{e}$ is the polarization vector of the electromagnetic wave, $\chi_{\alpha\beta\gamma}$ the LPhGE tensor.

In this work, we consider the photon mechanism of shift LPhGE in n-type gallium phosphide, caused by carrier displacement during direct optical transitions of electrons between the subbands of the conduction band, taking into account the "hump" of the subband *n*-GaP multivalley semiconductor, the extremes of the valleys of the conduction band are located at points X of the Brillouin zone [6].

This mechanism was first considered in [5] in the spherical approximation in the energy spectrum. Each valley of the conduction band consists of two subzones X_1^C, X_3^C. The energy spectrum of electrons in these subbands is determined with the Hamiltonian [6; 9; 8]

$$\widehat{H}(k) = \begin{bmatrix} A_3k_z^2 + B_3k_\perp^2 + \Delta/2 & -iPk_z + Dk_xk_y \\ iPk_z + Dk_xk_y & A_1k_z^2 + B_1k_\perp^2 - \Delta/2 \end{bmatrix} \qquad (2)$$

where $k_\perp^2 = k_x^2 + k_y^2$ is the two-dimensional electron wave vector, $A_{1,3}$, $B_{1,3}$, P, D are the band parameters of the semiconductor, Δ is the energy gap between the subbands and at the point X of the Brillouin zone. According to (2), the energy spectrum of the electrons in the subbands X_1^C and X_3^C is described by:

$$E_{1,3}(k) = \frac{1}{2}\left[\left(A_1 + A_3\right)k_z^2 + \left(B_1 + B_3\right)k_\perp^2\right] \pm$$
$$\pm\frac{1}{2}\left\{\begin{matrix}\left[\left(A_3 - A_1\right)k_z^2 + \left(B_3 - B_1\right)k_\perp^2 - \Delta\right]^2 + \\ +4P^2k_z^2 + 4D^2k_x^2k_y^2\end{matrix}\right\}^{1/2} \qquad (3)$$

In the two-band spherical approximation [7; 8], i.e. when $A_1 \simeq A_3 = A$, $B_1 \simeq B_3 = B$, (3) is transformed to the form

$$E_{1,3}(k) = Ak_z^2 + Bk_\perp^2 \pm \sqrt{\frac{\Delta^2}{4} + P^2k_z^2 + D^2k_x^2k_y^2} \qquad (4)$$

The wave functions of the electrons near the point X in the basis (2)

$$\psi_{X_1^c} = \begin{pmatrix} C_1 \\ C_2 \end{pmatrix}, \quad \psi_{X_3^c} = \begin{pmatrix} C_2 \\ -C_1 \end{pmatrix} \qquad (5)$$

where $C_{1,2} = \frac{1}{\sqrt{2}}\sqrt{1 \pm \eta}$,

$$\eta = \frac{1}{2}\frac{\Delta}{\sqrt{\frac{\Delta^2}{4} + P^2k_z^2 + D^2k_x^2k_y^2}} \qquad (6)$$

In the further calculations, we restrict by the contribution to the shift LPhGE current of electrons in which the wave

vectors lie in the region $\left|2Dk_xk_y\right| \ll \Delta,\ 2Pk_z$. Therefore, the value Dk_xk_y is taken into account only in the mespodzon matrix element of the momentum operator. Because Dk_xk_y is responsible for the appearance of both ballistic [5; 7] and shift LPhGE in n-GaP. According to (2)

$$ep_{31} = \frac{m_0}{\hbar}\left\langle x_3^c \left| e\frac{\partial H}{\partial k} \right| x_1^c \right\rangle = \\ = \frac{m_0}{\hbar}\left[iPe_z - \eta D\left(e_xk_y + e_yk_x\right)\right]. \quad (7)$$

We note here that for *n-GaP* the energy gap between the subbands of the conduction band is greater than the energy of the *LO* phonon and the average thermal energy of the electrons. Therefore, the nonphoton real transitions of thermalized electrons from the subband X_1^C to X_3^C (and back transitions) are absent. Therefore, optical transitions involving phonons, shown in (Fig) contribute to the *n-GaP* ballistic LPhGE, where a solid (thick) line is an electron, a wavy one is a photon, and a dashed line is a phonon.

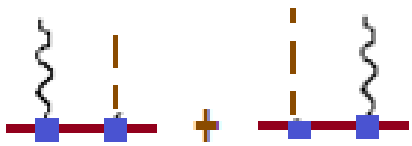

Figure 1. Optical transitions involving phonons

Next, we calculate the shift LPhGE current in *n-GaP*, which is related to the direct optical transitions between the subbands and without the participation of phonons, where we use the formula [4].

$$j_\alpha^{фот} = \frac{e^3 e_\beta e_\gamma}{2\pi m_0^2 \omega^2 \hbar c n_\omega} \sum_n \int dk \left(\mathrm{Im}\left[p_{31;n}^{(\gamma)} \frac{\partial}{\partial k_\alpha} p_{31;n}^{(\beta)} \right] \right) \times \\ \times \delta\left(E_3(k) - E_1(k) - \hbar\omega\right) \quad (8)$$

where n is the number of the valley (The remaining notations correspond to the notation of [4])

The substitution of (7) in (8) and the sum over all valleys gives an expression for the shift LPhGE current

$$j_\alpha^{фот} = -|e|\frac{I}{\hbar\omega} KL_{cовe} e_z \left(e_x\delta_{\alpha y} + e_y\delta_{\alpha x}\right), \quad (9)$$

$$j_\alpha^{фот} = j_0^{фот} \frac{\Delta}{k_BT} ch\left(\frac{\Delta}{k_BT}\right) \exp\left[\frac{\frac{\hbar\omega}{2} - A\frac{(\hbar\omega)^2 - \Delta^2}{(2P)^2}}{k_BT}\right] \times \\ \times \left(\frac{\Delta}{\hbar\omega}\right)^2 e_z\left(e_x\delta_{\alpha y} + e_y\delta_{\alpha x}\right),$$

where, $j_0^{фот} = -8\pi^{\frac{3}{2}}|e|\frac{I}{\Delta}B_1A_1^{\frac{1}{2}}\frac{D}{P}\frac{N'}{\Delta}$, N' is the concentration of free electrons, *K* is the light absorption coefficient for a direct optical transition of electrons between the subbands X_1^C and X_3^C. It is seen from (9) that the temperature variation of the shift LPhGE current is completely determined by the temperature dependence of the light absorption coefficient.

Let us compare the current of the ballistic contribution to the LPhGE calculated in [5; 7] in the spherical approximation in the energy spectrum (4) (that is, when $A_1 = B_1$, $A_3 = B_3$, $P = 0$), taking anisotropy into account in the matrix element of the optical transition $X_1^C - X_3^C$, with a shift photocurrent (9). Calculations show that at T = 200 K, the ballistic current of the LPhGE is five times greater than the shift current. In the estimation, we assumed that (the energy of the LO phonon), Δ = 335 MeV, $Pa_0 = D$, $a_0 = 5{,}4\cdot 10^{-8}\,sm$ (lattice constant).

The work is partially financed by the grant OT-F2–66.

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REVISITING THE NATURE OF DARK SUNSPOTS: A MODEL OF HOT SPOTS

Abstract: The empirical and physical inconsistency of the cold sunspot model is shown. It is shown that a dark sunspot can only be hot. Based on the results of an experimental study of the effect of a magnetic field on the intensity of visible light emitted by a tungsten filament lamp, a hot sunspot model was proposed. The heating and darkness of sunspots are due to the dissipation of the energy of electronic excitation of negative hydrogen ions induced by the magnetic field of the spot.

Keywords: dark spots on the Sun, quenching of radiation by a magnetic field, negative hydrogen ion.

Introduction

This work is a continuation of the work [1; 2], in which the darkness of sunspots is explained by the influence of the magnetic field of the spot on the intensity of the radiation of the photospheric gas, as a result of which the spots must be hot, and not cold. Such an explanation follows from the results of experimental studies of the effect of magnetic fields on the intensity of visible light of tungsten filaments of electric incandescent lamps, described in detail in [1; 2].

Problems of the model of a cold sunspot

In the list of unresolved problems in the physics of the Sun, questions about the temperature of matter of sunspots and the cause of their darkness are not listed. It is believed that the spots are dark, because they are cold, and cold, because their magnetic fields prevent convective heat transfer to the surface of the Sun. However, almost all the observational data on the Sun, with the exception of visible dark spots, do not agree with the model of a cold sunspot or contradict it. In addition, no convincing mechanism for magnetic spot cooling has been presented so far [3, P. 249–251].

In the context of the foregoing, it is appropriate to quote one quotation from the well-known monograph on sunspots [4, P. 265]: "The first magnetic theories of sunspot cooling were based on the suggestions that convection within the spot umbra is suppressed (Biermann) or diluted (Hoyle) by the field (cf. Section 8.3.2). However, observations of granulation in sunspot umbrae, described in Section 3.6, show that the convection is not suppressed; for this and other reasons both Biermann's and Hoyle's theories are no longer tenable. Nevertheless, it is almost certain that the coolness of a spot is due to a reduction in the amount of energy convected upwards, resulting in some way from the influence of the magnetic field".

These words, written more than half a century ago, sound surprisingly modern and relevant, because even today the visible darkness of sunspots is an indisputable proof of their coldness. Moreover, the a priori statement that "the spots are dark, because they are cold and cold, because their magnetic fields impede convection", consisting of two *circulus vitiosus*, not subjected to either empirical or theoretical verification, is already actually elevated to the rank of the postulate of solar physics. The negative aspect of this circumstance is that new ideas and alternative hypotheses about the nature of sunspots are not considered and, apparently, are generally not allowed to be discussed in the scientific literature.

Meanwhile, the key role of spots in all manifestations of solar activity is obvious. Without a clear understanding of the processes taking place in the sunspot and causing its darkness in visible light, without precise data on the actual temperature of the photospheric gas in spots, the solution of many other problems of solar physics is hardly possible.

If we compare the data of the Sun's cosmic observations with the predictions made on the basis of the concept of cold sunspots, then a paradoxical or even absurd picture of the processes and phenomena occurring on the surface of the Sun and in its atmosphere is obtained. It turns out that the "cold" spots shine brightly against the background of the photosphere in ultraviolet ($\lambda \sim 10$ nm) and X-rays, and the hotter faculae around the spots look very dark (X-ray brightness of the spots is 100 times greater than the photosphere). The most powerful and fastest movements of the photospheric gas (the Evershed flows) take place precisely in the "cold" spots, and solar flares emerge in them. It is over the "cold" spots that the hottest areas of the chromosphere and the corona are located, in which multiply ionized atoms of oxygen, argon, magnesium, silicon, iron and other elements emit bright spectral lines in the extreme ultraviolet and X-ray wavelength bands.

In this connection, another interesting question arises: how could the aforementioned atoms be in the Sun's corona? This issue is also not discussed in scientific articles, although the discovery of these atoms in the corona of the Sun looks from the point of view of the concept of cold spots exactly as if on Earth ordinary road dust was found at the same altitudes above sea level as the volcanic eruption ash.

There are many other facts and phenomena observed on the Sun, different in scale, but equally paradoxical, mysterious, or at least strange, if we explain them in terms of the concept

of cold sunspots. It follows that the model of cold sunspots leads to a deadlock, since empirical data on the Sun can not be explained within the framework of this model.

Insurmountable difficulties, and even of a fundamental nature, arise when considering the compatibility of the phenomenon of magnetic cooling of sunspots with the second law of thermodynamics.

Cooling a sunspot below the temperature of the photosphere means a spontaneous decrease in the entropy of the gas in the spot without removing heat from outside and without the work of an external force, which just prohibits the second law of thermodynamics. The removal of heat from the spot is impossible, since the photosphere is in a state of local thermodynamic equilibrium and the horizontal temperature gradients are practically zero. The magnetic field does not change the kinetic energy of the charged and neutral gas particles and can not cool it, but at the expense of Joule heat it is capable of heating. In general, no adiabatic process can cool the gas in an unchanged volume, you can only heat it.

Photometric measurements of spot temperature [4, Chap. 4], indicating their coldness, can not be considered objectively reliable. Doubt is not the measurement technique complicated by many artifacts (diffused light, etc.), but the legitimacy of the application of the laws of thermal radiation to measure the temperature of the spots. The point is that the radiation of the spots has a nonequilibrium character and can not be approximated by thermal radiation, especially in the visible region of the spectrum, where the true continuous emission of umbra spots is absent altogether [4, P. 133–134].

The direction of thermal processes occurring in sunspots can not contradict the law of increasing entropy, from which it follows that heating and cooling of matter are fundamentally asymmetric and unequal processes. The heating of any body increases its entropy, and cooling reduces, and if there is no compensating increase in the entropy of other bodies, cooling is impossible. It is for this reason that in nature, for example, there exist only compression shock waves associated with heating the gas at the wave front, and shock waves of rarefaction associated with cooling the gas are impossible (Zemplen's theorem, 1905), although the solutions of the gas-dynamic equations allow the existence of shock waves of both types. Here it is important to note that the Zemplen theorem is also true for magnetohydrodynamic shock waves [5].

Model of hot sunspot

In the first approximation, let us consider the radiant heat exchange between the gas of a spot and the gas of an unperturbed photosphere, neglecting thermal conductivity and convection, since the role of these processes in the energy transfer in the photosphere is comparatively small. However, we take into account the important fact that the photosphere of the Sun is in a state of radiant equilibrium and for the gas in it the Kirchhoff law for a black body is fulfilled.

Since the magnetic field does not interfere with the propagation of light, the volume of the spot is filled with an equilibrium thermal radiation emanating from the gas particles in the spot and from the particles of the photosphere located in some boundary layer of gas along the entire surface separating the spot and the unperturbed photosphere. The local temperatures of sufficiently small gas regions in the spot and in the boundary layer are proportional to the depths of their immersion in the photosphere and are initially identical both in the spot and in the photosphere. If the magnetic field does not affect the absorption and emission of photons by gas particles in the whole spectrum of its radiation, then an equilibrium thermal radiation will emerge from the spot through its outer surface, which will hardly differ from radiation emanating from neighboring sections of the surface of a quiet photosphere. In other words, under radiant equilibrium conditions, the radiative cooling of a sunspot is impossible, and it can not be dark.

To change the temperature of the gas in the spot, at least the Kirchhoff law for the blackbody must be violated in the photosphere region occupied by the spot, which is equivalent to breaking the detailed balance between the absorption and emission of photons by the gas particles in the spot.

However, if we now assume that the magnetic field has disturbed the radiant equilibrium in the spot, which is indeed quite possible, then it is not difficult to see that the consequence of this violation can only be the heating of the spot. This conclusion again dictates the second law of thermodynamics, since cooling the spot would mean a decrease in the entropy of the gas without removing heat from outside by internal processes alone, which is impossible.

The same conclusion, provided that the magnetic field of the spot has violated Kirchhoff's law, necessarily follows from the most famous observational fact, attesting to the almost total darkness of the umbra of sunspots in visible light. This darkness means that the processes of absorption of photons of visible light dominate in the gas of the spots, and the processes of their emission are almost completely suppressed by the magnetic field. It follows that photons of visible light heat the gas of the spot, since it is opaque to them. We note that for radiation volume cooling of gas it is necessary that photons are produced due to its internal energy and the gas for them is transparent. Consequently, dark sunspots can only be hot, and out of them come out those photons, the radiation process of which is not affected by the magnetic field of the spot, as well as photons that radiate gas spots due to its heating. The latter circumstance, in particular, explains the brightness of sunspots in the extreme ultraviolet and X-ray wavelength ranges.

Negative hydrogen ion in the magnetic field of the spot

The question arises, what is the possible mechanism for violating Kirchhoff's law by the magnetic field of the sunspot, at least in the initial stage of its appearance?

In the solar photosphere, photons of visible light are most strongly absorbed and emitted by negative hydrogen ions (H^-), in which there is one stable singlet state ($S = 0$, the spins of electrons are paired), the ionization energy of which is 0.75 eV [3, P. 149–150]. Apparently, all the excited states of the ion H^- belong to the continuous spectrum of the energy values, when one electron of the H^- ion remains in the discrete spectrum, and the other electron in the continuous spectrum. We note that a negative hydrogen ion is capable of absorbing and emitting photons in both bound-free and free-free transitions.

If there is not a sufficiently strong magnetic field in the photospheric gas, then the absorption by the ion of the H^- photon is completed by the formation of a loosely bound quantum system "hydrogen atom + electron", which remains in the singlet state for some time, since an electronic transition does not change the spin ($\Delta S = 0$). The electron, being in the field of radiation near the hydrogen atom, polarizes it, thereby stimulating the reverse process – the recombination of the H^- ion with the emission of a photon, as the Kirchhoff law demands. Naturally, the formation of the H^- ion must occur before the time determined by the lifetime of the "hydrogen atom + electron" system, when the distance between its particles is already excessively large.

If a sufficiently strong magnetic field is present in the photospheric gas, the course of events indicated above may be completely different. The spin of an electron or atom directed against a magnetic field is unstable, and for a short time it is reversed with an orientation along the field direction. For free electrons in a magnetic field $B \leq 1$ T, the spin flip time at room temperature does not exceed 10^{-10} s, while the duration of optical processes is ~ 10^{-8} s.

Thus, with a high degree of probability it can be asserted that in a time shorter than the lifetime of the "hydrogen atom + electron" system, the magnetic field will change the spin state of the electron, which means the transition of the system to a triplet state ($S = 1$). In this case, a photon with an energy of ~ 10^{-5} eV (the range of centimeter radio waves), which is associated with the spin flip of an electron in a magnetic field, will be emitted. The triplet state of the "hydrogen atom + electron" system is unstable, since the approach of particles with equally directed spins leads to a continuous increase in repulsive forces. The formation of an H^- ion with the emission of a photon becomes impossible, and the energy of the electronic excitation of the "hydrogen atom + electron" system becomes kinetic energy of the translational motion of its particles. In other words, there is a nonradiative transition of the energy of a quantum system into the thermal energy of its particles.

It is interesting to note that back in 1919, W. Steubing described in detail the observation of the quenching by the magnetic field of the fluorescence of iodine vapor [6], which later was called the phenomenon of magnetic predissociation of iodine molecules in the gas phase and has long been included in textbooks. The interesting thing is that the mechanism of magnetic quenching of iodine molecules emission is practically analogous to the mechanism described above for suppressing by the magnetic field of the radiation of negative hydrogen ions in the solar photosphere. In work [7], quenching of laser ruby luminescence by a strong pulsed magnetic field due to stimulation of nonradiative deactivation of optically excited Cr^{3+} ions by a magnetic field in the transition between energy levels responsible for the ruby laser radiation is described.

Conclusion

There is no doubt that the magnetic field in optical phenomena can play the same role as frictional forces in mechanical phenomena. An optically conservative photospheric gas becomes a dissipative medium in a sunspot, which is a direct consequence of the irreversibility of the absorption of photons by negative hydrogen ions in the magnetic field of the spot.

Dark spots on the surface of the Sun are original, giant in size and power analogs of volcanoes on the surface of the Earth, and the actual temperatures and speeds of movements of their dark "lava" have yet to be determined. It is the spots that are the sources of the energy that heats the Sun's corona.

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Section 15. Philosophy

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BALANCE BETWEEN RELIGIOUSNESS AND SECULARITY IN CONDIITONS OF GLOBALISATION OF ISLAMIC IDEOLOGY

Abstract: This article covers issues of ensuring a balance of religiousness and secularity in conditions of globalisation of Islamic ideology, and the problems of fighting the political Islam, radicalism, religious extremism, and terrorism are shown in the example of Uzbekistan. In addition, the work makes a special note about the importance of running the fight against extremism and terrorism based on the "education against ignorance" principle.

Keywords: religious tolerance, religious education, extremism, terrorism, fundamentalism, radicalism, fanaticism, Islamic law, secularity.

Nowadays, Islam has become one of the most influential factors affecting social and political life. The processes active in Middle East, partly in Syria, and Iraq are the events that reflect the social orientation of human progress in the 21st century. It is difficult to imagine the future order of the world without the influence of Islamic ideology to the development of modern world. It is the event of globalisation, which is the centre and root of it and which grew in its development in the last decades of 20th century and now covered the entire planet of Earth.

To the beginning of the 21st century the economic, political, cultural and information convergence, communication and influence reached their culmination. Growing influence of Islamic ideology not only in Muslim world but also outside this zone is a proof of this. It is obvious that as globalisation of economic, political, and cultural relations the influence of Islam ideology to world economic processes is continuously growing.

Can we say that there is a special Islamic ideology now? The facts about existence of Islamic geopolitics of political Islam can give answers to this. Presence of Islamic ideology, intended to restore Islamic Caliphate by real actions of ISIS also confirms this truth. In addition, a number of Islamic scholars also acknowledge this truth. For instance, Doctor Ahmad Abdullah (Arab Republic of Egypt) says: "Development of Islam in the 20th century led to establishment of an Islamic ideology similar to ideologies of Marxism, capitalism, liberalism, and socialism" [1].

The Islamic ideology tends to govern in the countries, whose population mostly represent Muslims. It is inevitable to acknowledge certain conditions. The events, which occurred in former Soviet republics, including radicalisation of Islam, popping out of various Islamic movements, even attempts to demolish the secular constitutional order and to establish a social order based on Sharia requirements (Hizb-ut Tahrir, Bahaviya, Akromiya, Nurcisti, etc.) also confirm the above statement. There were many conditions in the secular regime (as spiritual ability) to achieve this purpose. During the governing of the strict ungodly ideology, he people of Central Asia remained Muslims and we can acknowledge that they continued keeping to the Islam religion related customs and ceremonies. Due to ideological changes in the soviet regime, weakening of the CPSU control, the Central Asian republics saw the process of re-Islamisation, which could allow legally expressing the standards and values of Islamic religion. As a result, we saw intrusion of representatives of religion from foreign countries with the main purpose of establishing fundamental and radical trends, creating a network of illegal schools (hujrahs), provided with foreign literature.

Lack of religious education among population led to accept the bahai orientation as the real values of Islam. Some contradiction and separations started to occur that led to conflict in understanding and directing to the traditions and nature of Islam among Muslims. After collapse of the Soviet Union, the international Islamism ideology started filling the gap that appeared after ruining of the communistic-atheistic

ideology a French Islam scholar wrote the following about this: "the purpose of Islamists in re-islamisation of the society is getting to the power. As opposed to fundamentalists Islamists do not support the idea of "going back" to the history, but they devote themselves to fight against modern society and its technical means [2]. Lack of strong ideological control by the government and its weakening by foreign Islamic centres activated the envoys, who managed to get higher rank than the government and official priests had. In 1990's the extremist groups like Hizb-ut-Tahrir (Party of Allah), bahai faith, or Akromiya tried to divert the society from the path of democratic development and build an Islamic state. As a result, the Islamic ideology started growing rapidly in Uzbekistan, most part of whose population is Muslim and where in Bukhara, Samarqand, Qarshi, Termez and Tashkent are situated with most ancient historical Islam monuments are located and were they have great education and moral heritage of Imam Bukhari, Imam Termizi, Imam Moturudy and Bahovuddin Naqshband. On the 16 of February 1999, in Tashkent, in 2004 and 2005 in Tashkent and Bukhara, on the 12–13 of May 2015 in Andijan terrorist attacks killed many innocent lives. The early years of national independence of Uzbekistan is specifically noted for disbalance in the society between secularity and religiousness. The main reason that caused ruining of the balance between secular and religious ideology in Uzbekistan may not necessarily have been the attempts of international "Islamic forces" to re-Islamise the society, but possibly the "great games" of certain hegemon countries to achieve their geopolitical purposes to establish their strategic ruling in Central Asia.

By supporting the technologies that cause intentions of ruining political environment, nationalism, separatism, religious extremism in Middle East, Central Asia and other regions, special services of some countries tried to establish an opposition to official governments and managed to do so in some countries.

Application of such methods by Islamic organisations and geopolitical force led to "colour revolutions" in some former Soviet republics and occurrence of the Arab spring events in Middle East countries. The events in 1990's that caused serious social-political instability in Uzbekistan and Tajikistan and even later a civil war in Tajikistan can be brought as clear examples to this. The consequences of operations effected by these forces are still felt and dangerous.

Instead of using the mutual tolerance policy, in the conditions of globalisation and convergence of cultures, some geopolitical forces are using the political method of "Divide and Rule," as if they are trying to claim for the rank of the third force, i.e., a conciliatory mission. It is the task of modern philosophic science to analyse and adequately assess these activities and intentions.

In our globalisation era, while the balance between the secularity and religiousness is quite unstable, it is the requirement of time to give scientific analysis of philosophic-methodological aspects of religiousness and secularity. According to the analysts, "it is one of the most important objectives of modern philosophic science to run comprehensive and deep research of scientific issues, related with the philosophy of Islam, its science of law, Islam culture, and morals in moral and ideological fight against terrorism in the mask of Islam" [4]. Fighting only the consequences of this problem is nothing but philosophic illiteracy. In reality, it is more efficient to find and fight against the causes of the problem; it has political, legal, psychological, sociological, religious, moral, and historical features. In the current conditions, no individual, special interpretation and analysis can claim for a real scientific conclusion. Only scientific approach to the issue can give a comprehensive knowledge of its roots, causes, history, evolution, current state, and its potential.

As one of the analysts of religious situation, A. Qodirov noted: "In the conditions of establishing a national democratic statehood in Uzbekistan democracy is not a powerful force in front of radicalisation of Islam and the authoritarian system and bureaucracy" [5].

Despite the attempts of Islamic organisations to turn the secular way of development in Uzbekistan to Islamic development, as opposed to Middle East, Iran, Pakistan and Afghanistan, the Uzbek government managed to establish a reliable legal mechanism to eliminated religious fanaticism, fundamentalism and extremism.

Article 31 of the Constitution of the Republic of Uzbekistan, the new edition of the Law "About freedom of religion and religious organisations" introduced on 1 of May 1998, and especially the Strategy of Activities for Development of Uzbekistan in 2017–2021, adopted on 7 of February 2017 are creating the necessary conditions for secular democratic progress and development of pure Islamic education. With this regard, the Religious Office of Muslims of Uzbekistan, the Committee on Religious Issues at the Cabinet of Ministers of the Republic of Uzbekistan, the local Civil Self-Governing bodies are intensifying practical work on turning the multinational and multi-confessional Uzbekistan into a modern democratic state, based on common human, secular moral values and traditions.

In his speech at the Astana Science and Technologies First Summit of the Organisation of Islamic Cooperation (OIC) on the 10 of September 2017, President of the Republic of Uzbekistan Shavkat Mirziyoyev noted with sorrow that although the OIC countries have great financial opportunities, the OIC member countries are not active in implementing innovative ideas and technologies. For instance, he drew the

attention of the audience to the low ranking of OIC member countries higher education institutions, while only 11 of which are among World 500 best Universities Rating or these countries shared only 1.9% of patent applications were resolved positively. To this regard, he proposed an initiative to arrange and popularise an Organisation of Islamic Cooperation international award for contribution to development of science and technologies. President of Uzbekistan made a special note that though most Muslim countries host rich natural resources, great financial opportunities, they are not able to demonstrate activeness in implementing innovative ideas and technologies, and he only way to resolve this issue would be to intensify cooperation between the member countries and pay more attention to the global climate change, establish highly efficient computer centres, complex work with young scientists and youth [6].

The fact Sh. Mirziyoyev stated that Uzbekistan were ready to establish one of the size efficient computer centres in its territory, which he had recommended and his suggestion in establishing an International Islam World Young Scientists Centre proves that the leader of our country believes that ensuring development of secular sciences and due using of religiousness in this is one of the important conditions to ensure social stability.

In addition, President Sh. Mirziyoyev's speech at the 72th UNO General Assembly on 10 of September 2017 cause great interest not only in the Muslim world, but also among the world community.

With its vitality, proposal of our President from the high stand of the UNO to adopt this respected organisation's resolution called "Education and religious tolerance" is of great importance. In his speech, the leader of our nation made a special note that the main purpose of this document would be to ensure access to education for everyone, assisting in elimination of illiteracy and ignorance, and this resolution is intended to establish tolerance and mutual respect, ensure freedom of religion, protect the rights of believers, and prevent their humiliation [7].

In general, the speech of the leader of our state at the 72 assembly was another step to deliver the real humane sense of Islamic religion to world community.

International Islamic Academy was established according to the Order by President Sh. Mirziyoyev "About measures for radical improvement of the activities of the religious-educational field" [8]. This Academy is a leading educational and scientific-research institution, specialised in training skilled professionals in Quran sciences, Hadiths, Islamic law, aqeedah (dogma), tasawwuf, Islamic economy and finance, international relations, foreign languages (Arabic, Persian, English, Russian, Urdu, Turkish, etc.) and other internationally required fields, arranging a unified education system in postgraduate and skills improvement stages and deep study and careful preservation of scientific heritage, and offering secular and religious education. In addition, the Islamic Civilisation Centre was established within the framework of executing the Resolution of President Sh. Mirziyoyev "About measures to establish an Islamic Civilisation Centre in Uzbekistan a the Cabinet of Ministers of the Republic of Uzbekistan" [9].

The point is the right way is not opposing religiousness to secularity, but relevant use of religiousness in secular development. Opposing religiousness to secularity, its politicisation is very dangerous – it leads to broadening of the threat of religious extremism and religious fundamentalism to international community, relationship between countries and nations. The future of Uzbekistan lies in preservation of the balance between religiousness and secularity, ensuring tolerance between nationalities and confessions, establishing friendly neighbour relations between Muslim and non-Muslim worlds.

Therefore, on 7 of February 2017, President of the Republic of Uzbekistan issued the Order "The strategy of activities on further development of the Republic of Uzbekistan". Orientation Five of this Strategy of Activities poses the issue of ensuring security, inter-ethnic friendship, and peaceful coexistence and religious tolerance, strengthening the independence and sovereignty of our state, intended for running well-thought and practical foreign policy, and establishment of safe, stable, and friendly neighbouring environment around Uzbekistan.

The broad practical actions in process by our government for ensuring the balance of relations of religion and the state are also acknowledged by international community.

As a conclusion, we thought it expedient to propose the following recommendations for ensuring a balance between secularity and religiousness in the conditions of globalisation of Islamic ideology:

- Enhancement of scientific-research work on in-depth study of teaching social disciplines that serve improving ideological immunity of the main social layer, i.e., the younger generation, who fall under the intellectual forces with radical views trying to form the ideology of politicised religious organisations;
- Development of complex state programmes for coordination of actions intended for preventing radicalisation of inter-ethnic and interregional religious conscious and politicisation of religion;
- Improving efficiency of leading Islamic studies centres in the Oriental world and the West and assisting in combination of their opportunities for the purposes of prevention from conducting duplicating research works;

- Find mutually conformant interests of the Oriental and Western Islamic Studies schools, develop cooperation between such;
- Holding special scientific conferences on practical assistance to get rid of Islamophobia among the population of the Western countries;
- In-depth study of the experience of the Republic of Uzbekistan, which is based on the principle of "education against ignorance" to ensure the balance between secularity and religiousness in building a civil society on the basis of a constitutional state and democratic values.

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SOCIAL AND PHILISOPHICAL PERFORMANCE OF MAKING YOUTH'S INTELLECTUAL CULTURE

Abstract: This article is devoted to the socio-philosophical problems of the formation of intellectual culture components of the youth, their organizational, methodological, psychological and social factors in social development. It also discusses the socio-philosophical content of the intellectual culture problem, the development of the intellectual culture of young people in the context of social development, and its impact on the development of civilization.

Keywords: youth, intellectual, culture, science, intellectual culture, intellectual capital, innovative ideas, intellectual abilities, structure of intellectual culture, intellectual cultural functions.

Intellectual culture is the ability to designate goals and objectives of the gnoseological activity, which is based on human intelligence, planning skills, developing diverse intellectual capabilities, working with sources of knowledge and information and technology.

The main functions of 'Intellectual Culture' are followers: gnoseological, humanistic, communicative, informative, educational and social normative. According to the system of methodological knowledge, developing of intellectual culture has axiological, technological, personal-creative and cognitive components. It turns out that a person creates new ideas through creative thinking, puts various problems and solves them, solves their specific solutions, and sometimes finds unique approaches, methods, and methods to such solutions. The creative nature of the person's mind provides his socialization.

It is important to pay special attention to the socio-philosophical aspects of organizational, methodological and moral factors of formation of intellectual culture in young people. Prior to addressing these issues, it is desirable to focus on the peculiarities of the formation of intellectual culture.

Research shows that the parents, teachers and educators of the great talented people were also talented, creative people. For instance, Alisher Navoi's family and his ability to memorize many poems from his childhood, A. S. Pushkin 'snanny Arina Radionovna made them get lots of achievements.

Margaret Munnerlyn Mitchell, the author of well-known novel 'Gone with the Wind', remembers that her mother gave her 'cash prize' for reading and re-telling the main meaning of books, and the higher 'payment', the more complex work. That fact influenced on her future becoming a great writer.

Human's spiritual and intellectual features are based on their education and the environment which they live in. A well-planned educational system in a family is a base of being well-educated at school, by contrast, if there is no necessary bringing-updeeds in a family, it causes to many problems in school educational work.

It is vital that there should be very close and loyal, natural and simple, warm relationship between children and educators in a family, and should not be any type of formality. It is the main stage of formatting primitive intellectual cultural components in the youth in a family.

It is essential to create initial componentsof culture, which are acts of thought, in a family such as different vital experiences and scientific knowledge, skill of distinguishing, comparing, adding, dividing, abstracting, sequencing a number of complexes of information and news in the youth.

Because the spiritual consciousness of young people depends on the development of society in a certain intellectual field, as well as on the spiritual and cultural level of the particular family. The most important component of spiritual consciousness can be expressed as intellectual behavior and its three forms:

Firstly, a verbal intellect, which refers to the word, the erudition, the meaning of understanding the readers;

Secondly, the ability to solve problems;

Thirdly, the capacity to implement the set goals [1].

Thus, the intellect is the ability of a person to reach a certain level of understanding, thinking activity, which enables the individual to acquire new knowledge and effectively use them in his work. It is the basis of people's knowledge and behaviour (rationality)in a society. Like these skills must be formed in a family. Elders should give youngers lots of puzzles, do different intellectual games, which increase youngers' ability of thinking, and also they have to listen to youngers' ideas though they are very simple, encourage youngers' working skills, appreciate their own working or gaming results.

It is very theoretical-methodologically important to focus on 'intellectual potential', which is a main part of intellectual culture when we discuss about intellectual culture.

Being contrast to intellectual resource, intellectual potential refers a set of intellectual-creative abilities, although they are hidden, not officially noted, they are a real basis for any activity. Therefore, a subject must have a complex set of complex mental functions that will facilitate the acting of the functions of execution, implementation, and performance of a particular activity, i.e., the study of the subject of mental work [2]. That is why researcher Michael Polani states that'individual knowledge requires intellectual potential. It's not just about being of knowledge, but the person who seeks to know, his or her interest in knowledge, personal approach to interpretation and use of the information, and his or her perception of it [3].

The problem of skill has always attracted the attention of thinkers and philosophers of all time, as a human being is a researching object for many subjects, ability is also considered as that object.

The talent is the functional uniqueness of the human anatomical-physiological nature of the human brain, the nervous system, the emotional and behavior, and the basis of the development of organism's ability. People are inherently different in nature and form the basis of their abilities. Person's ability, which has not developed, could be forgotten.

The structure of intellectual skills has followers: the talent are the genetic base of ability; common abilities such as learning, attention, memory, imagination, role, hard working, appear in the same way in different type of human activities; specific abilities such as musical, mathematical, organizational ones, which appear in some kind of activities; social abilities, which are divided into groups and developed by common and special talents; professional abilities, which are involved in the selection of profession, specialty and labour activity [4].

Owners of creative abilities have the power to provide the vitality of a particular society. Moreover, the younger generation, with its creativity, becomes the vital force of the society. On the contrary, in social non-active people collapse destroying power of real being. In this sense, the idea that high creative ability is inherent in a person is not true according to us.The generation has a role to play in the formation of the talent.But in today's philosophical studieshas been discovered that children of unique creators did not have this ability and, on the contrary, had a lot of cases where many talented were born from parents who did not have this ability.This demonstrates that creativity is actually present in everyone, but this capability is often abandoned. Of course, this issue seems to be superficial, but in fact it is a very complex process that requires extensive specialized knowledge.

The experiences of social, economic, political and professional activities confirm that the only intellectual capacity of a human being to find place in society, family, or social groups is not sufficient. The growing generation must be able to have a high level of thinking, skills and high intelligence about the future development of the society, which has a sense of indifference for the fate of its country and its people, from the old thinking effect. This is firstly.

Secondly, it is a great task to upbringing and harmonizing a comprehensively advanced generation that has become our main goal and task to form a society that has a high intellectual base.

According to sociological psychological research, further advancement in the education and upbringing of gifted and intellectually gifted children is largely based on the essence of psychological terms that describe the abilities of parents, educators, teachers and the general public, and their specific developmental laws on scientific basis and that they are closely connected with their understanding.

The effectiveness of each case is closely interconnected with the understanding of the physical and psychological guidelines for a thorough understanding of the essence of the matter and its precise realization before it begins. This is, of course, solved based on the intellectual capacity of the person performing the task. The views that the ability to pass through a genealogy through the heredity is contrary to scientific theories. The rise of intellectual capacity of each person's mental development, including his talent, is governed by socio-historical principles. Ability to develop depends on the social conditions that initially emerges in the child's needs, interests, and directions. In this regard, from the lower stages of the education system, it is necessary to focus on the development of intellectual potential youth:

– intellectual competence, including the broad vision of the person, the intellectual preparation ready for vital activity in the society, the system of intellectual universality;

– a system of intellectual abilities and intellectual abilities, based on them;

– a system of concepts formed on the basis of self-reflection;

– a system of important attributes that can be adapted to the intellectual system [5].

The rise of intellectual culture in young people requires the creation of the ability to overcome contradictions on the path to creative thinking. These difficulties include followers:

– conformism, the desire to be like others; a person is afraid to declare extraordinary ideas in order to avoid laughing or foolishness to others;

– control censorship (in particular hidden senses or self-criticism), that is, people who are usually afraid of the consequences of their ideas can never be innovators [6]; there must be some kind of equality between the individual's ability and self-criticism, and the excessive humour of his talent can lead to creative disintegration;

– fear of human activity, that is the loss of luck and initiative;

– inability to adapt to social reality; this is a turmoil in changing the way they work in extreme conditions;

– striving to find ways of implementing a new task in certain social conditions; but excessively high motivation often leads to unreasonable decisions.

Based on the above, the following conclusions can be made:

1. Creating and introducing a socio-psychological mechanism to study the intellectual culture of youth, which is formed in the form of ability, talent, abilities and talents formed on the basis of physical and psychological development laws.

2. Creating the most appropriate courses for young people to get acquainted with parents, educators, teachers, and even the general public through the intellectual culture and its development laws.

3. By studying the intellectual potential of each of the younger generations through socio-spiritual and psycho-diagnostic methods, and developing a unique curriculum and system for it.

4. Creating a system for the broad introduction of innovation, and scientifically-based solutions to the development of intellectual capabilities of young people with the impact of individualized teaching and learning.

5. Talent formation in a person is connected with high level of knowing, thought, intellectual developing. That's why it is necessary to be able to anticipate the skills and talent skills of the person and to direct them in the right direction.

6. Intellectual culture is formed with knowing human being and the world, appreciating them. It is vital to develop youngers' thinking activity and extend it basing above mentioned. Because that may give an opportunity to bring up our youngers as free and independent, self-conscious, self-aware ones, who are skilled, political-aware one, who can stay against different branches, who are loyal to our motherland interests.

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Section 16. Chemistry

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ETHERIFICATION OF METACRYLIC ACID BY OLEFINES

Abstract: The process of synthesis of methacrylic unsaturated ester is studied. The reaction of esterification of methacrylic acid with isomeres of liquid olefins has been studied in the presence of an acid catalyst in a temperature range of 40–60 °C. The influence of the length of the hydrocarbon chain of olefins on the yield of the final product has been shown.

Keywords: olefins, esterification, methacrylic acid, catalyst, inhibitor.

Literary sources in recent years show that unsaturated esters are the object of research by many scientists. Owing to the presence of several reaction centers, these compounds can be the starting objects for the preparation on their basis of a number of substances possessing a complex of valuable properties.

Of the general methods for the preparation of esters can be indicated as the following: 1) the reaction of esterification of acids with alcohols; 2) reaction of esterification of alcohols with acid anhydrides or acid chlorides; 3) a interesterification reaction; 4) the reaction of esterification of carboxylic acids with olefins, etc. The esterification of carboxylic acids directly by olefins instead of alcohol has the following advantages: a) the stage of obtaining alcohols from olefins is removed; b) there is no need to allocate water; c) for a large excess of olefin with respect to the acid, it is possible to obtain a high purity ether, etc. [1, 172]. Most of the research in this area relates to esters based on acrylic and methacrylic acids.

To obtain **p-chlorophenyl** methacrylate, the authors used the methacrylic acid esterification (MAA) reaction with p-chlorophenol in the presence of a mixture of sulfuric and boric acids [2, 236–241]. The researchers showed that the esterification of MAC with **p-chlorophenol** does not occur with the catalysis only of sulfuric or boric acids, but occurs with the catalytic action of the $H_2SO_4 \cdot H_3BO_3$ system, based on the intermediate formation of tri-**chlorophenyl** borate.

The authors synthesized methacrylic ethers of cyclic and O, S, N-containing heterocyclic acetylenic alcohols [3, 237–241]. The influence of the structure and the ratio of reagents, the nature of the catalyst, the temperature on the kinetics of the reaction, and the conditions for the synthesis of esters have been determined.

Literature sources practically do not provide data on the processes of esterification of methacrylic acid with liquid olefins, the study of which is of undoubted interest for the purpose of producing reactive monomers.

Experimental part

To conduct the studies, liquid olefins were separated from the C_6-C_7 fractions by the rectification method; 2-methyl-1-pentene (clear liquid, boiling point 62.1 °C, density at 20 °C0.66798 g/cm^3); 2-ethyl-1-pentene (clear liquid, boiling point 62.1 °C, density at 20 °C0.66798 g/cm^3); hexene-1 (clear liquid, boiling point 62.1 °C, density at 20 °C0.66798 g/cm^3); methacrylic acid (TU2431–027–55856863–2003).

Esterification of methacrylic acid with liquid olefins has been carried out in a three-necked round-bottom flask fitted with a thermometer, a separatory funnel and a mechanical stirring device. The flask has been immersed in a "WITEG" thermostat filled with distilled water (temperature error of +0.1 °C).

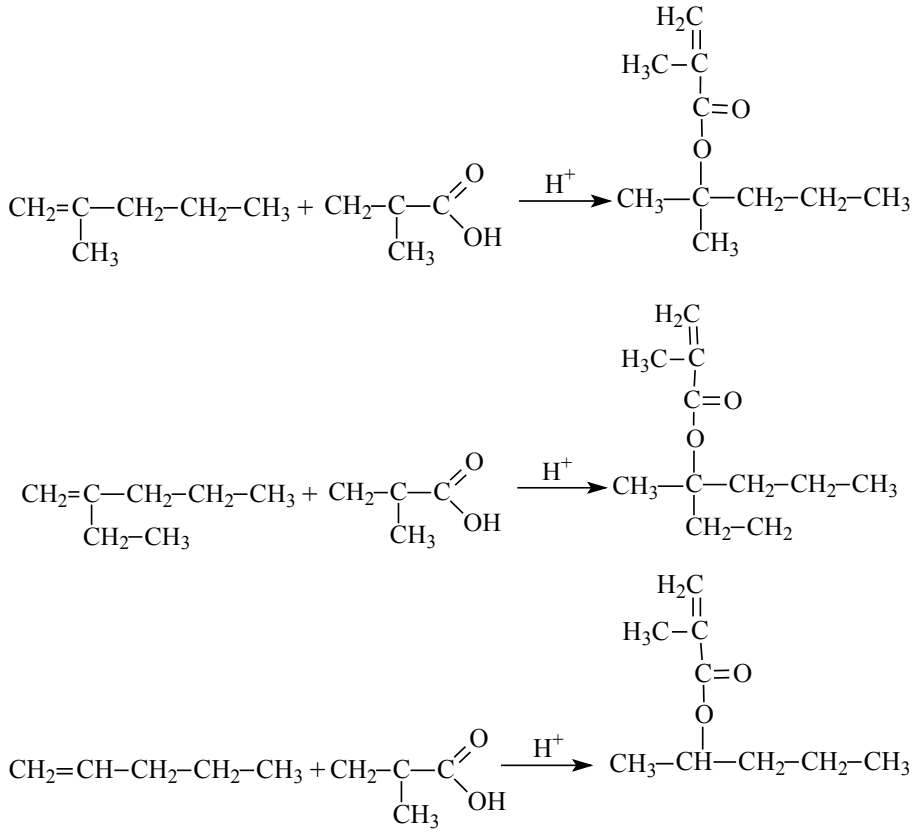
The process of carrying out the experiment is as follows. The calculated amount of methacrylic acid, hydroquinone,

acid catalyst was loaded into the flask. While stirring at room temperature, olefins were added dropwise. The resulting reaction mixture was stirred for 10–11 hours at a temperature of 60 °C. After completion of the reaction, the catalyst was separated by treatment with a 10% alkali solution. The ether extract was washed with distilled water and the mixture was distilled in vacuum to isolate the desired product. Synthesized esters are colorless liquids, readily soluble in organic solvents.

IR spectra of the initial reagents and the synthesized esters were recorded on a Fourier spectrophotometer "SISTEM-200" on KBr.

Results and discussion

Synthesis of unsaturated methacrylic esters was carried out by esterification of methacrylic acid with the corresponding olefins (2-methyl-1-pentene, 2-ethyl-1-pentene, 1-hexene) according to the following scheme:



The structure of synthesized complex unsaturated ethers is confirmed by IR spectra (table).

Table 1. – IR spectra of methacrylic esters of olefins $CH_2=C(CH_3)$ COO-R

№	R	IR-spectra		
		C=C	C=O	C-O-C
1.	$CH_3-C(CH_3)-CH_2-CH_2-CH_3$	1638	1728	1295
2.	$CH_3-C(CH_2-CH_3)-CH_2-CH_2-CH_3$	1646	1730	1280
3.	$-CH(CH_3)-CH_2-CH_2-CH_2-CH_3$	1637	1729	1290

The IR spectroscopic data showed that new absorption bands appear in the spectra of esters, corresponding to the frequencies of the stretching vibrations at C = O and C = C in the regions 1728, 1730, 1729, 1638, 1640, 1637 cm^{-1}.

The influence of the nature of the olefin, the ratio of the initial reagents and the concentration of the catalyst on the yield of the final product has been studied. The esterification reaction was carried out in bulk, i.e. without solvent. As a homogeneous acidic esterification catalyst, sulfuric acid, p-toluenesulfonic acid was used. In the presence of these catalysts, the esterification reaction rate increases sharply with increasing temperature (Figure 1, 2).

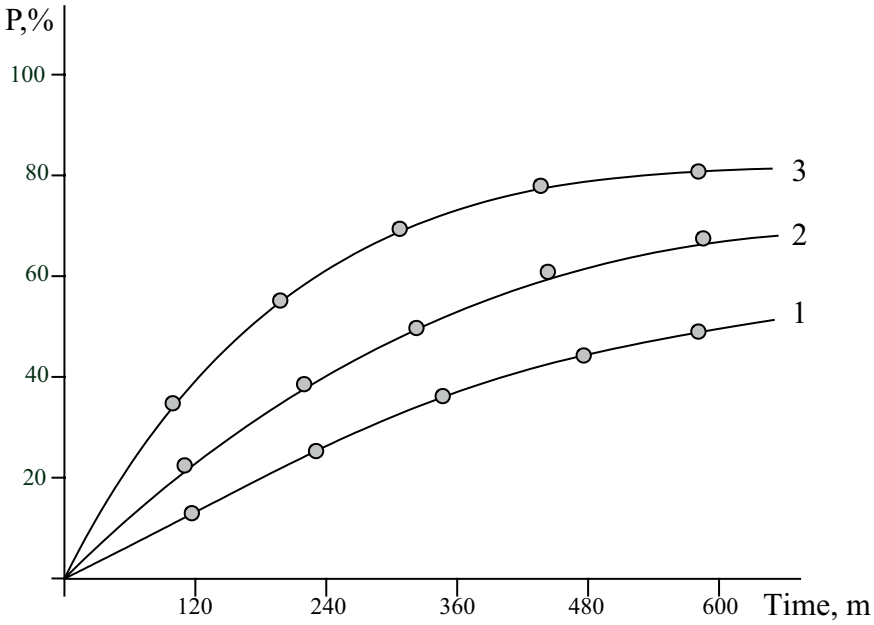


Figure 1. The dependence of the ester yield on time in the esterification reaction of MAC with 2-methyl-1-pentene. The ratio of MAC: olefin = 4, catalyst p-toluenesulfonic acid, [Inh] = 0.5 mg/eq. T, °C = 1–40; 2–50; 3–60

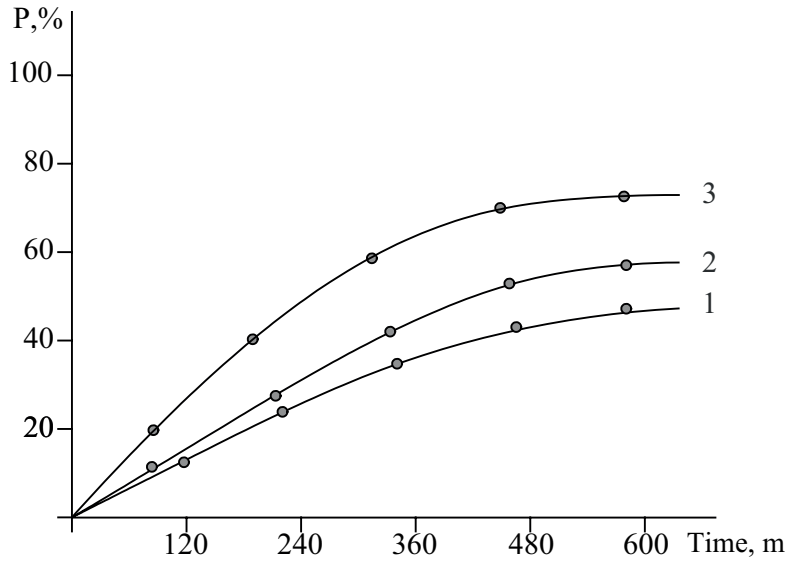


Figure 2. Dependence of the ester yield on time in the reaction of esterification of MAC with 2-methyl-1-pentene. The ratio of MAC: olefin = 4; catalyst, H_2SO_4, [Inh] = 0.5 mg/eq. T, °C = 1–40; 2–50; 3–60

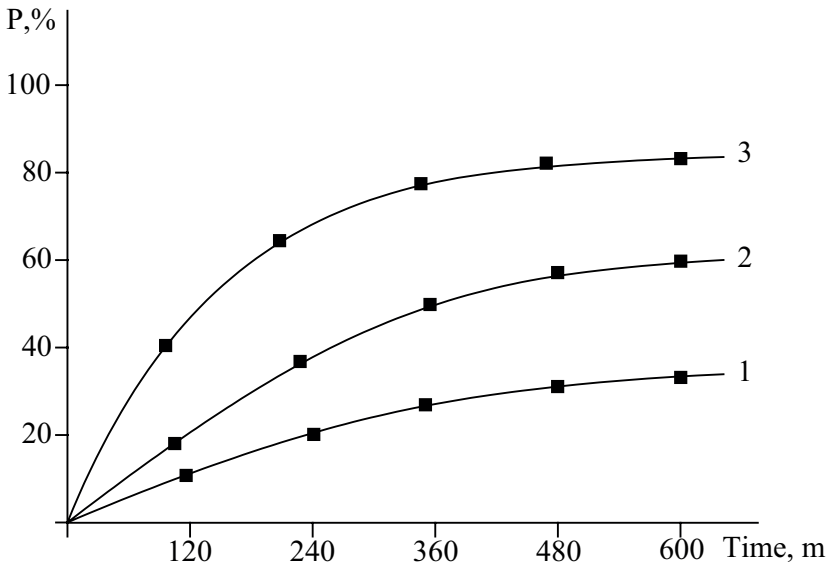


Figure 3. Dependence of the yield of esterification of methacrylic acid esterification with 2-methyl-1-pentene at different molar ratio of reagents: 1–1: 1; 2–2: 1; 3–3: 1. T = 60 °C; catalyst p-toluenesulfonic acid, [Inh] = 0.5 mg/eq

As can be seen from (Figure 1, 2) sulfuric acid is inferior in catalytic activity. The results of esterification of methacrylic acid with olefins at different ratios of the initial reagents are shown in (Figure 3).

From the data obtained, it follows that to achieve a high yield of ether, no less than threefold excess of methacrylic acid is required. Under these conditions, the yields of the ester based on methacrylic acid and 2-methyl-1 pentene are 80–82%.

Conclusions

1. A method for the preparation of esters by the reaction of methacrylic acid esterification with liquid olefins has been studied. The influence of the temperature and nature of olefins on the esterification process has been studied.

2. It has been found that the rate of reaction and the yield of the final product depends on the structure of the olefin used. Thus, in the esterification of 2-methyl-1-pentene with methacrylic acid, the greatest yield of the ester is formed.

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DEVELOPMENT OF IMPROVED METHODS OF THIN-LAYER CHROMATOGRAPHY AND UV-SPECTROPHOTOMETRY AT EXPERTISE OF PAROXETIN

Abstract: The practical application of the developed methods of thin-layer chromatography (TLC) and UV spectrophotometry with respect to paroxetine has been studied. The application of the obtained results to the practice of customs, forensic forensic medical examinations, as well as narcological and toxicological laboratories is considered. The validation of the methods was carried out by comparing the results with the traditional methods of analysis of solutions. High consistency between the values obtained in the analysis of substances allows us to declare the suitability of new techniques for routine analysis.

Keywords: thin-layer chromatography, antidepressants, depression, drug falsification, customs examination, sensitivity of the method, express analysis, paroxetin.

Psychopharmacology and psychopharmacotherapy of depressive states are dynamically developing areas, and antidepressants are drugs that are second only to all psychotropic drugs after benzodiazepines. According to the World Health Organization, such a high rating of these psychotropic drugs is due to the fact that about 5% of the world's population suffers from depression, often ending with suicide.

The main effect of antidepressants is that they block the disintegration of monoamines (serotonin, norepinephrine, dopamine, phenylethylamine) under the action of monoamine oxidases or block the reverse neuronal capture of monoamines. In accordance with modern ideas, one of the leading mechanisms for the development of depression is the lack of monoamines in the synaptic cleft – in particular serotonin and dopamine. With the help of antidepressants, the concentration of these mediators in the synaptic cleft increases, which leads to an increase in their action. Antidepressants are potent drugs, always requiring individual selection of a particular drug and dose. In this regard, when choosing a medicine for the treatment of depression, it is necessary to take into account the pharmacological and toxicological properties of certain preparations, as well as the symptomatic structure of the disease and the severity of the depressive state.

In a number of works the authors testify that antidepressants are used not only in psychiatric practice, but also in the treatment of certain neurovegetative and somatic diseases,

which can be considered as "disguised" forms of depression. Drugs like fluoxetine may increase the likelihood of suicide in the first months of therapy, especially in children and adolescents [1–5]. Self-administration of antidepressants without doctor's appointment is not recommended, because can be induced by hypomania, mania, psychoses both in patients with bipolar affective disorder, and in patients without it. Practice has shown that cases of inversion of affect (development of hypomania or mania) have been observed against the background of taking antidepressants of all groups [6–8]. With each form of pharmacological activity of antidepressants, certain clinical effects, including side effects, are associated.

Currently, globally, antidepressants are considered to be one of the most profitable drugs after antibiotics, anesthetics and antipyretic drugs. When studying the distribution of the main active substances in antidepressants, it was found that in 2012–2015 in the pharmaceutical market of the Republic of Uzbekistan, 70% of medicines were manufactured using 17 medicines related to antidepressants.

One such medication is paroxetine ((3S-trans) –3-(1.3-benzodioxol-5) -methyl) –4- (4-fluorophenyl) -piperidine), widely used in the treatment of depression. The mechanism of its effect is based on the inhibition of repeated seizure of serotonin by neurons. On the pharmaceutical market of the Republic of Uzbekistan, paroxetine preparations under the name Rexetin (Hungary), Palikson (Slovenia), Nondepress (England) are sold. The growing demand for these drugs increases the risk of falsified forms of them, which causes significant economic damage to the republic, as well as violating rights to intellectual property and trademarks. As practice shows, most falsified medicines are detected in the process of monitoring their quality for compliance with the requirements of regulatory documents for the indicator of "authenticity" [9].

In leading foreign pharmacopoeias, complex mobile phases or expensive reagents are used to analyze antidepressants. The analysis techniques described in foreign pharmacopoeias are more adapted for the use of TLC plates of foreign manufacture. Spectrophotometric methods allow solving a wide range of problems, namely, quantitative determination of substances in a wide range of wavelengths (185–1100 nm), as well as quantitative analysis of multicomponent systems; determine the composition, stability constants and photometric characteristics of light-absorbing compounds. The application of molecular spectroscopy methods for the forensic chemical study of biological objects is based on the individuality of the absorption spectra of chemical compounds [10–11].

Spectrophotometry in the ultraviolet region is based on measuring the properties of not the whole molecule, but only of its part – the chromophore grouping. In this case, the chemical nature of the latter determines the wavelength at which the maximum absorption takes place. In the process of measurement, the substance is not destroyed and it can be determined in parallel by another method. Spectrophotometry in the ultraviolet region makes it possible to carry out studies with fairly dilute solutions of the investigated substances (10^{-3}–10^{-5} M), provided that the solvent is properly selected.

For this purpose, the solvents must have the ability to dissolve the substance under study, be resistant to the radiation of the used wavelength and optically stable, should not fluoresce, react with the cuvette material, and absorb light in the same spectral region as the solute. The usual practice of recording absorption spectra involves the use of solvents such as hexane, heptane, methanol, ethanol, chloroform, carbon tetrachloride, etc. [12]. The advantage of this method over others is its high sensitivity, simplicity, expressiveness of the analysis, the uniqueness of the equipment used. This is especially important from the point of view of carrying out analytical work in forensic institutions, where substances that are in extremely small quantities are analyzed. UV spectrometry methods are also of great importance in the detection of counterfeit medicines. Using a ready-made collection of spectra greatly simplifies the analysis.

Despite the development of high-performance analytical instruments, for the final determination of analytes in pharmaceutical products and biological samples, in sample preparation, it is necessary to extract, isolate, concentrate the interesting analytes from a complex matrix. Sampling and sample preparation take more than 80% of the time from the general analysis, because these stages are very important and determine success in the analysis of components in a complex matrix. The method chosen for sample preparation depends on the overall analysis strategy.

Taking into account the foregoing, in this paper the results of studies on the development of optimal conditions for determination of paroxetine using TLC and UV spectrophotometry are presented, followed by their introduction into practice of customs, forensic forensic medical examinations, and also narcological and toxicological laboratories.

Materials and methods

To develop the TLC method, the studies were carried out on various sorbents, which differed in character and grain size:

– finished plates "Silufol", made of a large porous sorbent LS5-40, fixed on aluminum foil, binder-starch. The sorbent is processed by a luminescent substance intended for viewing at a wavelength of 254 nm;

– finished "Sorbfil" plates, PTSH-V-UV grades, grain size 8–12 microns. The sorbent is processed by a luminescent substance intended for viewing at a wavelength of 254 nm. The plates have a layer thickness of 100 mkm, fixed with the help of silicazole on polyethylene terephthalate plates. All plates

before the assays were activated at 105 °C for 30 minutes and stored in a desiccator before research.

To develop the UV spectrophotometry method, the studies were performed on a UV–VIS-8453 spectrophotometer from Agilent Technologies within the wavelength range of 220–400 nm.

Separation of paroxetine from the tablet. One tablet is crushed in a ceramic container, placed in a glass and 20–30 ml of ethyl alcohol is added and dissolved in a magnetic mixer. The filter separates the solution from the insoluble part of the tablet and is transferred to a 50 ml flask for qualitative and quantitative analysis.

Determination of paroxetine by thin layer chromatography. The TLC method is one of the main methods of substance research and is used in preliminary screening studies of a sample of unknown nature and confirmatory (private) studies on a specific drug or substance that confirm or deny its presence in the test sample. One of the advantages of TLC, in comparison with other types of distribution chromatography, is the rapid separation of substances, the stability of the sorbent-carrier layer with respect to aggressive developers and heating, the ability to fabricate thin-layer plates with any layer thickness under laboratory conditions [13–15]. In the course of our studies, we found that the detection reagents, the specificity of the chromatographic method of detecting paroxetine with respect to other toxicologically important compounds, and the influence of coextractive substances on the detection of an antidepressant have not been practically studied analytically. In this connection, the task was to study and select the optimal conditions for the detection of paroxetine in unknown samples.

A few drops of the alcohol solution were applied to the starting arrow of the chromatographic plate "Sorbophil", a few drops of the paroxetine starting solution were applied to the opposite side as a control substance and allowed to dry at room temperature. For the development of chromatograms, a number of organic solvents were used: ethanol: chloroform: benzene (2:1:2), taken in various combinations and ratios.

Chromatography was carried out according to the following procedure: A suitable solvent system was poured into the hermetically sealed chromatographic chamber (140×200 mm) 2–3 hours before the plate was established, in order to saturate the space of the chamber with the vapors of these solvents, so that the height of the liquid layer in the chamber was 1 cm. The chromatographic plate was marked with a start line, which was 1.5 cm above the lower edge of the plate. A sample of paroxetine solutions was applied using graded capillaries or a microsyringe MSh-10. After drying at room temperature, the sample plates were placed in a chromatographic chamber preliminarily saturated with solvent vapors for 15 minutes. When the front of the solvents reached 10 cm from the start line, the plate was removed from the chamber and dried at room temperature. To detect paroxetine, a Dragéndorff-modified reagent was used [10, 16–17]. The results of the studies of paroxetine are given in (Table 1).

Table 1.– Opening reagents and their sensitivity in the analysis of paroxetine TLC

Name of reagents	Colors of spots and their sensitivity (μg)
Bromine phenol blue	Bluish (4.0)
Dragendorff's reagent, made on the basis of Mounier	Yellow-brown (1.0)
Erdman's Reagent	Violet (4.5)
Brand reagents	Yellow-green (1.5)
Brand reagents followed by washing with clean water and with UV rays	Brown-green (1.0)
Bushard'sReagent	Yellow-white (2.5)
ReactiveFrede	Blue (5.0)

Table 2 shows the results of the amount of Rf paroxetine in various chromatographic plates. The developed analytical conditions of TLC are individual for paroxetine, which is Rf = = 0.32.

Table 2.– The amounts of Rf paroxetine in various chromatographic plates

The quantity system Rf of paroxetine in various chromatographic plates	The amounts of Rf paroxetine in various chromatographic plates	
Ethanol: chloroform: benzene(2:1:2)	0.39–0.41 (CSC)	0.31–0.34 (Sorbphil)

As a result of the conducted experiments it was established that the best separation of paroxetine is achieved on the plates of "Sorbophil". On these plates, the spots turn out to be rounded with distinct edges, the color of the spots differs in good intensity. As the developers for the detection of paroxetine localization zones in chromatographic plates, many chemical reagents and their mixtures were used in various sequences. Interactions of paroxetine with the following reagents were determined: Dragendorf modified by Mounier, Buke, Bouchard, Wagner, Lieberman, Mayer, Mark, Marme,

Mandelin sodium cobaltnitrate, pyridine thiocyanate, bismuth nitrate, alcohol solution of ammonium molybdate, ammonium molybdate sulfate, acid [16]. As a result of the studies presented in (Table 3). We have established reagents that allow us to detect and differentiate paroxetine in the test samples.

Table 3. – Color reactions of the paroxetine localization zones by TLC

Reagent	Substance (paroxetine) and staining
Bromophenol blue	blue
Iodine vapor	brown
Bushard's Reagent	brown
Dragendorf modified by Mounier	orange
UV light	–

As a result of the studies (Table 3), reagents were established, which allow detecting and differentiating paroxetine.

Based on the data given in Table. 2 and 3, one can judge the specificity of the recommended chromatographic conditions.

Purification of paroxetine from impurities by the TLC method. Before recommending the TLC method for the purification of paroxetine from impurities, studies were conducted on the elution process, the eluents reacting to it, and the amount of elution. Chromatography by TLC is carried out simultaneously for additional purification and preliminary detection of paroxetine. To this end, the chloroform solution was evaporated to a volume of 0.5–1.0 ml. To the start line of the chromatographic plate, 3–5 drops were placed in the form of a spot (not more than 5 mm in diameter) of the concentrated solution. At a distance of 2 cm from the spot examined, an alcohol solution of paroxetine was applied as a "witness". The remaining test solution was applied in the form of a strip 3 cm wide and 0.3–0.5 cm wide, chromatographed in chloroform: acetone (9:1). After raising the phase to a height of 10 cm, the plate was removed, dried until the smell of solvents was removed, and treated with Buschard's reagent in that part of the plate corresponding to the solution under investigation and to the "witness". In the area of the location of the paroxetine spot, the "witness" and the test extraction, spots with a value of Rf 0.31–0.34 (Sorbphil) and 0.39–0.41 (Silica Gel KSK) were shown. In the absence of spots on the chromatographic plate, it is concluded that paroxetine is not found in the test samples.

The validation characteristics of the developed TLC method. The sensitivity of the developed chromatographic conditions of the analysis was then determined. The sensitivity of the developed procedure was determined as follows: samples of a solution with different paroxetine contents were applied to chromatographic plates and chromatographed under the above conditions.

In the course of the studies, the suitability of the TLC method for the detection of paroxetine in chloroform extracts obtained from the liver of a human corpse containing and containing this preparation (model mixtures and expert material) was tested. The obtained results showed that the extracts from the biological material that does not contain the studied preparations do not give spots on the chromatograms of the spots, Rf of which is close to Rf of the paroxetine stain, which indicates the absence of the influence of possible impurities, which turn into extracts from the biological material, on the detection of paroxetine. When studying model mixtures and expert material, they came to the conclusion that, based on the results presented in (Table 4), developed by the TLC detection method is suitable for forensic analysis.

Table 4. – Limits of paroxetine detection by TLC

Reagent	Detection limits, μg (in the sample applied to the plate)
Bromophenol blue	3.0
Iodine vapor	2.5
Bushard's Reagent	2.0
Dragendorf modified by Mounier	0.45
UV light	–

The next stage of the research presented in the work was the development of optimal conditions for determining paroxetine by UV spectrophotometry. Ethanol, methanol, 0.1 M sodium hydroxide solution and 0.1 M hydrochloric acid solution were used as solvents. Paroxetine was chosen as the model sample, the solution of which was prepared for the determination of absorption spectra as follows: 1, 2, 3, 4, 5, 6, 7, 8, 9 ml of a 0.01% solution of paroxetine were introduced into a row of

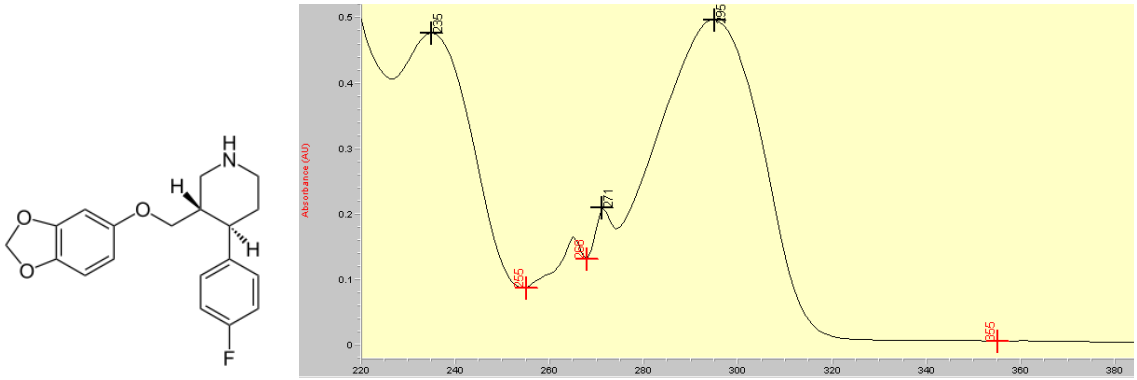
tubes (in one of the above solvents). The volume of solutions in the tubes was adjusted to 10 ml with an appropriate solvent and mixed thoroughly, after which the optical density of these solutions was measured, as well as 0.01% solution of paroxetine. The wavelengths λ_{max} = 235, 264, 295 nm correspond to the presence of paroxetine in the composition of the test samples. A comparative solution was a solvent corresponding to that used in the preparation of paroxetine solutions. The above absorption maxima were not observed in the study of pure solvents not containing paroxetine.

The work also tested the possibility of the influence of extraneous coextractive substances of biological and plant objects (not containing these preparations) on the identification of paroxetine by UV spectrophotometric method, based on the detection of characteristic paroxetine peaks at the wavelengths indicated in (Table 5). To solve this problem, a control sample of the crushed liver was taken and processed as in the isolation of the studied preparations from biological and plant material.

Table 5. – UV spectrophotometric characteristics of paroxetine

Name of the drug	Maxima of the wavelength of λ_{max} "spice" and antidepressants, (nm)		
	Ethanol	Methanol	0.1 M HCl
Paroxetine	235, 264, 271, 295*	235, 264, 271, 295*	233, 264, 270, 294*

Notes: 1. "–" – negative result; 2. "" is the value of the wavelength recommended for measuring the optical density*



ИЮПАК: (3*S-trans*)-3-[(1.3-Benzodioxol-5–yloxy)methyl]-4-(4-fluorophenyl)-piperidine; $C_{19}H_{20}FNO_3$ 329.4 г/моль

Figure 1. UV spectrum of paroxetine

Absorption maxima at these wavelengths were not observed in the control sample under the conditions described. The spectra obtained in this way are shown in (Figure 1).

The obtained results showed that the extracts from the biological material that do not contain the studied preparations do not have absorption maxima characteristic for paroxetine, which gives grounds to judge the absence of foreign substances influence when detecting the characteristic peaks of the studied preparations by UV spectroscopy.

To validate the identification of paroxetine by UV spectrophotometric method, validation of the developed method was carried out. To this end, standard solutions of paroxetine were prepared in those solvents in which they had the best solubility. Standard solutions of paroxetine were prepared in methanol (ethanol).

As is known, measurement of optical density with a relative error of 2–3% is possible in the optimal range of its values, namely from 0.2 to 1.0 [12]. Thus, suitable concentrations of the analytes were selected by dilution. Based on the measurement results, a plot of the optical density versus the solution concentration was constructed and the regression equation and correlation coefficient were calculated. Specific ($E_{1sm}^{1\%}$) and molar absorption (ε) paroxetine were also determined. Calculation of the value of the specific absorption index was carried out according to the formula:

$$E_{1sm}^{1\%} = \frac{D}{C \cdot l} \qquad (1.1)$$

where *D* is the optical density of the solution, cond. units;

C is the concentration of the test substance,%;

ℓ is the thickness of the absorbing layer,

The molar absorption coefficient is interrelated with the specific index and is expressed by the formula:

$$\varepsilon = \frac{E_{1см}^{1\%} \times M}{10} \qquad (1.2)$$

where *M* is the molecular mass of the test substance, cond. units

We also studied the linear dynamic range of definitions and subordination to the combined Bouguer-Lambert-Beer law. The results of the developed spectrophotometric method and validation are given in (Table 6).

Table 6. – Parametersof UV-spectrophotometricparametersparoxetine

Options	Results (n = 5)
λ_{max}, нм	295
The range of subordination to the Lambert-Beer law, μg/ml	5–60
The free term of the regression equation (a)	0.0069
Coefficient. regression (b)	0.0179
Coefficient. correlation ($r2$)	0.9998
$E_{1cm}^{1\%}$	181.90
λ(l /mol/cm)	6005.62
PO, mcg/ml	0.7732
EXAMPLE, mcg/mL	2.3195
Relative art. deviation,%	1.4236

Notes: 1.– the specific absorption index for each model of the spectrophotometer must be specified; 2. y is the optical density of the standard solution, condition; x-concentration, μg/ml.

In addition to the calibration graphs, we recommended a formula for calculating the quantitative content of the antidepressants and spices tested, isolated from various objects:

$$X = \frac{D \cdot V_1 \cdot 1000}{E_{1cm}^{1\%} \cdot 100 \cdot V_2} \quad (1.3)$$

where X – the number of "spice" and antidepressants in mg (ml), isolated from 100 g of biological object; n is the weight of a biological object, g (ml);

$E_{1cm}^{1\%}$ – specific absorption index (for each model of the spectrophotometer it is necessary to specify);

V_1 – initial chloroform extraction, ml;

V_2 is the volume taken for quantitative determination from V_1, ml.

Table 7. – The results of studying the accuracy of the method of UV spectrophotometric analysis of paroxetine (n = 6)

Solvent concentration, (μg/ml)	Defined		Metrological characteristics of the method	
	(μg/ml)	%		
0.5	0.491	98.2		
0.5	0.501	100.2	ff = 5	$T_{(95\%.5)}$= 2.57
0.5	0.505	101.0	XX_{av}= 99.8	S^2= 0.8960
0.5	0.501	100.2	SS= 0.9466	S_x= 0.3864
0.5	0.497	99.4	ΔX_{av}= 1.9931	ε= 0.9951
0.5	0.499	99.8		

The above results indicate that when calculating the statistical indicator of the results of the experiment, the error did not exceed 0.9951%. The received validation data prove that the metrological indices of the developed method of UV spectrophotometric analysis of paroxetine meet generally accepted requirements.

Conclusions

Based on the results of the conducted studies, it is possible to draw the following conclusions:

1. The optimal conditions for extraction of paroxetine from aqueous solutions are determined, depending on the nature of the organic solvent, the duration of extraction. It has been established that the pH of the medium, as well as the nature of the organic solvent, affects the process of isolating paroxetine by liquid-liquid extraction.

2. A unified method for the detection of paroxetine in aqueous solutions by TLC with the use of optimal solvent systems with detection of the zones of its localization Bromphenol blue and iodine vapor was developed. The detection limit was 3 μg and 2.5 μg in the sample.

3. Methods for determining paroxetine by UV spectrophotometry have been developed. Molar and specific absorption rates are determined. Calibration charts have been constructed to determine the quantitative content of paroxetine in objects of different origins.

4. It was found that the solution of paroxetine in 95% ethyl alcohol with UV spectrophotometry has an index of high absorption of rays at a wavelength of 235, 264, 295 nm. The linearity range of the method in the sample was 5–60 μg/ml, the sensitivity index was 0.77 μg/ml.

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DIFFERENTIAL HEATS OF WATER ADSORPTION IN MOLECULAR SIEVES OF IODIDE SODALITE

Abstract: The detailed thermodynamic characteristics of the adsorption of water into iodide sodalite are studied. The correlation between the adsorption-energy characteristics and the crystal-chemical structure of the sodalide iodide was found, and the molecular mechanism of the adsorption of water into iodide sodalite was found throughout the entire filling region.

Keywords: iodide sodalite, isotherm, differential heat, entropy, thermokinetic, adsorption, water, adsorption calorimetry.

Introduction. It is well known that a great interest is increasing in the research of capsulation of salts and other solid particles in crystalline materials having nanometric pores, with new optical, electrical and catalytic properties of materials. In this respect, it is useful to use sodalite, which possesses sorption properties and the ability to ion-exchange reactions, like zeolites. Sodalite was studied as a suitable phase for waste [10], but its leaching behavior remained undefined. The structure of the sodalite can be described as a covalent structural unit, called a beta cell.

Sodalite and some of its forms containing various salts have been repeatedly studied by various structurally sensitive methods [1–5]. However, in this regard, not enough attention is paid to research using the calorimetric method.

Thus, in this adsorbent, molecular sieves are highly effective adsorbents and can be used as an adsorbent for heavy salts of sea and drinking water, also they can be used for water purification from oil and oil products, natural gases, etc.

In this respect, using the calorimetric method of studying the hydration mechanism of iodide sodalite is of particular importance. In studying the guest-host interaction, special attention should be paid to the adsorption-calorimetry method among precision structure-sensitive methods. This method will make it possible to evaluate the crystal chemistry, chemistry, and physics of surface parts and also to determine the active center of solid particles when investigating the mechanisms of intermolecular interactions [6].

Thus, the aim of this study is to establish a stoichiometric relationship between the precision calorimetric data of the differential heats of adsorption of water molecules on energetically homogeneous (cation) centers located on the same crystallographic positions of the sodalite which are free from iodide ions and the number of water molecules adsorbed on these centers. An iodine anion with an iodine atom localized in the center of the cavity in an anion with a nitrite anion [5] exhibits 12-fold orientation disorder within the $(4^6 6^8)$ –sodalite cavity, which also affects the coordination of oxygen to sodium atoms.

Objective: to study isotherms and main thermodynamic characteristics of adsorption and the mechanism of adsorption of water in iodite of sodalite.

Subjects and Methods. The investigations were carried out with the help of an adsorption-calorimetric apparatus. The results obtained with this device are highly accurate. Differential heats of adsorption (Q_d) are determined by the differential microcalorimetric device of the Tian-Calvet type [7]. The adsorption isotherm is determined by a volumetric method using a high vacuum apparatus. The dosage of adsorption was established by the volume-liquid method [8]. The formula of the unit cell of the studied sodalite: $Na_8\ (AlSiO_4)_6 J_2$.

Results and discussion. The isotherm of adsorption of water into iodide sodalite was carried out at a temperature of 303 K, the calculated constants were also calculated from the values of a given temperature, extending up to ~ 10–6 relative pressures p/p° (p°-pressure of water vapor, p° (303K) = 4.24 kPa) (Figure 1).

Analysis of the isotherm of the investigated objects is carried out with the help of volumetric occupancy of micropores (VOM) by the absorbed substance. The isotherm of iodide sodalite is satisfactorily described, characterized by three-term equations by the theory of volumetric occupancy of micropores (VOM) [9].

$$a = 0.27\exp[-(A/18{,}86)^3] + 0.437\exp[-(A/4{,}87)^3] + 1.87\exp[-(A/0.48)],$$

a is the amount of adsorption in mmol/g, $A = RT\ln(P_o/P)$, the adsorption energy is calculated in kJ/moles. (P_o/P-transfer work of 1 mmol of surface steam (pressure P_0) to the equilibrium gas phase (pressure P)).

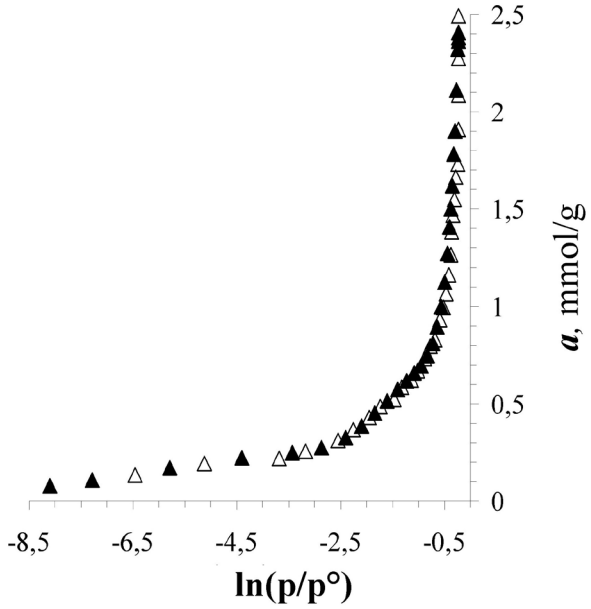

Figure 1. Isotherm of adsorption of water into iodite of sodalite at 303 K.;
Δ – experimental data;
▲ – estimating data by VOM

Differential heats (Q_d) of adsorption of water into iodide sodalite were measured at 303 K and are given in (Fig. 2). The intermittent line is the heat of condensation of water at 303 K (ΔHv = 43.5 kJ/mol). The aim of the work was to establish a stoichiometric relationship between the precision calorimetric data of the differential heats of adsorption of a test water molecule at energetically homogeneous centers located on the same crystallographic positions of zeolite sodalite and the number of water molecules adsorbed on these centers. Differential heats of adsorption of water vapor into iodite sodalite have stepped curves. It can be seen from the figure that adsorption occurs from four identical steps and in each stage the amount of adsorbate is 0.4 mmol/g. In the first stage, the heat of adsorption decreases from 61.57 to 52.74 kJ mol at α = 0.4 mmol/g, the second stage wavers down from 52.74 to 51.01 kJ/mol at α = 0.81 mmol/g, the third stage also decreases in wave form and decreases from 51.01 to 49.51 at α = 1.21 mmol /g. In the case of the fourth stage, the reduction occurs from 49.51 to 47.43 at α = 1.61 mmol/g. And in the last fifth stage the amount of adsorbate is 0.2 mmol/g and the thermal value of adsorption is equated to the heat of condensation of water i.e. 43.5 kJ/mol. The stepwise dependence of Q_d with respect to adsorption is justified with the adsorption of water to Na^+ cations of the active center of sodalite iodide.

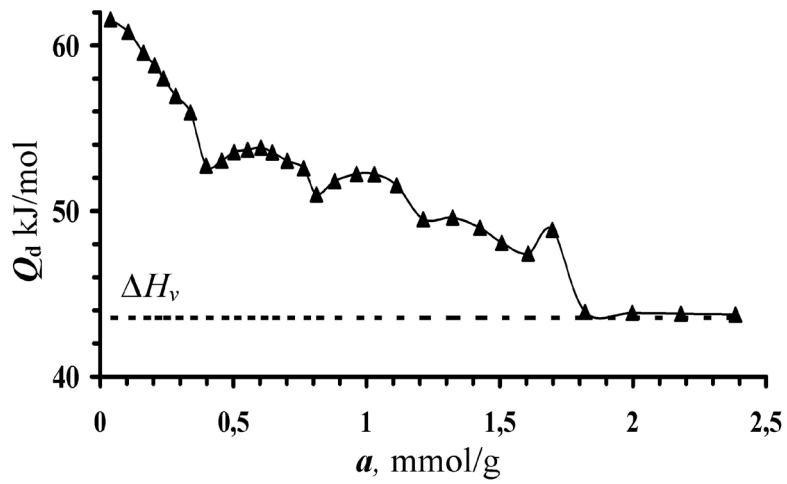

Figure 2. Differential heat of adsorption of water adsorption in the iodite sodalite at 303 K. The horizontal dashed line is heat water condensation at 303 K

A sharp decrease in heat in the initial stages and low values of heat of adsorption in subsequent stages indicate the migration of cations to the six-membered oxygen ring of the pore center under the influence of iodide ions.

Further, the differential heats of adsorption continue along the condensation curve. In general, the heat of adsorption of water into iodide is lower than the heat of adsorption in the basic sodalite. This is due to the influence of iodide ions on the cations of the six-membered oxygen ring.

Elementary cell of iodide sodalite contains 8 cations of sodium. At each pore there are 4 cations. The presence of the four main stages indicates the adsorption of water to cationic sodium located in the six-membered oxygen ring. The experimental determination of the position of the water molecule adsorbed on cations and localized at various sites of the zeolite is complicated by the method of X-ray powder diffraction due to the proximity of the number of electrons of water and sodium, which makes their identification difficult. The presence of salt in the sodalite structure significantly influenced the energy of water adsorption on cations. The heat is noticeably lower than on sodalite (1–3 steps). When the second molecule is connected to the cation, it also occurs with low energy, in addition, the second molecule, only half adsorbed with pain with high heat, and the remaining 1.5 molecules of water are adsorbed with heat equal to the heat of condensation. The inclusion or defect is an equal adsorption of one water molecule at the center.

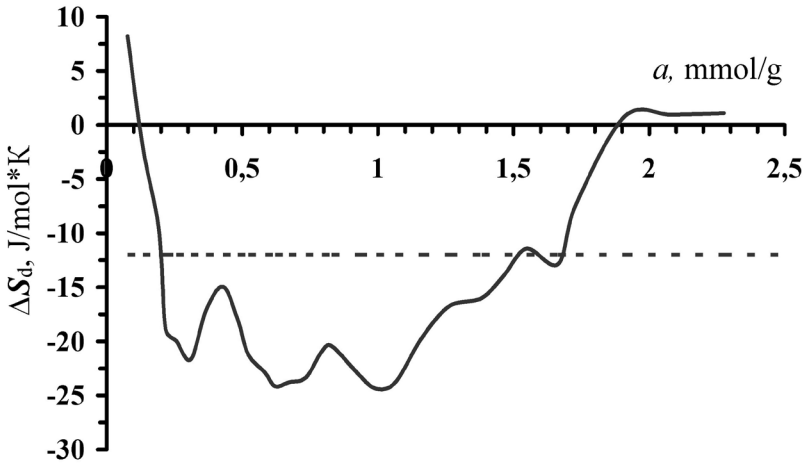

Figure 3. The differential entropy of water adsorption (ΔS_d) in iodide at 303 K. The entropy of liquid water is taken as zero. The horizontal dashed line – mean molar integral entropy

The stepwise nature of the heat curve of adsorption is considered in connection with the stoichiometric interaction of water molecules with coordinatively unsaturated Na^+ cations in the energy uniform centers of the cavities of the sodalite zeolites. To describe the hydration process, the calorimetric data were conditionally divided into five sections according to the specific points on the curve.

It is known from previous studies that in accordance of the differential heat of water with the hydration curves, the curve of the molar differential entropy (ΔS_d) curve has a wavy character. In this case, each step of the curve of the Q_d line corresponds proportionally to the entropy of adsorption. Figure 3 shows the molar differential adsorption entropy at 303 K. the entropy of liquid water is adopted as zero. The heat line corresponds of the water mid-molar integral entropy at 303 K. The heat of entropy line has a stepwise wave-like character. In general, the curves ΔS_d are located below the entropy of liquid water. In accordance with the shape of the differential heat of adsorption curve, the entropy of adsorption of water to the sodalite, starting at 8.20 J/mol*K, falls rapidly to –21.65 at 0.31 mmol/g, then wavers down to –24.38 J/mol * K at 1.06 mmol/g followed by a wave-like growth until the saturation of sodalite with water.The obtained values of ΔS_d are lower in comparison with the entropy of liquid water. The average molar integrated entropy is –12 J/mol*K, i.e. the motion of water molecules in the matrix of iodide sodalite characterizes the average motion of molecules between the liquid and solid state of water.

Thermometric results are given in all calorimetric studies. The obtained data indicate that the adsorption equilibrium is established in time when adsorbate molecules are absorbed on the surface of the adsorbent (Fig. 4). Figure 4 shows the time dependence of the establishment of adsorption equilibrium (τ) on the adsorption of water. For iodide sodalite, starting from ~ 8 hours, the curve decreases wavy to 2 hours. The equilibrium of water adsorption on cations initially proceeds slowly and the equilibrium time is from 8 to 4.56 hours at $N = 2H_2O$ /ec, and remains almost constant with two waves with a maximum at 1.06 mmol/g and 1.47 mmol/g. The second wave decreases to τ = 1.52 hours at 2.08 mmol/g.

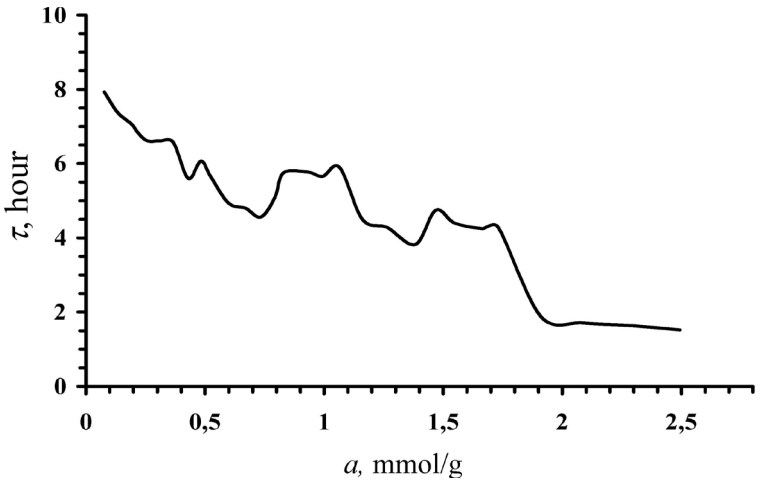

Figure 4. The set-time of the adsorption equilibrium, depending on the size of the adsorption of water in the iodide of sodalite zeolite at 303K

Hence it can be seen that thermokinetic data are a good chance for considering sorption systems in the molecular structural aspect, especially in cases where heat is powerless to differentiate adsorption centers.

Conclusions. In addition to the salts that are part of the sodalite, 6 more water molecules can also be adsorbed. The differential heat of adsorption has a stepped nature of the curves and in each step the water molecule is adsorbed to 4 cations of Na^+. Especially high energy is observed when adsorption of water in the amount of 0.2 mmol/g, which occurs at the first stage in a ratio of 1:2. Subsequent adsorption of water proceeds by forming hydrogen bonds and without affecting cations. The process of adsorption of water occurs at 303K, close to the thermal condensation of water. The mobility of water molecules in the iodide sodalite characterizes some average between the mobility of water molecules in the liquid and solid state. The equilibrium of water adsorption on cations initially proceeds slowly and the equilibrium time is 8 to 2 hours. Then the equilibrium time is accelerated and flows for 2 hours.

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Section 17. Economy

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A MODERN VIEW OF THE TRENDS IN THE DEVELOPMENT OF LOGISTICS IN TRADE AND ECONOMIC RELATIONS

Abstract: The article presents analytical material on the study of issues related to the consideration of aspects and features of logistics development in the sphere of customs services. The tendencies of formation of logistics as one of the most important links in the development of foreign economic activity are studied.

Keywords: logistics, customs logistics, customs territory, logistics chains, logistics operations.

Logistics is a part of economic science, the subject of which is to organize a rational process of promoting goods and services from producers to consumers, the functioning of the sphere of circulation of products, goods, services, inventory management, and the creation of a commodity circulation infrastructure.

The history of logistics shows how important it is for the country's economy. The word "logistics" has been known since the time of the Roman Empire, where employees involved in the distribution of food were called "logisticians" or "logistics". Thanks to the development of military affairs, logistics has become one of the areas of science. Science logistics became due to the development of military affairs. Thus, the Byzantine king Leon VI (865–912 AD) believed that the task of logistics is to pay tribute to the army, due to supply it with weapons and military equipment, timely and fully take care of its needs and accordingly prepare each act of the military hike, make the correct analysis of the terrain, taking into account the movement of the army and the strength of the enemy and, accordingly, these functions to manage and lead, i.e. to dispose of the movement and distribution of their own armed forces. This definition, in spite of military specifics, has a fundamental similarity with modern formulations of logistics tasks. Only after 1000 years, during the Second World War, the principles of logistics began to be successfully implemented, when in the United States, the USSR and other countries work was carried out to study the properties of operations for managing material flows. During these years, research was carried out related to the problems of military and standard front supply, mathematical methods and models were developed, which eventually became known as the "operations research", thanks to which it was possible to organize a constant supply of arms for the American army. As the analysis of literature data shows, the first author of works on logistics is considered to be the French military specialist of the early 20th century, A. G. Dzhamini, who defined logistics as "practical art of troop movement." He also argued that logistics does not only concern transportation, but also planning, management, supply, location of troops, construction of bridges, roads, etc. Logistics as a science in military campaigns, also used by Napoleon. In developed countries, the concept of logistics was formed in the late 70's due to the energy crisis for the development of ideas for a systematic approach to management. Western specialists call it "a new management philosophy", "the third way of rationalization" and is not groundless. For example, in Western Europe, about 98% of the time of production, taking into account the delivery of raw materials and the transportation of finished products, account for the passage of its logistics channels and mainly for storage. Actually, only 2% of the total time is spent on the production of goods, and 5% for

transportation. In addition, in Western European countries, the cost of all logistics activities is about 13% of the value of gross national product.

The structure of these costs is as follows: for transportation – 41%, for storage of goods – 21%, for inventories – 23%, for administrative expenses – 15%. The search for ways to reduce costs in this area goes in the direction of improving the management of supply, sales, storage of goods, improving marketing activities and interaction of suppliers, consumers and intermediaries, changes in technology for the movement of material flows, etc. The concept of integration of these processes is called "logistics" [2].

In view of the foregoing, the purpose of the conducted studies is to study the trends in the development of conceptual representations about the mechanisms for managing the logistics processes of global supply chains caused by the use of instruments of customs regulation when integrating the Uzbek economy into the international economic space.

To achieve the formulated goal, the article posed and solved a set of scientific and practical problems:

– the objective prerequisites for applying the concept of supply chain management in the process of Uzbekistan's integration into the world economy are explored;

– the evolutionary development of the concept of supply chain management in the context of globalization was disclosed and characterized, including the typology of supply chains, their species composition and management peculiarities of logistical processes;

– the interaction of customs intermediaries with participants of global and transboundary supply chains was grounded and a typological grouping of customs intermediaries was proposed;

– a model of interaction of participants in supply chains with options for choosing solutions based on cost accounting for customs operations;

– the comparative characteristic of customs regulation in global and transboundary supply chains in the conditions of trade and economic integration, as well as customs and logistics risks arising in the process of customs administration;

As international practice shows, customs administration is a system of means and methods that ensure the performance of the functions of customs regulation. Effective state regulation of the customs sphere is carried out on the basis of modern tools of the market mechanism, since economic entities are engaged in the implementation of foreign trade turnover.

This category includes exporters and importers of goods, commercial and institutional intermediaries engaged in foreign trade activities, the fulfillment of which is conditioned by the dynamics of the market environment and is determined by the dependence between the complication of economic ties in the global economy and the degree of demand for logistics.

Customs administration of logistics processes of global supply chains is aimed at performing operations, preparation and implementation of which is associated with the justification of the conditions for the introduction of technologies for the release of goods and their customs declaration, the reduction in terms and simplification of the procedures for customs operations related to the import / export of goods. This approach to improving customs services requires the use of innovative tools and management tools, including a more active use of logistics methodology and methods. However, at the present time, the problems of optimization of customs and logistics operations in places of passage through the customs border of the Republic of Uzbekistan have not been sufficiently investigated. The given situation, in the conditions of active introduction of innovative technologies, such as, preliminary declaration and preliminary information, does not allow to reach target indicators both on time, and the costs designated by the Government of the Republic of Uzbekistan. When developing new approaches to managing foreign trade transactions, material flows, it becomes necessary to turn to a logistics toolkit.

In the customs sphere, the objectives of logistics are inextricably linked with the movement of goods and vehicles across the customs border of the Republic of Uzbekistan. The logistics approach covers the following areas:

– Financial logistics of customs payments;
– Information logistics of customs business;
– Logistics of customs services;
– Logistics of customs administration[1].

Delivery of goods with minimal time and financial resources, satisfaction of interests of all participants in the chain of deliveries of foreign trade cargoes, creation of favorable conditions for their activities at the expense of improving the quality of services – this is the essence of the logistics approach in the customs sphere.

Customs logistics is a relatively new direction of logistics, which combines two different but interrelated areas of activity: customs and logistics. Logistics in the customs business should ensure the consistency of material (commodity), information and financial flows, as well as the optimal technology for moving goods across the customs border to accelerate this process and the handling of standard logistics requirements in relation to customs regimes (concerning customs authorities) and to participants foreign economic activity. The purpose of customs activity is to ensure the security of the state in the conditions of globalization of the world economy, and logistic – in determining the principles of integrated management of the foreign trade process in world trade[3–4].

The practice of the activities of the customs authorities of the Republic of Uzbekistan has shown that, to date, it is possible to identify a number of key problems in logistics, which are presented in this system.

Participants of logistical processes: Provider:

– Inventory management, pricing, transportation of own or hired transport, production planning, company location in Private sector;

– Staffing, pricing, transportation by own or hired transport, services offered, placing of orders in Government sector.

Transport Agency:

– Routing of transportation, level of service, prices, type of park in Private sector;

– Routing of transportation, level of service, prices, type of park in Government sector.

Government:

– Taxation, prices for products and tariffs of natural monopolies, stability of the financial system, functioning and development of the state infrastructure, legal regulation of economic relations in Private sector;

– Budgetary financing, the system of formation of state orders, control over their implementation and regulation in Government sector.

The logistic function of the customs business covers the following objects:

First, the logistics of the customs processing of goods, which involves the analysis of customs and logistics flows, which includes the integration of commodity, financial and information flows associated with the crossing of the customs border and the collection of appropriate customs duties and payments. At the same time, the basis of customs and logistics flows are foreign trade flows, which include input (that is, imported) and output (export) types of flows.

Secondly, the activities of logistics operators and customs activity of foreign economic activity entities. The functions of transport and logistics organizations in relation to the customs business are that their activities involve the crossing of the customs border and the performance of export-import transactions based on the provisions of the current legislation. Large transport and logistics organizations have in their structure customs posts, temporary storage warehouses and customs warehouses, and can also serve as a customs carrier and customs representative.

The creation of favorable conditions for the development of entrepreneurship in the Republic of Uzbekistan, has determined the active participation of national firms in the delivery chains of foreign trade cargoes will create an incentive for the development of logistics interactions aimed at the delivery of foreign goods to the country, taking into account the specifics of customs administration.

In this regard, the project "Strengthening transport and logistics business associations in Central Asia" was launched, aimed at increasing the competitiveness of Uzbekistan's business structures working in the field of transport and warehouse logistics. The concept of the project is to increase the level of knowledge and experience of entrepreneurs to create such a logistics base, which would ensure the most efficient movement of goods.

Summarizing the presented analytical material, it should be noted that logistics has become an integral part of the economic development of the Republic of Uzbekistan. The territory of the country with medium size and high population density, the disunity of industrial and agricultural centers, lack of access to the sea, and remoteness from world markets make the possession of a developed transport and logistics system a vital condition for expanding our country's trade relations.

The study of trends in the development of conceptual ideas and methodological approaches to the management of global supply chains demonstrates the expediency of designing them taking into account the specifics of the customs administration of logistical processes that allow increasing not only the volume of foreign trade turnover but also promoting the convergence of the economies of Uzbekistan and the countries-partners.

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THE MAIN CRITERIA FOR LEAD GENERATION

Abstract: In this article, the concept and essence of lead generation, the main types of customer acquisition and methods of successful work on lead generation, directions using lead generation and billing system are considered. The actions taken into account when creating the cost of website promotion by actions are analyzed. Guarantees for the promotion of the site on the leaders revealed.

Keywords: lead generation, leads, client brief, billing system, online store.

Lead generation – the generation of leads, the method of searching and attracting customers through the Internet. Consequently, by "lead" is meant the application of the potential client, the response call (real action). For example, registration on the advertiser's website; order formation; downloading, downloading, installing the proposed application; achieving a special level in the online game; confirmation of subscription to the newsletter, etc.

To achieve the goal – the acquisition of a potential client – you need, the client's passage of several or one level of filtration (as a rule, the more levels, the more perfect the lead). As the filters can be a characteristic of a potential client (age, sex, profession, occupation, etc.), a promo page on the Internet in which he should open and fill in the necessary fields.

For successful work on lead generation, it is necessary:

– Company engaged in lead generation
– Product understandable to customers;
– A quality promotional promo page;
– Established business processes within the company of the advertiser;
– Sources of traffic appropriate to the characteristics of the target audience;
– Conditions of the company-lead generator, for which the lead (bid) will be paid.

Led sales are possible if:

– Qualitative leads are acquired;
– Specialists have sales experience,
– There is a motivation for qualitative processing of leads,
– There is a clear strict process of controlling the quality of lead processing.

In Georgia, the direction "Lead generation" appeared around 2008–2010. In 2012, the direction began to acquire the market advertisers are increasingly using this service. Lead generation differs from other similar areas of advertising activities by the ability to monitor advertising costs, to see exactly where the advertising budget was spent. Including the advertiser was able to easily track the effectiveness of the event itself. Lead generation, unlike outdoor advertising, can be counted without difficulty: the level of conversion of costs into incomes.

Directions that apply lead generation:

– Tourism,
– Advertising Agencies,
– Banks (loans),
– Insurance,
– Training,
– Car repair,
– Recruitment,
– Real estate (buying and selling, renting),
– Medicine (paid services),
– Jurisprudence,
– Cars sale.
– Any sphere on sale of services.

The main task of platforms is to unite advertisers and traffic owners. The platform is the place where advertisers can find any kind of traffic and buy any audience, and the owners of traffic – choose any advertiser.

For example, the CPA Network platform is a billing system that considers all statistics on the advertising company: clicks, impressions, actions, sales, leads, statistics for each creative, traffic source. The platform can be connected independently to webmasters, partners, websites, that is all people / companies that have any kind of traffic.

To better comprehend the goals and objectives of the campaign, as well as to find the necessary traffic, customers fill out the form of the client brief, the first part of which includes questions about the campaign, and the second part – questions about traffic. The configuration of the brief is typical, as

for any agency – its main difference is that it contains questions about the leads that the client wants to acquire, also about the specifics of the traffic.

The key product offered to customers is the action – "filling out a questionnaire" or "leaving any contact data of users". The more diverse and complex the action, the more expensive it is. The actions of the client divided into three levels: the first – participation in a short survey, leaving an e-mail, like in social networks, downloading the application. The second is the contact data of users who are striving to buy something or acquire some information. The third – sales on the Internet. When buying in online stores also have different grades: "put in the basket", "confirmation in CRM", "confirmation of the fact of payment for the purchase," etc.

Are there any prospects for the development of this segment in Georgia? Analysts say, that there will be more players, who will start dealing in lead generation, and each player will have his own special know how. Participants will not be large, but rather – niche. There are financiers, certain drivers of this market, full e-commerce services, under which vertical networks will be organized which specialize only in them. At the same time, the essence of this market is transparency.

Over time, the exchange scheme will operate, when each lead will have its own lifetime, and one lead that may not like one brand, but will be attractive to another and it will be possible to pay and purchase it.

Which actions can be taken into account when creating the cost of website promotion by actions:

– Callback from the site,
– Application / order from the site,
– Applications for participation in events,
– Downloading price lists, technical documentation,
– Check in,
– User consultation from the site,
– Call from the site,
– Video views,
– Joining a group in a social network,
– Subscription to newsletters, news, special offers of the company,
– Resale.

Benefits

Only the result is paid, – target action of the user, potential customer. The cost of action (lead) is calculate personally and depends on many factors:

– The required number of actions or leads,
– Competition in the segment,
– The quality of the site, the design, the degree of trust,
– Competitive advantages of products / services,
– Geography of promotion,
– Technical preparedness of the site (it is important to prepare a site for the possibility of analysis and collection of all significant user actions).

Promotion of the site on the leads (in general) contains the following steps:

1. Configuring and analyzing web analytics,
2. Technical audit of the site. Audit of usability,
3. Determination of the cost of the lead,
4. Internal optimization of the site,
5. Regular reports,
6. Preparing the site for lead generation,
7. Daily monitoring,
8. External optimization of the site,
9. Technical support for promotion.

Guarantees for website promotion by actions (leads):

– In the technology of work the maximum transparency is laid. Our customers pay only for the real actions of users on the site.

– Advantages and disadvantages of website promotion with payment for targeted actions34.

Pro:

– Maximum quality and diversified traffic to the web-resource,
– You pay only for the targeted actions.
– Ability to deeply analyze the effectiveness of each advertising channel.
– Work is under way to improve the landing pages of the site and increase the level of conversion.

Contra:

– Not all sites can work on this method,
– The entrance barrier. Work on this tariff company can provide for customers with an initial monthly budget to promote about twenty thousand rubles,
– The advertising strategy of promotion is addressed only to sales, there is no talk about creating demand and increasing the level of recognition of the brand of conversation,
– We need a starting budget for the initial stage of testing, to find out the approximate cost of the lead and the prospects for cooperation.
– The final sales volume largely depends not on the features of visitors attracted to the site, but on the degree of preparation of the sales department, the level of service, pricing policy, the recognition of the customer's trademark.

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THEFT OF LIVESTOCK IN THE KYRGYZ REPUBLIC AS A SUSTAINABLE CRIME AND THE MEASURES TO COMBAT WITH THEM

Abstract: The main purpose of the work is to determine the content characteristics of crimes of cattle thefts, the state of disclosure, objective and subjective factors affecting the detection of crimes of this type. The research was carried out on the basis of general scientific methods of cognition, in particular system, system structural analysis.

The results of the research can be used in scientific research in this field, law enforcement practice of combating cattle theft, improvement of organizational and legal measures to combat cattle theft.

Keywords: Kyrgyzstan, cattle theft, criminality, latency, investigation, discoverability.

Kyrgyzstan is one of the Central Asian states with an agrarian economy. The majority of the population live in rural areas and are engaged in breeding cattle. Because of the degree of public danger, Kyrgyz legislators have singled out cattle theft separately from property theft.

And knowingly slaughtering has a persistent tendency in the general array along with other crimes. In rural areas, it is the most common type of crime against property.

Cattle theft in the Kyrgyz Republic remains one of the most common and difficult to solve crimes.

In accordance with Article 163 of the Criminal Procedure Code of the Kyrgyz Republic, the disclosure and investigation of theft of livestock "In criminal cases of crimes against property" (Articles 164, 165, 167, 168, 170, 172–172–2, 174–177), cases of the Kyrgyz Republic [1].

One of the most important tasks of law enforcement bodies, including the internal affairs bodies of the Kyrgyz Republic, is the full protection of the property of citizens against criminal encroachments.

Despite ongoing preventive work and the disclosure of crimes of theft of livestock, the situation in the republic remains rather unconcerning.

For example, in 2012, more than 1,800 heads of livestock were stolen in the Republic, with a total value of more than 25 million soms (average market price). More than 1100 heads of livestock were returned to the owners. In most cases, ordinary villagers are victims, for whom livestock is the only source of livelihood. More than 470 persons were brought to criminal responsibility, about one hundred groups of cattle-slaves were exposed. Most of them committed crimes in small groups.

From this official statistics, it can be concluded that this crime is causing huge damage to the property of citizens of Kyrgyzstan. To study the current state of the investigation of theft of cattle in the Kyrgyz Republic, we believe it is acceptable to refer to empirical materials, as well as the results of a sample survey. According to the National Statistical Committee of the Kyrgyz Republic, the number of registered crimes for the next five years is as follows:

Number of recorded crimes by type [2, P. 15].

As can be seen from the table above, that in the general mass of crime in the Kyrgyz Republic, theft has a stable tendency.

Separate statistics on theft of livestock are not available, but at the same time it can be said that in the regional statistical departments such reporting can be traced. For example, in the Osh region.

Table 1.

	2011	**2012**	**2013**	**2014**	**2015**
Total	30520	28847	27217	27070	29100
Theft	**12008**	**10848**	**9975**	**9029**	**9824**

The total crime detection rate is 65% of all recorded crimes. Almost one-third of crimes remain uncovered. On the basis of the foregoing, it can be concluded that theft including cattle theft has a stable tendency.

Such a tendency of crimes in the Kyrgyz Republic remains unfavorable in the conditions of a legal democratic state.

According to the information and analysis center of the Ministry of Internal Affairs of the Kyrgyz Republic, the percentage of disclosure leaves much to be desired, for example: as of January 1, 2014, 36.3 percent remained undisclosed. That is, every third theft of livestock remains uncovered. Latency crime remains in these statistical reports.

Such facts are confirmed by our sample studies.

Over the past 8 months in the Osh region 407 facts of cattle theft have been registered, 118 of them were theft of cattle, 56 horses, 233 facts of small cattle.

According to the press service of the Main Directorate of the Ministry of Internal Affairs for the city of Osh and the Osh region, 38.2% of cattle stealing was committed in the Kara-Suu district.

During the operational-investigative measures, 207 animals from stolen cattle were returned [3]. The damage inflicted on the owners of stolen cattle is 9 million soms, of which only 6 million soms were reimbursed.

In the Aksy region of the Jalalabad region in 2013, 48 facts of cattle theft were registered, none of which were uncovered. For the current year, 24 facts of theft of cattle were registered, only 4 facts were disclosed.

Over the past year in Aksy region there were 303 cases of cattle theft, including 72 theft of cattle, 15 horses, and 216 small cattle. According to the disclosed crimes, 34 cattle, 95 small cattle were returned to their former owners. According to statistics, it can be concluded that almost 90 percent of the theft of livestock remained undisclosed. The Aksy region, like the Aravan district, is located in the border zone with Uzbekistan, so this low disclosure of crimes of this category.

Most cases of cattle theft are committed at night with penetration into the premises, on pastures especially in the summer, in particular, stealing cattle and horses.

Criminals are informed in advance about the presence of livestock, in advance there is a thorough preparation, in most cases committed in complicity. Thus, about 98 percent of the thefts are committed by males, aged 23–36 years who do not work anywhere, as well as individuals with one-time earnings. A significant number of cattle robbery is committed by experienced criminals aged 35 to 40 years, using the most sophisticated methods. It should be noted that about one in five crimes are carried out by recidivists and persons previously convicted for theft.

An analysis of the investigative practice of the Kyrgyz Republic shows that cattle theft is most often committed in rural areas, at night, in the absence of masters. This is explained by the fact that the owners of livestock do not always look after. This allows criminals without special attention, to commit theft of livestock.

We believe that in order to effectively investigate crimes, including cases of theft of livestock, it is necessary to develop a complex of organizational and legal measures.

The general state of the investigation of cattle theft in the Kyrgyz Republic is significantly influenced by its geographic location, most criminal cases are registered in remote areas of Osh, Naryn, Jalalabad, Issyk Kul provinces. About 90 percent of the cases of theft of livestock are registered in the district departments of internal affairs.

Table 2.

Years	**Total population, thousand people**	**Including**		**In total population,%**		**Number of inhabitants per 1 km**
		city	a rural city	city	a rural city	
2010	5418.3	1846.8	3571.5	34.1	65.9	27
2011	5477.6	1861.7	3615.9	34.0	66.0	27
2012	5551.9	1884.4	3667.5	33.9	66.1	28
2013	5663.1	1900.2	3762.9	33.6	66.4	28
2014	5776.6	1943.6	3833.0	33.6	66.4	29
2015	5895.1	1986.7	3908.4	33.7	66.3	30
2016	6019.5	2029.5	3990.0	33.7	66.3	30

For the general disclosure of these crimes, in our opinion, several objective and subjective factors influence:

The number and density of the population, the density of the population as of January 1, 2016 in the Kyrgyz Republic is [4, P. 45]:

As can be seen from the table above, almost two-thirds of the population lives in rural areas, for which livestock is the only source of livelihood.

Poorly developed infrastructure, unemployment, migration flows cause the commission of a crime, respectively, a high proportion of crimes of cattle theft in rural areas.

According to our sample data, the production of criminal cases in remote areas is one-third greater than in urban centers.

The current state of the investigation of cattle theft in the Kyrgyz Republic shows that cattle theft is most often committed in rural areas, at night, in the absence of masters. This is explained by the fact that the owners of livestock do not always look after. This allows criminals without special attention, to commit theft of livestock

We believe that for an effective investigation of crimes, including cases of theft of livestock, it is necessary to take a set of organizational and legal measures at the state level.

The general state of the investigation of cattle theft in the Kyrgyz Republic is significantly influenced by its geographical location of the country, most criminal cases are recorded in remote areas, Naryn, Jalalabad, Issyk-Kul. It is about 90% of the cases of theft of livestock registered in the district departments of internal affairs.

For the general disclosure of these crimes, in our opinion, several objective and subjective factors influence;

1. Almost two-thirds of the population lives in rural areas, for which livestock is the only source of livelihood.

Weak or insufficiently developed infrastructure, unemployment, migration flows cause the commission of crime, respectively, a high proportion of crimes of cattle theft in rural areas.

2. Geographical factor, many remote areas are located near the border areas, especially Jalabad, Osh, Batken oblasts, which makes it difficult to gather evidence (the extension of the jurisdiction of the state).

3. The bodies of internal affairs in rural areas are not provided with the appropriate number of vehicles, mobile communications, forensic technology, which in turn does not provide an opportunity to promptly disclose and investigate crimes.

For example, out of 112 forensic experts throughout the republic in Batken, Naryn, Osh, and Talas oblasts, only 1–2 units are allocated.

4. Weak provision of staff, many graduates prefer to work in urban centers, this is due to the lack of proper social and medical services, lack of housing, schools, kindergartens for children of employees of internal affairs.

5. Low wages, despite the premium for the high mountains, the salaries of the internal affairs officer remain low – from 10,000 soms to 14,000 soms. Here there is a place for corruption.

6. Corruption mechanisms in the law enforcement sphere, many criminal cases are not initiated or disclosed.

7. Low qualification of employees of law enforcement agencies investigating criminal cases on theft of livestock, because of the lack of highly qualified personnel in the position of investigator, other people who graduated from civilian universities work.

8. High latency of these crimes.

9. The very subject of the crime itself, easily without any effort, can be moved in space in most cases in uninhabited places, it is possible to carve for meat, the difficulties of identification of cattle.

10. There are facts of official fraud reporting, in order to increase the detection of crimes.

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TACTICAL RECEPTIONS OF INITIAL INVESTIGATION ACTIONS IN THE INVESTIGATION OF THE CRAFT OF CATTLE

Abstract: The main goal of the work is to identify the features of the initial investigative actions and tactics and also to plan the investigation of the cases of cattle theft. The most characteristic features of the investigator's actions in the investigation and planning of cases of theft of livestock are determined.

The research was conducted on the basis of general scientific and especially scientific methods of cognition.

The results of the study can be used law enforcement practice of law enforcement agencies to combat cattle theft, planning of organizational and legal measures in the investigation of cattle theft.

Keywords: Consequence, planning, trace, investigative actions, tactics, preliminary investigation.

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Keywords: Consequence, planning, trace, investigative actions, tactics, preliminary investigation.

Planning of investigative actions at the initial stage of investigation of cattle theft is a necessary tactical condition for achieving the goal of criminal prosecution.

It should be borne in mind that criminal prosecution is limited to temporary categories, otherwise procedural actions will expire in a certain period of time so-called procedural terms.

From proper planning of investigative actions depends the result of work, where the maximum amount of procedural actions can be used for the shortest possible time.

Criminal Procedural Legislation Art. 164 of the Code of Criminal Procedure [1] of the Kyrgyz Republic defines the spatial aspects of investigative actions. The beginning of the investigative actions coincide with the commencement of the institution of the criminal case, but in some cases, it can be committed before the institution of the criminal case. Speed and efficiency is one of the key aspects of investigative actions, where you can get the maximum amount of information and evidence base. In accordance with Art. 165 CCP inspection of the scene of the incident and the purpose of the examination can be conducted in case of detection of an offense.

In accordance with art. 166 of the Code of Criminal Procedure of the Kyrgyz Republic established the terms of the preliminary investigation. Rational use of organizational and tactical methods of investigation is a pledge of timely and successful completion of the investigation.

As part of the principle of legality, the criminal procedural law establishes certain rules for the conduct of investigative actions. And with the design of the tactics of investigative actions, the investigator can not go beyond the procedural legislation.

In accordance with Art. 169 of the Criminal Procedure Code of the Kyrgyz Republic [2] established general rules for the production of investigative actions. In the manufacture of investigative actions, technical means can be used and scientifically founded methods of detecting, fixing and removing traces of crime and material evidence can be used.

In the conduct of investigative actions, the use of violence, threats and other illegal measures is unacceptable, as well as creating a danger to the life and health of the persons participating in them.

Proceeding from the foregoing, it is possible to establish criminal legislation in every way to protect the rights and freedoms of persons participating in criminal prosecution.

It should be noted that the order of the sequence of investigative actions is not clearly regulated by the criminal procedure legislation. When choosing the procedure for carrying

out investigative actions, the investigator acts autonomously, he has the right to independently establish their order at their discretion, this circumstance makes it possible to equip the tactics of investigative actions.

Nevertheless, to conduct some investigative actions, the investigator must obtain permission.

On the basis of Art. 169–1 of the Code of Criminal Procedure of the Kyrgyz Republic, the investigator in cases provided for in Art. 32 of the Code of Criminal Procedure, with the consent of the prosecutor, raises an application for an investigative action before the court, on which a decision is made [2].

At the initial stages of the investigation of cattle theft is characterized by special tension. Since the investigator must plan the tactics of investigative actions in a particular case.

The first step in the initial period of investigating theft of livestock is to extract the maximum amount of information. The victim can serve as the source of the source.

According to I. I. Belozerova's «tactical methods of producing an investigative action with his participation impose not only a record of his personality, but also the goals of the victim's participation in an event» [1, P. 234].

As we described above, an immediate investigative action is to examine the scene of the incident. Inspection of the scene of the incident is not only procedural, but also criminal legal value as an optional feature of the objective side of the crime. In addition, the scene of the incident is indicated by the presence in the objective world of the crime event. And the events of the crime, in turn, are subject to proof. In the process of inspecting the scene of the incident of cattle theft, it is necessary to find out the following circumstances:

a) the form and content of the object from which the theft was committed;

b) the circumstances of the environment and approaches to it;

c) the way the criminal gets to the place of theft if this is a closed room and in which direction he disappeared;

d) the criminal used the technical means;

e) what is the sequence of actions of the offender;

f) how many persons participated in the theft;

g) what mechanisms the traces of education were left on the scene of what traces from the scene could have remained on the offender;

h) characteristic signs in the tracks and other material objects, by which you can determine the age, professional skills, appearance of the offender;

i) whether there are signs, staged theft.

In order to clarify these circumstances, it is necessary to inspect not only the premises from which the theft was committed (if the theft of livestock is committed from the yard), but also the adjacent construction through which the criminal could have entered or left. Important for the tactics of investigative actions is the study of the place from which it is possible to observe. In such places, material footprints of shoes, cigarette butts, etc. can be found.

Imprints of material traces must be sought in places of penetration to the scene of the incident, doors where material traces of other excretions of the human body can be found, all sorts of objects by which the person who committed the theft touched.

In the case of detection of the tools of hacking at the crime scene, it is necessary to conduct a detailed inspection, where it is possible to detect traces.

A proper investigation of the situation of theft of cattle allows you to obtain the maximum of personal information that provides for the disclosure of the crime. The theft allows you to point out the age of criminals:

– a place of penetration;
– on the physique;
– by the method of opening the barrier
– professional skills (for cattle stealing, there are signs of rope knots, the so-called «kurmo», «kazyk boo» among the people;
– on the psychological characteristics of the criminal's personality.

Investigative situations, when stealing animals allows you to determine the intent of the person who committed the theft.

Numerous footprints left on the scene may indicate the mental state of the offender.

Analysis of the method of committing a crime largely determines the personal qualities of the person who committed the theft of cattle,

Since any criminal act is determined by the psychological characteristics of the individual. It expresses social demographic-gender, age, life experience, professional skills.

Traces obtained during the inspection site of the incident must be subjected to examination.

In accordance with Article 157 of the Criminal Procedure Code of the Kyrgyz Republic [2], upon the fact of the crime committed, the body of inquiry takes the necessary measures to protect the scene of the incident.

Timely measures taken when going to the scene give the investigator a number of advantages:

– timely organization of operational-search activities;
– conduct urgent investigative actions-searches, seizures;
– obtain samples for comparative study;
– appoint an expert examination;
– interrogate the victims and witnesses;
– the next step in the tactics of investigative actions is the questioning of the victim.

Interrogation of the victim is an integral part of the investigative actions, the activities carried out at the initial stage of the investigation.

During the interrogation of the victim, it is necessary to pay attention to the establishment of group and individual traits of stolen cattle, distinctive features.

When interrogating the victim, it is necessary to maximize the details of the testimony.

Part of the interrogation is the questioning of witnesses, questioning which is significant information about the theft of livestock, as they are directly observing the event of the deed. During the interrogation of witnesses, social psychological properties are important:

– their individual abilities to perceive and remember the circumstances of the event;
– initial attention of the witness;
– the nature of the suspect's actions;
– at what time the event occurred;
– Signs of criminals.

The most important tactical action is the search of the suspect. After the detention, the suspect must be subjected to a personal search, if necessary, the shoes and clothes for examination are withdrawn from the suspect.

The purpose of the search is to find stolen items that could be used as tools for hacking. The auxiliary premises-sheds, garages, where sometimes it is possible to find objects important for investigation are subject to a search.

The procedure for conducting the search is regulated by Art. 184. CPC KR [2] indicating that the basis for the search is the availability of sufficient factual data.

An important evidentiary value may be the examination and examination of the suspect's clothing.

The survey is conducted in order to detect traces left after the theft was committed on the suspect's body. Detection and fixation are subject to fresh wounds, scars and burns, microparticles that fall on other parts of the body.

The next stage of investigative actions is preliminary preparation, thorough and

The next stage of investigative actions is preliminary preparation, thorough and in-depth study of the person of the accused in order to timely select the moment of carrying out certain actions. The sequence of the conduct is largely determined by the nature of the investigative situation.

In the process of questioning the suspect (accused), if he pleads guilty, it is necessary to find out in detail all the circumstances of the crime: – the fact of the theft, the circle of participants if committed in complicity;

– when, and where, the sale of stolen cattle was carried out;
– How much he received as a result of the sale of the kidnapped;
– who can confirm his testimony, etc.

The process of interrogation of the accused must cover all the basic circumstances of the theft, the sane guilty, the interrogated and set out in the decision to bring in as the accused.

To investigate the theft of livestock, proper preparation is necessary, during which the investigator must carry out a set of actions, including: studying the materials of the criminal case, the identity of the person being interrogated; determination of the order of interrogations and methods of summoning the interrogated, preparation of a place for interrogation.

In the process of these actions, the investigator must find out:

– personal qualities of the suspect, the accused;
– the idea of life values;
– professional skills;
– whether there is a conviction, under which article of the Criminal Code;

From the totality of the information received, it is necessary to provide certain information, the use of which can lead to a truthful testimony given to the accused.

The interrogation of the accused should, in the form of a free conversation of the proposal, tell everything that he wishes to clarify on the charges brought against him.

As the investigative practice shows, interrogation of the accused in theft of cattle can proceed in the following investigative situations:

– Recognition of guilt by the accused;
– partial confession of guilt;

denial of guilt.

In the first investigation, the situation is conditioned by the positive qualities of the accused, or forced to do so because the investigation contains irrefutable evidence of his guilt.

In the second case, the defendant's partial confession of guilt, the accused has no idea of the availability of information at the disposal of the investigator.

As the investigative practice shows the suspects, the accused are very cautious, often gives uncertain answers to the questions posed. The investigator must select special tactical methods that would expose the interrogated.

In the third case, the accused does not admit his guilt, refuses to give evidence or gives false, psychological contact is necessary with the interrogated.

In case of refusal to give testimony, it is recommended to use tactical methods aimed at inducing the accused to conduct logical reasoning.

Summarizing this article, we believe that the specifics of the tactics for conducting investigative actions are:

1. When choosing the tactics of investigative actions, the investigator does not have absolute freedom, his actions take place within certain limits.

2. When choosing a sequence of investigative actions, the investigator has the right of autonomy.

3. The tactics of investigative actions in each case of theft of livestock depends on the circumstances of the case.

4. The most typical investigative actions in the commission of thefts are the examination of the scene of the incident, the interrogation of the victim and the suspect, operational-search activities.

5. During the interrogation it is necessary to detail all the information about the circumstances of the case, it will help further planning the investigation.

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Contents

Section 1. Biology 3

Amanov B. Kh., Samanov Sh.A.
CORRELATION BETWEEN SOME MORPHOLOGICAL AND ECONOMICAL TRAITS AT THE HYBRIDS F_4 OBTAINED ON THE BASE OF INTRASPECIFIC DIVERSITY OF SPECIES *G.BARBADENSE* L. 3

Gaipova Mutabar Ergashevna, Akramova Firuza Djalaliddinovna, Shakarbaev Ulugbek Abdulakimovich, Azimov Djalaliddin Azimovovich, Saparov Kalandar Abdullaevich
NEW DATA ON THE BIOLOGY AND LOCALISATION OF NEMATODE *SETARIA LABIATOPAPILLOSA* (ALESSANDRINI, 1838) 6

Ismoilova Karomatkhon Mahmudjonovna
THE IMPACT OF STEROID NATURE COMPOUNDS ON THE MUTUAL CONNECTION LEVEL OF OVERALL INDICATORS OF WINTER WHEAT 11

Qulmamatova Dilafruz Erkinovna, Adilova Shohista Shukhrat qizi, Baboev Saidmurat Kimsanbaevic
VARIATION OF QUANTITATIVE TRAITS IN F_2 HYBRIDS RECEIVED IN CROSSES OF GEOGRAPHICALLY DISTANT WHEAT FORMS 15

Mustafaev Ilyor Muradullaevich, Iminova Malika Mashrabovna, Sherkulova Jamila Payanovna, Xolmurodova Tutigul Nafasovna, Teshaboeva Shaxnoza Arabovna
NEW RECORDS OF RUST FUNGI OF TREES AND SHRUBS FROM UZBEKISTAN 19

Nabiyev Saidgani Mukhtorovich, Khayitova Shakhlo Davlatovna, Khaitov Sh.D.
THE PHENOTYPIC CORRELATION OF FIBER LENGTH WITH VALUABLE ECONOMIC SIGNS IN THE FIRST F_1, SECOND F_2 AND ORDINARY-GENERATION HYBRIDS OF COTTON GENETIC COLLECTING LINE. 22

Onarkhon G., Khusanova Kh., Alimjanova X.A.
STRUCTURE AND TAXONOMIC ANALYSIS OF SOIL ALGAE STEEP AREAS OF NORTHERN FERGHANA IN WINTER 26

Usmanov Rustam Makhmudovich, Madaminov Ruslan Ramanberdiyevich, Bahodirov Zafar Abduvaliyevich
ANALYSIS OF IMPACTS OF SOIL SALINITY ON WINTER WHEAT DEVELOPMENT WITH SPECTRAL VEGETATION INDICES 30

Khayitov Davron Gaybullaevich, Rajamurodov Z. T.
INFLUENCE OF ECOLOGICAL FACTORS ON BIOCHEMICAL PARAMETERS OF BLOOD OF RABBITS OF DIFFERENT BREEDS 34

Ergashev Marufjon Makxammatjanovich
DEPENDENCE OF THE LEVEL OF CORRELATION LINKS AND STRUCTURE ON COTTON LEAF AND FIBER COLOR 38

Yuldasheva Muattarkhon Pulatovna
THE DISTRIBUTION OF INDICATOR-SAPROBE ALGAE ALONG SHAKHIMARDONSOY-MARGILANSOY RIVERCOURSES 42

Section 2. Geography **44**

Kadirov Murodillo Aslamovich, Sherkholov Olim Iskandarovich
AGE COMPOSITION OF POPULATION AND LABOR RESOURCES
OF SAMARKAND REGION IN REPUBLIC OF UZBEKISTAN 44

Raupov Orif, Umarov Komil, Khaydarov Bakhtiyor, Raupov O. K.,
Sam D. U., Umarov K. O'z. D. J. T. va S. U., Khaydarov B. T.
DYNAMICS OF GENERAL AND SPECIAL PHYSICAL TRAINING
OF EXPERIENCED FEMALE BOXERS 47

Khikmatov Bekzod Fazliddinovich, Pirnazarov Ravshan Topvoldievich
CALCULATION OF THE OUTBREAK DISCHARGES THROUGH
A CLOSURE CHANNEL WITH TRAPEZOID SHAPE OF CROSS-SECTION 51

Section 3. Journalism **54**

Barlybayeva Saule
NEW MEDIA DEVELOPMENT OF THE XX1 CENTURY: GLOBAL
AND NATIONAL TENDENCIES 54

Section 4. History **57**

Rahimov Sherzod Abduhalilovich
STATE POLICY ON THE YOUTH IN UZBEKISTAN: NATIONAL
EXPERIENCE AND REAL NECESSITY OF INTERNATIONAL INITIATIVES 57

Section 5. Material Science **60**

Adilkhodjaev Anvar Ishanovich, Mahamataliev Irkin Muminovich,
Ilyasov Allanazar Torehanovych
ON POROSITY PARAMETERS OF CERAMIC BRICKS MADE OF LOW-GRADE RAW
MATERIAL USING BURN-OUT ADDITIVES OF AGRICULTURAL PRODUCTION 60

Ramazanov Bahrom Gafurovich, Kadirov Tulkin Jumaevich
INVESTIGATION OF STRUCTURAL FORMATION OF AMINOALDEHYDE
OLIGOMERS IN THE INNER SURFACE OF LEATHER 64

Section 6. Mechanical engineering **69**

Akhmedov Khamidulla Abdukhoshimovich
ANALYSIS OF ENERGY INDICATORS OF THE SAW GIN WITH A NEW DESIGN 69

Mukhammadiev Davlat Mustafaevich, Ibragimov Farkhod Khayrulloevich
DETERMINATION OF CRITICAL ANGULAR SPEED OF SAW CYLINDER
OF A COTTON GIN 72

Section 7. Medicine **76**

Agzamova S. A., Akhmedova F., Shamansurova E. A.
EVALUATION OF POTENTIALLY REMOVABLE RISK FACTORS
OF ARTERIAL HYPERTENSION IN CHILDREN OF UZBEKISTAN 76

Azamatov Azizbek Azamat o'gli, Tursunkhodzhaeva Firuza Muratovna,
Rejepov Jimadulla, Maksudova Alloma Nizamovna
PSYCHOTROPIC ACTIVITY OF CYTISINE N-BENZOYL DERIVATIVES 80

Akhmedova Nilufar Sharipovna
THE IMPORTANCE OF PROTEINURIA AS A PREDICTOR OF DIAGNOSIS AND A RISK FACTOR FOR THE DEVELOPMENT OF CHRONIC KIDNEY DISEASE 84

Bobojonov Oybek Abdujabbarovich, Karimov Hamid Yakubovich, Arifov Saidkosim Saidazimovich, Boboev Kodirbek Tohtabayevich
ANALYSIS OF THE ROLE rs1544410 POLYMORPHISM OF THE VDR GENE TO THE DEVELOPMENT OF ROSACEA ASSOCIATED WITH DEMODEX FOLLICULORUM MITES 86

Nazirov Feruz Gafurovich, Gulamov Olimjon Mirzakhidovich, Muzaffarov Farukh Umarovich, Akhmedov Akrom Rustamovich
PURULENT-SEPTIC AND SPECIFIC COMPLICATIONS IN SURGICAL TREATMENT OF ESOPHAGUS THORACIC PART TUMOR 89

Daminov B. T., Makhmudova N. R.
CHARACTERISTICS OF THE LIPID SPECTRUM VALUES IN THE PATIENTS WITH CHRONIC RENAL DISEASES 91

Yoltukhivskyy Mykhaylo, Nikolaenko Oksana, Boreyko Tatiana, Dovgan Alexandr, Lesya Kostyk
INFLUENCE OF BIORHYTHMS ON STUDYING FOREIGN STUDENTS AT A MEDICAL UNIVERSETY 93

Zefi Gjulio
THE EFFECTS OF ELECTRICAL MUSCLE STIMULATION TRAINING (EMS) ON IMPROVING POSTURAL PARAMETERS IN MIDDLE AGE (50–60 YEARS) 96

Ibragimov Shavkat Narzikulovich, Enikeeva Zulfiya Makhmudovna, Abdukhalilov Majid Makhamatkulovich, Saidkulov Bunyod Suyunovich, Narzikulova Kamola Shavkatovna
RADIOSENSITIZING EFFECT OF K-19 AND K-2 UPON THEIR INTRATUMORAL ADMINISTRATION TO ANIMALS WITH WALKER'S CARCINOSARCOMA STRAIN 99

Ibragimov Shavkat Narzikulovich, Enikeeva Zulfiya Makhmudovna, Abdukhalilov Majid Makhamatkulovich, Saidkulov Bunyod Suyunovich, Narzikulova Kamola Shavkatovna,
THE STUDY OF MITOTIC ACTIVITY, ALKYLATING ACTION AND EFFECT ON TOPOISOMERASE PREPARATIONS K-19, DECOVIN AND K-20, OBTAINED ON THE BASIS OF COLCHICINE AND COLCHAMINE 103

Ibragimov Jasurbek Khabibjanovitch,Akilov Khabibulla Ataullaevitch, Toshboev Sherzod Olimovich
FREQUENCY OF OCCURRENCE OF ADHESIVE INTESTINAL IMPASSABILITY IN THE STRUCTURE OF PEDIATRIC EMERGENCY SURGICAL CARE 107

Kadomtseva L. V., Pulatova S. S., Tukhvatulina E. R.
CHARACTERISTICS OF RENAL DAMAGE EARLY STAGE IN HYPERTONIC DISEASE 112

Kalanhodjaeva Shahnoza Bahtiyarovna, Khaidarova Feruza Alimovna
PSYCHOSOCIAL FACTORS OF QUALITY OF LIFE ASSOCIATED WITH HEALTH IN WOMEN WITH CONGENITAL ADRENAL HYPERPLASIA 115

Kamalova Mexriniso Kilichevna, Kamilov Khaydar Pazilovich
USE OF LAZER THERAPY IN THE TREATMENT OF CHRONIC RECCURENT HERPETIC STOMATITIS FOR FOR CHILDREN 120

Kamilova Iroda Abdurasulovna, Yunusov Khaydar Ergashevich, Sarymsakov Abdushukur Abdukhalilovich
HORIZONS AND CHALLENGES OF THE SILVER NANOPARTICLES APPLICATION IN THE PRACTICAL MEDICINE (REVIEW PAPER) 122

Kurbanova Zumrad Chutbaevna, Babajanova Shoira Agzamovna,
VIOLATIONS OF COAGULATIVE HEMOSTASIS IN PATIENTS WITH LIVER CIRRHOSIS OF THE VIRAL ETIOLOGY 128

Mirzayeva Rafiqa Sahib, Kaziev Abuzer Yusif, Jafarova Gulnara Alisa
EVALUATION OF HEPATOPANKREATOBILIARY SYSTEM FUNCTIONAL ACTIVITIES IN POSTOPERATIV PERIOD IN GASTRIC CANCER PATIENTS 131

Muminov K. P.
ALTERATIONS IN THE RIGHT CHAMBERS OF HEART IN COPD 136

Navruzova Shakar Istamovna, Sa'dulloeva Iroda Kurbonovna, Suleymanova Gulrukh Suleyman qizi
CORRELATION INTERRELATION OF IMMUNOLOGICAL AND HORMONAL INDICES IN CHILDREN WITH CONGENITAL HEART DISEASES 139

Nazyrov Feruz Gafurovich, Kurbaniyazov Zafar Babajanovich, Davlatov Salim
MODIFIED METHOD OF PLASMAPHERESIS IN THE TREATMENT OF PATIENTS WITH PURULENT CHOLANGITIS..... 142

Nazyrov Feruz Gafurovich, Kurbaniyazov Zafar Babajanovich, Akbarov Mirshavkat Mirolimovich, Askarov Pulat Azadovich
RESULTS OF SURGICAL TREATMENT OF "FRESH" INJURIES OF MAGISTRAL BILE DUCTS..... 148

Nechytailo Yuriy, Pidmurniak Olesya
AMBULATORY BLOOD PRESSURE MONITORING IN ADOLESCENTS WITH ENDOCRINE PATHOLOGY..... 153

Rasulova Khurshidakhon Abduboriyevna, Nishonov Shokhidbek Yusufjonovich
STROKE BURDEN IN ASIA: TO THE EPIDEMIOLOGY IN UZBEKISTAN 156

Rasulova Mukhsina Razikovna
FORENSIC EXAMINATION OF FRACTURES OF THE BONES OF THE NOSE 162

Raximov Ilxom Raximovich
AN INVESTIGATION OF INDICATORS OF SOME CYTOKINES IN PATIENTS WITH CUTANEOUS LEISHMANIASIS IN THE PROCESS OF TREATMENT 165

Tilliashaykhov Mirzogolib Nigmatovich, Zakhirova Nargiza Nematovna
FRONT IMPRESSIONS OF SMALL PANCRE WITH RECONSTRUCTION OF MUSCULAR SLOT IN PATIENTS WITH LOCALLY EXTENDED UTERINE CERVICAL CANCER 169

Tursunova Nodira Isroilovna, Atakhanova Nigora Ergashevna
THE SIGNIFICANCE OF PREOPERATIVE RADIATION THERAPY IN THE TREATMENT OF UTERINE BODY CANCER, DEPENDING ON P53 AND BCL-2..... 171

Ubaydullaeva Nilufar Bahromhodjaevna
DYNAMICS OF THE QUALITY OF LIFE OF WOMEN WITH GRAVES' DISEASE, DEPENDING ON THE DURATION OF THE DISEASE 175

Usmanova Shakhnoza Erkinovna, Yakubov Abdujalol Vahabovich
INFLUENCE OF SOME I-APF ON CYTOPROTECTION MECHANISMS IN INDOMETHATSIN-INDUCED GASTROPATHYARTHRITIS 180

Khamroev Farhod Sharafovich
APPLICATION MAGNIT LAZER THERAPY WITH LAZER ACUPUNCTURE PATIENTS WITH INFANT CEREBRAL PALSY 183

Shamsiev Abdulla Yakubjanovich, Ruziev Sherzod Ibadullaevich
USE OF DERMATOGLYFICS IN DETERMINING THE PERSONALITY AND THE PROBABILITY TO SUICIDE IN FORENSIC MEDICINE 185

Yusupalikhodjaeva Saodat Hamidullaevna, Bekjanova Olga Esenovna, Patkhiddinov Jaloliddin Sharofiddin o'gli
FACTORS FOR PERSISTENCE OF CANDIDA ALBICANS, DEFINED IN PATIENTS WITH ORAL MONILIASIS OF ORAL CAVITY 187

Section 8. Pedagogy 191

Goncharenko Mariya
WAYS TO ACHIEVE SPIRITUAL SELF-REALIZATION OF FUTURE SPECIALISTS 191

Kutateladze Rusudan, Chechelashvili Maia
INNOVATIVE EDUCATIONAL TECHNOLOGIES IN THE HIGHER EDUCATION SYSTEM OF GEORGIA 194

Secction 9. Political science 198

Galym Maral, Zholdasbekova Akbota
GEOPOLITICAL CHANGES IN LATIN AMERICA: ARGENTINA AND URUGUAY 198

Salii Sergey Mihailovich, Moldahanova Gulnar Isaevna
LAND BORDER DELIMITATION OF REPUBLIC OF KAZAKHSTAN: PRACTICAL KNOWLEDGE OF BORDER POLICY FORMATION 202

Section 10. Psychology 205

Moskvin Victor, Moskvina Nina
INDIVIDUAL PECULIARITIES OF STUDENTS WITH MANIFESTATIONS OF INTERNET ADDICTION 205

Section 11. Agriculture 208

Mirkhasilova Zulfiya
WAYS TO IMPROVE THE WATER AVAILABILITY OF IRRIGATED LANDS 208

Shamuratova N. G.
GYPSY MOTH (*LYMANTRIA DISPAR* L.) POPULATION IN UZBEKISTAN AND PATHOGENICITY OF THE NUCLEAR POLYHEDROSIS VIRUS 210

Section 12. Technical science **213**

Artikbaeva Nozima Mumindjanovna, Nutfullaeva Lobar Nurullaevna, Bakhritdinova Dilrabo Amanbaevna, Shin Illarion Georgievich, Tashpulatov Salikh Shukurovich, Murodov Tahir Bakhramovich
DEFORMABILITY OF THE PACKAGE OF MULTILAYER COMPOSITE MATERIAL OF THE WORKING PRESS ORGAN FOR WET-HEAT TREATMENT OF SEWING PRODUCTS 213

Djalilov Anva, Yeshbaeva Ulbosin, Rafikov Adham
PAPER WITH INTRODUCTION OF WASTE OF POLYACRYLONITRILE FIBER 217

Jonkobilov Ulugmurad Umbarovich
METHODOLOGY OF CALCULATION AND EXPLORATION OF RUPTURE AT HYDRAULIC IMPACT 221

Ikramov Rakhimjan Karimovich, Jumaev Ziyadulla Tashtemirovich, Amanov Bahodir Tuhtasinovich
ON THE ISSUE OF METHODS OF MANAGING ADAPTIVE-MELIORATIVE REGIMES OF TECHNOGENICALLY DISTURBED AGROLANDSCAPES 224

Nomozov Shuhratjon Yuldashali-o'gli, Jumanova Miyasar Ortikovna, Namazov Shafoat Sattarovich
SUSPENDED LIQUID COMPLEX FERTILIZERS FROM UNEVAPORATED WET-PROCESS PHOSPHORIC ACID 227

Juraeva Shakhnoza Gayratovna, Tashpulatov Salih Shukurovich, Murodov Tahir Bakhramovich
DEVELOPMENT OF INFORMATION SUPPORT FOR DECORATIVE ELEMENTS FOR FASHION INDUSTRY OBJECTS 231

Kuldoshev Davronbek Abdullajonovich
ANALYSIS OF FACTORS AFFECTING TO WORK FECUNDITY OF COTTON HARVESTING 235

Qutlimuratov Yusup Qulbaevich, Kulbaeva Miyasar Yusupovna
PRINCIPLES OF SYSTEM APPROACH TO ANALYSIS OF PRODUCTION IN AGRICULTURAL ENTERPRISES 238

Mamajonov Makhmud, Shakirov Bakhtiyar Makhmudovich, Shermatov Rakhmatilla Yuldashevich
HYDRAULIC OPERATING MODE OF THE WATER RECEIVING STRUCTURE OF THE POLYGONAL CROSS SECTION 241

Mamatov Farmon Murtozevich, Mardonov Sherzod Halilovich, Shodmonov Golib Dustmurodovich
DUMP RIPPER FOR SOIL PROTECTION FROM WATER EROSION 245

Muzaffarova Maujuda
HUMIDITY OF SAND AS BUILDING AND TECHNOLOGICAL CHARACTERISTICS OF NEW RESOURCE-SAVING TECHNOLOGY SOLUTIONS FOR FIXING SHIFTING SANDS 247

Muminova Umida Tokhtasinovna, Sharipova Saodat Islomovna, Tashpulatov Salikh Shukurovich
PREREQUISITES FOR THE DEVELOPMENT AND IMPLEMENTATION OF BUSINESS CLOTHES FOR SCHOOLCHILDREN 250

Parpiyev Azimjan, Navruzov Nodir
THE ANALYSIS OF RESIDUAL FIBRATION OF SEEDS AFTER SAW GINNING. 253

Nutfullaeva Lobar Nurullaevna, Artikbaeva Nozima Mumindjanovna, Bakhritdinova Dilrabo Amanbaevna, Shin Illarion Georgievich, Tashpulatov Salikh Shukurovich, Murodov Tahir Bakhramovich
INVESTIGATION OF FORMATION CONDITIONS PACKAGE AND ENSURING PILLARITY OF PILLOWS FROM COMPOSITE MATERIALS. 259

Uzakov Gulom Norboyevich, Davlonov Khayrulla Allamurotovich
MODELING OF THE HEAT AND MOISTURE BALANCE OF THE HELIO-GREENHOUSE WITH THE PYROLYSIS HEATING INSTALLATION AND THE HEAT ENERGY UTILIZATION 262

Usmankulov Alisher Kadirkulovich, Sadikov Farkhod Samandarovich
RESEARCH TEPLOFIZICHESKY PROPERTIES OF THE CLAP-RAW AND ITS COMPONENTS 268

Hodjaeva Kamola, Tashpulatov Salih Shukurovich, Mansurova Munisa Anvarovna, Murodov Tahir Bakhramovich
PREREQUISITES OF IMPROVEMENT OF METHODS FOR ESTIMATING THE ADJUSTMENT OF TEXTILE MATERIALS AND DEVICES FOR THEIR IMPLEMENTATION. 274

Yuldosheva Ozoda, Karimov Sardorbek Khojiboevich, Rafikov Adham Salimovich
PHYSICAL AND CHEMICAL PROPERTIES OF THE IMPARTED COPOLYMERS OF COLLAGEN AND POLYACRYLIC ACID 277

Section 13. Transport 281

Ziyoda Mukhamedova
DIAGNOSTICS OF ASYNCHRONOUS ELECTRIC MOTORS ON THE BASIS OF SPECTRAL ANALYSIS OF AMPLITUDE-MODULATED STATOR CURRENT 281

Section 14. Physics 286

Rasulov Voxob Rustamovich, Rasulov Rustam Yavkachovich, Eshboltaev I. M., Mamadaliyeva N. Z.
A SINGLE-QUANTUM SHIFT PHOTOCURRENT IN PIEZOSEMICONDUCTORS. 286

Soika Alexander Kuzmich
REVISITING THE NATURE OF DARK SUNSPOTS: A MODEL OF HOT SPOTS 288

Section 15. Philosophy 292

Daniyarov Xushvakt Tajibayevich
BALANCE BETWEEN RELIGIOUSNESS AND SECULARITY IN CONDIITONS OF GLOBALISATION OF ISLAMIC IDEOLOGY 292

Siddiqov Ilyosjon Bakhromovich
SOCIAL AND PHILISOPHICAL PERFORMANCE OF MAKING YOUTH'S INTELLECTUAL CULTURE. 296

Section 16. Chemistry 299

Mahmudova Feruza Ahmadzhanovna, Umarova Muattar Bahtiyarovna, Maksumova Aytura Sitdikovna
ETHERIFICATION OF METACRYLIC ACID BY OLEFINES 299

Pulatova Lola Tairhanovna, Iskandarov Alisher Iskandarovich, Aripova Tamarkhan Uktamovna, Polyarush Svetlana Vitalovna, Sirov Vladimir Nikolayevich
DEVELOPMENT OF IMPROVED METHODS OF THIN-LAYER CHROMATOGRAPHY AND UV-SPECTROPHOTOMETRY AT EXPERTISE OF PAROXETIN 303

Ergashev Oybek Karimovich
DIFFERENTIAL HEATS OF WATER ADSORPTION IN MOLECULAR SIEVES OF IODIDE SODALITE 310

Section 17. Economy 314

Pulatova Lola Tairhanovna, Uralova Zilola Vohid kizi
A MODERN VIEW OF THE TRENDS IN THE DEVELOPMENT OF LOGISTICS IN TRADE AND ECONOMIC RELATIONS 314

Chechelashvili Maia, Berikashvili Lia
THE MAIN CRITERIA FOR LEAD GENERATION 317

Section 18. Jurisprudence 320

Jusupov Bolotbek Asanovich, Orozov Jarkyn Junusovich
THEFT OF LIVESTOCK IN THE KYRGYZ REPUBLIC AS A SUSTAINABLE CRIME AND THE MEASURES TO COMBAT WITH THEM 320

Jusupov Bolotbek Asanovich, Orozov Jarkyn Junusovich
TACTICAL RECEPTIONS OF INITIAL INVESTIGATION ACTIONS IN THE INVESTIGATION OF THE CRAFT OF CATTLE 323