

European science review

Nº 7–8 2017
July–August

European Sciences review

Scientific journal

№ 7–8 2017 (July–August)

ISSN 2310-5577

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Editorial office

European Science Review "East West" Association for Advanced Studies and Higher Education GmbH, Am Gestade 1 1010 Vienna, Austria

E-mail:

info@ew-a.org

Homepage

www.ew-a.org

European Science Review is an international, English language, peer-reviewed journal. It is published bimonthly with circulation of 1000 copies.

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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.

Section 1. Biology

*Bondarenko Marina Anatolyevna,
Kharkiv National Medical University,
Associate professor of the Department of Medical
and Biological Physics and Medical Informatics
E-mail: bondaren.koma3007@gmail.com*

*Ponomarenko Natalya Sergeevna,
Kharkiv National Medical University,
Teaching assistant of the Department of Medical
and Biological Physics and Medical Informatics
E-mail: bondaren.koma3007@gmail.com*

*Zaytseva Olga Vasilyevna,
Kharkiv National Medical University,
Professor of the Department of Medical
and Biological Physics and Medical Informatics,
E-mail: olgvaszay@gmail.com*

*Knigavko Vladimir Gilyariyevich,
Kharkiv National Medical University,
Head of the Department of Medical
and Biological Physics and Medical Informatics,
E-mail: olgvaszay@gmail.com*

EVALUATION OF THE CELL CYCLE DURATION OF TUMOUR CELLS UNDER THE CHANGES OF THEIR OXYGENATION DEGREE

Abstract: The work is devoted to mathematical modelling of the known radiobiological effect — “potentially lethal injuries”. We evaluated the value of such indicator as the cell cycle duration of tumour cells under repair of DNA double-strand breaks depending on their oxygenation degree.

Keywords: mathematical modelling, potentially lethal injuries, repair of DNA double-strand breaks, cell cycle duration, photon radiation.

Introduction. The urgent character of this research is caused by the necessity for development of correct mathematical model of the known radiobiological effect called “potentially lethal injuries” (PLI) [1]. Theoretical and practical significance of this effect is connected with its contribution to the degree of injuries to the malignant tumour cells, which should be taken into consideration in radiation therapy [2]. The aim of this work was to evaluate the cell cycle duration of tumour cells as the most adequate indicator that reflects the severity of PLI process.

The results of the study. It is assumed in the work that any factor, which slows down the passing of irradiated cells through the cell cycle stages, is associated with the increase in the dimension of repair of the radiation injuries to DNA and this, in turn, increases the probability of survival of cells. The assumption about the universality of the discussed effect allows us to reckon that the well-known phe-

nomenon of increase in the survival of tumour cells, when they are irradiated under hypoxia, is also associated with the phenomenon of potentially lethal injuries (PLI). The above-mentioned suggests that an optimal indicator of the severity of PLI effect is the cell cycle duration (T). Thus, the problem of PLI modelling is reduced to the mathematical model development that allows to estimate the value of the indicator T . In the present paper we studied only effects that result from irradiation of cells by photon radiation (x-ray or gamma).

Initially, the PLI phenomenon was regarded as the increase in the survival of irradiated cells if they were exposed to radiation not in a nutrient medium but in water. Apparently, the most convincing explanation for this effect is the assumption that the lack of nutrients in a cell slows down the passing of cells through the cell cycle stages, and this slowdown leads to the increase in the dimension of repair of double-strand breaks (DSBs) in DNA of irradiated cells. In its

turn, the increase in the dimension of repair leads to the increase in survival of irradiated cells.

If we accept the suggested way of interpretation of PLI phenomenon, we may assume that it has a more universal character. Namely, we may assume that any factors, which slow down the cell cycle, enhance the dimension of DNA repair and increase the survival of cells. To support this hypothesis, we may mention the well-known phenomenon that consists in the fact that in the course of radiation therapy the radio resistance of tumour cells increases with the growth of their hypoxia degree.

These arguments are the basis for the mathematical model development of PLI phenomenon.

First of all, let us decide what indicator will reflect the discussed effect in the most correct way. Considering our assumption that the degree of the cell cycle slowdown determines the survival of irradiated cells, the duration of this cycle can be used as the specified indicator.

Let us suppose that the cell cycle duration is equal to T . Regardless of the hypoxia degree the cell needs a certain amount of oxygen for the cell division. It is clear that the oxygen consumption rate by the cell depends on the concentration of oxygen in the pericellular environment.

The experimentally obtained dependence of the oxygen consumption rate by the cell on the oxygen concentration in the environment is represented in the current work [2]. From this work and also as a result of our earlier studies [3–5] it follows that the diagram of this experimental dependence can be fairly correctly approximated by two linear sections (not taking the area of tissue necrosis into account), besides, one of these sections describes normoxic segment of the diagram of the discussed function, and the other – hypoxic segment.

The hypoxic segment, we are interested in, is mathematically described as follows:

$$v = \frac{v_m c}{c_r}, \quad (1)$$

where v – the mass rate of oxygen consumption by the cell, v_m – maximum value of the indicator v (in the case of normoxia), c – the oxygen concentration in the environment, c_r – the oxygen concentration value that borders between normoxia and hypoxia.

The complexity of further modelling is determined by the fact that the value v consists of two functionally different components. One of them ($V_{ж}$) is the oxygen consumption rate that is spent on the maintenance of cells. This value is constant. Other component

(V_{∂}) is the oxygen consumption rate spent on preparation and implementation of the cell division. Exactly this component is important for further modelling.

It is clear that

$$v_{\partial} = v - v_{ж} = \frac{v_m c}{c_r} - v_{ж} \quad (2)$$

Hence, at $c = \frac{c_r v_{ж}}{v_m}$ the value $v_{\partial} = 0$ and we may write down

$$v_{\partial} = \frac{v_m (c - c_{ж})}{c_r} \quad (3)$$

where $c_{ж}$ – the oxygen concentration necessary for the maintenance of cells.

Let us suppose that M is the oxygen mass that is required by the cell for preparation and implementation of division. It is clear that

$$M = T \cdot v_{\partial}$$

The sought-for value T may be calculated by the formula

$$T = \frac{M}{v_{\partial}} \quad (4)$$

and then using the above-mentioned approximation it may be transformed as follows:

$$T = \frac{M \cdot c_r}{c - c_{ж}} \quad (5)$$

The received formula for evaluation of the cell cycle duration of tumour cell as the index of severity of PLI effect shows the dependence of T on the oxygen concentration in the environment, the border value of oxygen concentration (between normoxia and hypoxemia), the oxygen concentration necessary for maintenance of cells, as well as the oxygen mass required by the cell for preparation and implementation of division.

Conclusions. Any factor, which slows down the passing of irradiated cells through the cell cycle stages, is associated with the increase in the dimension of repair of the radiation injuries to DNA in these cells, which in turn increases the probability of survival of cells. The increase in the survival of tumour cells, when they are irradiated under hypoxic conditions, is also caused by the phenomenon of potentially lethal injuries. The above-mentioned suggests that an optimal indicator of the severity of PLI effect is the cell cycle duration T . Thus, the problem of PLI modelling was reduced to the mathematical model development, which allows to estimate the value of the indicator T .

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Isaeva Kamala Kamaledin qizi,
Sumgait State University
E-mail: matlabm@yandex.ru

THE EFFECT OF SALINIZATION ON THE NUMBER AND SPECIES COMPOSITION OF BACTERIA IN NATURAL CONDITIONS

Abstract: One of the factors causing the decline in soil productivity is salinity or salinization. In this regard, the study of soils, especially in the Republic of Azerbaijan is not at the desired level. Although some researches (botanical, physiological, biophysiological and etc.) are conducted in soils exposed to saline, i. e., under salt stress, the research materials on the role of microorganisms, as well as, the change of their functions are not found.

Therefore, during the research first of all, there was observed the reduction in productivity of leguminous plants (bean, pea, lentil, soybean, clover and etc.) in soils exposed to salinization in Azerbaijan. Characterization of microbiota of leguminous plants growing in such soil, by number and species composition was considered appropriate during research.

Keywords: salinization, stammer, symbiotic system, root-tuber.

Selection of legumes for research is related to the fact that firstly, at least 200 species of these plants, which are included in one of the largest families (this family includes 13,000 species of plants) of the higher plants, are widely cultivated and about 90% have been found to have symbiotic relationships with bacteria.

Secondly, leguminous plants are used for various purposes, such as food, feed, and medical purposes. It is almost found in all countries involved in agriculture. Because of the important share of the agrarian sector in the economy of Azerbaijan, the leguminous plants such as beans, peas, clover and etc. are widely cultivated. It is possible to note only that the clover, which is used as a valuable animal feed in animal husbandry, and beans used for food purposes, are grown almost in every region of Azerbaijan.

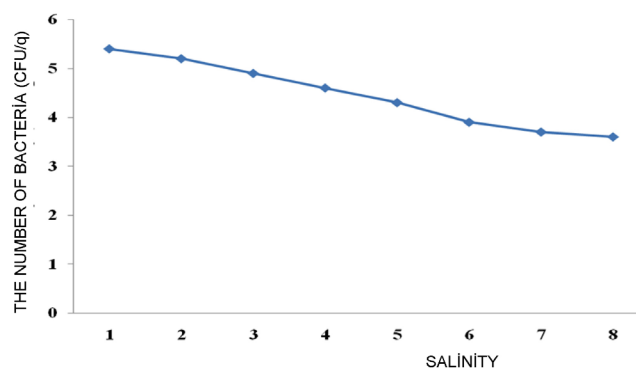
Finally, i. e., thirdly, leguminous plants, especially their species which are included in cereal legumes, are related to the fact that they are regulators of ecological balance in agroecosystems, as well as, they are an agricultural plant with high protein and able to grow in various agro-climate conditions.

Selection of soils exposed to salinization for study is related to the fact that currently, salinization is considered one of the most serious threats to the development of modern agriculture. Currently, more than 40% of soils, including those exposed to irrigation, are found to contain excessive mineral salts (Zahran H. H., 1999). On the other hand, in studies conducted in Azerbaijan there is no re-

search materials related to either microbiologic processes occurring in the soils exposed to salinization, or clarification of the nature of participants in these processes.

Actually, there is no accurate literary information on the exact area of the soils exposed to salinization in Azerbaijan, however probability of gradually increase in size of such areas against the background of global climate change is high and at least this should be one of the issues that should be taken into account.

Compounds that cause salinization, are Chlorides (NaCl , CaCl_2 , MgCl_2), sulfates (Na_2SO_4 , MgSO_4), nitrates (NaNO_3 , KNO_3) and borates. Salt stress is the existence of NaCl . If the soil content of NaCl is more than 0.5%, then these soils are saline soils. If NaCl in soil is more than 0.5%, such soils are considered the salty soils. In the world the 20% of arable lands are arid, and the 30% of them are under salt stress. The effects of high-density Na and high-density salt are similar. Ions such as Ca^{+2} , Mg^{+2} , SO^{-4} are also included in the total amount of salt. High-density Na not only directly damages the plants, but also destroys the structure of the soil and reduces the water's permeability. The salts content in the saline soil of the Absheron peninsula varies between 0.4–2.0%. During the study of the composition of microbiota of soil corresponding to the characteristic, it was clear that salinization affects the number of microorganisms. The amount of salts and the number of microorganisms are inversely dependent in this case (Pic. 1).



Picture 1. Change in the number of bacteria spread in soils with different salinity

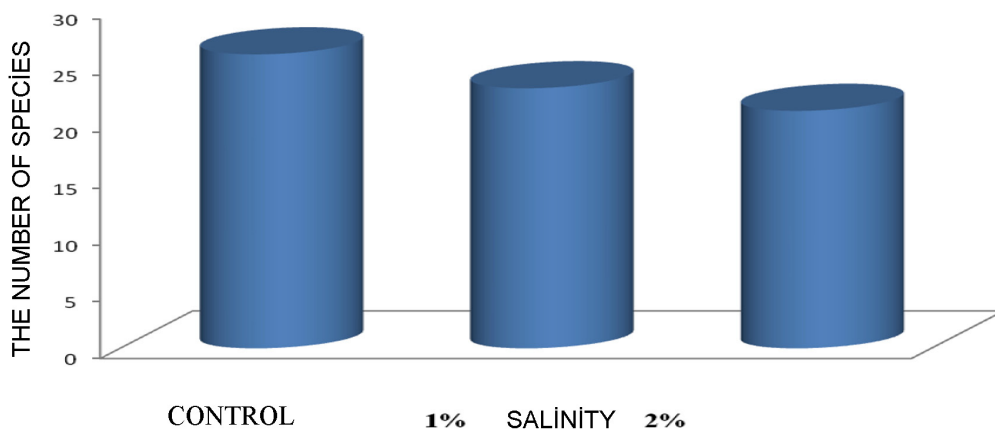
As can be seen, the increase in salinity from 0.25% to 2% is observed with decrease in the number of bacteria by 1.5 times. Comparing it to the control areas, that is, not exposed to saline, makes it possible to note that the difference is somewhat high. Thus, the number of bacterial biota in pure soils is 1.2 times higher than that of 0.25% salinity.

As for the species composition of bacteria that spread in the saline soil, it was clear that in this case, salinization can be characterized as the factor that causes the reduction of species diversity.

So, the number of types of bacteria registered in control areas is 26 (*Bacterium cereus*, *Bac.megaterium*, *Bac.nitrificans*, *Bradyrhizobium japonicum*, *Pseudomonas fluorescens*, *Rhizobium galegae*, *Rh.gallicum*, *Rh.japonicum*, *Rh.leguminosarum*, *Rh.loessense*, *Rh.lupini*, *Rh.lusitanum*, *Rh.meliloti*, *Rh.mongolense*, *Rh.phaseoli*, *Rh.trifoli*, *Sinorhizobium fredii*, *S.medicae*, *S.meliloti*), but this indicator can be significantly reduced in the areas exposed to saline.

For instance, the comparison of bacterial biota of soils with 1% or 2% of salinity shows it clearly (Pic. 2).

As it can be seen, the number of bacterial species registered in controlled soils is respectively higher by 11.5% (23 species) and 19.2% (21 species), compared to the soil by 1% and 2% of salinity. It is noteworthy that there are some differences in the bacterial participation patterns involved in the formation of bacterial biota of control and saline soils, in other words, some bacteria in control soil are not found in the soil exposed to salinization, or vice versa, some of the bacteria in the saline soil are not specific to the bacterial biota of pure soils. For instance, halophilic bacteria such as *Halobacterium salinarum* (= *Halobacterium halobium*), *Geobacillus stearothermophilus*, *Lysinibacillus xylanilyticus*, *Pseudomonas halophila* and *Salicola marasensis* are widespread in soils exposed to the high salinization, these bacteria, as well as, bacteria as *Sinorhizobium meliloti* are not encountered in pure soils.



Picture 2. Changing the number of bacterial species depending on salinity

It should be noted that bacteria such as *G.stearothermophilus*, *L.xylanilyticus*, *Ps.halophila* and so on belong to real halophyls (Borisov V.D., Kalyonov S.V., 2015), and they are more commonly spread in high-salinity biotopes.

When the species of the leguminous plants growing in saline soil, as well as, the type of bacteria that are involved in the microbiota formation of those soils, are compared to those of pure soils, the bacteria as *Rhizobium leguminosarum* and *Bradyrhizobium japonicum* are less commonly found in biotopes (0.25–0.75% salinity) exposed

to saline (frequency of encounter is 3,4%), or not found at all (more than 1.0% salinity). As is known, there is a symbiotic relationship between these bacteria and leguminous plants. The mentioned bacteria actively participate in land fertilization. So, the salinization can also be regarded as a condition that causes the breach of relationships between plant and microorganisms. *Sinorhizobium fredii*, detached from the salt affected soil, and its intensive growth ability have been identified during the research in extreme conditions, i.e. fertile conditions containing 0.4 M NaCl.

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*Raimova Guli Matmuradovna,
Master of biology, scientific researcher
A. S. Sadikov Institute of Bioorganic Chemistry,
Academy of Sciences of the Republic of Uzbekistan, Tashkent city
E-mail: Guli-raimova@mail.ru*

*Khoshimov Nozim Numonjonovich,
Master of biology, scientific researcher
A. S. Sadikov Institute of Bioorganic Chemistry,
Academy of Sciences of the Republic of Uzbekistan, Tashkent city
E-mail: Nozimka@inbox.ru*

*Nasirov Kabil Erkinovich,
Doctor biological sciences, leading scientific researcher
A. S. Sadikov Institute of Bioorganic Chemistry,
Academy of Sciences of the Republic of Uzbekistan, Tashkent city
E-mail: K-nasirov@front.ru*

*Ziyavitdinov J.F.,
Candidate of Chemical Sciences
A. S. Sadikov Institute of Bioorganic Chemistry,
Academy of Sciences of the Republic of Uzbekistan, Tashkent city*

ISOLATION AND PHYSICAL AND CHEMICAL CHARACTERISTICS OF ANTICOAGULANTS FROM THE FIRE-BLIND CLEVER TRIFOLIEAE

Abstract: The obtained results indicate that in the concentrate isolated from the moldy clover, the anticoagulant components are contained as indirect so direct action that mutually reinforces its anticoagulant to the hemostasis system. These properties of the moldy clover concentrate are of some interest, which in the long run will allow using it as the basis of the rodenticide preparation against the rodents' fights.

Keywords: platelet, CMC, coumarin, HPLC, dicumarol.

Introduction. Anticoagulants of indirect action are coumarins (dicumarin, warfarin, syncumar, neodicumarin, or others), which interfere with the formation of prothrombin of the liver and involved in blood clotting [1]. However, in itself, coumarin does not affect blood coagulation, but can be initially metabolized by various fungi in combination such as 4-hydroxycoumarin, and then (in the presence of natural formaldehyde) into dicumarol, which has anticoagulant properties. The fungal origin of dicumarol explains the presence of this anticoagulant only in a damaged clover silo. Thus, dicoumarol is a product of fermentation and mycotoxin [2].

The mechanism of indirect action of these anticoagulants is concluded in stopping normal formation of coagulation factors – coagulation, which is based on a complex system of various metabolic processes.

At present, dicumaroles have found a wide range of applications not only in medicine, but also the quality of rodenticides for the destruction of rodents. The purpose of this work is to isolate from the clover *Trifolieae* dicoumarins and the development of bait formulations of complex compounds based on anticoagulants and synergists to combat the synanthropic rodents and pests of agricultural crops.

Materials and methods

Spectrophotometric analysis was conducted in the range of characteristic absorption maxima (220–350 nm) for the quantitative determination of the content of coumarins [3; 4].

Fluorescence analysis was carried out on a USB 2000 fluorimeter. In size the identification of coumarins at a maximum excitation (380 nm) and fluorescence (480 nm) was carried out using the Stokes shift and the fluorescence maximum. With the help of fluorescence spectra, a linear dependence of its intensity on the concentration was obtained and established [5; 6].

HPLC was run on an Agilent Technologies 1200 series chromatograph with a DAD detector and an automatic sampler. A chromatographic column of 4.6 × 150 mm Eclipse XDBC-18, 5 μm was used. Mobile phase: A – 0.1% phosphoric acid, B – acetonitrile. Gradient 5% – 3 min, 80% – 18–23 min, 5% – 25 min at flow rate – 1 ml/min. Absorption at 278 nm. The duration of the analysis is 25 minutes. As a standard sample, dicoumarol was used with a concentration of 1 mg/ml, previously isolated and dried from the dosage form of the dicumarin preparation (Sigma Aldrich. M 1390). The concentration of the test sample is 5 mg/ml [7].

Toxicological experiments were performed on non-native white male rats weighing 200–250 g. All experiments were carried out in accordance with the requirements of the World Society for the Protection of Animals and the European Convention for the Protection of Experimental Animals [12].

Thrombin and prothrombin time, activated plasma recalcification time (APRT) and activated partial thromboplastin time (APTT) – the test was performed on a coagulometer (CYANCoag, Belgium).

The results were statistically processed for Origin 6.1 (Origin Lab Corporation, USA).

Results and discussion

In preliminary studies it was found that when feeding laboratory rats and mice with bait containing an alcohol extract of moldy clover *Trifolieae*, during 2–3 days causes severe bleeding in animals, which served as the basis for obtaining a concentrate from moldy clover (CMC) and studying its anticoagulant and Toxicological characteristics, as well as the development of technology of rodenticidal preparations against rodent control.

The raw clover was moldy in a closed bag in a dark place for 10 days. After the formation of the mold, the moldy clover was crushed to a particle size of not more than 2 mm and subjected to extraction at a raw material/extractant ratio of 1: 100. The most complete extraction of coumarins (in free form and in the form of glycosides) was achieved by using 45–96% ethanol both in the cold and under heating. At the same time, the yield of extractive substances was 32–36% of the initial mass of moldy clover.

To purify the amount of coumarins from the concomitant substances, the thick extract obtained after distillation of the extractant was treated with chloroform and a mixture of coumarins was recovered. After concentrating the extract, a mixture of coumarins in a crystalline state was obtained.

The quantitative and qualitative composition of the coumarin mixture was studied using spectrophotometry, fluorescence analysis and high-performance liquid chromatography, as described in [8].

The spectrophotometric method is based on the ability of coumarins to absorb in the UV region of the spectrum and does not require a preliminary separation. We have found that in the UV spectra of the coumarin mixture, two characteristic maxima for dicoumarins (control) of high intensity bands in the 220–380 nm range are observed, the first of which is of an oscillatory nature, and the second corresponds to the *pt*-conjugation of the benzene ring (Fig. 1.)

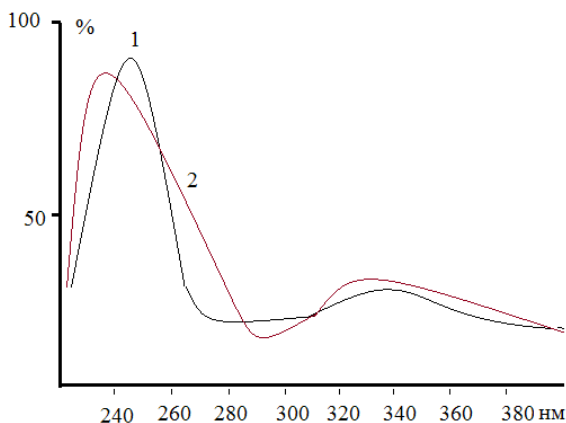


Figure 1. UV spectrum of coumarins. 1 – Spectrum of dicoumarol (control); 2 – The spectrum of a mixture of coumarins

Many coumarins exhibit characteristic (yellow, green, blue or violet) fluorescence under UV excitation in neutral alcohol solutions and in alkali solutions [9].

Fluorescence is enhanced in an alkaline medium due to the formation of a quinoid structure. By the size of the Stokes shift and the maximum of fluorescence, it is proposed to carry out identification of phytochemical preparations [10]. For coumarins and dicoumarins,

fluorescence spectra were obtained and a linear dependence of its intensity on concentration was established, which made it possible to apply fluorescence analysis for the quantitative determination of coumarins [5; 6]. Fluorescent analysis of the extract (a mixture of coumarins) showed that with a saturated solution of bromine in an alkaline medium it was possible to identify them on the basis of equal excitation maxima (380 nm) and emission (480 nm) [11].

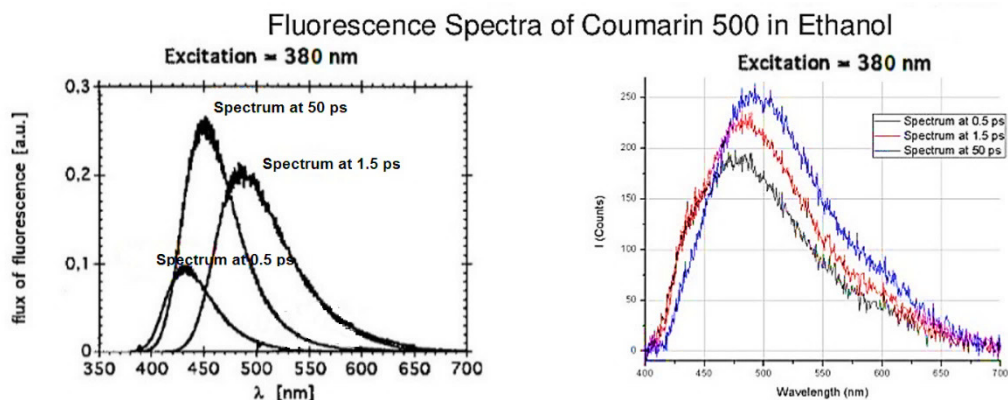


Figure 2. Indications of intensity from the concentration of the fluorescence spectrum

The obtained fluorescence spectra as a function of the concentration of the extract showed a linear dependence of their intensity on the concentration, which made it possible to estimate the quantitative content of coumarins in this extract (Fig. 2).

At present, the method of HPLC is widely used in the analysis of coumarin derivatives. The method in the isocratic mode of separation allows simultaneous qualitative and quantitative analysis of coumarins without preliminary purification of the extract.

In Analysis HPLC of a thick extract of moldy clover revealed a component with retention time identical with standard dicoumarol of 15.22 minutes. (Fig. 3). The amount of dicoumarol in the thick extract was calculated by comparing the peak areas in the chromatogram of the standard sample and in the test sample. As a result of the studies, it was found that in a dense extract the amount of dicoumarol was 0.64%, and in the crystalline fraction the sum of coumarins obtained with the help of chloroform was 30.5%.

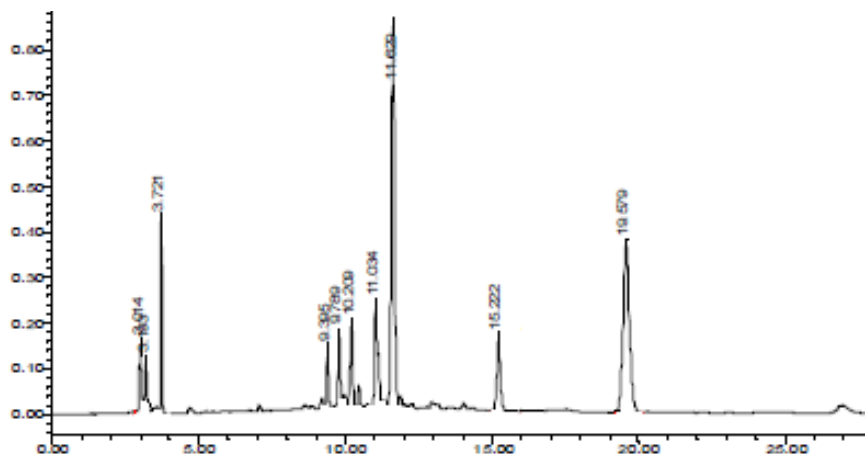


Figure 3. Chromatogram of a thick extract of moldy clover

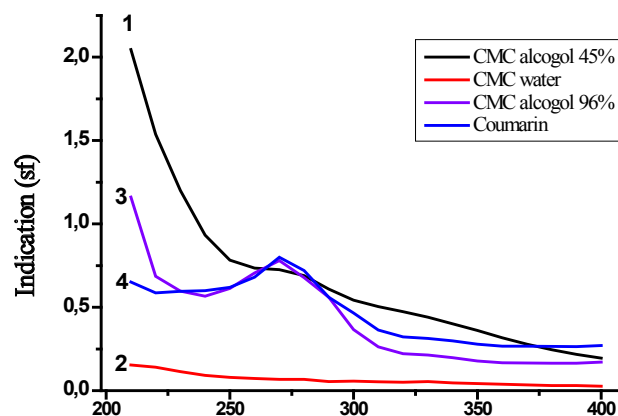


Figure 4. Spectrophotometric readings of CMC and Coumarin. Electronic absorption spectrum of coumarin and CMC in 45–96% alcohol extraction

This material was enough to test anticoagulant actions and compare anticoagulant indirect effects with dicoumarol, which caused bleeding.

A study of the toxicological properties of the extract extracted from clover *in vivo*, both with single and multiple oral administration to mice, revealed that depending on the dose of the extract (50–500 μ l/g) in bait, the symptoms of intoxication were mani-

festated for several days. Among the common manifestations of intoxication, a significant place was occupied by symptoms, massive damage to the blood supply of organs and tissues, and thrombohemorrhagic syndromes (hemorrhages of the mucous membranes of the skin, bleeding), like dicoumarol poisoning, an anticoagulant of indirect action.

Table 1. – Toxicological features of CMC with a single consumption of bait by rats

Dose of the CMC ml/gr	Number of rats	Number of surviving rats	Deaths of rats	Over time
50	6	6	1	5 days
100	6	2	4	3 days
250	6	1	5	3 days
500	6	0	6	3 days

In *in vitro* studies at a concentration of 50 mg/ml, CMC also prolonged the recalcification time, thrombin, prothrombin and APTT. In these cases, lengthening the clotting time of blood plasma may be due to inhibition of one or more clotting factors. Violations of one or more of these processes can lead to disturbances in the functional activity of hemostasis and the development of hemorrhagic syndrome.

The obtained data indicate that, in the concentrate isolated from the moldy clover, there are anticoagulant components as indirect, so direct actions that mutually reinforce its anticoagulant properties.

These properties of these concentrates are of some interest and require further detailed study of the physicochemical characteristics and mechanisms of their action, which will eventually allow them to be used as a rodenticide against rodent control.

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*Yakubov Mirakbar Daniyarovich,
Candidate of Biological Sciences, Post doctoral student
National University of Uzbekistan named after Mirzo Ulugbek, Tashkent,
E-mail: mirakbardan@yahoo.com*

APPLICATION OF GENETIC TESTING METHODS IN SPORT

Abstract: a study to determine the frequency of occurrence of genotype polymorphism C34T AMPD1 gene to assess physical performance Uzbek athletes engaged with football. AMPD1 gene polymorphism, which is involved in the energy supply of muscle activity and metabolism was analyzed among Uzbek athletes and in the control group. Based on the comparison of the distribution of genotypes and alleles rates of AMPD1 gene, the CC genotype of AMPD1 gene association with a predisposition to the high physical performance and endurance was found.

Keywords: gene polymorphism, DNA, genetic predisposition to sport.

Introduction

The use of molecular-genetic markers in sports science significantly increased the predictive ability of sports orientation and selection which led to the formation of a new scientific discipline – molecular genetics of sports. The central idea of which is that the individual differences in the degree of development of certain physical and mental qualities largely depend on DNA polymorphisms.

Genetic testing in sports provides assistance to teachers, coaches and sports doctors in determining the predisposition of children and adolescents to a certain type of motor activity, in rising of athletic performance through the optimization and adjustment of the training process, and in the prevention of various diseases associated with the sportsmen occupation.

In the future, every person will be able to get the individual genetic map – data of variations (polymorphisms) in certain parts of the genome, which are the markers of susceptibility to locomotor activity and health risk factors. Such information has great practical importance, because it allows a person to know the potential strengths and weaknesses of his/her body and helps in the selection of optimal sports specialization, as well as in the optimization of the training process, nutrition, and will significantly limit the impact of hazards on health.

Muscle adenosine monophosphate deaminase (AMPD-M) is an important regulator of muscle energy metabolism during exercise. AMPD-M is one of the integral enzymes of purine nucleotides cycle which catalyzing the deamination reaction and plays an important role in the metabolism of adenine nucleotides, and determines the energy potential of the cell. In resting muscle, more than 90% of AMPD-M in sarcoplasm is inactive and unbound with myosin. During vigorous muscle contraction 50–60% of AMPD-M binds to myofibrils. At a constant level of general activity in the period of rest, the amount of bound enzyme returns to its initial level [1].

Specific for skeletal muscle AMPD-M is encoded by AMPD1 gene, localized in the short arm of the first chromosome [1, P. 13.1]. During the muscle biopsy it was found that about 2% of the samples had decreased activity of AMPD-M [2]. Individuals with reduced activity of AMPD-M may experience weakness, fatigue, even after the exercise with average intensity [3]. Deficiency of AMPD-M in human occurs generally because of the single nucleotide substitution of cytosine for thymine at 34th position in the second exon of AMPD1 gene, resulting in the glutamine CAA

codon is transformed into a stop codon TAA (C/T gene polymorphism). The frequency of mutant T allele is 12% among people in Europe, 19% for Afro-Americans, and 0% in the Japanese population. Mutant allele homozygotes have very low concentration of AMPD-M in skeletal muscle so during short but highly intensive exercise does not use the entire pool of adenine nucleotides, therefore there is no accumulation of inosine monophosphate (IMP) and ammonia.

Homozygotes with the normal allele, on the contrary, use almost all ATP and concomitantly accumulate more IMP and NH₃. These characteristics for heterozygotes have an average value [3; 4].

Increased formation of ADP is a consequence of reduced concentration of AMPD-M, which reduces the maximum speed of contraction and increases the time of skeletal muscles relaxation. It was found that after the high intensity training individuals who are homozygous for the mutant allele (genotype TT) or heterozygous (genotype CT) have worse aerobic indicators than those lacking the mutant allele in the genotype (CC genotype) [5]. When performing anaerobic Wingate test, carriers of the CT and TT genotypes showed the maximum capacity of 10% less than carriers of the CC genotype [2]. The first research regarding the distribution of AMPD1 genotypes among athletes, showed a significant decrease in the frequency of mutated T allele in elite cyclists and long-distance runners as compared with the control group [6].

A genetic background to the diversity seen in the clinical progression of heart disease is well documented. Genetic variants that lead to halted or delayed disease progression are particularly interesting as they may provide a basis for new therapies. Genetic diversity in pathways involving nucleotide metabolism are particularly important due to the latter's direct links to myocardial function and metabolic regulation [7]. Several polymorphisms of the AMP deaminase 1 (AMPD1) gene have been described [8]. The C34T (Glu12Stop) mutation in exon 2 is by far the most common in the general population with an allele frequency of 10–14% [9]. Lohet et al. [10] were the first to describe a benefit of the C34T mutation in patients with heart disease. This study conducted in a group of 132 patients with dilated cardiomyopathy demonstrated that the probability of surviving without transplantation for more than 5 years is 8.6 times greater in patients carrying the C34T allele. Anderson et al. [11] confirmed a protective effect in ischemic heart disease demonstrating prolonged survival associated with the C34T mutation in a prospective study in 450 patients. Another study by Gastmann et al. [2] conducted in

a group of 90 patients with congestive heart failure demonstrated better prognosis in patients possessing the C34T *AMPD1* mutation. Analysis of a consecutive group of 390 patients with left ventricular dysfunction revealed better survival in C34T allele carrier patients within a subgroup with ischemic cardiac dysfunction [13]. Other independent studies demonstrated a beneficial effect of the C34T mutation on metabolic aspects related to the cardiovascular system such as a lower level of an inhibitor of plasminogen activator and soluble von Willebrand factor in patients with coronary heart disease [14]. In contrast, three studies have indicated a lack or even a deleterious effect of the C34T *AMPD1* mutation in patients with heart disease. A large population study conducted in 935 post myocardial infarction and 433 heart failure patients with long term follow-up indicated increased mortality associated with the C34T mutation within patients with a history of myocardial infarction [15]. A prospective study in 686 patients with stable congestive heart failure did not demonstrate any impact of the C34T polymorphism on tested clinical, biochemical, echocardiographic, radionuclide or exercise parameters [16]. Analysis of 161 patients undergoing coronary revascularization for clinical parameters including heart failure and cardiac death revealed lack of any impact of the C34T mutation [17]. In case of C34T polymorphism, assessment of impact on cardiovascular system could be complicated because this mutation was found to exert deleterious effects on muscle performance [18].

In this regard, the purpose of our study was to determine the rate of genotypes with C34T polymorphism of *AMPD1* gene in athletes involved in football.

Materials and methods

Blood samples for molecular genetic analysis of *AMPD1* gene polymorphism were taken from 201 Uzbek athletes involved in football and 101 individuals of the control group. The venous blood from the cubital vein in the amount of 1 ml was used as the material for DNA extraction. For the collection, storage and transportation of blood samples, vacutainers or disposable plastic tubes with 0.5 ml of anticoagulant (conservative) were used. For further processing blood samples were stored at the temperature of not more than +4 °C.

For extraction of DNA from whole blood, *PureLink Genomic DNA Mini Kit 250* was used ("Invitrogen, Carlsbad, CA, USA").

AMPD1 genotyping was performed using specific oligonucleotide primers with fluorescent probes, as well as RT-PCR Kit (manufactured by *Applied Biosystems Corporation*). Ready-made amplification reagents, containing liquid inhibited "hot start" Taq DNA polymerase, deoxynucleoside triphosphates (dNTP) and magnesium chloride with final concentrations, 200 μ M and 2,5 mM respectively, and optimized buffering system for Real Time PCR were used. Into the sterile tubes 0.5–1.0 μ l Primer Mix with final concentration 10 pmol/ μ l, 10 μ l 2.5 \times Reaction Mix, 7 μ l dH₂O, and 1–2 μ l of target DNA were added. Real Time PCR was performed according to standard protocol. For Real Time PCR *GeneAmp[®] PCR-ABI 7500 Fast Real-Time PCR System* with 96-well block was used. Real Time Amplification program included: pre-denaturation at 95 °C – 100 seconds; 40–45 repetitions 56–60 °C – 40–50 seconds; 95 °C – 15 seconds. FAM and ROX detectors were entered into the program.

Results and discussion

When analyzing the distribution of genotypes and alleles rates for C34T polymorphism of *AMPD1* gene in the control group and among athletes, the following results were obtained: 81% of examined athletes belonged to CC genotype. Distribution of these genotypes rates corresponded to the distribution of Hardy-Weinberg equilibrium ($\chi^2 = 5.16$; $df = 1$; $p = 0.02$). Distribution of genotypes observed in the control group – CC (75%), CT (23%) and TT (2%) – also obeyed Hardy-Weinberg equilibrium.

Conclusion

The information-analytical search of gene markers, whose polymorphisms are associated with specific cellular metabolism of athletes and might be used as predictors of competitive success, was performed. *AMPD1* gene polymorphism, which is involved in the energy supply of muscle activity and metabolism, was analyzed among Uzbek athletes and in the control group. Based on the comparison of the distribution of genotypes and alleles rates of *AMPD1* gene, the CC genotype of *AMPD1* gene association with a predisposition to the high physical performance and endurance was found. The correlation analysis of the gene polymorphism with indicators of physical performance in athletes showed its association with CC genotype of *AMPD1* gene.

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Section 2. Machinery construction

Kaniev Djamshid,
Head of Technopark
Turin Polytechnic University in Tashkent,
E-mail: j.kaniev@polito.uz

DETERMINATION OF THE SHOCK PULSE OF THE FLUID IN THE PRESSURE CHANNEL OF THE CONTROL VALVE

Abstract: In the article, the following issues will be discussed: increased temperature in impurity of bursting force pressure pipe hydraulic valve and mathematical forms for determination hydraulic stroke.

Keywords: pressure, control valve, hydraulic shock, hydraulic fluid flow, control valve, hydraulic impact.

The basic scheme of the physical process of the phenomenon of hydraulic impact according to the theory of N.E. Zhukovsky, is based on an instantaneous impact of the liquid on the membrane. In this case, the fluid is considered not viscous, but compressible and obeying Hooke's law, the pipeline is rigid, and the velocity of the pressure head is equal $v_H = \sqrt{2gH}$.

To obtain this velocity in the injection channel, it is necessary to create a pressure drop Δp , which is determined in the form of a pressure difference [7]:

$$\Delta p = p_H - p_a = \rho \frac{v_H^2}{2} d$$

Where v_{cp} – the average flow velocity, α is the coefficient of kinetic energy, or the Coriolis coefficient, and is equal to the integral ratio:

$$\alpha = \frac{1}{\omega_0} \int_{(\omega_0)} \left(\frac{u}{v_{cp}} \right)^3 d\omega$$

Thus, we have the following equation for determining the pressure drop:

$$\Delta p = \alpha \rho \frac{v_H^2}{2} = \alpha \rho \frac{2gH}{2} = \alpha \gamma H$$

Where γ – is the specific gravity of the liquid. From equation (1), for $\alpha \cong 1,04$ we obtain the following table for the relationship between the pressure drop and the head of the hydraulic fluid flow;

In the injection channel, due to the impact of the flow in the injection channel, flow through the throttle opening, a bypass valve with a diameter – d_0 .

Due to the sudden impact of two flows in the injection channel, a total hydraulic impact occurs in the bypass valve, which is perpendicular to the movement of the liquid. The impact arises from the collision of the flows in the injection channel, therefore, determine the dependence of the pressure drop on the momentum of the flow I_0^* formed in the injection channel with a diameter of $-D_0$. It is of great importance. For this purpose, we define the shock pulse in the flow I_0 , which is [2]:

$$I_0 = P_0 + \gamma H$$

To determine the momentum of the flow, we use the Navier-Stokes equation for an incompressible viscous fluid, i. e. for hydraulic fluids. Then the equation of the number of motions of a viscous liquid has the form:

$$\rho u \frac{\partial u}{\partial x} + \rho v_{cp} \frac{\partial u}{\partial r} = - \frac{\partial p}{\partial x} + \nu_{cp} \nabla^2 u$$

The equation of continuity of this liquid can be written in the form:

$$\frac{\partial(u\rho r)}{\partial x} + \frac{\partial(v_{cp}\rho r)}{\partial r} = 0$$

Suppose that the pressure channel is round, axisymmetric. Then we have the following initial and boundary conditions:

$$u(R_0) = 0, \left. \frac{\partial u}{\partial r} \right|_{r=0} = 0, v_{cp}(0) = 0, v_{cp}(R_0) = 0$$

The equation of momentum with allowance for the continuity equation (3) can be reduced to the form [3]:

$$\frac{\partial}{\partial x}(\rho u^2) + \frac{\partial(\rho u v_{cp})}{\partial r} = - \frac{\partial p}{\partial x} + \nu_{cp} \nabla^2 u$$

To obtain an equation for the circular tube averaged over the thickness, we multiply the equation by $r dr d\theta$ and integrate with respect to r and θ , and the inner integral of u before and then we have the following integral equation for the viscous fluid equation:

$$\begin{aligned} & \int_0^{2\pi} d\theta \int_0^{R_0} r dr \left[\frac{\partial}{\partial x}(\rho u^2) + \frac{\partial(\rho u v_{cp})}{\partial r} \right] = \\ & = - \int_0^{2\pi} d\theta \int_0^{R_0} \frac{\partial p}{\partial x} r dr + \gamma \int_0^{2\pi} d\theta \int_0^{R_0} r \nabla^2 u dr \end{aligned}$$

From this, we obtain equality for the momentum of the flow:

$$2\pi \frac{d}{dx} \int_0^{R_0} (\rho u^2 + p) r dr = \gamma \frac{1}{r} \left. \frac{\partial u}{\partial r} \right|_0^{R_0}$$

Thus, we establish that the momentum of the flow is unchanged:

$$2\pi \left[\int_0^{R_0} \rho u^2 r dr + p \frac{R_0^2}{2} \right] = const$$

Suppose that in a shock pipeline the loss of pressure is invisible, ie:

$$|P_{\text{bnc}} - P_{\text{ex}}| \ll 1$$

As is known, the first integral of the expression determines the momentum of the stream, then we will have an expression for the momentum of the stream in the following form.

$$I_0 = 2\pi \int_0^{R_0} \rho u^2 r dr = const.$$

According to Poiseuille's formula we have that the fluid flow is determined through the pressure drop in the form:

$$Q = 2\pi \frac{\Delta p R_0^4}{16\mu L}; \quad R_0 = \frac{D_0}{2} \quad (6)$$

Using the formula, we determine the momentum of the flow in the injection channel:

$$\begin{aligned} I_0 &= \int_0^{2\pi} d\theta \int_0^{R_0} r u^2 \rho dr = 2\pi \int_0^{R_0} \rho \left(\frac{\Delta p}{4\mu L} \right)^2 [R_0^4 - r^2]^2 r dr = \\ &= 2\pi \rho \left(\frac{\Delta p}{4\mu L} \right)^2 \int_0^{R_0} [R_0^4 - 2R_0^2 r^2 + r^4] r dr = \\ &= 2\pi \rho \left(\frac{\Delta p}{4\mu L} \right)^2 \int_0^{R_0} [R_0^4 r - 2R_0^2 r^3 + r^5] dr = \end{aligned}$$

$$= 2\pi \rho \left(\frac{\Delta p}{4\mu L} \right)^2 \left[\frac{R_0^6}{2} - 2 \frac{R_0^6}{4} + \frac{R_0^6}{6} \right] =$$

$$= 2\pi \rho \left(\frac{\Delta p}{4\mu L} \right)^2 \frac{R_0^6}{6} = \rho \left(\frac{\Delta p R_0^4}{16\mu L} 2\pi \right)^2 \frac{16}{6} \frac{1}{2\pi} \frac{1}{R_0^2}.$$

Thus, for a stream pulse, we have the expression:

$$I_0 = \rho \frac{16}{12\pi} \frac{1}{R_0^2} Q$$

Where Q is the flow rate, i.e. the volume of the working fluid flowing through the cross section of the discharge channel, which is determined from the continuity equation, assuming that the cross section of the injection channel is a circle of radius R_0 , which is determined by the continuity formula:

$$Q = \omega v_{cp} = \pi R_0^2 v_{cp}$$

Here v_{cp} – is the average flow rate.

Then for the pulse, we have the following expression:

$$I_0 = \frac{16}{12\pi} \frac{1}{R_0^2} \rho [\pi R_0^2 v_{cp}]^2 = \frac{16}{12\pi} \rho \pi^2 R_0^2 v_{cp}^2$$

Or

$$I_0 = \frac{4\pi}{3} \rho R_0^2 v_{cp}^2$$

Thus, the determination of the shock pulse of the liquid in the delivery channel of the control valve depends mainly on the diameter of the discharge channel and the speed of the working fluid.

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Section 3. Medical science

*Alimukhamedov Dilshod Shavkatovich,
Senior researcher fellow, Department of Hygiene of Nutrition
and Hygiene of Children and Adolescents
Tashkent Medical Academy,
E-mail: dilshod2308@mail.ru*

STUDY OF EFFICACY OF SAUSAGE PRODUCTS WITH ENRICHMENT OF SOY PROTEIN ISOLATE IN PATIENTS

Abstract: Inclusion of SPI and sausage products with enrichment of SBI in the diets of patients with peptic ulcer of duodenal ulcer was accompanied by normalization of indicators of the functional state of the gastro-duodenal system. The production of hydrochloric acid and pepsin decreased, the activity of gastro-duodenal neutralization of the acid increased, the pathological peristaltic activity of the stomach was eliminated.

Keywords: efficacy of sausages, sausage products, duodenal ulcer patients.

Food rations for patients with peptic ulcer are elaborated using the products with minimal secretogenic effect. Even if some diets are not carried out the principle of gastrointestinal rest with great severity, the products that exert strong secretogenic effect and contain coarse cellular membranes like fruit and berries with skin, bread made from whole grain flour, etc. are still excluded. [1, P. 14–20; 2, P. 3–4]. According to literature (R. Dol, 1956; C. Fllod, 1948; S.J. Lawrece, 1952;) [3; 4, P. 41–43], the earlier studies showed that comparison of low-fiber diet used for the treatment and prevention of peptic ulcer, with normal food regime did not reveal its considerable advantages. Some authors consider that refining foods rich in carbohydrates is the main reason for the increase in the incidence of duodenal ulcer in Western countries in the twentieth century (T. Clave, 1962; F. Towey, 1974) found that wheat and rice bran and some unrefined cereals have a greater neutralizing ability of increased acidity than refined carbohydrate products such as sweet rice and white flour. However, bran and unrefined cereals do not affect the activity of pepsin in vitro. According to 6-mo observation by A. Rydning and A. Brestad (1986), in 73 patients with peptic ulcer, the incidence of recurrences in low- fiber diet was significantly higher than high- fiber diet (80 and 45%, respectively), which fully agrees with S. Malchotra data (1988) [5, P. 106–107; 6].

Aim. To study the efficacy of soy protein isolate (SPI) and sausages and sausage products with enrichment of SPI in patients suffering from gastrointestinal diseases.

Material and methods. Clinical studies were conducted in the Department of General Therapy, Nursing and Gastroenterology of the 1st Clinic of Tashkent Medical Academy. The study included the patients of both sex aged 21 to 55 years, suffering from gastro-duodenal pathology (peptic ulcer of duodenal erosive form at the acute stage, erosive gastritis, and erosive-ulcerative esophagitis). The first group (the control group) received standard therapy. The second group (the main group) received the preparations for the

diagnosed disease, SPI and compatible sausages and sausage products enriched with SPI. There prescribed the following scheme for SPI and sausages and sausage products enriched with SPI intake: in duodenal ulcer during the exacerbation phase – SPI 1 teaspoon \times 3 times per day before meals, 100 g sausages for breakfast and 100 g sausage products for afternoon snack within 28 days; in gastric ulcer and erosive ulcerative esophagitis is during the active phase – SPI 1teaspoon \times 3 times per day before meals, sausages 100 g for breakfast, sausages products 100 g for afternoon snack within 28 days; at chronic viral hepatitis, which was transferred to cirrhosis SPI 1 teaspoon 3 times per day before meals, sausages 100 g for breakfast and sausage products 100 g for afternoon snack within 28 days. All patients underwent clinical examination, including the collection of complaints, anamnesis of the disease and patient's examination. Estimate of efficiency of SPI under investigation as well as sausages and sausage products enriched with SPI was assessed on the basis of criteria in points (1p; 2p; 3p; 4p). The registration of the efficiency rates was carried out immediately after examination of investigated SPI and the results of obtained laboratory-instrumental studies. Drug tolerance was estimated on the basis of subjective symptoms and sensations reported by the patient and objective data obtained by the investigator during the treatment, as well as the incidence and nature of side reactions. Patients' drug tolerance was also scored in points (1p; 2p; 3p; 4p). The obtained results are processed by the method of variation statistics, with the calculation of the mean error (m), the confidence coefficient (t) and the error probability (P). The mathematical processing was carried out on PC in the program Windows 2000, Microsoft Excel version 7.0. (7).

Results and discussions. Clinical examination of the main group patients showed that on admission to the clinic all patients complained of heartburn, nausea, pain in the pyloroduodenal zone. SPI and new sausage products with SPI enrichment were tolerated

well by patients within 28 days. The mean score for oil, as indicated in the material and methods of research, was 3.86 ± 0.6 points, the tolerance was very good, no side effects were noted. New sausages with soybean enrichment are effective; this is manifested by considerable reduction in the majority of clinical manifestations of the disease by the end of treatment course, and significant improvement in data from instrumental methods of examination. The mean score of sausages with soya enrichment was 3.9 ± 0.7 , this indicator is rather high. New sausage products with soybean enrichment were

well tolerated, there were no side effects for the follow up period, and the clinical and instrumental rates were normalized. Dynamics of EGDFS data in the main group of patients showed a decrease of mucus edema from 2.85 to 1.25 points, in contrast the control group to 1.3 points; mucosal hyperemia from 2.9 to 1.15 points and to 1.2 points in the control group; esophageal erosion by 0.6 points, whereas for the control group by 0.8 points; erosion of the stomach to 0.6 and 0.8 points, erosion or duodenal ulcer 0.8 and 1.0 points; gastro esophageal reflux 0.5 and 0.2 points ($P < 0.05$) (table 1).

Table 1. – Dynamics of EGDFS data in the examined patients

Symptoms (in points)	The main group (N = 20)		The control group (N = 20)	
	Before treatment	After treatment	Before treatment	After treatment
mucus edema	2.85 ± 0.3	1.25 ± 0.4	2.7 ± 0.3	1.3 ± 0.14
mucosal hyperemia	2.9 ± 0.4	1.15 ± 0.02	2.7 ± 0.3	1.2 ± 0.03
esophageal erosion	1.2 ± 0.6	0.6 ± 0.004	1.1 ± 0.5	0.8 ± 0.01
erosion of the stomach	1.0 ± 0.6	0.6 ± 0.003	1.1 ± 0.7	0.8 ± 0.006
erosion or duodenal ulcer	2.2 ± 0.6	0.8 ± 0.004	2.4 ± 0.8	1.0 ± 0.008
gastro esophageal reflux	1.5 ± 0.6	0.5 ± 0.02	1.3 ± 0.6	0.2 ± 0.33

Dynamics of clinical symptoms showed a decrease of pain in the pyloroduodenal zone in the main group of patients by 2.42 points

and in the control group by 2.4 points; heartburn by 2.25 and 2.2 points; nausea 2.0 and 1.9 points (table 2).

Table 2. – Dynamics of clinical symptoms in the examined patients

Symptoms (in points)	The main group (N = 20)		The control group (N = 20)	
	Before treatment	After treatment	Before treatment	After treatment
pain in the pyloroduodenal zone	$2.7 \pm 0,5$	$0,28 \pm 0,05$	$2,8 \pm 0,05$	$0,4 \pm 0,13$
heartburn	$2.5 \pm 0,4$	$0,25 \pm 0,04$	$2,6 \pm 0,25$	$0,4 \pm 0,16$
nausea	$2.1 \pm 0,4$	$0,1 \pm 0,005$	$2,2 \pm 0,24$	$0,3 \pm 0,15$

Dynamics of complete blood count in the examined patients showed that systolic blood pressure in the main group (within 28 days) was 115 ± 14.1 versus to the control $110 \pm 14/0$; diastolic blood pressure in the main group from 71 ± 5.6 to 75 ± 5.8 , and in control group

75.0 ± 5.8 points. Complete blood count showed the increase of hemoglobin in the main group from 110.6 ± 9.0 to 114.5 ± 9.3 ; and in the control group to 115 ± 9.0 ; erythrocytes 3.2 ± 1.4 ; leukocytes decreased from 7.2 ± 2.1 to 7.3 ± 2.4 ; and in the control group 7.2 ± 2.0 (table 3).

Table 3. – Dynamics of complete blood count in the examined patients

Symptoms (in points)	The main group (N = 20)		The control group (N = 20)	
	Before treatment	After treatment	Before treatment	After treatment
systolic blood pressure	$112 \pm 13,1$	$115 \pm 14,1$	$113 \pm 12,5$	$110 \pm 14,0$
diastolic blood pressure	$71 \pm 5,6$	$75 \pm 5,8$	$72 \pm 5,5$	$75 \pm 5,8$
heart rate	$86,4 \pm 9,6$	$82,4 \pm 6,7$	$85,8 \pm 8,8$	$82,3 \pm 6,6$
Complete blood count:				
hemoglobin	$110,6 \pm 0$	$114,5 \pm 9,3$	$112 \pm 6,8$	$115 \pm 9,0$
erythrocytes	$3,2 \pm 1,2$	$3,3 \pm 1,4$	$3,1 \pm 1,2$	$3,2 \pm 1,4$
leukocytes	$7,2 \pm 2,1$	$7,3 \pm 2,4$	$7,3 \pm 2,2$	$7,2 \pm 2,0$
ESR	$8,4 \pm 1,3$	$7,6 \pm 1,4$	$8,1 \pm 1,2$	$7,8 \pm 1,3$

Thus, the new sausage products enriched with SBI under investigation have anti-inflammatory, regenerative-enhancing action in the complex of treatment; they are sufficiently effective, have no side effects and are well tolerated by patients.

Conclusions

1. To include SPI and sausage products enriched with SBI in the diets of patients with peptic ulcer of duodenal ulcer was accompanied

by normalization of indicators of the functional state of the gastro-duodenal system. The production of hydrochloric acid and pepsin decreased, the activity of gastro-duodenal neutralization of acid increased, the pathological peristaltic activity of stomach was eliminated.

2. New sausages with enrichment of SPI can be recommended to be introduced into the complex treatment for the patients with erosive and ulcerative lesions of the gastro-duodenal zone.

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*Artikova Magina Akmalovna,
Tashkent Medical Pediatric Institute
Assistant of the Hospital pediatrics department № 1
Uzbekistan, Tashkent
E-mail: magina-1984@mail.ru*

DYSMETABOLIC NEPHROPATY IN CHILDREN: ETIOPATHOGENESIS, THE ROLE OF OXALOBACTER FORMIGENES IN THE DEVELOPMENT OF SECONDARY OXALURIA

Abstract: The article presents modern views on the etiology and pathogenesis of metabolic nephropathies, kinds of crystal-luria, data on the steady increase in the incidence of metabolic nephropathy, and also possible complications due to untimely diagnosis. Modern views on the role of intestinal microbiocenosis, especially oxalobacter formigenes in the development of metabolic nephropathy, are described.

Keywords: children, dysmetabolic nephropathy, secondary oxaluria, oxalobacter formigenes.

One of the current problems of pediatrics at the present stage is diseases of the organs of the urinary system. The prevalence of the pathology of the urinary system in children varies from 60: 1000 to 187: 1000 in the children's population, depending on the environmental situation in the child's area of residence. At the same time, in the structure of the pathology of the organs of the urinary system, congenital and hereditary diseases predominate, with a latent course, among which a large proportion falls on metabolic dismetabolic nephropathies (DMN). The frequency of various dismetabolic nephropathies (DN) in children is unknown [1]. The factors that cause the risk of developing diseases of kidney and discharge organs are not the same. At the moment, there is a marked decrease in immune parameters in children, which can affect the growth of the frequency of metabolic nephropathy [2]. A number of researchers in their scientific works show that the steady growth of metabolic disturbances is due not only to the combination of genetic, medical and biological risk factors, the presence of somatic pathology in children, but also to unfavorable environmental conditions [5; 6; 7; 8]. In connection with the active increase in the number of children suffering from dismetabolic disorders, there is an increase in the occurrence of tubulointerstitial damages to the kidneys, the formation of micro-lites and the formation of urolithiasis, while being the basis for the development of infections of the urinary system, which tend to be chronic and recurrent, which eventually leads to disruption of renal function [9]. At the same time, the infection of the urinary system in patients with metabolic disorders is the cause of stone formation [10]. Among DMNs associated with the violation of water-salt, phosphoric-calcium and other types of metabolism, special attention is paid to metabolic disturbances of oxalic acid, so-called DMN with oxalate-calcium crystalluria, reaching 20% of the total number of pathologies of the urinary system [1]. The variability of the prevalence of DMN with oxalate-calcium crystalluria according to different authors is due to differences in the environmental situation in the region where children live and can reach 31.4% [11]. The main signs that allow diagnosing dismetabolic nephropathy in children are crystalluria, which is characterized as follows: 1) the presence of "crystalloids" in elevated quantities — oxaluria, phosphaturia, calciuria, uraturia, ammonium-magnesium-phosphaturium, which

not always precipitate; 2) the presence of calcium oxalate crystals, calcium phosphate, ammonium magnesium phosphate (tripol-phosphates), urate crystals; 3) the presence of promoters (amplifiers) of crystal formation (fibrinogen, etc.); 4) reduction of crystal formation inhibitors (inorganic pyrophosphate, citrate, glutamate and other organic acids); 5) pH value of urine: tripol-phosphates precipitate in alkaline, and calcium phosphates, cystine, urates — in acidic environment [12]. However, the most common indicator that allows to detect dysmetabolic nephropathy in children is more or less constant oxalate-calcium crystalluria [13]. Such children have signs of endogenous intoxication and transient changes in the urinary syndrome: microproteinuria (microalbumin), fermenturia (phospho-lipase A and C, alkaline phosphatase, lactate dehydrogenase, beta-glucuronidase), and microhematuria. Large aggregated crystals of oxalates appear in the urine even with normal excretion of oxalates, which is associated with a decrease in the anticrystalline capacity of urine, the normal state of which depends mainly on the products of bioenergetic processes in mitochondria (inorganic pyrophosphates, citrates, etc.) [3; 13; 14; 15]. Oxalate-calcium crystalluria, as a rule, is detected in the form of single crystals, but mixed crystalluria can occur with the presence of crystals of calcium oxalate, calcium phosphate, and sometimes with urate crystals.

A number of foreign researchers believe that one of the main places in the development of metabolic nephropathies (oxaluria) belongs to the pathology of the digestive tract. Thus, dysbiotic intestinal disorders (in particular, lactobacillus deficiency) can lead to disturbance of oxalate degradation in the digestive tract, which is accompanied by increased absorption of oxalates in the intestine and the development of oxaluria (Mittal R. D., Kumar R. 2004). Interest is the study of the role of the anaerobic microorganism *Oxalobacter formigenes*. This microorganism produces an enzyme oxalyl-CoA-decarboxylase, which leads to the degradation of oxalates, which affects the regulation of the homeostasis of oxalate, preventing its absorption in the intestine. The results of the studies performed by Troxel S.A. et al. In 2003 in the USA, indicate a link between the presence of *O. formigenes* in the intestine and the development of hyperoxaluria. Due to the comparison of the *O. formigenes* genes sequence with other beta-proteobacteria, significant affinity to other

genera of bacteria such as, *Telluria*, *Janthinobacterium* and *Duganella*, which are now related to the *Oxalobacteraceae* family, has been revealed. For the human body is characterized by two groups *Oxalobacter formigenes*: I group is characterized by the content of cyclic 17 carbon fatty acids and group II cyclic 19 carbon acids [16]. The programming of the genomes of these 2 groups provided an opportunity to increase the concept of the biological importance of the microbe for the organism. As a result of the determination of the *O. formigenes* genomic sequence, scientists have opened the possibility for a more detailed study of the important biological properties of bacteria for the organism [17]. It was determined that, in children up to 6–9 months, *O. formigenes* was not detected. In the first year of life, an increase in the population of *O. formigenes* is observed, by 6–8 years it is found in practically all children, and in adults in 60–80% of cases [21]. Decrease in colonization occurs in adulthood. In 20–40% of healthy adults this microorganism is not detected. It is not well known under what conditions a person is being colonized by a given bacterium. The prevalence of *O. formigenes* varies from 46% to 77% in the adult population. To the end, the sensitivity of *O. formigenes* strains to antibiotics and other medicinal products has not been studied [18]. Currently *O. formigenes* is the most effective oxalate absorbing microbiota of the intestine. Despite this, scientists do not exclude the role of other microorganisms in reducing the absorption of oxalates. Scientists V.R. Abratt, S. Reid (2010) suggest using bifido and lactobacillus as a probiotic in hyperoxaluria, taking into account the phylogenetic similarity of these microorganisms. Clinical studies examining the reduction of hyperoxaluria by the administration of *O. formigenes* or its enzymes show a promising trend, but the data need to be confirmed in larger, well-controlled

studies. Similar studies using *Lactobacillus* and *Bifidobacterium* also show a reduction in oxalate in vivo, but these data are still contradictory. In particular, further studies should determine whether there is a direct link between the absence of oxalic acid-absorbing bacteria and hyperoxaluria, and whether their absence is a risk factor for the development of secondary hyperoxaluria [19]. Studies have shown that prolonged use of antibiotics in children with cystic fibrosis can cause permanent decolonization of *O. formigenes* [20].

N.A. Korovina, I.N. Zakharova, L.P. Gavryushova, E.B. Muladze (2007) noted that in children with metabolic nephropathies in the absence of correction of metabolic disturbances, the progression of membrane-destructive changes and formation of tubulointerstitial nephritis and/or urolithiasis, as well as the development of the microbial inflammatory process in the renal tissue (pyelonephritis) with a decrease in renal function in the future — the formation of chronic renal failure, aggravating the course of the underlying disease. Progression of oxalate nephropathy often leads to the development of abacterial interstitial nephritis, and as a result of infection, pyelonephritis develops. The maximum expressed dizmetabolic disorders can cause the onset of urolithiasis, even in the first years of the child's life.

Thus, dysmetabolic nephropathy is a natural response to chronic effects on the kidneys of components of exogenous or endogenous intoxication — increased content of products of ordinary or disrupted metabolism, including peroxidation with reduced mitochondrial function, as well as various xenobiotics. The role of intestinal microbiota on the development of dysmetabolic nephropathy has not been fully understood, but the development of secondary oxaluria in children with chronic bowel diseases has been proved.

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Ahmedova S. D.,
Ph. D., of Medical Sciences
Farajev Z. Q., D.Sc.,
Amirova I. A., D.Sc.,
Agayeva N. A., D.Sc.,
Azerbaijan Medical University
Department of dermatovenereology,
Baku, Azerbaijan
E-mail: matlabm@yandex.ru

IDENTIFICATION OF SENSITIVITY OF DERMATOMYCOSIS AGENTS TOWARDS ANTIMYCOTICS

Abstract: The given article presents the outcomes of a research that was held with the goal of identification of sensitivity of skin and its appendages mycosis agents to antimycotics (nystatin, ketoconazole, itraconazole, fluconazole, clotrimazole) in isolates, separated from patients with dermatomycosis. Identification of sensitivity of dermatomycosis agents to antifungal drugs must be held in recurrent cases, and in cases resistant to standard therapy, as well as during mixed infections. Despite laboriousness and long terms of sensitivity identification, this method can be recommended as it is considered a “golden standard”. Clotrimazole was found to be an antimycotic most sensitive to dermatomycosis agents, and is followed by ketoconazole and nystatin in the third place. Fluconazole and itraconazole did not represent sensitivity and were found to be resistant to agents.

Keywords: resistance, antimycotics, dermatomycosis, mixed-infection.

Introduction. Around 400 types of fungus are recognized to be provocatives of fungal diseases, 100 of which are met most frequently. They are distinguished by the extraordinary vitality and resistance to environmental impact. Dermatophytes, causing dermatomycosis can survive in the environment for more than 2 years [1]. Due to that dermatophytes relate to pathogenic provocative, a great role in development of infectious process is given to reactivity of the macro-organism, and therefore, the risk of falling sick to fungal infection is multiplied in case of mixed fungal infection in individuals with concomitant diseases, and increases and doubles every 10 years of life [2].

Dermatophytes constitute one of the primary groups of fungus pathogenic for people. Dermatophytes consist of 39 types, integrated in three kinds – *Trichophyton*, *Microsporium* and *Epidermophyton*. Keratin, which comprises the stratum corneum of epidermis, nails and hair is a primary source of nourishment for anthropophilic dermatophytes, necessary for existence, reproduction and growth [T. rubrum, T. Interdigitale]. Animals and birds comprise the habitat of zoophilic dermatophytes [*M. canis*, *M. distortium*, *T. equinum*, *T. mentagrophytes var. erinacei*, *T. mentagrophytes var. gypseum*, *T. Verucosum*]. Some kinds of zoophilic dermatophytes parasitize in skin, hair and nails of a human, and they are considered zooanthropophilic dermatophytes. Geophilic dermatophytes, inhabiting in the soil comprise a small group of dermatophytes [3].

Despite numerous studies of dermatomycosis, mixed forms of mycosis (mixed infections) still comprise a complicated problem, creating additional difficulties for diagnostics and therapy. Role of mixed-microbiota, emitted from the lesions in pathogenesis, proliferation and sensitivity to antimycotic therapy of this group of diseases is still not clear [4].

According to international clinical recommendations [5], definition *in vitro* of sensitivity of dermatomycosis agents to antifungal drugs

must be held towards all infectious agents, as well as during recurring cases and cases, resistant to standard therapy of the illness. Methods of serial breedings [6] comprise referential methods of identification of sensitivity of dermatomycosis agents. Yet, these methods are too complicated for application in everyday practice of laboratories due to their laboriousness and significant expenditures for materials.

There exists a row of commercial, as well as automatized systems and test-systems for identification of sensitivity of dermatomycosis agents to antimycotics, and disco-diffusive method gained great popularity [7].

The goal of the research – is the identification of sensitivity of dermatomycosis agents to antimycotics (nystatin, ketoconazole, itraconazole, fluconazole, clotrimazole) in isolates, separated from patients with fungal lesions.

Materials and methods. 114 isolates emitted from biomaterials of patients with dermatomycosis were used in the frames of multi-centered research in Azerbaijan (2014–2016). Within this period, 253 patients with mycotic lesions of scalp and smooth skin aged between 3–80 referred to the Republican skin and venereal dispensary and Children skin and venereal dispensary № 3.

All the patients were held clinical and mycologic survey, including microscopic and cultural surveys of samples of pathologic material from the lesions. During squamous form of smooth skin mycosis, mycosis-like flakes of skin furrow received as a result of scraping were studied, during dyshidrotic form of mycotic lesion of hands and feet samples were taken from exfoliating epidermis of the periphery of lesions, and during the lesion of nail plates stratum corneum was scraped with scalpel, as well as during trichomycosis pieces of hair, taken from the lesions were studied. The “crop” was generated in the breeding ground Saburo and was cultivated at 28°C in a thermostat for 7 days.

Results and the discussion. Results of identification of sensitivity of dermatomycosis agents to antimycotics (nystatin, ketoconazole, itraconazole, fluconazole, clotrimazole) are presented below.

Table 1.

Infectious Agents	Antimycotics				
	Ketoconazole	Clotrimazole	Nystatin	Fluconazole	Itraconazole
<i>Microsporium audouinii</i> (8)	+++	+-	-	-	+-
<i>Trichophyton</i> spp. (6)	+++	+++	+-	-	-
<i>Trichophyton rubrum</i> (5)	-	+++	+++	-	-
<i>Trichophyton</i> spp. + <i>Cladosporium</i> spp. (7)	+++	+++	+++	-	-
<i>Trichophyton</i> spp. + <i>Candida albicans</i> (4)	+-	+++	+++	-	-
<i>Trichophyton</i> spp. + <i>Stafilok</i> (5)	+-	+++	+++	-	-
<i>Epidermophyton</i> spp. (8)	+++	+++	+-	-	-
<i>Cladosporium</i> spp. (8)	+++	+-	+++	-	-
<i>Microsporium audouinii</i> + <i>Cladosporium</i> spp. (9)	+++	+++	+++	-	-
<i>Cladosporium</i> spp. + <i>Penicillium</i> (3)	+++	+-	+++	-	-
<i>Aspergillus</i> spp. (9)	+++	+++	+-	-	-
<i>Aspergillus</i> spp. + <i>Cladosporium</i> spp. (6)	+++	+++	+++	-	-
<i>Aspergillus niger</i> (4)	-	+++	-	-	-
<i>Aspergillus versicolor</i> (6)	+++	+++	+-	-	-
<i>Candida albicans</i> (11)	++	+-	+	-	-
<i>Aspergillus</i> spp. + <i>Candida albicans</i> + <i>Penicillium</i> (7)	-	+++	-	-	-
<i>Cladophialofora</i> spp. (8)	+++	+++	+++	-	+

Criteria of sensitivity of dermatomycosis agents to antimycotics (nystatin, ketoconazole, itraconazole, fluconazole, clotrimazole) (n = 114)

Remarks: +++ high sensitivity;
 ++ moderate sensitivity;
 + low sensitivity;
 +- questionable sensitivity;
 - complete absence of sensitivity (resistance).

When comparing the results, no sensitivity of dermatomycosis agents towards fluconazole and itraconazole during both mono and mixed infections was identified. *Microsporium audouinii* found during trichomycosis demonstrated high sensitivity for ketoconazole, questionable sensitivity for clotrimazole and itraconazole, and resistance for nystatin and fluconazole. During mixed-infections *Microsporium audouinii* + *Cladosporium* spp high sensitivity of mixed-microbiota was revealed for ketoconazole, clotrimazole and nystatin, along with resistance for fluconazole and itraconazole.

Trichophyton spp is highly sensitive for ketoconazole and clotrimazole and is questionably sensitive for nystatin. *Trichophyton rubrum* and mixed-microbiota during mixed infections *Trichophyton* spp. + *Cladosporium*: *Trichophyton* spp. + *Candida albicans*; *Trichophyton* spp. + *Stafilok* represented high sensitivity for clotrimazole and nystatin.

Epidermophyton spp. is highly sensitive for ketoconazole and clotrimazole.

Cladosporium spp., and mixed-microbiota during mixed infections *Cladosporium* spp. + *Penicillium* spp., *Cladosporium* spp. + *Aspergillus* spp., *Microsporium audouinii* + *Cladosporium* spp represented high sensitivity for ketoconazole. *Cladophialofora* spp. is highly sensitive for ketoconazole, clotrimazole and nystatin.

Infectious agents of *Aspergillus* spp., *Aspergillus niger*, *Aspergillus versicolor* in the form of monoinfection, as well as in the form of mixed-infection are equally positively sensitive for clotrimazole.

Candida albicans represented moderate sensitivity for ketoconazole, low sensitivity for nystatin and questionable sensitivity for clotrimazole.

Results. Thus, clotrimazole was found to be an antifungal antibiotics that is most sensitive to to dermatomycosis agents, and is followed by ketoconazole, and nystatin in the third place. Fluconazole and itraconazole were found to be resistant to infectious agents and did not represent sensitivity. Despite laboriousness and long terms of the test, this method of sensitivity identification can be recommended in resistant to standard antimycotic therapy forms of disease.

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Boymanov Farhod Xolboyevich,
 Samarkand State Medical Institute,
 Master degree in medicine,
 Department of Forensic Medicine,
 E-mail: boymanovf@mail.ru
 Indiaminov Sayit Indiaminivich,
 Samarkand State Medical Institute,
 Doctor of Medicine, Professor,
 Department of Forensic Medicine,
 E-mail: davolash@mail.ru

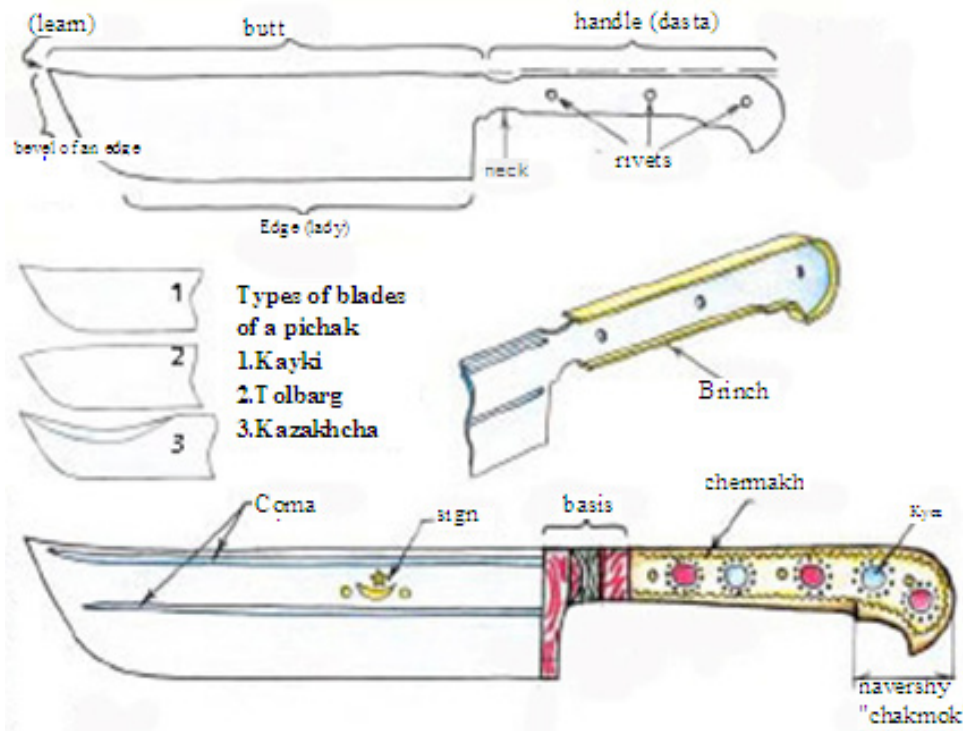
THE ROLE OF DESIGN FEATURES OF UZBEK NATIONAL KNIVES -“PICHAK” IN THE TASK OF FORENSIC MEDICAL EXAMINATION

Abstract: This article is carried out different types of design features of the Uzbek national knives. Differences can be found in a design even at those knives which have been made approximately in at one time, but in different regions of Uzbekistan. A big variety of types of tools (arms) dictates need to conduct further researches. One of such problems is determination of features a structure of the Uzbek national knives-pichak where each constructive unit can be a constitutive subject, allow to use data on chipped and cut damages when conducting diagnostic and identification of forensic medicine and criminal-medicine examinations.

Keywords: national knife-pichak, blade, butt, ornament, knife handle, chipped and cut wounds, trauma tools.

Introduction. The Uzbek knives “pichak” as ancient and modern production, most widespread – the straight lines, and curved, have characteristic features inherent in the culture of the Uzbek people. Differences can be found in a design even at those knives which have approximately been made before, but in different regions of Uzbekistan. To learn where were concrete Uzbek knives are made it is possible not

only in a blade form, but also on the pattern decorating a knife and its edge. Khiva, Bukhara, Samarkand, Chust, Karasu, Shakhrikhan are considered as the known centers for production of the Uzbek “Pichak” knives [1] to this day. The modern legislation considers that “pichak” related to an economic household so far of as purpose as function of attack or defense for the following knives isn’t fundamental.



Drawing 1. Design of a national Uzbek knife

The from high-quality steel, or produced from iron which surface was processed by copper vitriol were various. The blade form at a knife “tolbarg pichak” reminds willow leaves; “tugr pichak” – a straight line blade with flat blade edges; “hisor pichak”, “kozok pichak” and “a bodomcha pichak” – the blade of a knife comes to an end with an edge of an almond-shaped form; “soil pichak”, “kamalak pichak” – on the upper edge of a blade there passes the flute; “kush-kamalak pichak” – the blade of a knife has a double flute. In this plan the Uzbek knife “pichak” is one of world examples of growth and formation of national craft [3]. The national Uzbek knife is 28,02 cm long, consists of a handle and a blade (picture), a way of sharpen trend. A handle is 11,38 cm long, 2,04–3,01 cm wide, 1,78–1,95 cm thick, section rectangular with the rounded-off corners.

The blade of a knife-pichak has the wedge-shaped cross section which basis is the butt which is narrowed to an edge. A blade of this knife rather wide that is even more emphasized with the thin, displaced up handle so that her top party continues the line of a butt. Often the blade on all length has identical width. At some knives-pichakov which especially have the edge which is a little raised concerning the line of a butt, the blade can be narrowed a little from a handle to a tip.

The blade of a knife-pichak has three main options of execution that is connected with economic purpose of a knife. But all blades differ in rather sharp raising of the line of an edge to the blade edge which is on the line of a butt.

The most common form of a blade of the Uzbek knife-pichak which is considered universal and used at production of knives for city dwellers is called “kayke”. The edge of this blade settles down on the line of a butt or is a little raised over it.

The second of everywhere the used forms of a blade is called “a willow leaf” (uzb. “tolbarg”). At a blade of this kind, at distance about 1/5 lengths of a blade, a butt when approaching to an edge, it is a little lowered down. Thus, the edge of a blade is a little below than the line of a butt that is considered convenient for work of the butchers undressing carcasses of animals. During the work as a similar knife the butt of the turned knife-pichak slides on muscles, and the edge doesn't crash into them, and the edge cuts only a skin and sinews.

One more original form is given to a blade of a knife-pichak that fishermen use. This version is especially widespread among inhabitants of the coast of the Aral Sea, generally Kazakhs. Therefore such form of a blade is called “Kozok”. But also the fishermen living on coast of the rivers and lakes in all territory of Central Asia [1] like to use knives-pichak of this kind. The line of a butt of a blade of a knife of “kozoka” approximately from the middle of length forms smooth dredging, again rising to the edge which is on the line a butt handle. The formed dredging is sharpened by means of the small descents going on a side surface of a blade to dredging. For this purpose blade metal under dredging is removed with one (unilateral) or both parties (bilateral sharpening).

Ornament – decoration of a blade. It can be, except an inscription and a print – “tamg”, expensive knife-pichak of national Uzbek vegetable ornament “isly” in various initial variations which aren't allowing any change in the drawing. The blade is considered more valuable, the ornament is applied on it more carefully.

Decorate a knife-pichak handle with color circles (uzb. “kyoz”). Decorative elements – “kyoz” – are made of a bone, nacre, non-ferrous and precious metals or plastic. They are pressed in made especially for this purpose of deepening in dies. In a handle of expensive knives-pichak, most often the Bukhara work, intersperse not cut semiprecious stones, mainly turquoise. In this case, unlike flat kyozy jewelry, pro-polished aflush with handle dies, stones act over a surface of a handle [1] a little.

Sometimes each circle – “kyoz” – is in addition surrounded with “vsechka” – a number of small metal points or triangles. On perimeter of each of dies of a handle one more decorative element – “chermakh” can be put. These are points or the wavy line made of metal (copper or silver) [1].

The provided information on a structure of the Uzbek national knives-pichakov where each constructive unit can be a constitute subject, allows to use data on chipped and cut damages when conducting diagnostic and identification of forensic medicine and criminal-medicine examinations.

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*Kurbanov Ravshanbek, PhD, ScD,
Zakirov Nodir, PhD, ScD,
Irisov Djamshid,
Ganiev Tohir,
Kuchkarov Husniddin,
Republican Specialized Center Of Cardiology,
Tashkent, Uzbekistan
E-mail: tohir-86@mail.ru*

PREHOSPITAL ANTITHROMBOTIC THERAPY IN PATIENTS WITH ATRIAL FIBRILLATION

Abstract: In clinical practice, there is a low alertness of doctors on stroke prevention in outpatient patients with AF. Anticoagulants was received by 32.5% of patients, and only 13,7% of them (4.3% of all patients) received the drug in doses that provide the adequate level of INR.

Keywords: atrial fibrillation, thromboembolic events, bleeding risk, CHA₂DS₂-VASc, HASBLED, antithrombotic therapy.

It is known, the presence of atrial fibrillation (AF) is associated with an increased risk of stroke, characterized by severe course and high incidence of disability, and a double increase in the risk of death, regardless of the presence of other risk factors [1; 2; 3].

In accordance with the recommendations of the European Society of Cardiology (ESC) in 2012, the obligate component of pharmacotherapy for non-valvular etiology is the prescription of various antithrombotic agents, the choice of which depends on the CHA₂DS₂-VASc and HASBLED scores.

In particular, it is indicated that oral anticoagulant therapy (OAC) either vitamin K antagonists (VKA) or new oral anticoagulants (NOACs), is recommended for the prevention of ischemic stroke (IS) in patients with risk factors for IS or recurrence of AF, which should be taken regardless of the presence of sinus rhythm (class of recommendations-I, level of evidence-B). In patients with valvular AF, most often rheumatic etiology, because of even higher risk of thromboembolic events (TEE) [4], it is necessary to administer warfarin, without taking into account other risk factors, if contraindications are absent. The relevance of this problem is evidenced by numerous publications that cover various aspects of prevention of a TEE [4; 5; 6; 8]. The situation in Uzbekistan on issues related to the adequacy of prevention of TEE in patients with various clinical forms of AF has not been studied before and therefore is considered relevant.

The aim of the study: was to determine the compliance of pre-hospital antithrombotic therapy in patients with atrial fibrillation in accordance with current recommendations of the ESC (2012).

Materials and methods. For the achievement of the goal, medical dates of 1298 patients discharged from the Republi-

can Specialized Cardiology Center (RSCC) for the period from 01.10.15 to 01.12.2015 was retrospectively studied. The only criteria for inclusion in the study was the presence of any clinical form of AF in the diagnosis at discharge of.

A risk assessment of the TEE on the CHA₂DS₂-VASc scale (patients with non-valvular etiology of AF) and assessment of the risk of bleeding on the HAS-BLED scale (in all patients) in accordance with the recommendations of ESC, at the time of hospitalization were retrospectively evaluated. We studied the frequency of appointment of various variants of antiplatelet agents recommended by ESC [3] at the prehospital stage: 1) VKA (warfarin and its analogues); 2) NOACs (rivaroxaban, etc.); or 3) combination of antiplatelet drugs of acetylsalicylic acid (ASA) 75 mg + clopidogrel 75 mg, or 4) ASA 75–325 mg in the form of monotherapy.

We also analyzed the results of the level of the international normalized ratio (INR) at admission to the hospital for evaluation of hypocoagulation degree in patients taking VKA therapy at the prehospital stage. The statistical processing of the material was carried out using the statistical processing program BIOSTATISTICS 4.03. The quantitative data are presented as the mean ± standard deviation.

Results and discussion

Various clinical forms of AF were revealed in 161 (12.9%) patients according to 1298 medical cards: 32 (19.9%) patients had valvular and 129 (80.1%) had non-valvular AF. At the same time, paroxysmal AF was diagnosed in 45 (28%), persistent in 19 (11.8%) and permanent in 97 (60.2%) patients (Table 1).

Table 1. – Etiology and clinical forms of AF

AF	Paroxysmal	Persistent	Permanent	Total
Valvular	2	1	29	32
Non-valvular	43	18	68	129
Overall	45 (28%)	19 (11.8%)	97 (60.2%)	161

In other words, the doctor had to solve the problem of assessment of TEE developing risk and possible bleeding because of the prescription of ATT for each 8-hospitalized patient. It is interesting to note that this indicator was 2.0–2.5 times lower than the corresponding parameters published in similar studies [8; 9]. We have established the fact of the prevalence of women 86 (55.4%), which is generally consistent with the comparative studies [8; 9].

A distinctive feature of our study is a relatively high incidence of detection of valvular AF – almost in 20%, whereas in the Omsk

study [5], the corresponding parameter was only 5.9%. The mean age of patients with AF in our study was 65.3 ± 8.7 years that 8 years lower than in Omsk, and the proportion of patients over the age of 65 (49.7% vs. 69.4%) was significantly less, especially in the age group over 75 years (12.5% against 40.5%).

Despite this, in patients with non-valvular AF, the detectability of the risk factors for the TEE on the CHA₂DS₂-VASc score was quite high in our study (Table 2).

Table 2. – Clinical characteristics of patients with non-valvular atrial fibrillation

Параметры	n = 129	%
Average age	65.3 + 8.7 years	
Duration of arrhythmic history	5.3 + 2.1 years	
Average length of stay	9,4 ± 6,3 days	
Women	70	54.26
Men	59	45.7
Congestive heart failure	85	65.9
Arterial hypertension	81	62.79
Diabetes Melitus	22	17.05
Stroke or TIA in history	13	10.07
Peripheral vessel Diseases	71	55.03
Age 65–74	52	40.31
Age ≥ 75 years	17	13.17
CHD	76	58.91
Impaired renal function	4	3.1
Impaired liver function	3	2.32

According to our calculations, in 129 patients with non-valvular AF, the mean value of CHA₂DS₂-VASc was 4.1 ± 1.5 points (Table 3). It was noted that 119 (92.3%) patients had 2 or more points, which indicated the need for the appointment of ATT, in the

case of absence of contraindications. Another 6 (4.6%) patients who had 1 point were indicated to ATT with a low risk of bleeding. Thus, only 4 (3.1%) patients with non-valvular AF, and absence of risk factors for TEE, did not have any indications for ATT.

Table 3. – The distribution of patients in accordance with the number of points on the CHA₂DS₂-VASc and HAS-BLED scores

	CHA ₂ DS ₂ -VASc score (n = 129)	HAS-BLED (n = 161)
0 score	4 (3.1%)	40 (24.8%)
1 score	6 (4.6%)	60 (37.2%)
2 score	9 (6.9%)	48 (29.8%)
3 score	26 (20.1%)	7 (4.3%)
4 score	32 (24.8%)	6 (3.7%)
5 score	29 (22.5%)	0
6 score	13 (10.1%)	0
7 score	10 (7.7%)	0
8 score	0	0
9 score	0	0
Average score	4.1 ± 1.5	1.25 ± 1.0

According to the recommendations of the ESC (2012), all 32 (100%) patients with valvular AF included in our study had absolute indications for the administration of OAC. Therefore, only 4 (2.5%) of the 161 patients with different etiology of AF who had a “really low risk” of the TEE did not need to receive ATT at the prehospital stage.

The risk of bleeding was assessed using the HAS-BLED score in all 161 patients with AF. As it is seen from (Table № 3), 92% of

patients showed a low bleeding risk (less than 3 points), allowing to prescribe the maximum dose of ATT in the case of absence of contraindications. In 13 (8.0%) patients, due to the high risk of bleeding (3 or more points), it was required more careful control of ATT, as well as correction of removable risk factors.

In general, we identify the clinical situation, which is characterized by high mean values of CHA₂DS₂-VASc and quite low HAS-

BLED in patients with AF and reflects the revealed trend in such studies [9; 10]. Thus, the average patient admitted to a hospital with various clinical forms of AF has a high risk of IS with a low

probability of bleeding. This situation allows to use the most effective variant of pharmacological prevention of IS – anticoagulants more widely and aggressively.

Table 4. – Admission of antiplatelet therapy at the prehospital stage in patients with atrial fibrillation

Drugs	Valvular AF n = 32	Non valvular AF n = 129	Total n = 161
None	9 (28.1%)	34 (26.3%)	43 (26.7%)
Aspirin (75–100 mg)	5 (15.6%)	49 (38%)	54 (33.5%)
Clopidogrel (75 mg)	0	9 (7%)	9 (5.6%)
Aspirin+clopidogrel	0	4 (3.1%)	4 (2.5%)
Warfarin	16 (50%)	29 (22.5%)	45 (27.9%)
Aspirin + Warfarin	1 (3.1%)	3 (2.3%)	4 (2.5%)
Syncumar/Phenylin	2 (6.25%)	0	2 (1.25%)
NOAC	0	0	0 (0%)

However, the analysis of the structure of antithrombotic therapy of patients on admission to hospital (Table No. 4) had revealed that only 51 (32.5%) of the 157 patients who had indications to ATT were administered VKA, 49 of them were warfarin, and one case of syncumar and phenylin. In the cause of small number of patients taking syncumar and phenylin, and for the convenience of further analysis, all of them (n = 51) were combined into a group of individuals who received VKA therapy.

It was established that 16 (50.0%) patients with rheumatic etiology and 31 (24.0%) patients with non-rheumatic etiology of AF ($p < 0.05$) received warfarin or its analogs at the outpatient stage. It should be noted that the extremely low level of use of OAC for primary (4.1–4.3%) and secondary (22–25%) prevention of TEE among AF patients with absolute indications for their use has been described many times [6; 7; 8; 9] and reflected a low alertness for IS both doctors and patients.

We found that, any patient did not take new oral anticoagulants at the outpatient stage! Whereas, in a number of Russian studies, it has been established that up to 15–27% of patients with AF received new oral anticoagulants – rivaroxaban, dabigatran, etc. in order to prevent TEE [6; 8]. It is known, the main reason for the NOACs inadequate popularity in the prevention of a TEE is the economic component, even in economically developed countries. The fact of relatively recent (2014) registration of rivaroxaban – the only representative of this group in Uzbekistan also has a great importance.

Table 5. – Degree of hypocoagulation at the outpatient stage among persons taking vitamin K antagonists.

INR	Patients (n=51)
<1,5	33 (64.7%)
1.5–2,0	4 (7.8%)
2,0–3,0	7 (13.7%)
3<	7 (13.7%)

Only 2.5% (n = 4) of patients in order to prevent TEE took a combination of aspirin and clopidogrel (75 mg + 75 mg). Another

61 (37.9%) patients at the prehospital stage took aspirin at a dose of 75–100 mg/day, as a part of the basic therapy of the underlying disease, which, as is well known, lacks sufficient evidence for the prevention of TEE in AF. It should be especially noted that 28% (n = 45) of patients did not take any antiplatelet therapy at the prehospital stage.

Even more dramatic is the situation of achievement therapeutic hypocoagulation with OACs in patients with AF. Thus, on admission to a hospital, adequate control of INR from 2.0 to 3.0 was noted in only 7 (13.7%) patients taking VKA, another 7 (13.7%) patients had INR values > 3.0. Overall, 37 (72.5%) patients were not treated completely with VKA, of which 33 (64.7%) had an INR below 1.5, indicating a lack of TEE prevention (Table 5).

We found that only 13.7% of directed to the hospital patients monitor INR, out of 31.7% (of those in need) taking Warfarin. Therefore, at the pre-hospital stage, only 4.3% of patients who needed anticoagulants were taking the drug at doses that provided maximum prophylaxis for the TEE. Thus, the described actual clinical practice of prevention of stroke and systemic thromboembolism in patients with AF does not response current standards of prescribing anticoagulant therapy.

Conclusions

1. Various clinical forms of AF were detected in 13% of patients directed to the center of cardiology. In this case, the valvular AF was detected in 20% of patient and these patients were more committed to receiving OACs.

2. The vast majority of patients with AF had a high risk of thromboembolism (an average of 4.1 on the CHA₂DS₂-VASc score) and a low bleeding risk (1.25 points on the HAS-BLED score), which allows in more than 90% of cases to prescribe maximum prophylaxis of the TEE with anticoagulants.

3. In real clinical practice, there is a low alertness of outpatient physicians regarding the prevention of TEE in patients with AF. 32.5% of patients took the most effective variant of TEE prevention – anticoagulants, only 17% of them (4.3% of all patients) took the drug in doses ensuring the proper level of INR.

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Gulyamov Nariman,

Dolimov Tohirbek,

Nazarov Elbek,

Research institute of epidemiology microbiology
and infectious diseases

E-mail: Argandalf@gmail.com

EVALUATION OF GCS APPLICATION IN THE TREATMENT OF VIRAL HEPATITIS

Abstract: Glucocorticosteroids (GCs) were applied for inhibition of superfluous inflammation activity of pathological process [13]. GCs have been used in the treatment of viral hepatitis (VH) since 1950th. Management of hormones in patients with infectious diseases and particularly viral hepatitis are going on since nearly very beginning of hormones discovery. The first papers about successful management of cortisone and adrenocorticotrophin in viral hepatitis emerged in the middle of the 20th century [H. Butt, M. Comfort; H. Rilkin, L. Marks, 1952; J. Roskamp, 1953; H. Colbert, Holland and al. 1956 (cited by Kassirsky), and that was before the identification of viral etiology of hepatitis A (S. Feinstone, 1973) [9]. B (M.E Bayer, B.S Blumberg) [1] and C (1989 Choo et al. 1989 Kuo et al.) [4, 14] and D [1977 Rizzetto) [15].

Keywords: prednisone, GCs, cortisone, hormones, Hepatitis B, Hepatitis C, Hepatitis DCBG.

Some authors recorded the “striking effect” of hormones in the treatment of patients. But later data accumulation opinions of scientific society tended to be more moderate.

T. Ritis applied prednisone at the dose of 30 mg per day in 34 patients with viral hepatitis during 24 days. Group of comparison included 31 patients who received placebo. It was established that bilirubin, transaminases and aldolase indices in both groups didn't differ significantly as well as prednisone. Later prednisone was displaced with prednisolone [13].

Liver is an organ of great significance in synthesis of corticosteroid binding globulin (CBG), transcortin, which plays a crucial role in transport function for GCs. Usage of GCs in patients with hepatitis especially viral hepatitis is the problem of great interest for global hepatology. The inflammation is the result of complex and balanced orchestra from several pro and anti-inflammatory mediators, cytokines, free radicals, fatty acids and enzyme activation. All this complex triggers activation of inflammation process not only in local, but and in cells which circulate in peripheral blood [10].

GCs are like Kapellmeister that are playing a leading part in inflammatory response control.

It is well known that deficiency and excess of hormones can bring to various pathologies from acute pancreatitis to Cushing syndrome [6; 19; 20].

It is known that the GCs ability to regulate the inflammatory response is strongly related with their availability on the site of inflammation. Tissue availability of GCs, namely the proportion of GCs binding by the receptor and carrying out a response, depends of its synthesis at adrenal gland [6], its binding to the CBG [22], as well as its activation or inhibition catalyzed locally by the intracellular activity of enzymes 11 β -HSD1 and 11 β -HSD2 [3; 12]

Transcortin is mainly synthesized in liver, and it could be also produced by placenta, kidney and adipose tissue [7; 18; 21]. Transcortin is the primary cortisol binding protein, which is capable of conformational changes from a high cortisol-binding affinity form to

a low affinity form upon cleavage of its reactive centre loop by various proteases, for example neutrophil elastase [17]. The main function of CBG seems to be GCs transport since under normal conditions 80–90% of circulating cortisol is bound with high affinity to CBG, while only 10–15% binds with low affinity to albumin and the remaining 5–10% is known as “free cortisol” [8, 12]. In our clinical practice we observed patients with severe course of hepatitis with complications who had intensive inflammatory and cytolytic process in liver and we found out that application of GCs was inefficient. That was one of our purposes to understand the pathophysiology of that process.

In clinical review of Aberdin, Singer (2006) was shown that systematic review found 13 adequate trials of steroid therapy prior to interferon- α involving 790 patients [16]. Pre-treatment with steroids for four to six weeks showed improved clearance of infection markers such as hepatitis e antigen and hepatitis B DNA. However there were no differences in mortality, incidence of hepatitis B surface antigen, hepatitis B e antibody, liver histology, or quality of life. Adverse events were equally distributed. They concluded that steroids should not be used for pre-treatment of chronic hepatitis B.

The same authors in their review involving eight randomised trials that examined GCs in chronic hepatitis C [2], showed the great heterogeneity of results but in general there was no effect on all-cause or liver-related mortality, virological response, biochemistry, or liver biopsy findings. One trial reported a significant reduction in side-effects of interferon with concurrent steroid use [11].

The **purpose** of our research was to study variations of GCs hormones levels and efficacy of their application in patients with severe course of viral hepatitis to reduce the liver necrosis

Materials and methods: We studied 51 patients with severe course of viral hepatitis B, C and D diagnosed by ELISA and PCR at the clinic of Research institute of Epidemiology Microbiology and Infectious Diseases (REIMID) from January 2016 to March 2017.

Age ranged 28–68 (middle age 41.6), 66% were males and 34% females. We examined our patients with clinical, biochemical (ALT,

AST) immunological (antigen binding lymphocytes (ABL) specifically sensitized to liver parenchyma tissue) methods.

We also used ELISA method to detect the levels of CBG and cortisol in blood and cortisol levels of saliva of patients. Control group included 27 healthy individuals.

Statistical analysis was carried out using the program Microsoft Excel 2.

Results: According to the clinical examination of patients, a severe course of chronic viral hepatitis exacerbation was noted in all the patients. Biochemical studies showed that in patients the mean values of ALT and AST were 1.57 mmol/L and 0.78 mmol/L, it was 2,31 times as high as upper limits of normal values (Table 1).

Detection of ABL specifically sensitized to the liver tissue antigen showed that their percentage achieved 11.68% and were 5,8 times as high as normal values (Table 1). Biochemical and immunological indices testified the intensive processes of cytolysis and the pathological process activity in the liver. Clinical, Biochemical and immunological data demonstrated a severe course of the disease in all the patients indicating the intensive processes of cytolysis and activity of the pathologic process.

The serum content of patients with severe viral hepatitis in the liver-synthesized transcortin protein was $32.0 \pm 4.26 \mu\text{g/ml}$, it was ↓

3.20 times as low as in healthy individuals ($105.22 \pm 2.01 \mu\text{g/ml}$). This indicates a significant decrease in the protein-synthesizing function, in particular, the synthesis of transcortin in the liver against the background of a pronounced activity of the pathological process.

Transcortin in blood serum of patients with severe course of viral hepatitis amounted to $32,0 \pm 4,26 \text{ MKT/MA}$, which was 3,20 times as low as in healthy individuals ($105,22 \pm 2,01 \text{ MKT/MA}$). It indicates a significant decrease of protein synthesizing function, in particular, transcortin synthesis in liver against the background of a pronounced activity of pathological process.

In patients with severe viral hepatitis, the content of total cortisol in blood was increased to an average of $1284.3 \pm 89.50 \text{ nm/l}$, which was ↑ 2.04 times higher than the parameters of healthy individuals varying from 140 to 630 nm/l (Table 1). The free cortisol content in saliva was also increased by ↑ 1.85 times and amounted to $12.8 \pm 1.03 \text{ ng/ml}$ against the upper normal value norm equal to 6.9 ng/ml (Table 1).

So a significant decrease in the blood content of transcortin, an increase in total cortisol in the blood and free cortisol in saliva against the background of high intensity of cytolysis and pathological process in liver in the patients with severe course of viral hepatitis were observed.

Table 1. – Biochemical, immunological and hormonal status (by transcortin and cortisol of blood plasma and saliva) in patients with severe course of viral hepatitis

Indexes	Healthy individuals (control) (n = 27)	Patients with severe course (n = 51)	Induction index or suppression index
Biochemical indices			
ALT mmol/L	Up to 0,68	1,57	↑2,31
AST mmol/L	Up to 0,45	0,78	↑1,73
Immunological index			
ABL to liver antigens (%)	Up to 2%	11,68%	↑5,84
Indices of Transcortin (CBG) and Cortisol			
Transcortin in blood serum (mkg/ml)	$105,22 \pm 2,01$	$32,0 \pm 4,26$	↓3,20
Cortisol in blood plasma (nm/l)	140–630	$1284,3 \pm 89,50$	↑2,04
Cortisol in saliva (ng/ml)	0,65–6,9	$12,8 \pm 1,03$	↑1,85

Conclusion: Therapy with GCs didn't show statistically significant changes in transcortin and cortisol levels in blood plasma, and cortisol levels in saliva in patients with viral hepatitis A, B, C and D.

So GCs-therapy application may be considered as double-edged sword in treatment of viral hepatitis. On the one side GCs protect hepatocytes from superfluous aggression of immunocompetent cells

of the host, but on the other side immunosuppression contributes to progression of the infection.

Immunosuppression induced by GCs-therapy contributes to increase of viral load and in the presence of antiviral preparations indications to GCs-therapy are very limited, for example, they can be applied in the cases with expressed autoimmune component.

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*Donscaia Anna Evghenievna,
Oncological Institute from the Republic of Moldova,
Department of thoracic and abdominal surgery
E-mail: donscaia53@mail.ru*

*Antoci Liliyan Fiodorovich,
Oncological Institute from the Republic of Moldova,
Department of thoracic and abdominal surgery*

*Cernat Mircha Victorovich,
Oncological Institute from the Republic of Moldova,
Department of thoracic and abdominal surgery*

*Mednicov Lorena Vladimirovna,
Oncological Institute from the Republic of Moldova,
Department of thoracic and abdominal surgery*

*Catrinich Victor Porfirovich,
Oncological Institute from the Republic of Moldova,
Department of thoracic and abdominal surgery*

*Corobceanu Nadejda Konstantinova,
State university of medicine and pharmacy "Nicolae Testemitanu",
Department of oncology, hematology and radiology*

MANAGEMENT OF EXTENDED AND COMBINED GASTRECTOMY IN STOMACH CANCER PATIENTS

Abstract: The surgical treatment in stomach cancer is the only radical method of the treatment. The nearest results depend on patient's age and operation's volume. The aim of our study was to analyze the nearest surgical treatment results in stomach cancer patients who underwent extended and combined gastrectomies in order to elaborate a strategy of preoperative prevention of complications. The data of 585 stomach cancer patients radically operated in the Oncological Institute of Republic of Moldova between 2010 and 2014 was analyzed. All the patients were divided in two lots according to the surgical treatment volume. 376 patients with typical interventions have been included in the first lot and 209 patients who underwent extended and combined surgical interventions made up the second lot. Lots were comparative after sex and age and differed after surgical intervention volume. Postoperative morbidity and lethality were higher in the second lot (2.9% vs. 9.1% and 1.6% vs. 8.1% $p < 0.05$). Postoperative complications were analyzed in order to elaborate prevention and treatment management.

Keywords: Stomach cancer, surgical treatment, extended and combined surgical interventions, postoperative morbidity management.

Cancer is one of the leading causes of mortality worldwide. In spite of decreasing morbidity of gastric cancer in the last decades, it remains high, being on the 4th place of cancer morbidity structure [1; 2, 1; 5, 394–400].

Surgical treatment in stomach cancer is considered the "gold standard". Surgery remains the only treatment with curative intent [3, 109–118]. Radical resections with negative margins and extended lymphadenectomy is the preferred surgical strategy in Eastern Asian Centers and most specialized Western Centers [2, 1; 4, 2–6].

Radical gastrectomy is indicated for resectable stage IB-III disease, although subtotal gastrectomy may be performed if a macroscopic proximal margin of 5.0 cm tumor-free can be achieved [3, 109–118; 5, 394–400]. Therefore, negative margins gastrectomy and adequate lymphadenectomy are the cornerstones of treatment of resectable gastric cancer.

Randomized trial by Italian Gastric Cancer Study Group did not demonstrate the survival benefit for D2 lymphadenectomy over D1, but the authors concluded that D2 lymphadenectomy may be a better choice for patients with advanced disease [6, 170–178; 7, 23–31].

Despite the fact that there has been an improvement in postoperative outcomes over the last two decades, complications rate is still high, also in extended surgical interventions [8, 2398–2408; 9, 863–871].

Postoperative morbidity after gastrectomy is higher in comparison with subtotal gastrectomy [2, 1; 4, 2–6; 10, 1–7].

Splenectomy and distal pancreatectomy provide higher rates of surgical complications and higher postoperative lethality.

D2 lymphadenectomy is associated with higher postoperative morbidity and lethality in comparison with typical surgical intervention.

The postoperative morbidity after gastrectomy is represented by acute pancreatitis, duodenal stump fistula, anastomotic leakage, pancreatic fistula, luminal or abdominal postoperative bleeding.

Bile duct injury is a rare complication, more frequently registered in laparoscopic interventions.

The aim of our study was to analyze the nearest surgical treatment results in stomach cancer patients who underwent extended and combined gastrectomies in order to elaborate a strategy of preoperative prevention of complications.

Material and methods

The data of 585 stomach cancer patients radically operated in Oncological Institute of the Republic of Moldova between 2010–2014 has been analyzed. Patients were divided in two lots according to surgical treatment volume: the first lot consisted of 376 patients who underwent typical surgical interventions and the second lot – of 209 patients with extended and combined operations. The statistical analysis was performed using Student index.

Results and discussion

Lots were comparable by sex (men – 60.1% and women – 58.9%), age (83.8% and 86.2% were older 50 years old) and tumor histopathology. Subtotal gastrectomy was performed in 219 cases, polar superior gastrectomy – in 13 cases and total gastrectomy – in 144 cases of the patients from the first lot. Postoperative morbidity was registered in 11 cases (2.9%) and lethality – 6 cases (1.6%)

In the second lot subtotal gastrectomy with D2 lymphadenectomy was performed in 24 cases, associated with splenectomy or colonic resection – in 33 cases. Total gastrectomy was performed in 124 cases: associated with D2 lymphadenectomy – in 22 cases, with splenectomy, distal pancreatectomy, colonic resection and more than three organs resection or removal – in 67 cases. 35 cases of total gastrectomy were performed through combined thoraco-abdominal access. Eleven patients underwent polar superior gastrectomy. Postoperative morbidity has been registered in 19 cases (9.1%), and lethality – in 17 cases (8.1%). In our study postoperative morbidity

after total gastrectomy was higher in comparison with subtotal gastrectomy (6.7% over 3.2%).

Our results confirmed literature data that splenectomy and distal pancreatectomy provide higher level of surgical complications and postoperative lethality.

In the first lot postoperative abdominal bleeding has been registered in one case and in the second lot – in two cases. Immediate relaparotomy was necessary to save patients.

Abdominal drainage and periodic amylase testing of the fluid from it was a good way for temporary diagnosis of acute pancreatitis and its evolution monitoring. Conservative treatment was successful, except for 5 cases (2.4%), which finished with exitus because of pancreonecrosis.

Postoperative pancreatic fistula as a result of pancreatic tissue scarification during D2 lymphadenectomy was observed in 11 cases (5.3%).

Chilous fistula after D2 lymphadenectomy was registered in 5 cases (2.4%). Temporary replacement of high loss volume of fluids permits to avoid hypovolemic syndrome and dyselectrolytemia, which usually lead to serious homeostatic disturbances.

The anastomotic leakage has been registered in 2 cases (0.9%). Primary peritonitis led to lethality outcome in 5 cases.

So, the results of our study permit to conclude:

1. The volume of surgical interventions essentially influences the nearest treatment results. Postoperative morbidity in typical surgical interventions was 2.9% while in extended and combined interventions was 9.1% ($p < 0.05$). The same trend were observed in postoperative lethality (1.6% versus 8.1%, $p < 0.05$).

2. Extended and combined surgical interventions were associated with postoperative acute pancreatitis, pancreatic fistula, anastomosis leakage, abdominal bleeding and peritonitis more frequently in comparison with typical surgical interventions.

3. Knowing the frequency of possible complications, postoperative algorithm of perioperative measures for their prevention and treatment was elaborated.

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Zakirov Nodir, PhD, ScD,
 Kevorkova Yulia,
 Kevorkov Amayak, PhD,
 Republican Specialized Center Of Cardiology,
 Tashkent, Uzbekistan
 Fazylbekova Zulfiya
 Tashkent Pediatric Medical Institute,
 Tashkent, Uzbekistan
 E-mail: amayak-kevorkov@mail.ru

DECREASED INITIAL LEVEL OF HEART RATE VARIABILITY AS A PREDICTOR OF POTENTIALLY MALIGNANT VENTRICULAR ARRHYTHMIAS AFTER MYOCARDIAL INFARCTION

Abstract: A retrospective analysis showed that in the group of patients with PMVA, registered at 6 months after the Q-MI, on the 10–14th day of the disease were observed more patients with reduced HRV and a lower average levels of SDNN, SDANN, RMSSD and pNN50 were noted. Therefore, there is reason to propose that in patients with a lower level of HRV in the early stages of the post-infarction period, the likelihood of developing PMVA at 6 months of treatment is higher than in patients with normal HRV.

Keywords: heart rate variability, potentially malignant ventricular arrhythmias, myocardial infarction

As it is known, mechanisms of sudden cardiac death (SCD) development in the overwhelming majority of cases (85%) are life-threatening ventricular tachyarrhythmias: ventricular tachycardia and ventricular fibrillation [1; 2]. There are many of indicators could be used for stratification of SCD risk [3]. Non-invasive indicators with the most studied prognostic value include the reduced left ventricular ejection fraction (LVEF), the duration of the QRS complex, the presence of the left bundle branch block, premature ventricular contractions (PVCs) of high grades according to Lown-Wolf (class II–V), decrease of heart rate variability (HRV), pathological changes in baroreflex [4–6]. The presence of several factors at the same time allows the doctor to refer the patient to the group of high or moderate risk of SCD, which determines the need for the most aggressive tactics of preventive measures.

It was found that in patients with or without a history of myocardial infarction (MI) and having heart failure, more often observed a decrease of physiological fluctuations of cardiac cycle's duration. It is assumed that such insensitivity to vegetative stimuli is associated with an increased risk of developing life-threatening arrhythmias in this category of patients [8].

Farrell TG et al [9] reported that in patients with history of MI, low HRV is a predictor of SCD and arrhythmic events. Similar data were obtained by Odemuyiwa O. et al [10], Cripps TR et al [11], Pedretti R. et al [12]. The authors showed that the relative risk of SCD was seven times higher in postinfarction patients with low HRV and found that HRV is more significantly associated with subsequent arrhythmic events than other prognostic factors, like EF or ventricular arrhythmias (VA) and independently predicts arrhythmic death.

Due to postinfarction myocardial remodeling is a dynamic process, in our opinion, for the most accurate risk-stratification of patients with history of MI it is important to identify the causal relationship between the predictors already in the early stages of the disease.

Therefore, the **purpose** of this research was to study the baseline level of HRV in patients with potentially malignant ventricular arrhythmias (PMVA) developed 6 months after acute Q-MI.

Materials and Methods:

A retrospective study included 96 male patients aged between 29 and 73 years (mean age 51.78 ± 9.05 years) surviving 6 months after acute Q-MI. The diagnosis of AMI was made in accordance with the criteria of the European Society of Cardiology (ESC, 2012) [6].

Patients with sinoauricular blockade, atrioventricular blockade of II–III degree, with absence of stable sinus rhythm (in case of supraventricular tachyarrhythmias, nodal rhythm, frequent PVCs), with repeated MI or non-Q wave myocardial infarction, patients with hyperthermia, as well as with concomitant diseases significantly altering HRV (diabetes mellitus, hypo- or hyperthyroidism, alcoholism, severe respiratory, renal or hepatic insufficiency, oncological diseases, etc.) were not included into the study.

All patients underwent ECG Holter monitoring (ECG HM) by CardioSens+ system (XAI-MEDICA, Ukraine) with assessment of ventricular arrhythmias and HRV. Patients were monitored in normal conditions, without any additional restrictions. The examination was performed on the 10–14th day of the disease and after 6 months of treatment with standard therapy including antiplatelet agents, beta-blockers, ACE inhibitors or ARA II, statins at individually selected doses, nitrates (if necessary), and amiodarone (if necessary in patients with PMVA). As PMVA were considered PVCs of III–V grades (Lown-Wolf), as well as 10 or more PVCs per hour (Bigger). Depending on the presence of PMVA at the 6th month of treatment all patients were divided into 2 groups. Group I (n = 54) consisted of patients without PMVA, Group II (n = 42) – patients with PMVA (table 1).

The following time indices of HRV were recommended by the “Standards of Measurement, Physiological Interpretation and Clinical Use of Heart Rate Variability” [7]: SDNN – the standard

deviation of the normal RR (NN) intervals characterizing HRV as a whole; SDANN – the standard deviation of the mean RR intervals counted for every consecutive 5-minute time periods for the entire ECG record and serves to estimate the low-frequency components of the HRV; RMSSD is the square root of the mean squares of the differences in the values of successive pairs of RR (NN) intervals, characterizing the high-frequency components of the HRV; pNN50 is the percentage of consecutive RR (NN) intervals, the difference between which is greater than 50 ms. As a decrease in the total HRV, a reduction of SDNN \leq 100 msec was assumed.

Interpretation of HRV parameters was made in accordance with the Standards of measurement, physiological interpretation, and clinical use (European Society of Cardiology and The North American Society of Pacing and Electrophysiology, 1996). Differences were considered significant for $p < 0.05$.

Results and discussion:

As it can be seen on Table 1, there were no differences between patients of both groups by main characteristics. PMVA were registered during the initial examination in 35.2% of patients of Group I and in 45.2% patients of Group II ($p = 0.15$).

Table 1. – Clinical characteristics of patients

Parameters	Group I (n = 54)	Group II (n = 42)	χ^2	p	All examined patients(n = 96)
Age	51.76 \pm 8.20	51.79 \pm 9.73		0.98	51.78 \pm 9.05
Localization of MI					
frontal	32 (59.3%)	23 (54.8%)	0.20	0.65	55 (57.3%)
rear	22 (40.7%)	38 (45.2%)			41 (42.7%)
Arterial hypertension	44 (81.5%)	38 (90.5%)	1.53	0.21	82 (85.4%)
EPIA	22 (40.7%)	12 (28.6%)	1.53	0.21	34 (35.4%)
PMVA	19 (35.2%)	19 (45.2%)	1.0	0.32	38 (39.6%)
Thrombolysis	7 (12.9%)	3 (7.1%)	0.86	0.35	10 (10.4%)

In accordance with the purpose of the study, in individuals with PMVA occurred at 6 months after the acute Q-MI a retrospective analysis of the baseline HRV level features, was performed. In Group I, fewer patients with lowered HRV were observed at the 10–14th day of Q-MI than in Group II – 26 (48.2%) vs 22 (52.4%),

but these differences were not significant ($\chi^2 = 0.17, p = 0.68$). The mean values of all HRV values assessed in Group I of patients were higher than in Group II, but the differences also did not reach reliability (Table 2).

Table 2. – HRV parameters in compared groups

HRV parameters	Group I (n = 54)	Group II (n = 42)	p
SDNN, msec	104.38 \pm 30.34	94.85 \pm 26.30	0.11
SDANN, msec	94.33 \pm 27.88	84.47 \pm 24.80	0.07
RMSSD, msec	23.3 \pm 11.32	20.16 \pm 8.07	0.13
pNN50,%	5.0 \pm 6.08	3.16 \pm 4.36	0.10

Currently, the definition of HRV is recognized as the most informative non-invasive method for the quantitative assessment of vegetative regulation of heart rhythm. For prognosis, it is expediently to determine HRV not earlier than one week after the development of MI, since in the early days, a prognostic assessment is impossible due to multidirectional changes in vegetative activity [5, 7]. Following this principles, our study was performed on the 10–14th day, after Q-MI against the background of the relative stabilization of the patient's condition.

According to the results of our study, in contrast to Farrell TG [9], Odemuyiwa O. [10], Cripps TR [11], Pedretti R. [12] there was only a trend in the relationship of the initially reduced level of HRV with the subsequent development of PMVA. It should be noted that the protocols of these studies differed from our protocol by inclusion of a larger number of patients and longer follow-up periods. In addition, there was a significant difference in clinical characteristics of patients. So, in particular, in the Cripps TR study the analysis was performed in 177 patients who survived a clinical death or had a symptomatic stable ventricular tachycardia, which indicates the initially significantly more pronounced electri-

cal instability of the myocardium in the studied group of patients in compare with our patients. At the same time, the follow-up period averaged 16 months [11]. The tasks of our study did not include the analysis of the effect of basic therapy on dynamics of the studied indicators, although it is known, in particular, that beta-blockers are capable of independently influence on the level of HRV. It is possible that the heterogeneity of patients by this parameter also determined the nature of the obtained results. Nevertheless, an attempt was made to make an objective assessment of the relationship between the baseline level of HRV and the development of PMVA at 6 months after Q-MI.

Thus, a retrospective analysis showed that in patients with PMVA registered after 6 months after MI, a lower level of SDNN, SDANN, RMSSD and pNN50 was observed on the 10–14th day of the disease. Therefore, there is reason to propose that in patients with a lower level of HRV in the early stages of the post-infarction period, the likelihood of PMVA developing at 6 months of treatment is higher than in patients with normal HRV. It should be noted that the average level of SDNN in Group II was <100 msec, which generally corresponds to modern criteria, although a number of authors

for the decreased HRV take SDNN < 70 msec and even < 50 msec, which could also affect the difference between the results of the previous studies and our results. In addition, in our study was conducted a retrospective analysis of patients who survived 6 months after

Q-MI and it naturally not included deceased patients and patients with developed recurrent MI during the follow-up period. Probably, such patients had an initially decreased HRV, which also affected the difference in the obtained results.

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*Tilliashaykhov Mirzolib Nigmatovich,
Director of Republican Specialized Scientific
and Practical Medical Center of Oncology and Radiology,
Republic of Uzbekistan*

*Zakhirova Nargiza Nematovna,
Leading Researcher of Republican Specialized Scientific
and Practical Medical Center of Oncology and Radiology,
Republic of Uzbekistan
E-mail: evovision@bk.ru*

COMPARATIVE CHARACTERISTIC OF EXPRESSION OF ANTIGENS OF IMMUNOGISTOCHEMICAL PROFILE IN UTERINE CERVICAL CANCER

Abstract: The most prognostic significance had the proliferative activity (the proportion of Ki-67-positive cells), since an increase of this index by 1 unit decreased overall survival observed in 0.9884 times. Multivariate analysis of the cumulative impact of the studied oncogenes on overall survival observed in view of the degree of spread of the tumor process has allowed to develop a formula for calculating the risk of disease progression in a specific clinical observations.

Keywords: cervical cancer, cancer markers, Ki-67, p53, Bcl-2, immunohistochemistry.

The relevance of research. For many years, it is the second most frequent among malignant neoplasms of reproductive system organs in women. In the structure of oncologic pathology in the world, cervical cancer accounts for 15%, and mortality 8% [3]. Despite the successes achieved in the diagnosis and treatment of cancer of this localization, there is an increase in morbidity and an increase in the aggressiveness of the disease [1].

At present, much attention is paid to the study of the influence of the level of expression in tumors of a number of antigens (Ki-67, p53, cyclin E, p150, metalloproteinase and other factors of proliferative activity, apoptosis, angiogenesis, etc.) Cervical cancer [2].

One of the most studied indices of tumor growth aggressiveness is cell proliferation, which can be assessed with the help of the mitotic index and the level of Ki-67 expression. The latter is a nuclear antigen expressed in all phases of the cell cycle, except for G0 and the early stages of the G1 phase. The proliferative index for various tumor localization serves as an independent prognostic indicator of the occurrence of relapse, general and disease-free survival, and also a predictive factor for determining sensitivity to chemo- and radiotherapy.

However, the significance of the evaluation of immunohistochemical markers remains relatively unexplained relative to cervical cancer, a consensus opinion on the prognostic role of Ki-67, Her2/neu, Bcl-2, p53 expression and its combination with other clinical and morphological features of the tumor has not been obtained [7; 8; 10].

The purpose of this study is to study the prognostic significance of the expression profile of a number of antigens in patients with cervical cancer.

Material and methods. A histological study and study of the expression of immunohistochemical markers Ki-67, Her2/neu, Bcl-2 and p53 in tumor tissue in 30 women with cervical cancer was carried out. All patients underwent a clinical and instrumental examination.

A regression and stratified regression analysis of Cox proportional hazards was used to assess the effect of potential risk factors for a time to the detection of disease progression [9]. One-time events were taken into account according to Braslow. Assessment of the significance of the influence of the risk factor on the overall observable survival (STV) was performed with the help of Wald's statistical analysis. The significance of the model was determined by the method of maximum likelihood.

The results obtained and their discussion. A low level of Ki-67 expression was detected in 10 (33.3%), intermediate – in 8 (26.7%), high in –12 (40.0%) patients. At the same time, a low level of proliferative activity of the Ki-67 tumor was diagnosed in 2 women with stage I cervical cancer, in 5 patients in stage II, and in 3 in stage III. A moderate level was noted in 4 observations at the 1st stage, in 3 – at the II stage, in 5 – at the III stage.

High antigen expression was detected in 2 patients with stage I cervical cancer, in 4 patients with stage II, in 2 patients with stage III ($p < 0.05$).

The average value of the Ki-67 level at the first stage of the disease was $23.03 \pm 0.52\%$, at II – $52.94 \pm 34.5\%$, at III – $44.81 \pm 34.17\%$ ($p < 0.05$). The statistical significance of the differences between the mean value of Ki-67 expression in patients with I and II, I and III stages of the disease ($p < 0.05$), as well as the absence of significant differences between the mean value of the marker in the II and III stages of the disease ($p > 0.05$).

A low level of expression of mutant p53 protein was diagnosed in 10 (33.3%), moderate – in 8 (26.7%), high – in 12 (40.0%) women. A low p53 ex-press was observed in 9 patients with stage I cervical cancer, 11 in stage II, and 10 in stage III. A high level of mutant p53 protein was detected in 1, 13 and 16 patients ($p < 0.05$), respectively.

The mean p53 level at the first stage of the disease was $6.03 \pm 13.42\%$, at II – $36.58 \pm 34.53\%$, at III – $53.08 \pm 32.21\%$

($p < 0.05$). The statistical significance of differences between the mean p53 expression in women with I and II, I and III disease stages ($p < 0.05$), and the absence of significant differences between the average marker level in stage II and III cancer ($p > 0.05$). Evaluation of the expression of the anti-apoptotic antigen Bcl-2 showed that a low level of expression was found in 27 (90%), moderate in 2 (6.7%), and high in 1 (3.3%). A low level of Bcl-2 oncoprotein was diagnosed in 11 patients with stage I cervical cancer, 27 in stage II, and 22 in stage III. Moderate and high expression of tissue antigen was found in patients with II (3 and 1 cases) and stage III disease (3 and 1 cases), respectively ($p < 0.05$).

The average value of the Bcl-2 antigen level in the 1st stage of the disease was $0.72 \pm 0.91\%$, at II- $6.81 \pm 16.38\%$, at III- $10.54 \pm 15.65\%$ ($p < 0, 05$). The statistical significance of differences between the mean values of expression of Bcl-2 in cervical canal I and II, I and III stages of the disease ($p < 0,05$), and the absence of significant differences between the mean value of the tumor marker at II and III Stages of cervical cancer ($p > 0.05$).

Expression of the oncoprotein HER2/neu was not detected in 16 (53.3%) people. Low antigen expression (score 1 “+”) was established in 7 (23.3%), moderate (score “2 +”) – in 7 (23.3%), over-

expression (score “3 +”) – in 7 (23.3%) of patients. A low level of expression of the tumor antigen HER2/neu score “+” was found in 2 women with stage I cervical cancer, in 3 – in stage II, in 5 – in stage III, score “2+” – in 10, 2 and 4 people, Score “3+” – in 4, 1 and 1 observations, respectively ($p > 0.05$).

5-year-old overall observed survival (OOS) of patients with cervical cancer of the first stage in the study group was 94.9% [95% confidence interval (CI) = 88.2–100], at II 62.8% [95% CI = 46, 8–84.3], with III – 32.1% [95% CI = 15.4–67.2] ($p < 0.001$).

In women diagnosed with stage I and II cervical cancer, the median time of life was not attained, and at stage III of the disease it was 31 months [95% CI = 13-ND1], at IV – 9.5 months [95% CI = 5-ND] ($p < 0.001$). In general, the group median time of life of patients was not achieved.

Table 1 presents the results of a multifactor analysis of the predictive role of the expression of the studied oncogenes without taking into account the influence of the spread of the tumor process on the OOS. The most significant was proliferative activity according to the Ki-67 label, since with the increase of this indicator by 1 unit, the OOS decreased by 0.9884 times, $pWald = 0.088$.

Table 1. – Regression analysis of Cox proportional risks in patients with the studied expression of Ki-67, p53, Bcl-2, Her2/neu, taking into account the prevalence of cervical cancer

Parameter	Calculated values			
	Coefficient	Relative risk	95% ΔИ	pWald
Ki67	0,9884	1,01	0,975–1,022	0,0888
p53	0,9967	1,003	0,989–1,018	0,6466
Bcl-2	1,0185	0,99	0,947–1,018	0,321
Her2/neu	0,778	1,29	0,810–2,041	0,2871

Table 2 OOS contains the coefficients obtained as a result of a multifactor analysis of the effect of the oncogenes studied on the, taking into account the extent of the spread of the tumor process.

Then, by substituting the values of the coefficients, the risk of progression to cervical cancer was calculated for each of the patients who underwent immunohistochemical examination.

Table 2. – Results of Cox proportional risk regression analysis in patients with current expression of Ki-67, p53, Bcl-2, Her2/neu

Parameter	Calculated values				
	Coefficient for formula	Coefficient	Relative risk	95% ΔИ	pWald
II stage	2,679701	0,06856	14,6	3,0477–69,757	< 0,0008
III stage	3,255491	0,038	25,9	5,2424–128,279	0,0005
Ki67	-0,011261	0,9888	1,014	0,9756–1,002	0,0999
p53	0,002478	0,9975	1,003	0,9886–1,017	0,7276
Bcl-2	-0,017271	1,0174	0,98	0,9480–1,019	0,3491
Her2/neu	0,266996	0,7657	1,31	0,8249–2,068	0,2547

The value of the risk factor for progression at the first stage cervical cancer ranged from 0.06 to 1.169 (mean 0.369). In the case of death, it varied from 0.387 to 0.831 and averaged 0.645.

Conclusion. Expression of markers Ki-67, p53, Bcl-2 in combination with the degree of tumor spread serves as a prognostic criterion for cervical cancer.

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Zufarov Mirjamol Mirumarovich,
 Babadjanov Sandjar Abdumuratovich,
 Im Vadim Mukhasanovich,
 JSC "Vakhidov s Republican specialized center of surgery",
 Endovascular surgery and cardiac arrhythmias department,
 Uzbekistan
 E-mail: im-vadim@mail.ru

ASSESSMENT OF APICAL VERSUS SEPTAL RIGHT VENTRICULAR PACING IN PATIENTS WITH COMPLETE ATRIOVENTRICULAR BLOCK

Abstract: The article presents data on the study of right ventricular apical pacing (RVAP) and right ventricular septal pacing (RVSP) in patients with complete atrioventricular block. It was found that RVSP is more physiological compared with RVAP.

Keywords: atrioventricular block, cardiovascular diseases, heart failure, pacemaker.

Cardiac pacing is considered as single effective method of treatment of symptomatically bradycardia. Despite much progress in this field, optimal position for right ventricle (RV) pacing is not defined. The most common practice is to place the lead in the right ventricle apical (RVA) position, where it is generally straightforward to implant, safe and effective to pacing [1].

Studies up to date showed that right ventricular apical pacing (RVAP) developed adverse effects on cardiac pump function. In one study was found out, that pacing site affects left ventricle (LV) mechanical synchrony [2]. During RVAP electric impulse spreads in myocardium passing over His-bundle, that leads to deformation of QRS complex as left bundle branch block pattern [3]. First activates the right side of ventricular septum (VS), then after RV depolarization, activation front reaches LV [4]. LV free wall contracts after VS contraction, that leads to worsen of LV systolic function [5]. Increasing interventricular dyssynchrony results LV systolic and diastolic dysfunction, and, as it follows, heart failure (HF) development [6; 7].

Pacing alternatives to RVAP are numerous: medial septum, lower septum, right ventricular outflow tract, His-bundle and para-His pacing [8; 9]. Studies to date have demonstrated superior outcomes of RVSP

compared with RVAP [10; 11; 12], more synchronous activation of myocardium, that presents as shorter QRS duration [13]. Conversely, another studies reported that was a small difference between RVAP and RVSP despite more synchronous contraction of LV [14; 15].

Aim: The objective of the research is to assess effects of RVAP and right ventricular septal septum pacing (RVSP) to structure and function of heart in patients with complete atrioventricular (AV) block.

Materials and methods. Eighty five patients with complete atrioventricular block and normal cardiac function at baseline and underwent implantation of a permanent pacemaker system JSC "Vakhidov s Republican specialized center of surgery" between January 2015 and June 2017 were retrospectively studied in this comparative analysis. Excluding criteria were atrial fibrillation (AF), myocardial infarction, advanced HF, QRS complex duration >120ms, hemodynamically significant heart defects. All patients were divided into 2 groups: 46 RVAP patients and 39 RVSP patients. There was no significant difference regarding age, sex, rates hypertension, diabetes mellitus, and/or heart failure, ischemic heart disease between both groups (Table 1). The mean follow-up duration was 1.4 ± 0.2 years.

Table 1. – Clinical characteristics of patients

Indexes	RVAP group (n = 46)	RVSP group (n = 39)	P value
Age, y \pm SD	65.1 \pm 5.3	66.0 \pm 7.2	p < 0.05
Sex, male/female	29/17	23/16	p < 0.05
HTN, n (%)	18 (39.1)	17 (43.5)	p < 0.05
HF I, n (%)	28 (60.8)	24 (61.5)	p < 0.05
HF II, n (%)	9 (19.5)	7 (17.9)	p < 0.05
DM, n (%)	9 (19.5)	8 (20.5)	p < 0.05
IHD, n (%)	31 (67.3)	26 (66.7)	p < 0.05
DDD, n (%)	20 (43.4)	18 (46.1)	p < 0.05
VVI, n (%)	26 (56.6)	21 (53.9)	p < 0.05
% of ventricular pacing	> 50%	> 50%	p < 0.05

HTN, hypertension; IHD, ischemic heart disease; DM, diabetes mellitus; HF, heart failure; DDD, dual chamber pacemaker; VVI, ventricular demand pacing; RVAP, right ventricular apical pacing; RVSP, right ventricular septal pacing.

All implantations were performed in a sterile manner under local anesthesia in catheterization laboratory. In the RVAP group im-

plantation of electrode was performed with standard method. In the RVSP group active helix electrodes were positioned against the

middle septum using curved stylet. The RVSP position was confirmed if the tip of the electrode directed to the spine in 45°C to the left anterior oblique view using fluoroscopy. The aim was shortest duration of QRS complex and adequate pacing parameters (pacing threshold, sensitivity and electrode impedance).

Postoperative follow-up included ECG, echocardiography, pacing parameters assessment.

ECG measurements included pacing assessment, QRS complex values, other arrhythmias presentation.

Echocardiographic examination was performed with the M-mode technique included heart chambers, interventricular septum thickness, LV posterior wall thickness (LVPWT), LV end-diastolic diameter (LVEDd), LV end-systolic diameter (LVESd), LV end-diastolic volume (LVEDV), LV end-systolic volume (LVESV), LV ejection fraction (LVEF) measurement.

Statistical analyses were performed using the computer program Excel 2010 (Microsoft, USA), Statistica 7.0 (StatSoft Inc., USA). Continuous data were expressed as $M \pm SD$. Categorical data were summarized as frequencies and percentages, which were analyzed using the chi-square test. For quantitative data Student *t* test analysis was used. A *p* value < 0.05 was deemed statistically significant.

Results and discussion. There was no statistical difference in follow-up duration. All patients received medical therapy. 25 (54.3%) patients with RVAP, and 9 (23.0%) patients in RVSP group had new onset of AF. QRS duration was similar in both groups before operation. At the end of follow-up QRS complex increased compared with both baseline levels. In RVSP group it increased from 102.1 ± 9.7 to 146.3 ± 15.2 ms, but significantly shorter than in RVAP group from 102.3 ± 10.1 to 165.1 ± 17.7 ms ($p < 0.05$) (Table 2).

Table 2. – QRS complex changes during follow-up, $\mu \pm \sigma$ (ms)

Indexes	RVAP group (n = 46)			RVSP group (n = 39)			p value
	Initial	Final	p value	Initial	Final	p value	
QRS complex duration, ms	102.1 ± 9.7	146.3 ± 15.2	$p < 0.05$	102.3 ± 10.1	165.1 ± 17.7	$p < 0.05$	$p < 0.05$

RVAP, right ventricular apical pacing; RVSP, right ventricular septal pacing.

Echocardiography was performed for assessment of cardiac structure and function before and after pacing. In RVAP group LVEDV increased (from 150.1 ± 16.5 to 167.2 ± 19.8 ml, $p < 0.05$), LVESV (from 61.1 ± 20.6 to 67.3 ± 27.9 ml, $p < 0.05$), LVEF decreased (from 52.1 ± 5.6 to $49.3 \pm 3.7\%$, $p < 0.05$). In RVSP group these indexes showed a few positive changes, LVEDV de-

creased (from 140.1 ± 18.3 to 135.6 ± 15.4 ml, $p < 0.05$), LVESV (from 53.2 ± 32.5 to 50.3 ± 25.7 ml, $p < 0.05$), LVEF increased (from 51.2 ± 4.7 to $53.1 \pm 5.4\%$, $p < 0.05$) (Table 3). Other echocardiographic indexes displayed no significant changes in both groups (Table 3).

Table 3. – Echocardiographic changes during follow-up, $\mu \pm \sigma$ (mc)

Indexes	RVAP group (n = 46)			RVSP group (n = 39)			p value
	Initial	Final	p value	Initial	Final	p value	
LA, cm	4.3 ± 0.8	4.5 ± 0.9	$p < 0.05$	4.4 ± 0.7	4.4 ± 0.9	$p < 0.05$	$p < 0.05$
LVESd, cm	3.3 ± 0.6	3.1 ± 0.8	$p < 0.05$	3.2 ± 0.7	3.3 ± 0.7	$p < 0.05$	$p < 0.05$
LVESV, ml	61.1 ± 20.6	67.3 ± 27.9	$p < 0.05$	53.2 ± 32.5	50.3 ± 25.7	$p < 0.05$	$p < 0.05$
LVEDV, ml	150.1 ± 16.5	167.2 ± 19.8	$p < 0.05$	140.1 ± 18.3	135.6 ± 15.4	$p < 0.05$	$p < 0.05$
LVEDd, cm	4.8 ± 0.8	4.5 ± 0.9	$p < 0.05$	4.6 ± 0.8	4.9 ± 1.0	$p < 0.05$	$p < 0.05$
LVEF,%	52.1 ± 5.6	49.3 ± 3.7	$p < 0.05$	51.2 ± 4.7	53.1 ± 5.4	$p < 0.05$	$p < 0.05$
RV, cm	3.6 ± 0.4	3.4 ± 0.6	$p < 0.05$	3.5 ± 0.5	3.7 ± 0.6	$p < 0.05$	$p < 0.05$

LA, left atrium; LVESd, left ventricular end-systolic diameter; LVESV, left ventricular end-systolic volume; LVEDV, left ventricular end-diastolic volume; LVEDd, left ventricular end-diastolic diameter; LVEF, left ventricular ejection fraction; RV, right ventricle; RVAP, right ventricular apical pacing; RVSP, right ventricular septal pacing

Consequently, results of this study demonstrate that RVSP is associated with fewer adverse effects on LV function compared with RVAP due to more physiological electric activity sequence. Our findings are not contrary to other studies results. Studies investigated acute and long-term effects of RVSP demonstrated less ven-

tricular dyssynchrony is present compared to RVAP [10; 11; 12] and the QRS duration is shorter and the LVEF is greater [16].

In conclusion, RVSP maintains more physiological conduction of electric impulse in myocardium and shows fewer adverse effects on cardiac function compared with RVAP.

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*Iskandarova Shakhnoza Tulkinovna,
Professor of the Tashkent Pediatric Medical Institute*

*Mamatkulov Ihtiyor Basimovich,
Assistant of the Tashkent Pediatric Medical Institute*

E-mail: mbshakur@mail.ru

THE HISTORY OF PEDIATRIC ANESTHESIOLOGY AND REANIMATION DEVELOPMENT IN UZBEKISTAN

Abstract: Development of children's anesthesiologic reanimation medical help in the Republic occurs in compliance with the planned formation with indicated quite positive shifts in equipment, reconstruction, proliferation, and providing effective help. Though without the knowledge of history of the development of the service, it is difficult to imagine great success, achievement of which promoted improvement of its role in the provision of specialized emergency medical help.

Keywords: history, anesthesiology-reanimation and intensive care pediatric units, children, emergency care.

At the modern stage of the development of medical science health and life of a patient depend not only on time of medical aid, but also the quality of the help and, what is especially important, specificity of it. That is why implementation of the principles of anesthesiology and reanimation to the practice of medical facilities lead to profound changes in the provision of pre-hospital and hospital medical aid to population.

The objective. To enlighten the formation and development of anesthesiology and reanimation in Uzbekistan, and scientific analysis of the success and disadvantages in this sphere.

Materials and methods. Basic source of the articles was archive materials, scientific works of famous researchers anesthesiologists and reanimatologists, and conversations with them.

Results and discussion. Anesthesiology as a service started developing in Uzbekistan since the end of 1950-s and beginning of 1960-s of the XX century. In 1962 in the Republic there were only 21 doctors anesthesiologists, seven of whom were surgeons at the same time, and 20 nurses.

Some intensification in the organization of anesthesiology and reanimation service started in 1966 after the order № 287 of the Ministry of Health of the former Soviet Union. The number of doctors then was 72 and Center of terminal states with 20 beds was opened in Tashkent.

In 1968 at the Tashkent Urban Station of Emergency Medical Aid (SEMA) a specialized substation was organized, where three teams (out of ten) worked on terminal states.

The basic milestone in the development of anesthesiology reanimation and specialized medical help, which played a crucial role, was the order of the Minister of Health of the former Soviet Union № 605 dated 19.08.1969, the aim of which was profound reconstruction of the work of medical-prophylactic system in the Republic. In compliance with the order a plan of actions was worked out for the development of anesthesiology and reanimation in the regions and cities, and it was confirmed by the order № 15 of the Minister of Health of Uzbekistan from the 8th of January, 1970 where it was said to equip anesthesiology and reanimation units with necessary apparatus and instruments, while the Human Resources of the Ministry of Health of Uzbekistan was ordered to provide training of doctors and subordinate medical personnel for the units of anesthesiology and reanimation.

The first children's reanimation unit with 15 beds was founded in 1972 at the base of the Second Republican Clinic of the MH of the RUz, which was an academic base of Tashkent State Medical Institute. The second children's reanimation unit with 12 beds was opened in January 1973 in the 14th urban hospital. The last one was the base of Middle Asian Medical Pediatric Institute (MAMPI).

From year to year there was gradual improvement of the quality of children's reanimation units operation. Thus, while in the urban children's clinic in 1972 the rate of reanimation unit efficacy was equal to 86%, in 1973 it was 96%. The unit was equipped by the necessary instruments of the time, using various kinds of inhalation and non-inhalation narcosis, and performing care of surgical patients and children.

Development of anesthesiologic help in the Republic promoted the implementation of some kinds of endotracheal narcosis with application of neuroleptic and analeptic means, anesthesia of delivery with the help of nitrogen peroxide, minor obstetric surgeries with general anesthesia (sambrevin) and others for abdominal surgery in the practice of delivery facilities. Planning of organization of a specialized anesthesiologic transfusion team in Tashkent provided improvement of the help in case of hemorrhagic shock, terminal states, and resuscitation of new-born babies in delivery facilities.

In March 1972 due to epidemic of meningococcal infection in the first infectious hospital there was opened a reanimation room with 4 beds where qualified specialists worked day-and-night shifts. That provided decrease of lethality rate from 25% to 6–7%.

In 1973 in Uzbekistan there were 30 anesthesiologic reanimation groups serving the wards of intensive therapy in urban and large central regional clinics.

The total number of anesthesiological reanimation teams in 1974 in the Republic was 267, i. e. it increased 2.5 folds in comparison to the value of 1969. Within 1973 beds of reanimation units were occupied by 2053 patients who spent 23100 days there. Average term of staying in bed was equal to 11.25 days. Hospital lethality rate was equal to 21.1%.

As it was noted before, teams working on terminal states, including children's, were created for the first time in 1963 at the SEMA specialized substation in Tashkent. Within 1973 SEMA teams served 6604 calls, and that was 19% of the total number. Besides that, in various areas there were reanimation teams

functioning, which totally worked on 34128 calls for 1974. Specialized reanimation teams were equipped by the following apparatus: KI-3M, DP-2, RP-2, electrical drainages, knife drainages, apparatus for the direct blood transfusion, sterile means for hem transfusion, defibrillators for new-born children, "Salut" and "Rocket" ECG-apparatus, electrical manometers, etc.

Ministry of Health of Uzbekistan paid great attention to the training of reanimatologists and anesthesiologists, both in Tashkent Institute of Advanced Studies for doctors (TIAS) and local bases with the help of Central Institute of Advanced Studies for doctors (Moscow). In 1971 TIAS course for senior lecturers was reorganized to the department of Anesthesiology and Reanimation, where besides two long-term cycles there was a long 1.5 months cycle on anesthesiology-reanimation for specialized teams of SEMA.

Within the period from 1965 to 1979 one hundred and thirteen specialists were trained (in 1970 –25; 1971–20; 1972–20; 1973–38). The number of doctors was in 1969 –75; 1970–124; 1971–160; 1972–215 respectively. On the 1st January 1974 two hundred and eighty anesthesiologists-reanimatologists worked at 356 staff positions.

Equipment with modern apparatus improved within 5 years. Thus, while in 1969 there were no apparatus at all, in 1973 there were 40: polynorcones 22 (1969), (1969 r), (1969–20), RO-48 (1969–3), narcosis apparatus "Khirana" (1969–6), cardiomonitors –2 (1969–0), Micro Astrups (1969–0).

Ministry of Health of Uzbekistan continued to work on further improvement of anesthesiology-reanimation service in the republic and a great contribution was made by specialists of the Central Institute of advanced Studies for doctors (Moscow), Moscow clinics, Scientific Research Institutes (seminars held by Professors V.I. Sachkov, U.N. Shanin in Bukhara and Samarkand).

Together with the achievements in the organization of anesthesiology-reanimation service in the Republic there were significant disadvantages and shortcomings revealed by the Ministry of Health of Uzbekistan in December 1973 and January 1974 when execution of the order № 605 was checked in all regions, and commission check outs of the Ministry of Health in 1972–1974. These shortcomings were subject to discussion of the meeting of the Ministry of Health in February 1974. The main shortcoming was the fact that many reanimation beds were not united in common reanimation units yet.

Unfortunately, significant number of small clinics (average capacity of CRC – 196 beds, 44 beds) in the Republic did not allow to

develop reanimation service and open independent units in compliance with the order № 605.

Besides, the qualification of anesthesiologists-reanimatologists was not sufficient, especially in children's facilities. The equipment of the units stayed insufficient.

For the further improvement of anesthesiologic-reanimation service in the Republic the Ministry of Health performed the following actions:

1. Maximal centralization of the doctoral staff and increase of the number of reanimation beds in common specialized units of multi profile clinics, where all necessary apparatus are concentrated.

2. Equipment of the existing reanimation units and centers by modern apparatus and instruments, paying attention to children's and delivery facilities.

3. For the further separation of the work in April 1978 reanimation center was moved to the base of the 1st urban clinical hospital of Tashkent city, where TIAS was located.

4. In compliance with the order № 969 dated 06.12.1974 three departments of Anesthesiology and Reanimation were organized in Tashkent, Andijan, and Samarkand medical institutes.

5. Training on the subject "Anesthesiology-reanimation" was organized in clinical internship.

6. A special attention was paid to specialization and improvement of the qualification of children's doctors anesthesiologists-reanimatologists.

7. The quality of the work in specialized reanimation teams of SEMA was improved, together with the increase of their number, especially pediatric ones.

8. Improvement of sanitary propaganda among organized population on self care and help to others in cases of accidents.

9. In 1975 there was Republican Conference on the problem of Anesthesiology-reanimation.

In 1980 Ministry of Health of Uzbekistan asked the Ministry of Health of USSR to assist in the salvation of the following problems:

1. To organize department of Anesthesiology-reanimation in Middle Asian Pediatric Institute due to high rate of children's mortality.

2. To organize centralized children's reanimation units in regional clinics taking into account the total number of children's beds.

3. To equip the units with the following apparatus: narcosis apparatus (Polynarcone-85, Narcom-«P»-100, Khirana-10), respiratory apparatus (RO-2–30, RO-5–15), etc.

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Muminov Shovkat Kadirovich,
Tashkent Pediatric Medical Institute, Faculty assistant
E-mail: mbshakur@mail.ru

STRUCTURAL-FUNCTIONAL VALUES OF THE LEFT CHAMBERS OF HEART IN THE ASPECT OF THE CONTRAST INDUCED NEPHROPATHY

Abstract: This research demonstrated that echoCG predictors of contrast induced nephropathy in patients with stable forms of ischemic heart disease were chamber dilatation (136 ml) and increase of the index of the left ventricle regional contractibility disorder (up to 1.2 points and above), decrease of E/A ratio of tissue dopplerogram of the lateral margin of mitral ring to 0.7 rel. units and less. In spite of the improvement of the index of regional contractibility disorder and the index of the left ventricle sphericity, after roentgen contrast endovascular procedures in the group of contrast induced nephropathy of the patients with ischemic heart disease there was more significant deterioration of the structural-functional characteristics of the left ventricle myocardium, which displayed in the increase of the value of systolic myocardial tension, decrease of ejection fraction, and increase of the degree of diastolic dysfunction, proving the toxic effect of contrast preparation not only in kidneys, but also in myocardium.

Keywords: ischemic heart disease, contrast induced nephropathy, cardiotoxicity of contrast media, structural and functional features of the left heart.

This research demonstrated that echoCG predictors of contrast induced nephropathy in patients with stable forms of ischemic heart disease were chamber dilatation (136 ml) and increase of the index of the left ventricle regional contractibility disorder (up to 1.2 points and above), decrease of E/A ratio of tissue dopplerogram of the lateral margin of mitral ring to 0.7 rel. units and less. In spite of the improvement of the index of regional contractibility disorder and the index of the left ventricle sphericity, after roentgen contrast endovascular procedures in the group of contrast induced nephropathy of the patients with ischemic heart disease there was more significant deterioration of the structural-functional characteristics of the left ventricle myocardium, which displayed in the increase of the value of systolic myocardial tension, decrease of ejection fraction, and increase of the degree of diastolic dysfunction, proving the toxic effect of contrast preparation not only in kidneys, but also in myocardium.

For many years IHD and its complications stay to be leading cause of death among adult population in the world, conditioning 7.2 mln deaths a year. That guaranteed topicality of the searching for the salvation of the problem of radical treatment of IHD [1]. 1958 was the start of new era of implementation of roentgen contrast endovascular procedures (CEP) [2]. It is interesting that in the same year the first selective coronary angiography done to Mason Sons from Cleveland clinic was complicated by the development of ventricular fibrillation [3], and it made the history of intervention cardiology development to be the history of the study of unfavorable effects of contrast substance application. Though, the intervention cardiology, including balloon angioplastics, implantation of stents of various design, application of rot ablaters and intravascular lasers [4; 5], progresses very fast, the problem of CEP safety is still topical one.

The number of the performed roentgen contrast procedures (CEP) is steadily growing. According to the data of European Register of intervention procedures, in Europe the number of the performed coronary angiographies within 2010–2015 increased to 13.91%, while therapeutic interventions (angioplastics, stenting, etc) increased to 25.76% [6]. Application of contrast substances is one of

the most important factors conditioning CEP complications due to nephrotoxicity. Since the moment of the first CEP application there were studies performed for understanding of pathologic physiology and design of preventive strategies in the aspect of contrast induced nephropathies (CIN) [7; 8]. Though the problem of cardiac toxicity of contrast media and the link between the processes of myocardium ischemic remodeling and risk of CIN development are not less topical.

The objective: to study structural-functional peculiarities of the left chambers of heart in patients with IHD dependently on the development of contrast induced nephropathy (CIN) endovascular procedures (CEP).

Materials and research methods. The research involved 303 patients with stable forms of IHD, hospitalized in the department of intervention cardiology of the Republican Specialized scientific Practical Medical Center of Therapy and Medical Rehabilitation for the performance of roentgen endovascular procedures (CEP). The average age of the patients was 53.79 ± 1.27 years; there were 212 men and 91 women, and that was equal to 70% and 30% of the total number of patients. The study did not include the patients with GFS below 60 ml per a minute determined according to serum concentration of creatinine. Inclusion criteria were also oncologic and autoimmune pathologies, glomerulonephritis, pyelonephritis, and infections of urinary ducts in exacerbation stages, uncontrolled arterial hypertension, blood pathologies, gout, allergic reactions to iodine and iodine containing preparations, chronic diseases demanding therapy during the research period, and patient's refusal to participate in the study. All patients involved in the study received a standard therapy of IHD for 3 months at the moment of the inclusion to the study. The control group included 20 healthy volunteers of the appropriate age without signs of the diseases of cardiovascular and urinary systems, including functional ones.

All patients with IHD involved in the research had coronary angiography with application of unihexone contrast substance. Angioplastics and stenting of coronary arteries were performed when there were indications (84.82%). Later at the 1, 2, 3, 5, 7, and 10th

days we performed dynamic definition of serum concentration of creatinine with calculation of the speed of glomerular filtration for the isolation of the patients who had CEP post operatively complicated by CIN. The present study CIN was defined as increase of the concentration of serum creatinine to 25% in twenty-four hours and later after CEP. According to the results of the study all patients were divided to 2 groups: patients with uncomplicated post operative CEP period (CIN–, 206 patients, 67.99%) and patients who had contrast induced nephropathy (CIN +, 97 patients, 32.01%). We performed retrospective comparison of CIN + and CIN – group according to echocardiographic parameters.

Echographic study (EchoCG) with the help of ultra sound sensor with 2.5–5MHz frequency and application of standard approaches and positions. The following parameters were registered: terminal diastolic volume of the LV (TDV LV) and terminal systolic volume of the LV (KCO ΔЖ) calculated according to Simpson's modified method; left atrium volume (LA); terminal systolic and diastolic sizes of LV; width of ventricular septum and the posterior wall of the left ventricle during diastole and systole; diameter of basal part of LV chamber and length of LV.

We performed spectral tissue dopplerography of the lateral margin of fibrous ring of mitral valve where we registered maximal speeds of diastolic shift of the fibrous ring of mitral valve in the stage of early and atrial fulfillment of the LV (E and A) and their correlation.

Reliability of comparisons between groups was performed using Student's criterion for pair and unpaired differences.

Results of the research and discussion. That research revealed that compared to the control group in patients with IHD structural-functional status of the left chambers of heart demonstrated processes of remodeling tending for formation of dilatation cardiomyopathy with ischemic genesis. For example, in case of global systolic function at the level of the lower normal border of TDV LV was significantly increased, as well as LV myocardial mass indexed to the square area of the body surface (iMMLV). The value of internal myocardial systolic stress was notably increased testifying pathological and not physiological remodeling.

LV geometry was also changed with a tendency for formation of sphere-like cavity (increase of the sphericity index), which in its turn decreased hemodynamic efficiency of myocardium, as the most effective one in the aspect of spiral ejection flow formation was cone shape characteristic for normal LV. Ischemic genesis of cardiomyopathy forming due to coronary artery conductivity disorder serves the basis for disorders of regional systolic myocardial function, and it was proven in that research by the increase of the index of regional contractibility disorder (IRCD). That phenomenon can be based both on post infarction cicatrix and hibernating myocardium, which preserves viability, but does not manifest contractive activity in the conditions of mitochondrial deficit and calcium resetting. Same processes of mitochondrial deficit and calcium resetting promote the increase of myocardial stiffness, the additional mechanism of which is activation of local tissue RAAS. The result of myocardial stiffness increase was diastolic dysfunction determined in our research by means of tissue dopplerography of the lateral margin of the fibrous ring of mitral valve. Application of this method was conditioned by the fact that its results did not depend on preload, which was actual

for CIN, treatment of which was actually adequate rehydration of the patients. Indirect prove of diastolic dysfunction increasing the load on LA, was enlargement of LA in patients with IHD in comparison with the control (CG) (difference reliability of all described values with the CG $p < 0.001$).

Comparison of CIN+ and CIN– groups revealed that TDV and IRCD were reliably higher in CIN+ than in CIN– ($p < 0.001$ for both correlations); there was also greater diastolic dysfunction in CIN+ group ($p < 0.01$ compared to CIN–).

TDV medium was equal to 136ml; there were 153 patients with TDV less than 136ml, among them CIN developed in 37 (absolute risk 24%); there were 150 patients with TDV above 136ml, among them 60 had CIN (absolute risk 40). Thus, according to the results of our research the rise of TDV above 136 ml increased the risk of CIN 1.65 folds (relative risk of CIN with TDV above 136 ml compared with TDV below 136 ml: 40/24, $\chi^2 = 8.72$, $p < 0.01$). For IRCD medium was 1.2 points; the absolute risk of CIN in patients with IRCD below 1.2 points was equal to 23% (32 out of 141); patients with IRCD 1.2 points and more had 40% (65 out of 162); relative risk of CIN in case of IRCD rise to 1.2 points and above in the patients with stable forms of IHD was 1.77 ($\chi^2 = 10.56$, $p < 0.01$). E/A medium was equal to 0.7rel.units; absolute risk of CIN in patients with E/A less than 0.7rel.units was 24% (34 out of 140), while in patients with E/A 0.7rel.units and less 39% (63 out of 163); relative risk of CIN in case of decrease of the speed of mitral ring lateral margin shift in early and late stages of diastole was less than 0.7 rel.units and was equal to 1.59 ($\chi^2 = 8.72$, $p < 0.01$).

The aforesaid results correlate with reference data on the predisposition to the development of CIN in patients with symptoms of cardiac failure decompensation such as increased concentration of cerebral natrium diuretic peptide in peripheral blood [9,10], atrial fibrillation [11], cardiogenic shock [12], complicated myocardial infarction.

At the 10th day of the follow up after CEP patients involved in the study had statistically reliable, but clinically insignificant increase of iMMLV (to 0.73%, compared to original data $p < 0.01$), decrease of the global systolic function (to 0.31%, $p < 0.001$), rise of internal myocardial tension (to 3.33%, $p < 0.001$), decrease in E/A ratio of trans mitral flow (to 1.83%, $p < 0.001$), and LA enlargement (to 0.66%, $p < 0.001$). Complex of all described alterations indicates deterioration of structural-functional status of the myocardium of the left chambers of heart, though the degree of these alterations is not clinically significant. Revealed negative effects of CEP on hemodynamics can be explained by cardiac toxic effects of iodine containing contrast substance. Possessing high osmolar value (5 times above blood osmolarity) the contrast substance causes cellular dehydration and ischemia, especially in originally ischemic myocardium. Clinically cardiac toxicity can be manifested in the symptoms of cardiac failure and ventricular tachyarrhythmia [13].

The trigger of the described process was possibly roentgen contrast substance. Though among the studied values there were shifts to positive side, probably linked to performance of coronary revascularization such as improvement (decrease) of the local contractibility of the LV IRCD (to 0.69%, $p < 0.001$) and sphericity index indicating the process of reverse remodeling of the LV (to 1.92%, $p < 0.001$).

Division to CIN+ and CIN- groups revealed that the value of internal myocardial tension in CIN+ group significantly increased ($p < 0.001$), while in CIN- group it was at the original level ($p < 0.001$) (difference reliability of relative dynamics between the groups). Dynamics of the rest studied values of echoCG was similar in both groups.

Thus, the research demonstrated the following:

1) EchoCG predictors of CIN in patients with stable forms of IHD are dilatation of LV chamber above 136ml (relative risk 1.65, $p < 0.01$), disorder of its regional contractibility (index of regional contractibility disorder 1.2 points and more, relative risk of CIN -

1.77, $p < 0.01$), and diastolic function (decrease of e/a ratio of tissue dopplerography of the lateral margin of mitral valve to 0.7 rel.units and less, relative risk of CIN 1.59, $p < 0.01$);

2) Patients with IHD after CEP had deterioration of structural-functional characteristics of LV myocardium more significant in CIN+ group, manifested in the increase of the value of systolic myocardial tension, decrease of FE of LV, and increase of the degree of diastolic dysfunction, in spite of the improvement of IRCD and LV sphericity index, testifying toxic effect of roentgen contrast substance on myocardium, parallel to renal dysfunction.

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Nazirova Zilola Makhmadovna,
Assistant of the Andijan Medical, Uzbekistan

Nosirova Feruza Dzhumabaevna,
Assistants of the Andijan Medical, Uzbekistan

Kuzieva Gulruh Alizhanovna,
Assistants of the Andijan Medical, Uzbekistan

E-mail: evovision@bk.ru

THE ACTIVITY OF THE PRO-AND ANTIOXIDANT SYSTEM IN MEMBRANES OF ERYTHROCYTES IN WOMEN WITH HYPERPLASIA ENDOMETRITIS

Abstract: A distinctive feature of hyperplastic changes of the endometrium is a significant increase in the concentrations of lipid peroxidation products and decreased activity of antioxidant enzymes in the blood with the growth of the severity of disease.

Keywords: Hyperplasia, endometrium, lipid peroxidation.

Hyperplastic processes of the endometrium (HPE) are among the most common gynecological diseases, occurring with a frequency of 30 to 55% [1–4].

The important clinical significance of this pathology is that HPE is one of the most frequent causes of uterine bleeding and hospitalization of women in a hospital. Many authors note a high incidence of combination of HPE with uterine myoma, adenomyosis, which is often preceded by chronic inflammatory processes of the endometrium.

Purpose of the study. To study the state of reactions of lipid peroxidation and the activity of the glutathione redox system in women with benign endometrial hyperplasia.

Materials and methods. The study is based on a clinical and laboratory study of 102 women with endometrial hyperplasia and 20 conditionally healthy women.

To fulfill this goal, the following special research methods were carried out:

The evaluation of the state of lipid peroxidation reactions included the determination of the content of lipid hydroperoxides (Gavrilov VB, Mishkorudnaya MI, 1987), diene conjugates (Steel ID, 1977), and malonic dialdehyde (Kurian GVN, 1976) in erythrocytes.

The state of activity of the aioxidation system was analyzed by the level of activity of catalase, glutathione-S-S-transferase, glutathione reductase, and the content of reduced glutathione in erythrocytes, determined by spectrophotometric method according to E. Beutler (1984). The activity of superoxide dismutase was determined by the method of S. Chevri et al. (1991), and glutathione peroxidase – according to the method of V.M. Moin (1993).

The statistical processing of the results was carried out using the package of standard applied statistical programs Exsel and included the calculation of the arithmetic mean (M), the standard error of the mean (m). The data in the tables are presented in the form $M \pm m$. To assess the reliability of the differences, the F-test (Fisher) and the t-test (Student) with the Bonferroni amendment were used. The probability of null hypothesis validity was assumed at 5% significance level ($P < 0.05$). To assess the degree of correlation between the parameters studied, a correlation analysis was performed.

The results obtained and their discussion. Analysis of clinical and anamnestic data showed that statistically significant risk factors for hyperplastic endometrial processes in our studies were the following: a large number of abortions in the anamnesis; High prevalence of gynecological diseases, in particular, uterine fibroids in 32 (31.4%) and chronic endometritis in 21 (20.6%); Frequent somatic pathology (obesity – 637%, type 2 diabetes mellitus – 13,7%); Burdened inheritance of endometritis hyperplasia.

Since metabolic disorders, in particular those associated with lipid metabolism, play an important role in the pathogenesis of tumor processes, the question naturally arises of the state of activity of lipid peroxidation reactions.

Thus, the content of lipid hydroperoxides (GPL) in patients of the main group increased by 22.26% relative to the control group. The production of diene conjugates (DC) in the patients of the main group exceeded the control level by 27.83%. The content of malonic dialdehyde (MDA) in patients of the main group decreased by 1.4 times with respect to control (Table 1).

Table 1. – The content of products of lipid peroxidation in erythrocytes of healthy and in patients with hyperplastic processes of the endometrium

Indicators of POP	Control group (n = 20)	Main group (n = 102)	P
Lipid hydroperoxide (relative units)	6,02 ± 0,28	7,36 ± 0,19	p < 0,001
Diene conjugates (relative units)	2,12 ± 0,15	2,71 ± 0,12	p < 0,005
Malon dialdehyde (µM/ml)	2,97 ± 0,11	4,13 ± 0,12	p < 0,01

According to IS. Brechov (2010) that the increase in the content of GPL and DK causes a delay in the fission of the nucleus at

the metaphase stage, which leads to a delay in cell division [1]. Probably, on the one hand, this is a mechanism for limiting the

proliferation of cells. On the other hand, the accumulation of Peroxide oxidation of lipids (POP) products leads to the death of endometrial cells, and, along the way, necrosis, and not apoptosis. Necrosis, from the biological point of view, is less beneficial to the tissue mechanism of maintaining structural and functional homeostasis, as it causes accumulation of free radicals, which, in turn, can induce secondary oxidative damage [3].

Therefore, an assessment of the state of antioxidant protection, and primarily of the glutathione redox system, is of undoubted interest.

Characteristic indicators reflecting the degree of prooxidant/antioxidant imbalance in the development of benign endometrial hyperplasia are an increase in peroxide products in the blood and a change in the activity of the glutathione re-dox system (Table 2).

Table 2. – The state of the glutathione redox system in healthy women and in patients with hyperplastic endometrial processes

Indicators of POP	Control group (n = 20)	Main group (n = 102)	P
Glutathione peroxidase ($\mu\text{mol GSH/g Hb}$)	$36,77 \pm 1,12$	$56,01 \pm 1,11$	$p < 0,001$
Glutathione reductase ($\mu\text{mol/ml}$)	$4,49 \pm 0,17$	$3,01 \pm 0,05$	$p < 0,001$
Glutathione-8-trace-times (mmol/g HB)	$6,31 \pm 0,16$	$2,91 \pm 0,09$	$p < 0,001$
Reduced glutathione (mmol/ml)	$1,96 \pm 0,09$	$1,39 \pm 0,11$	$p < 0,001$
Glutathione peroxidase/reduced glutathione	$27,01 \pm 2,32$	$47,62 \pm 1,03$	$p < 0,001$

Conclusion. Activation of lipid peroxidation reactions in benign endometrial hyperplasia is accompanied by an increase in the functional load on antioxidant systems, which is manifested in

an increase in the activity of catalase, glutathione peroxidase and a decrease in the activity of glutathione reductase, glutathione-8-transferase, and the content of reduced glutathione in the blood.

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*Niyazova Zebiniso Anvarovna,
assistant of the Andijan State Medical Institute*

*Buzrukov Botir Tulkunovich,
professor, Doctor of Science,
head of the Tashkent Pediatric Medical Institute*

*Salahiddinov Kamaliddin Zuhriddinovich,
docent, PhD of the Andijan State Medical Institute*

*Abzalova Shakhnoza Rustamovna,
docent, PhD of the Tashkent Pediatric Medical Institute*

E-mail: mbshakur@mail.ru

USE OF BIOFILMS IN OPHTHALMOLOGY

Abstract: Today one of the priority areas of research and development in medicine, in particular in ophthalmic surgery, is the creation of new biocompatible and biodegradable products that promote the regeneration of the eye tissues for various injuries. In this connection, coatings based on oxidized cellulose.

Keywords: eye trauma, biofilms, the products of cellulose oxidation, ophthalmic surgery.

Diagnosis and qualified primary surgical treatment are crucial in preventing the development of severe complications of mechanical eye trauma, which are not always performed at the proper level. In the study of the pathogenesis of eye trauma, significant advances have been made through comprehensive clinical, immunological [1; 2; 3], biochemical [4] and morphological [5] studies, which have determined certain patterns in the course of the wound process and developed pathogenetic treatment regimens.

Nevertheless, despite the advances made in the conservative treatment of posttraumatic complications, the search continues for such drugs that are highly effective, have a small spectrum of side effects and are easily tolerated with prolonged use. Despite the huge experience accumulated in domestic and foreign ophthalmology on the prevention, diagnosis and treatment of acute eye trauma (OTG) and the achievement of modern ophthalmic surgery, the effectiveness of treatment of OTS is not high and often can not satisfy either the patient or the ophthalmologist [6; 7; 8; 9]. Thus, the development and implementation of effective methods of prevention and treatment of eye trauma in public health practice are one of the most important tasks of modern ophthalmology. The change in the mechanism, nature and severity of the trauma makes it necessary to revise the tactics of treating traumatic injuries of the visual organ, both medical and surgical, in order to create the most favorable conditions for rehabilitative measures. In this connection, the search for new, pathogenetically grounded methods for treating penetrating wounds of the eye, Not only surgical, but also medicamentous. In the complex conservative treatment of traumatic eye injuries in order to combat traumatic inflammation and proliferation, glucocorticosteroids (GCS) are widely used that exert a depressing effect on all phases of the inflammatory-proliferative process. The use of powerful short-acting glucocorticosteroids (dexamethasone) in the treatment of patients with OTS requires daily, repeated subconjunctival and (or) parabulbar injection of the drug, which causes additional traumatization (hypophagmia, hematoma of the eyelid, scarring of the conjunctiva, etc.). As a rule, after discharge from the

hospital, injections are not performed, but go on instillation of eye drops, which does not provide a sufficiently high concentration of GCS in the tissues of the posterior segment of the eye. Avoid frequent daily injections and the associated consequences can be with the use of deposited GCS. One of the drugs used in ophthalmology of deposited GCS is triamcinolone acetonide (TA) [10; 11]. In the modern literature there is a large number of publications on the effectiveness of the intravitreal method of administering TA in the treatment of diseases associated with retinal edema, inflammation of the choroid. The advantage of intravitreal introduction of TA before peribulbarnym during the cupping of the inflammatory and proliferative process in vitreoretinal surgery has been proved [12; 13]. However, until now there is no single point of view on the advisability of intravitreal introduction of TA in the complex therapy of patients with penetrating wounds of the eyeball.

Drugs administered topically usually show low bioavailability. Most drugs intended for use in the treatment of ophthalmic patients are currently available in the form of aqueous solutions and suspensions. These liquid forms quickly merge from the conjunctival sac into the nasolacrimal duct, resulting in a weak drug Exposure to the main zone, increases the risk of systemic side effects and poor compliance with the patient's treatment regimen. Typically, the use of drugs in this form, ok binds only impact on the front of the eye, more limited effects on the cornea, and only a small amount of drugs used can go into intraocular tissue through Cornea [14]. Studies have been conducted comparing the efficacy and safety of a timolol maleate (TM) mucoadhesive film coated with chitosan using 0.5% TM of a commercial ophthalmic solution in a rabbit model. As a result of the study, efficacy in reducing IOP in rabbits with normotensive ocular parameters. [14]. It was found that this film is an effective system that delivers eye medicines for the treatment of glaucoma and does not present any signs of toxicity, is well tolerated in vivo. However, there is no data on the use of mucoadhesive films with penetrating wounds of the eyeball.

The literature data on the use of biodegradable poly-line-caprolactone [15] when the eye biocompatibility of micro-

and nanostructured thin films of PKL, which are applicable to the eye, for tissue transplantation, cell therapy, and for the delivery of medicaments have been investigated. Approaches have been described for the fabrication of micro- and nanostructured thin PCL films (with a total thickness of 20–40 nm) and the development of ophthalmic implants. The biocompatibility of these thin films was assessed using a standard injection needle or implantation with a cut in the eyes of adult rabbits up to 9 months. The acceptable eye safety of these biopolymer films was shown in experiments on toxicity in the eyes of mature rabbits with sequential ophthalmologic examinations and ocular histology. The results of the studies showed the feasibility of using micro- and nanostructured PKL for ophthalmic applications and the fact that nanoscale design elements in biodegradable polymers can retain structural integrity while staying in the eye: in particular, this result establishes the basis for a class of devices that rely on preservation Membrane structure over time. But there is no evidence of studies using these films with penetrating wounds of the eye.

The biological compatibility of restoring keratin glass membranes was studied [16], but keratin films were not yet used in penetrating wounds of the eye. Thin films containing Ranibizumab [17] were studied. There are data on studies of the effect of enzyme Vobenzimate on inflammatory processes of percutaneous eye injury, but there is no data on the use of ocular films with this preparation [18]. Studies were conducted to prevent intraocular infections after phacoemulsification of cataracts using eye medicated films with Levofloxacin, which resulted in the concentration of levofloxacin 5 times higher in the moisture of the anterior chamber than in instillation, which indicates the effectiveness of biofilms and the use of biofilms With penetrating wounds to the eye to prevent intraocular infections [19].

In the literature there is a large number of publications devoted to the study of the frequency and prevalence of various kinds of ophthalmic diseases occurring among people of different ages [20; 21; 22]. However, these studies are mainly devoted to the clinical aspects and prevention of a particular eye disease. It should be noted that in our republic there have been practically no works

devoted to the provision of primary care with penetrating wounds to the eye, there is no data on morphological studies to compare the traditional method of primary surgical treatment with the application of biodegradable coatings, there are no studies devoted to the study of frequency and structure Ophthalmic traumatism, the identification of specific factors that cause its severity, no studies were conducted to assess the effectiveness of Enlargement of biofilms with open trauma of the eye in the experiment and in the clinic. The presented materials show that much has not been investigated enough in this matter. Among polymers that have found wide application in various areas of human activity, an important place is occupied by cellulose, as a constantly renewed polymer in nature, and its derivatives. Cellulose, having a set of valuable properties, has a relatively low. Significant interest is caused by haemostatic preparations, for the preparation of which polysaccharides and, first of all, oxidized cellulose (OC) [23] are used as a raw material. The products of cellulose oxidation are of scientific interest, since by selective oxidation of hydroxyl groups it is possible to introduce new functional groups into the molecule, thereby giving the polymer new properties [24; 25].

Thus, today one of the priority areas of research and development in medicine, in particular in ophthalmic surgery, is the creation of new biocompatible and biodegradable products that promote the regeneration of the eye tissues for various injuries. In this connection, coatings based on oxidized cellulose, which, due to their structure and plant origin, meet all the requirements for eye coatings, such as biocompatibility, non-toxicity, chemical inertness, biodegradability and mechanical strength, are of great interest. In this connection, the development and implementation into practice Healthcare, effective methods of prevention and treatment of eye trauma are one of the most important tasks of modern ophthalmology. The presented materials show that much has not been investigated enough in this matter. The available literature data are mainly devoted to the study of the biocompatibility of films and their use in various diseases. No literature has been published on the use of biodegradable films in penetrating wounds of the eyeball.

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*Omonova Umida Tulkinovna,
PhD of the Tashkent Pediatric Medical Institute
E-mail: mbshakur@mail.ru*

THE FREQUENCY OF DYSTROPHIN GENE MUTATION IN THE FAMILIES OF PATIENTS WITH DUCHENNE\BECKER MUSCULAR DYSTROPHY IN UZBEKISTAN POPULATION

Abstract: The article represents the data of molecular genetic researches performed among 91 patients with Duchenne/Becker muscular dystrophy from 81 families. Results of the researches showed that in Uzbekistan population family cases of progressing Duchenne/Becker muscular dystrophy prevail over de novo mutation, and prolonged deletions were in the 3' area of dystrophine gene. According to indirect DNA-diagnostics the most informative ones for the families with high risk in Uzbekistan population are intra gene high polymorphic markers STR45 and STR49.

Keywords: progressing muscular dystrophy, molecular genetic researches, dystrophine.

Duchenne muscular dystrophy (ICD G71.0 – muscular dystrophy; synonyms – Duchenne pseudohypertrophic myodystrophy, Duchenne progressing muscular dystrophy, Duchenne disease, Duchenne palsy) is the most malignant and the most widely spread form of myodystrophy. Population frequency of this pathology is 1:3500 boys and 21.7 per 100000 alive born boys [3; 5]. The group of dystrophic pathologies includes Duchenne/Becker progressing muscular dystrophies (D/BMD), representing allele variants conditioned by various mutations in dystrophine protein gene [1; 3]. Approximately 55–65% of all the cases of D/BMD were conditioned by the deletions of dystrophine gene with various lengths, 5–10% cases by duplications of a part of the gene, and the rest had spotty mutations [2; 4].

In the modern time there is scope of data relevant to deletion spectra in dystrophine gene in various populations in the world, and certain population differences were determined [2; 5]. Up to now molecular genetic studies of D/BMD were not performed in Uzbekistan. That's why for the development of the approaches of prenatal, differential, presymptomatic diagnostics and definition of mutant gene carriers it is topical to study molecular genetic nature of D/BMD in Uzbekistan.

The objective: study of genetic polymorphism of dystrophine gene among the patients with Duchenne/Becker muscular dystrophy and definition of the prevalence of dystrophine gene mutation carriers among the relatives in the families of the patients with D/BMD in Uzbekistan population.

Materials and methods. Molecular genetic researches were performed in scientific Research Institute of Hematology and Blood transfusion of the Ministry of Health of the Republic of Uzbekistan in the department of molecular medicine and cellular technologies. Molecular genetic researches were performed in two fields: multiplex PCR diagnostics for the detection of major deletions in the patients with D/BMD and performance of indirect DNA-diagnostics for the definition of dystrophine mutant gene carriers among women relatives of the patients with D/BMD. Genome DNA taken from the samples of peripheral blood (Vacutainer Becton Dickinson International with EDTA) was isolated with the help of the DIAtom™ DNA Prep100 set for DNA isolation produced by “Center of Molecular genetics” Ltd., Moscow in compliance with the manual. Amplifica-

tion was performed using thermocyclers GeneAmp PCR-system 2720 (Applied Biosystems, USA) and Corbett Palm Cycler (Corbett Research, CG1–96 model, Australia) with the help of DMD-del and DMD-CA sets (“Center of Molecular genetics” Ltd., Moscow).

Direct DNA-diagnostics was done in 91 patients with D/BMD from 81 families; 84 (92.3%) patients with Duchenne muscular dystrophy, and 7 (8.6%) patients with Becker muscular dystrophy. Analysis was performed according to 20 exons of dystrophine gene – promoter area, 3, 4, 6, 8, 13, 17, 19, 32, 42, 43, 44, 45, 47, 48, 50, 51, 52, 53, 60 exons.

Indirect diagnostics was done in 21 families with D/BMD cases, using intra gene high polymorphic markers located in the 45th (STR-45), 49th (STR-49), 50th (STR-50) intrones of the gene.

Results and discussion. The studied pathology has X-recessive type of transmission. The basic group of the families consisted of non-relative couples and we did not reveal a direct correlation between the number of relative couples and the prevalence of the disease. According to the results of genealogical history study we revealed 5 families with close relative couples, and that was equal to 6.2% of the total number of the examined families; deletions were revealed in 4 cases of close relative couples (80%). Correspondingly, the number of non-relative couples was equal to 93.8% (76 families), and deletions were revealed in 59.2% cases (45 families).

All mutations of dystrophine gene revealed in 4 families with relative couples in each case were characterized by deletions of one exon in distal area of 3'-end (deletions of 48, 50, and 53 exons), and in 3 families out of 4 Duchenne muscular dystrophy was diagnosed for the first time in that generation.

According to the results of molecular diagnostics 33 patients (36.3%) from 32 семей (39.5%) had no deletions, while 58 patients (63.7%) from 49 families (60.5%) had major deletions of dystrophine gene with various lengths: from one to nine exons; in 65.3% there were verified long deletions; deletions of one exon were observed in 34.7% of the families. The basic deletion spectrum was located in distal part of dystrophine gene – 3'-end (deletion of 40–60 exons), that was equal to 81.6% (40 families, 47 patients).

Analysis of deletions most often revealed deletions in the distal part of dystrophine gene; and that was equal to 81.6% from the total number of the revealed mutations: 50 exon in 24 cases, 51 exon in

24 cases, 52 exon in 21 cases, 48 exon in 16 cases, 53 exon in 14 cases; there were no deletions in promoter area, 32. 42. And 60 exons.

In cases of maximal mutations more often we observed deletions of 19 (8 cases) and 17 (6 cases) exons.

Indirect diagnostics was performed in 21 families with the cases of progressing Duchenne/Becker muscular dystrophies using intra gene high polymorphic markers located in the 45th (STR-45), 49th (STR-49), 50th (STR-50) intrones of the gene. In 33.3% (7 families) out of 21 families direct DNA-diagnostics major deletions in dystrophine gene did not reveal, in 14.3% (3 families) – deletions in 5'-end were observed; and in 52.4% (11 families) we revealed deletions in 3'-end.

We performed 81 indirect DNA-diagnostics in 21 families with high risk of D/BMD. Among these families there were 8 (38.1%) non-informative in STR 45, STR 49, STR 50; in 13 (61.9%) families women relatives of proband with D/BMD had confirmed the status of dystrophine gene mutation carriers.

On the basis of the Republican Center “Mother and child screening” the method of prenatal invasive diagnostics of Duchenne/Becker MD was implemented. 6 families with high risk of the pathology were checked; in 5 cases cordocentesis and in one case amniocentesis was performed.

According to the results of DNA-diagnostics we revealed 3 male fetus with indetified deletions in dystrophine gene and recommended to stop the pregnancy due to medical genetic indications. In the rest families pregnancy was prolonged with further postnatal checking of the born children for the confirmation of the absence of the damage in dystrophine gene.

Conclusions:

1. Results of proper molecular genetic researches showed that in Uzbekistan population family cases of Duchenne/Becker MD prevail over de novo mutations, and prolonged deletions in the 3'area of dystrophine gene.

2. According to the data of multiplex PCR in patients with Duchenne muscular dystrophy mutations were revealed in 16 exons out of 20 researches, and that served the basis for the application of the set for direct PCR-diagnostics of major deletions in dystrophine gene in Uzbekistan population.

3. According to the result of indirect DNA-diagnostics in the families with high risk in Uzbekistan population the most informative ones are intra gene high polymorphic markers STR45 and STR49.

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*Sabirov Djurabay Marifbaevich,
DMD, Tashkent postgraduate medical Institute
Head of the Department of anaesthesiology and reanimatology
E-mail: mariannabk@mail.ru*

*Krasnenkova Marianna Borisovna,
Ph. D., Tashkent postgraduate medical Institute
Associate Professor of the Department
of anaesthesiology and reanimatology
E-mail: mariannabk@mail.ru*

*Dr. Khaydarova Siranush Eduardovna,
Tashkent postgraduate medical Institute
Assistant of the Department
of anaesthesiology and reanimatology
E-mail: siranush.haydarova@mail.ru*

THE ROLE OF ADAPTIVE-COMPENSATORY CAPACITY OF THE ORGANISM IN PREDICTION OF OUTCOME IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY

Abstract: In recent years, much attention has been paid to the study of the functional state of the adaptive-compensatory mechanisms in traumatic brain injuries. However, information on the relationship of the main clinical manifestations of severe traumatic brain injury (STBI) with the glucocorticoid function of the adrenal glands, the state of autonomic regulation in brain trauma remains fragmentary.

Keywords: traumatic brain injury, hypothalamic-pituitary-adrenal system, nervous regulation, neuromonitoring, central hemodynamics, hormonal indicators.

Despite significant advances in the development of medical science and the improvement of quality of medical care, traumatic brain injury (TBI) is a medical problem with a high level of mortality and disability.

Predict the outcome on the basis of only clinical data from these patients is extremely difficult. Dissatisfaction leads clinicians to search for new prognostic criteria and their control capabilities. Thus, in recent years, much attention has been paid to the study of the functional state of the adaptive-compensatory mechanisms of traumatic brain injury [4; 5; 7]. Most authors found in patients with traumatic illness a long activation of the adrenal cortex, growing in proportion to the severity of the injury. Such changes in the hypothalamic-pituitary-adrenal system, in most cases, are being reflected at from the perspective of stress reactions and general adaptation syndrome.

Only a few studies have shown the value of neurohormonal shifts in the pathophysiological mechanisms of TBI. An increase of ACTH level during the first 10 days was revealed in severe TBI with a maximum concentration at the 5th day, 11-ACS and cortisone during the whole acute phase, a change in growth hormone and insulin secretion [6; 8]. A general regularity in the manifestation of hormone imbalance, depending on the degree of severity of the TBI was established [2; 3].

However, information about the relationship of the main clinical manifestations of the TBI with the indicators of adrenal glucocorticoid function of the autonomic regulation of brain trauma remain fragmentary [5; 6].

As is known, the regulation of the heart rhythm is carried out by the autonomic, central nervous system beside humoral and reflex actions. Parasympathetic and sympathetic divisions of the autonomic nervous system (ANS) are in a certain interaction with and influenced by the central nervous system, of number of reflex and humoral factors. Constant influence on sympathetic and parasympathetic effects occurs at all levels of regulation. Their essence consists in varying degrees of activity of one of the divisions of the ANS when changing another's activity.

It is often claimed that the heart rate variability (HRV) – a “new vital sign” that must be monitored, and the data must be used during the distribution of victims with injuries [1; 7]. It is well known that the absence of HRV is an early predictor of the brain death [4; 5], and low levels of HRV is associated with high mortality and morbidity after injury [6–8]. Violations of HRV is associated with increased intracranial pressure and a decrease in CPP [1; 2; 5]. Data that has been published until the present day, show that HRV can predict the death of a patient in less than 12 hours [6; 7]. The increase in fragmentation HRV correlates with the depletion of physiological reserves and mortality, in many critical conditions, including traumatic brain injury TBI [1; 3; 4].

Based on the above it is clear that further study of the vegetative manifestations of stress in brain injury is an urgent task, and that the control of the autonomic functions – are a promising, but insufficiently developed area of intensive therapy in STBI.

The aim of our study was to evaluate the features and performance of the autonomic regulation and the functioning of the

hypothalamic-pituitary-adrenal system and its impact on outcomes in patients with severe traumatic brain injury.

Material and methods of research: Following the approval of TIAME Ethics Committee (№ 6 of 2014) 68 patients with SBI (56 men and 12 women) admitted to intensive care unit in a coma ($GCS \leq 8$ points), were included in a prospective study. The average age of the patients was 34.4 ± 6.9 years. Exclusion criteria were previously established cardiovascular diseases, arrhythmia and its specific therapy: atropine, beta-blockers; patients with clinical factors that can disrupt the rhythm of the heart; spinal cord injury; diabetes.

Patients were distributed into 3 groups: I group – patients with lethal outcome – 17 patients (level of consciousness – 3–5 points on the GCS at admission), group II – 32 surviving patients with a good outcome (good recovery group, $GCS \geq 10$ points) and group III – 19 patients with a worse neurological status (poor outcome group, $GCS < 10$ points). All patients were performed decompression craniotomy-resection with removal of intracranial hematomas of different localization, not later than the first day of the receipt of the injury.

Patients received intensive treatment according to the protocol, focused on maintaining optimum cerebral perfusion pressure (CPP) above 70 mm Hg. Invasive monitoring of intracranial pressure (ICP) was carried out. Also the heart rate (HR), mean dynamic blood pressure (MAP) and central venous pressure (CVP) were registered. All patients were intubated, ventilated, and received sedatives (midazolam, fentanyl) to synchronize to the ventilator, reducing the intracranial pressure and improving cerebral oxygenation.

The following indicators were calculated, as recommended by the International Standards by the Working Group of the European Society of Cardiology: Heart rate, SDNN – standard deviation of the full array of cardio, RMSSD – the square root of the sum of the differences of the series of cardio, pNN50 – the number of pairs of cardio intervals with a difference of more than 50 ms. in % to the total number of cardio, IN – Stress Index, TP – total power spectrum of HRV in ms⁻², of HF – power spectrum of the high variability of the component as a % of total power fluctuations, the LF – power spectrum of low-frequency variability of the component as a % of total power fluctuations, LF/HF – the balance of sympathetic and parasympathetic influences, VLF – power spectrum 0.003–0.04 Hz as a % of total power fluctuations.

ECG was recorded on the day after the injury, and the performed resection – decompression cranial trepanation. According to the physiological circadian rhythms HRV registration was started at 10 am. If patients survived, the next time the ECG was recorded was one week after receiving the traumatic brain injury (48 hours after sedation).

To assess the impact on fatal dysfunction on the ANS activity, we compared HRV data from patients who died with HRV parameters in patients who survived the day after the injury. To assess the degree of influence on the neurological status of the identified violations of the SPA, we compared the studied parameters obtained after 48 hours. After the sedation, the surviving patients with a good outcome (good recovery group, $GCS \geq 10$ points) and in patients with a worse neurologic status (the group of poor outcome, $GCS < 10$ points).

Cortisol content was measured by radioimmunoassay using standard test kits on the next day after the injury, in 3, 5 and 7 days.

Statistical data processing was performed using Statistica 6.0 software package with the use of parametric (t-Student criterion) and nonparametric (Mann – Whitney, Wilcoxon test for paired indicators, Spearman correlation test) methods. Figures in the paper presented as $M \pm m$, where M – arithmetic mean and m – SEM. Statistically significant differences were considered at a confidence level (p) less than 0.05.

Results and discussion: All patients were admitted in a comatose state. In assessing the level of consciousness by GCS grade point average for admission to intensive care unit was 6.1 ± 1.3 points, 2 days after the end of sedation average score in survivors was 10.5 ± 3.2 points. The data obtained are shown in Table № 1.

The day after the injury a significant difference was found in the parameters of systemic hemodynamics and HRV between dead patients and survivors. Indicators of MAP and ICP in this group were up 56% and 47%, respectively. The group with dead patients had significant efferent parasympathetic hyperactivity and a tendency to increase throughout the HRV. TP Index was up 65%, and LnLF figure is 24% for patients who died. The group with patients that poorly recovered tended towards a low HRV, indicating a lower parasympathetic efferent activity. When comparing the patients who died within 7 days after the injury and the survivors on the day after obtaining the traumatic brain injury a significant increase in HRV is marked, associated with a significantly increased parasympathetic tonus. In our study LnLF index declined below the physiological values in all groups. The lower level of the ratio LF/HF in the dead group (1.12 ± 0.24 vs. 4.51 ± 1.91). In terms of HRV significant differences were found between the patients of the 2nd and 3rd group. PT index was higher by 219%, and LF/HF was 53% lower in the patients with a good recovery. Such disturbances in HRV coincided with clinical lesions of cerebral functions.

After injury in all patients plasma cortisol level was above the normal range. The next day in patients with a favorable outcome was determined the relative permanence of the hormonal balance, indicating the stability of the adaptive-compensatory mechanisms in this group of patients. During the next week cortisol declined gradually from 1040.5 ± 98.1 nmol/l to 784.7 ± 58.6 nmol/l.

A characteristic of hormonal changes in patients with unfavorable outcome was the undulating nature of the changes of average cortisol concentration, indicating failure of the adaptive-compensatory abilities in these patients. Thus, the average level of cortisol in patients with unfavorable outcome of SBI after a significant decline in 3–7 days (from 1083.4 ± 98.8 to 692.4 ± 105.7 nmol/L) to the beginning of the second week of posttraumatic period was increased to 852.1 ± 94.2 nmol/l. And then gradually decreased to the normal range. At the lethal SBI there was an excessive increased level of cortisol on the 1st day. Victims' death occurs mainly in the 1st week, when the cortisol content in the peripheral blood and HRV were the highest, indicating the overvoltage of the autonomic and endocrine systems.

Data obtained in this study are consistent with previously described data in literature [5; 6; 7] and the assumption that with a more unfavorable course of traumatic brain injury disturbances in the hypothalamic-pituitary-adrenal system are expressed in a greater degree. HPA function suppression should be seen as an adaptation

response, which contributes to hypoxia experience. Critical reduction of function can lead to the disruption of adaptation, as happened in dead patients.

In case of stress, which the traumatic brain injury is, all the body's life-support systems are involved in the pathological process. Violations occur not only in the central nervous system, but also in the ANS, which are closely interrelated. Violation of the ANS as a result of STBI has been described by many researchers [1; 2; 8]. Autonomic imbalance occurs under the influence of several factors: the result of direct mechanical impact on the structure of the brain or secondary hypoxic neuronal damage regulating function of ANS [4; 8].

Hormonal indicators are predictive markers of the disease [3; 5]. When initially low levels of cortisol and TSH unfavorable outlook on life, subject to the high content the term of life of the patients is longer.

However, the determination of hormonal activity in patients with STBI is not always possible, economically costly and time consuming. Determination of HRV is a more affordable and an

equally reliable method of evaluating the ANS [2; 6] in terms of emergency medicine. In recent years, the published works of many authors point to the predictive capabilities HRV analysis in patients with various injuries at the prehospital stage (4–7). So, [3; 6] describe the decline in HRV in the dead patients with skeletal injuries after several days.

Thus, the activity of the sympathetic-adrenal system, significantly increases in direct response to the traumatic impact is reduced at the end of the acute traumatic period, i. e. at the time of apparent clinical recovery is not happening yet normalization of adaptive systems of the body. This process is unstable in the patients with lethal STBI, and the adaptive-compensatory abilities of the body are not sufficient to sustain life. Critical reduction of function can lead to the disruption of adaptation, which took place in the dead patients.

Conclusions: On the outcome of traumatic brain injury, along with the nervous regulation, disorders greatly affect the imbalance of two interconnected regulatory systems of the body: the autonomic and hormonal.

Table 1. – Heart rate variability, systemic hemodynamics and hormones in the examined patients

Mark	On the first day		After 48 hours, after sedation	
	Deaths	Survivors	2 group (GCS < 10)	3 group (GCS > 10)
GCS, points	6.1 ± 1.3	8.5 ± 1.5	9.2 ± 1.2	11.3 ± 1.4
HR, beats/min	72.9 ± 5.31	89.8 ± 5.58	105.5 ± 4.66	94.2 ± 4.75
AP, mmHg	155.8 ± 7.9	144.9 ± 5.1	129.8 ± 7.9	134.6 ± 8.3
MAP, mmHg	105.3 ± 2.3	95.9 ± 1.9	93.3 ± 5.3	92.7 ± 1.9
ICP, mmHg	34.1 ± 3.5	18.2 ± 3.8	25.8 ± 3.9	15.2 ± 2.6
CPP, mmHg	71.2 ± 0.9	77.7 ± 1.3	67.5 ± 1.9	77.5 ± 1.8
pNN50 (%)	8.78 ± 3.22	1.99 ± 1.11	3.5 ± 1.43	12.2 ± 2.67
rMSSD (ms)	33.8 ± 5.79	15.2 ± 3.63*	18.4 ± 4.61	35.2 ± 3.82*
IV (%)	2.23 ± 0.36	1.36 ± 0.51*	1.73 ± 0.64	3.29 ± 0.95*
PT (ms ²)	891 ± 236	312 ± 88*	864 ± 287	2755 ± 749*
LnLF	4.77 ± 0.35	3.65 ± 0.41	5.21 ± 0.74	5.99 ± 0.32
LnHF	4.71 ± 0.28	3.57 ± 0.36	3.99 ± 1.12	5.48 ± 0.27
LF/HF	1.12 ± 0.24	1.33 ± 0.32	4.51 ± 1.91	2.11 ± 1.45*
Cortisol nmol/l	1083.4 ± 98.8	1040.5 ± 98.1	852.1 ± 94.2	784.7 ± 58.6
TSH mmol/l	0.697 ± 0.168	1.610 ± 0.101	0.822 ± 0.126	1.562 ± 0.151

Note: * authentically regarding the 1st group of patients

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Sultanov Shokrukh Habibullaevich,
PhD., in Medicine, department
of psychiatry and psychotherapy
Tashkent Institute of Postgraduate Medical Education,
E-mail: nazira-48@bk.ru

THE STATE OF HUMORAL MECHANISMS OF THE IMMUNE SYSTEM IN HEROIN ADDICTS

Abstract: The article is devoted to the study of humoral mechanisms of immunity in heroin addiction. It was revealed that the disorganization of immune systems, which are in close relationship with the central nervous system, lead to disruption of homeostasis and aggravate the course of drug abuse.

Keywords: heroin addiction, withdrawal syndrome, activated neutrophils, myeloperoxidase.

In recent years, many investigations indicating immunological failure in drug addicts and the increased interest to study the influence of drugs on the immune system of people [1, 50–52; 3, 3–5]. It is known that among patients with drug abuse infectious and inflammatory diseases are spread much more often than in healthy people [5, 191–193; 6, 198–200]. In this regard, of considerable interest is the study of the immune system of these patients. The results of a clinical assessment of the functional state of the individual components of nonspecific resistance in drug addicts remain to be elucidated [2, 23; 4, 120–122].

The aim: of the study was to investigate immunological features of patients with heroin addiction.

Material and methods: 57 heroin addicts. Of these 34 patients aged 19–20 years, 11 patients aged 10–22 years, 8 patients – 23–25 years; 43 male, 14 female employees. All patients for the duration of the use of opium preparations were divided into 2 groups. Duration of drug abuse in group I ranged from 4 months to 5 years (31 patients). In the 2nd group duration of drug addiction was more than 5 years (26 patients). All patients were formed on narcotics withdrawal. The analysis of anamnestic data of drug addicts have revealed a tendency to infectious diseases, while prevailing were the so-called blood-contact infection – viral hepatitis and HIV infection. So, 64,0% of the patients were identified antibodies to hepatitis C virus, 14,0% of both hepatitis C virus and In and 11,1% of patients – to HIV. In addition, most patients complained of frequent (4–5 times per year) respiratory diseases, mostly acute respiratory viral infection.

To the cells, taking an active part in realization of the basic functions of the immune system, as well as key positions in the non-specific immunological resistance, are dendrite-wide cells, neutrophils, monocytes/macrophages, eosinophils, basophils, mast cells. The main role belongs and refers to neutrophils. Given this fact, in the course of this study that these cells were the main focus in assessing the status of patients who abuse heroin. A series of studies was devoted to the evaluation of the actual phagocytic function of neutrophils (percentage of activated neutrophils) in the peripheral blood of heroin abusers.

For statistical processing of material was used statistical analysis and information delivery SAS (Statistical Analysis System).

Results and discussion: The results of the survey showed that pereditary burdened by alcoholism, drug abuse was detected in 6 patients. All the studied patients abused heroin, which was their main drug. Parallel, but much less from case to case, the patients had used alcohol, cannabis, psychotropic drugs.

As follows from the data, the most pronounced reduction in the proportion of activated neutrophils in peripheral blood were registered in patients of the 2nd group in the withdrawal period taking heroin for over 5 years (Table 1).

The percentage of phagocytic cells was the lowest and amounted to $25,7 \pm 2,3\%$ and significantly differed from the value compared to the control. In the future, these indicators at the exit of the withdrawal syndrome and is in remission increased, but did not reach the numbers of the control group.

Table 1. – The state fraction of activated neutrophils in the peripheral blood of heroin addicts with different duration of the disease

Groups	The proportion of activated neutrophils in the withdrawal period	The proportion of activated neutrophils after treatment	The proportion of activated neutrophils in remission
I group	$34,8 \pm 3,2\%^*$	$38,5 \pm 3,8\%$	$39,8 \pm 3,6\%$
II group	$25,7 \pm 2,3\%^*$	$29,8 \pm 2,8\%$	$30,7 \pm 3,3\%^*$
Control group	$41 \pm 3,9\%$	$41 \pm 3,9\%$	$41 \pm 3,9\%$

*significantly compared to control group ($p < 0,05$)

Pronounced changes in the functional state of phagocytic cells was recorded also at the duration of taking the drug up to 5 years in patients of the 1st group. Patients who use heroin has a direct moderate correlation between duration of intake of drugs and the proportion of acti-

vated neutrophils ($r = 0,56, p < 0,05$), while the proportion of activated neutrophils and phagocytic number also correlate among themselves.

The fraction of lymphocytes in peripheral blood were assessed according to the magnitude of the phagocytic number (Table 2).

Table 2. – The state of phagocytic numbers in the blood of heroin addicts with different duration of the disease

Groups	Withdrawal period	After treatment	Remission
I group	8,8 ± 0,76	9,0 ± 0,55	9,1 ± 0,72
II group	7,8 ± 0,56*	8,6 ± 0,66	8,9 ± 0,88*
Control group	9,5 ± 0,78	9,5 ± 0,78	9,5 ± 0,78

*significantly compared to control group ($p < 0,05$)

Currently, it is well known that the metabolism of phagocytes is mediated by the presence in their lysosomes of a number of enzymes including acid hydrolases, neutral proteases, bactericidal enzymes (myeloperoxidase, lysozyme) as well as lactoferrin and others. Of particular importance is the activation of these enzymes during phagocytosis and other effects of oxidative metabolism. When this occurs, activation of the oxidase to the cell membrane, which restores the O_2 to superoxide ion O_2^- accumulated in phagosome and becoming partly in H_2O_2 in an acidic environment.

In the next phase of this study, we evaluated the extent to which heroin use is reflected in this component. The bactericidal effect of the mentioned substances is enhanced by myeloperoxidase. The

entire set of enzymes of phagocytes can act not only within cells but also released into surrounding tissues and the blood, forming, thereby, along with other biologically active-governmental substances (complement, lysozyme, 3-lysine, lymphokines, monokini, etc.), the humoral component of the immune system. In this connection seemed interesting to assess in conditions of chronic heroin intoxication this side of the functioning of phagocytes.

We determined serum concentration of myeloperoxidase, a key enzyme of oxygen-dependent metabolism of phagocytes. The results of the studies in this direction showed that in the acute period of the disease the concentration of this enzyme in the blood serum of the examined patients was significantly lower than the control (Table 3).

Table 3. – The content of myeloperoxidase in serum of heroin addicts with different duration of the disease

Groups	Withdrawal period	After treatment	Remission
I group	220,7 ± 10,75*	229,4 ± 12,55	239,8 ± 20,76
II group	208,7 ± 10,73*	215,7 ± 7,19	225,7 ± 4,53*
Control group	252,5 ± 3,19	252,5 ± 3,19	252,5 ± 3,19

*significantly compared to control group ($p < 0,05$)

As can be seen from the Table 3, the use of heroin leads to a decrease in the level of myeloperoxidase in blood serum of examined patients at all stages of the disease. Depending on the duration of drug abuse value of myeloperoxidase were detected reliably at a lower level than in the control group ($p < 0,05$). Failure of the phagocytic systems in heroin addicts is clinically manifested in the form of infectious-inflammatory processes in internal organs. Given information, determine the relevance of a comprehensive study of acquired defects of phagocytosis, to determine the feasibility of establishing new ways to study the functional activity of neutrophils and development of pathogenetic methods of their prevention.

Conclusions

Thus, on the basis of a comprehensive study of the phagocytic activity of neutrophils in heroin addicts, we have determined that heroin addiction is accompanied by pronounced changes in cell-humoral system of human. Drugs have a suppressive effect on immunocompetent cells. Disruption of the immune system leads to the violation of cellular and humoral homeostasis and exacerbates the course of addiction. The comprehensive study of the functional activity of neutrophils extends pathogenetic interpretation of the clinical manifestations of addiction and helps the development of additional methods of correction of ongoing therapeutic interventions.

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Tairova Sevara Furqatovna,
Tashkent Medical Academy
E-mail: dildor-22@bk.ru

COMPARATIVE STUDY OF CROPPING ABILITY OF ETIOLOGICAL AGENTS OF THE CHILD CHRONIC PURULENT GAIMORITES

Abstract: The aim of the study was to assess the etiological structure of chronic purulent and acute sinusitis at children as the patients in the dynamic of the disease. It was found that the gram-negative flora was dominated by the chronic purulent maxillary sinusitis, while the gram-positive microflora prevailed as result of the acute purulent maxillary sinusitis. In addition, the spectrum of pathogens in the case of chronic sinusitis was significantly greater than in the case of acute sinusitis. The indexes of dynamic of the bacterial inflammation characterized by fractionally changing of the pathogen's species composition in the postoperative cavity in both compared groups: chronic and acute. It was found, a low sensitivity of strains: *S. aureus*, *S. viridans*, *S. epidermidis* to the unprotected penicillin, however, the higher sensitivity was discovered for the cephalosporin of different generations.

Keywords: the sick children, the chronic purulent sinusitis, the pathogens, identification, antibiotic resistance.

It is known that nowadays for the clinical microbiology it was increased the diagnostic importance of the bacteriological examinations of ENT organ's diseases (i. e., the paranasal sinuses) [4].

It was revealed sinusitis agents more often were: *S. pneumoniae* (48.0%) and *H. influenzae* (12.0%), and more rarely observed anaerobes: *S. pyogenes*, *M. catarrhalis*, *S. aureus*, [2; 5]. In the case of the recurrent acute sinusitis, the spectrum of pathogens did not differ from the spectrum of acute sinusitis. The authors affirmed that amplification of chronic sinusitis was generally due to anaerobic agents.

The actuality of the study consist in firmly increased pathogen's resistance of the inflammatory agents of paranasal sinuses to antibacterial preparates, infast changing of pathogen's landscape, in enlarged importance the anaerobes into pathogenesis of chronic etiology of paranasal sinuses [3; 6; 8].

In the study we are aiming to investigate and evaluate the dynamic of etiological structure of the chronic purulent and acute sinusitis for children.

Materials and methods. For this goal the 130 sick children under 15 years old were studied. The examined patients were boys – 69 (53.1 ± 4.4%) and girls – 61 (46.9 ± 4.4%). Among these were children rural area – 98 (75.4 ± 3.8%) and 32 (24.6 ± 3.8%) patients were urban area. The patient's distribution by age was as followings: from 0 to 6 years – 39 (30.0 ± 4.0%) and from 7 to 15 years – 91 (70.0 ± 4.0%) of children. These patients were divided into 2 representative groups: the first principal group – 95 children with chronic purulent sinusitis (ChPS); and the second comparison group – 35 children with acute sinusitis (AS). The study was done in dynamic: before surgery, and at 3, 7 and 14 day after surgery.

The all patients were diagnosed with help the clinical, instrumental, bacteriological methods according to Statistical Classification of Diseases and Related Health Problems (2007).

Collection of the biological material (i. e. pus from pathological focus) and delivery of samples to bacteriological laboratory was carried out according with the traditional method. Identification and differentiation of pathogens were carried out in concordance with Bergey's Manual Systematic Bacteriology [1]. Sowing of the material was carried out according to Gold 'manual book. Genus

and species identification of cultures were based on their determination of main taxonomic features. To etiologically significant were considered the pathogens cropped at concentration on nutrient media of HiMedia (India) more than 10^4 – 10^5 CFU/ml. To determine resistance of the cultures against antibiotics, the disc-diffusion method was used [7]. The method is based on diffusion the antibacterial drug through the paper disc into the tough nutrient medium (Müller-Hinton), and on suppressing of culture growth at concentration of 1.5×10^8 CFU/ml in zone where concentration of the antibacterial drug is exceeded the minimum inhibitory concentration. The density of inoculum (suspension of studied microorganisms) was adjusted to 0.5 according with McFarland (i. e. with turbidity standard) and used in the period of 15 minutes after the preparation. Petri dishes were filled with agar layer of 4 mm thick (Petri dish of diameter 90 mm filled with 20 ml of agar) and were used immediately. Standard inoculum consisted of 2 ml the nutrient medium pipetted into Petri dishes. Standardized commercial disks of HiMedia (India) were used. The glasses with the disc pulled out refrigerator before 1 hour of start. The sensitive (S), conditioned-resistant (SR), resistant (R) strains were evaluated on measuring of their growth diameter [7].

To evaluate results of the study was taken into account the qualitative and quantitative composition of natural microflora of the clinical samples. As etiologically significant were assumed: a) the detection of microorganisms are not belonging to natural microflora (i. e. microflora of the upper respiratory tract), or b) detection of unusually large number of microorganisms of any species.

The more difficult it was interpretation of results for chronic inflammatory processes, in the case of detection of microorganism's association. Growth of various species from the associations was quantified as initial sowing of pathological material on nutrient media. The species are quantitatively predominated, was taken the leading position in the etiology of the disease. Interpretation of results on the contents of maxillary sinus usually was not difficult, since detected microorganisms were the causative agents of studied disease.

Statistic analyses carried out using the method of variation statistics with help programs for biomedical research. Experiments based on the evidence-based medicine principles.

Results and discussion. It was noted for the $6,9 \pm 2,2\%$ ($n = 9$) of sick patients a result marked as “negative bacteriological result”, and for $93,1 \pm 2,2\%$ ($n = 121$) of patients result marked as “positive bacteriological result”. Due to study it was emphasized that “monoculture” of microorganisms was obtained for $33,1 \pm 4,3\%$ ($n = 40$) of patients, and “association” of microorganisms for $66,9 \pm 4,3\%$ patients ($n = 81$; mainly 2–3 pathogens).

Cropping of the etiological agents before surgery from the child's biological materials with chronic and acute sinusitis ($n = 121$) shown in Figure: *S.viridans* – $21,5 \pm 3,7\%$ ($n = 26$), *S.aureus* – $19,0 \pm 3,6\%$ ($n = 23$), *S.epidermidis* $16,5 \pm 3,4\%$ ($n = 20$), *P. aeruginosa* – $15,7 \pm 3,3\%$ ($n = 19$), *E. coli* – $13,2 \pm 3,1\%$ ($n = 16$), *Enterococcus* spp $5,8 \pm 2,1\%$ ($n = 7$), *Proteus* spp $5,0 \pm 2,0\%$ ($n = 6$), *S.haemolyticus* – $1,7 \pm 1,2\%$ ($n = 2$), *S.saprophyticus* – $1,7 \pm 1,2\%$ ($n = 2$).

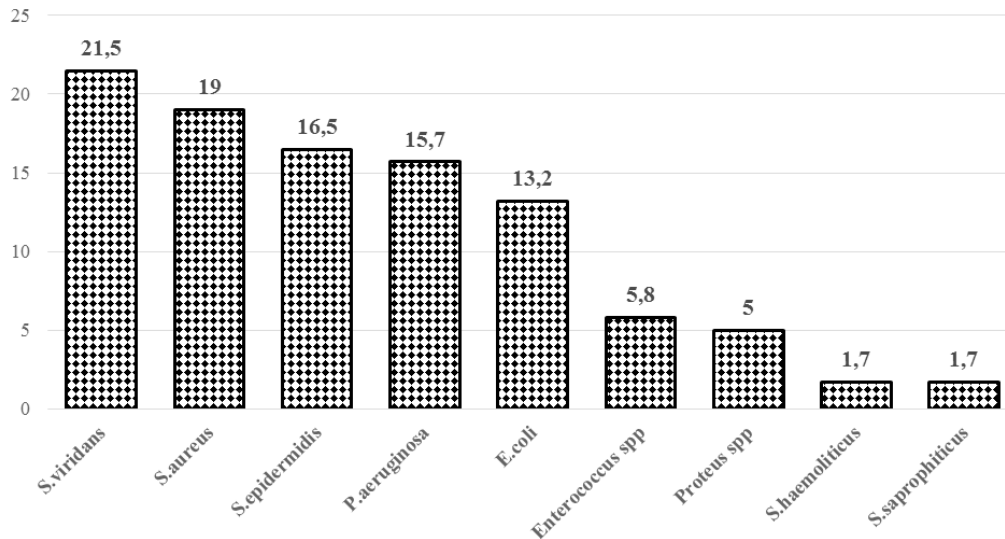


Figure 1. The etiologic structure of sinusitis agents (acute and chronic) of child before medical treatment, %

For chronic sinusitis patients in 88 out of 95 cases and for acute sinusitis patients in 33 out of 35 cases, the “positive bacteriological results” were obtained. The microbial landscape of chronic sinusitis patients ($n = 88$) was mainly represented by strains: *P. aeruginosa* ($19,3 \pm 4,2\%$, $n = 17$), *E. coli* ($13,6 \pm 3,7\%$, $n = 12$), *S.aureus* ($11,4 \pm 3,4\%$, $n = 10$), *S.viridans* ($10,2 \pm 3,2\%$, $n = 9$), *S.epidermidis* ($10,2 \pm 3,2\%$, $n = 9$), etc. For chronic sinusitis patients, in contrast with acute sinusitis patients (comparison group), the gram-positive microflora was prevailed and pathogen's spectrum was significantly less ($P < 0,05$).

It was found, that indexes of the bacterial contamination in dynamic characterized by fractional changing of pathogen's species composition in the postoperative cavity in both compared groups (chronic and acute). It was revealed, the before surgery was only observed 7 patients ($7,3 \pm 2,7\%$) with chronic and 2 patients ($5,7 \pm 3,9\%$) with acute sinusitis marked as “negative bacteriological result”, but at the third day after surgery the indexes was raised to $43,1 \pm 5,1\%$ ($n = 41$) and to $40,0 \pm 8,3\%$ ($n = 14$), respectively for chronic and acute patients. This result indicated the successful medical treatments of both chronic and acute groups.

When we have compared the inoculation rate of *S. aureus* for chronic sinusitis in dynamics: before surgery it was $11,4 \pm 3,4\%$ ($n = 10$), and after surgery: on the third day – $13,6 \pm 3,7\%$ ($n = 12$), on the seventh day – $11,4 \pm 3,4\%$ ($n = 10$) and on the 14th day – $9,1 \pm 3,1\%$ ($n = 8$). For acute sinusitis inoculation rate of *S. aureus*, were obtained the following indexes: before surgery – $39,3 \pm 8,5\%$ ($n = 13$), after surgery: on the third day – $24,2 \pm 7,5\%$ ($n = 8$), on the 7th day – $21,2 \pm 7,1\%$ ($n = 7$) and on the 14th day – $12,1 \pm 5,7\%$ ($n = 4$).

Comparative analysis indicated that in the first group of children, there was no significant difference between the indexes in its

dynamic ($P > 0,05$), while for second group there was statistically significant difference ($P < 0,05$).

The seeding rate of *S.viridans* in the “chronic” group was practically the same as the germination rate of *S. aureus*, while for children with acute sinusitis, the seeding rate of *S. aureus* ($P < 0,05$) was significantly more pronounced.

The similar results were obtained for patients with on the seeding rate of *S. epidermidis*. We had not found any specific pattern for this index, and the post-surgery seeding rates were not bearing a definite tendency to decreasing/increasing ($P > 0,05$).

The study of sensitivity of the pathogen's seeded strains to the antibacterial drugs, it was found the median sensitivity of strains: *S.aureus*, *S.viridans*, *S.epidermidis* to unprotected penicillin ($n = 69$; $S = 17,4 \pm 4,6\%$, $n = 12$), but the higher sensitivity was established for the cephalosporin of different generations: from $S = 76,8 \pm 5,1\%$ ($n = 53$) to $S = 95,7 \pm 2,4\%$ ($n = 66$). All strains of the mentioned pathogens ($S = 100\%$, $n = 69$) were high sensitive to amoxiclav.

The study resulted that the coagulase-negative staphylococci have not influenced definitely on maintenance of the acute inflammatory process, while the species *S.aureus* played the main role at the process. In other hand, at the chronic inflammatory process, was not observed the significant differences between the coagulase-negative staphylococci and *S. aureus* ($P > 0,05$).

It is interesting that for children of “main” group ($n = 95$) the inoculation processes on 14th day after surgery demonstrated only the normal representative microflora of the upper respiratory tract in $29,5 \pm 4,7\%$ cases ($n = 28$), though this trend was not observed for children of “comparison” group.

Conclusions

1. For 93.1% of the studied patients it was found the “positive bacteriological result”, and for 33.1% of patients, their results was obtained as monoculture, for 66.9% of patient as association of microorganisms (i. e., 2–3 pathogens).

2. Before the beginning of medical treatment, the child patients with acute and chronic sinusitis, were inoculated by: *S. viridans* (21.5%), *S. aureus* (19.0%), *S. epidermidis* (16.5%), *P. aeruginosa* (15.7%), *E. coli* (13, 2%), *Enterococcus spp* (5.8%), *Proteus spp* (5.0%), *S. haemolyticus* (1.7%) and *S. saprophyticus* (1.7%).

3. Among the children patients with chronic sinusitis, was predominated the gram-negative, while among the children with acute sinusitis dominated fauna was the gram-positive. In addition, the spectrum of pathogens for chronic patients was significantly greater.

4. The indexes of dynamic of the bacterial inflammation characterized by fractionally changing of the pathogen's species composition in the postoperative cavity in both compared groups. It was revealed that before surgery only 7.3% of chronic sinusitis patients and 5.7% of acute sinusitis patient shown the result that was marked as “negative bacteriological result”. However, on the third day after surgery, the indexes were rising in at both groups – 43.1% and 40.0% respectively for chronic and acute patients. This fact indicated about the successful medical treatments of both groups of child.

5. It was noted the low sensitivity of strains: *S. aureus*, *S. viridans*, *S. epidermidis* to the unprotected penicillin, but the higher sensitivity to cephalosporin of different generations. All of pathogen's strains were sensitive to amoxiclav.

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*Toychiev Abdurakhim Khodjiakbarovich,
Junior researcher, Research Institute of Epidemiology,
microbiology and infectious diseases, Tashkent Uzbekistan*

*Pazilova Dinora Ubaydullaevna,
Head of the department of coloproctology,
the 1st Republican clinical hospital, Tashkent Uzbekistan*

*Olimov Jakhongir,
Student, Tashkent Medical Academy, Tashkent Uzbekistan*

*Davis Nikolay Aleksandrovich,
researcher, Research Institute of Epidemiology,
microbiology and infectious diseases, Tashkent Uzbekistan*

*Osipova Svetlana Olegovna,
Head of the department, Research Institute of Epidemiology,
microbiology and infectious diseases, Tashkent Uzbekistan*

*Navruzov Bexzod Sarimbekovich,
Professor, Tashkent Medical Academy, Tashkent Uzbekistan
E-mail: davisnikolay@gmail.com*

IMMUNE STATE OF PATIENTS WITH ULCERATIVE COLITIS

Abstract: Cellular and humoral immunity in patients with ulcerative colitis at the period of exacerbation and after colectomy were studied. Immunologic shifts were analyzed for the purpose of defining their possible role in the monitoring of specific therapy efficacy and clarifying some aspects of ulcerative colitis pathogenesis.

Keywords: Ulcerative colitis, cellular immunity, humoral immunity, IgE, IgA.

Introduction. Ulcerative colitis (UC) is a chronic intestinal inflammatory disease of unknown etiology. Main attributable causes include genetic and environmental factors as well as a multifactorial immune disorders [1, 220–226; 2, 727–737; 3, 323–331]. The gastrointestinal tract in which this disease occurs is central to the immune system, and the innate and the adaptive immune systems are balanced in complex interactions with intestinal microbiota under homeostatic conditions. In UC this homeostasis is disrupted and uncontrolled intestinal inflammation is perpetuated [4, 3–10; 5, 928–937]. UC is characterized by chronic relapsing inflammation of the intestine. Heterogeneity among UC patients is poorly understood and represents a significant barrier to efficiency of conventional therapy, including 5-ASA, corticosteroids, 6 mercaptopurin. The treatment goal in UC is the induction and maintenance of remission. However, 20% to 40% of UC patients do not respond to conventional medications [6, 1582–1592; 7, 1–25]. In such cases they should receive biological therapy (monoclonal antibodies to TNF- α (infliximab and other preparations) or colectomy [8, 660–671].

There is some information on cellular and humoral immunity in UC and it is partly controversial: inhibition of cellular immunity and activation of humoral one [9, 25], exhaustion of NK cells and increase CD8⁺ cells [10, 25] and elevation of CD16 [11, 115–126], but studies of immune state after colectomy in patients with UC refractory to conditional therapy are practically absent.

The purpose of the study: to characterize cellular and humoral immunity in patients with UC at the period of exacerbation and after colectomy before restorative surgery.

Materials and methods. Study was conducted on the basis of Research Institute of Epidemiology, Microbiology and Infectious Diseases and the First Republican Clinical Hospital. 30 patients with UC were admitted at the First Republican Clinical Hospital, coloproctology department. All of them were hospitalized at the period of exacerbation. Diagnosis was based on clinical, laboratory, endoscopic and histological data. Total and distal forms were diagnosed in 28 and 2 patients respectively. Activity of UC was estimated according to Mayo Clinic Score. Moderate and severe diseases were detected in 8 and 22 patients respectively.

Age of patients was at the range of 17–78 years and an average age was 42 years. There were 16 males and 14 females. Conservative therapy included salofalk, glucocorticoides, probiotics. All of the patients were examined upon admission to the hospital, 14 of them were refractory to conventional therapy.

The standard surgical treatment for UC is restorative proctocolectomy with ileo-pouchanal anastomosis and protective ileostoma (a double-staged procedure). The subtotal colectomy without any intestinal anastomosis, with a transient ileostoma, followed by proctectomy and pouch creation at a later time are applied in active UC [12, 72–82]. All the patients were undergone to colectomy with a transient ileostoma and they were examined additionally before reconstructive rehabilitation surgery. It was carried out in 5–6 months after the first stage of surgery.

The control group included 30 residents of Tashkent city without any complaints from gastrointestinal tract matched by gender and age to the patients with UC.

Table 1. – Indices of cellular immunity in patients with UC

Cohort under study	CD3 ⁺	CD4 ⁺	CD8 ⁺	CD4 ⁺ /CD8 ⁺	CD16 ⁺	CD25 ⁺	CD95 ⁺	CD20 ⁺
Healthy individuals	59,9 ± 0,9	36,0 ± 2,4	21,4 ± 2,2	1,6 ± 0,1	10,2 ± 1,1	2,4 ± 0,2	21,8 ± 2,2	20,0 ± 1,2
Patients with active UC	57,4 ± 3,5	31,7 ± 3,2	28,2 ± 2,5*	1,1 ± 0,1***	15,4 ± 0,9***	1,7 ± 0,1***	15,2 ± 1,1***	23,2 ± 2,1
Patients with UC after colectomy	60,4 ± 7,1	35,2 ± 3,1	20,9 ± 3,3	1,7 ± 0,1	9,7 ± 1,3*	2,7 ± 0,1	22,3 ± 2,4	21,3 ± 1,8

*Significant difference with healthy individuals

**Significant difference with condition after colectomy

CD3⁺, CD4⁺, CD8⁺, CD20⁺, CD16⁺, CD25⁺, CD95⁺- lymphocytes in peripheral blood were detected by the method of indirect rosette formation with appropriate monoclonal antibodies, production of LLC “Medbiospectrum”, Moscow, Russia [13, 12–14]. The level of serum IgM, IgG and IgA was detected by the method of Mancini et al. [14, 235–248], the level of total serum IgE was detected by the ELISA method (reagents production of ZAO “Vector-Best”, Novosibirsk, Russia).

The study was approved by the Medical Ethics Committee of the Medical Association of the Republic of Uzbekistan in accordance with the Declaration of Helsinki. Informed consent was obtained from each participant prior to their enrolment.

Results and discussion. Subpopulation of lymphocytes of peripheral blood are represented in table 1. No significant difference were found between UC patients and control group in proportions of circulating CD3⁺- and CD4⁺-lymphocytes, although the tendency to decrease of CD4⁺-lymphocytes percentage was observed. CD8⁺ lymphocytes percentage was increased and the CD4⁺/CD8⁺ ratio in UC patients at the period of exacerbation were significantly lower than in controls.

Peripheral blood CD4⁺CD25⁺ regulatory cells have a central role in the immunopathology of a number of diseases, mediated by inflammation, autoimmunity and neoplasia [15, 29–38]. Comparison of CD4⁺CD25⁺ lymphocytes in UC patients at the period of exacerbation and in patients after colectomy showed that the highest value was obtained in UC patients after colectomy and CD4⁺CD25⁺ lymphocytes percentage was significantly decreased in active UC. It can indicate their role in alleviation of inflamma-

tion. Our results are in some accordance with data of Dahlen et al. [16, 275–284] that positive results of infliximab in UC treatment is followed by reduced expression of CD25⁺ in CD4⁺ and CD8⁺ T cell population. The count of circulating CD4⁺CD25⁺ regulatory cells in UC patients may serve as additional diagnostic test for estimation of relapse and/or indicator for efficiency of therapy.

We found a decrease of percentage of CD95⁺ lymphocytes, it reflects low apoptosis readiness, typical for severe forms of UC. CD95⁺ may play a role in protecting the colon from inflammation and it was demonstrated by Park et al on experimental model of colitis [17, 1063–1070].

CD16⁺ lymphocytes are responsible for antitumor, antiviral and transplantation immunity. Decrease in the number of CD16⁺ lymphocytes results in development of oncologic diseases and increased severity of the course of viral and autoimmune diseases. CD16⁺ cells possess a high cytotoxicity and ability to produce a lot of cytokines, mainly TNF-α, IL-1 and IL-12 [18, 584–592]. We detected that peripheral blood CD16⁺ lymphocytes were increased significantly in active UC and decreased after colectomy indicating their crucial role in inflammation.

Table 2 shows that level of serum IgM and IgG in patients with active UC insignificantly differed from normal values as well as in patients after colectomy. An elevated level of serum IgA was detected. A tendency to decrease of IgG level was observed. It is at some extent in accordance with data of Tarun Rai et al. [19, 115–121] who described a low level of serum IgG in UC patients and connected it with disease duration and hypoalbuminemia. In our case it can be connected with a great number of the patients refractory to conventional therapy.

Table 2. – Indices of humoral immunity in patients with UC

Cohort under study	IgM (mg/%)	IgG (mg/%)	IgA (mg/%)	IgE (IU/ml)
Healthy individuals	141,1 ± 5,1	1225,8 ± 38,8	153,5 ± 7,1	55,0 ± 7,2
Patients with active UC	155,9 ± 10,2	1175,3 ± 44,0	189,9 ± 9,4***	277,6 ± 14,1***
Patients with UC after colectomy	162,4 ± 12,5	1210,6 ± 57,0	172,0 ± 8,1	169,2 ± 11,2

*Significant difference with healthy individuals

**Significant difference with condition after colectomy

Serum concentration of IgE, as well as the prevalence of patients with a high IgE level were significantly increased in patients with UC. An elevated serum level of IgE was observed in 7 UC patients with allergy (food allergy, urticaria, allergic rhinitis) as well as in 23 patients without allergic manifestations. Maximal values of IgE level were observed both in patients with allergic manifestations and without them. The cause of the IgE elevation in patients without clinical aller-

gic manifestations is unclear, but there is information of clinical and pathophysiological similarities between IBD and non-pulmonary allergic phenomena [20, 11–23].

Effective treatment of food allergy in UC patients by specific immunotherapy and butyrate-production probiotics improve of the clinical symptoms of UC [21, 37] On the experimental model of oxazolone induced colitis was shown that development of pathological

process is mediated by IL-13 and IgE production by Th2 and B cells respectively [22, 96–108]. So a high level of total serum IgE could indicate its participation in pathological process.

Conclusion. The main changes found in UC patients with dominating severe form of the disease at the period of exacerbation were elevation of percentage of CD16⁺ lymphocytes and decrease of CD25⁺- and CD95⁺-lymphocytes. Humoral immunity was char-

acterized by significant increase of serum concentration IgA and especially IgE. Colectomy induced clinical improvement and decrease of circulating CD16⁺ and increase of CD25⁺ – and CD95⁺ lymphocytes. These shifts could be considered as importance of these subpopulations for inflammatory process. Significant elevation of the concentration of total serum IgE after colectomy allows to suspect that allergy is a factor of UC pathogenesis.

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*Tulyaganova Fazilat Mukhuddinovna,
Candidate of Medical Sciences,*

*Tashkent Institute of Postgraduate Medical Education,
Department of Gastroenterology and Physiotherapy, tutor-trainee*

*Khamrabaeva Feruza Ibragimovna,
Doctor of Medical Sciences,*

*Tashkent Institute of Postgraduate Medical Education, professor,
The Head of the Department of Gastroenterology and Physiotherapy*

RISK FACTORS AND QUALITY OF LIFE IN THE PATIENTS WITH VARIOUS CLINICAL FORMS OF ACUTE AND CHRONIC PANCREATITIS

Abstract: This research was carried out to assess the association between major risk factors for pancreatitis and the quality of life in the patients with the various clinical forms of acute and chronic pancreatitis.

Keywords: pancreatitis, acute, chronic, risk factors, obesity, tobacco dependence.

Background. In many researches it has been proved, that tobacco smoking is a risk factor of acute and chronic pancreatitis (AP, CP) of various etiology [2; 5; 6], however, the effect of tobacco smoking on the quality of life (QL) of the patients with AP and CP remains to be studied insufficiently. The direct link between alcohol consumption and AP and CP is well-known, within first ten years after confirmation of the diagnosis of alcoholic CP more than 30% of the patients died, and after 20 years – about 50% of patients [1; 3; 4]. However the complex study of the risk factors of AP and CP has not been carried out till now.

Purpose of research. Because of significance of the problem we undertake attempt to investigate association between major risk factors for pancreatitis and quality of life in the patients with the various clinical forms of chronic pancreatitis (XII).

Design. open one-stage clinical research. Criteria for inclusion into research were: men and women at the age 25 years and older with acute pancreatitis or chronic pancreatitis. Criteria for exclusion included pseudotumorous pancreatitis, presence of cysts in the pancreatic gland (PG). The selection of the patients was performed in the Railway Polyclinic, in the Surgical Department of the Railway Hospital.

During the period from 2010 to 2014 the group of 127 patients with AP and CP was formed, 4 patients were excluded from research after revealing cysts and tumor of the PG. This work was enrolled 123 patients with AP and CP, among them there were 60 men and 63 women, the mean age of the patients with pancreatitis was $50,4 \pm 2,2$ years. Of them 42 patients were with AP and 81 patients with CP. The duration of disease was from 3 till 20 years, on the average $5,6 \pm 4,3$ years. With regard to the number of men and women the groups of the patients with AP and CP did not differ ($p = 0,09$).

Methods of investigations. interview and objective examination of the patients, basic and additional laboratory-instrumental researches. For verification of the diagnosis all patients underwent coprological investigation, ultrasonography of the pancreatic gland, liver and biliary ducts. For diagnosis confirmation a part of the patients was performed CT and MRI of the PG, elastase test. The interview of patients with AP was performed in the first 5–10 days from the date of hospitalization, patients with CP – during an aggravation.

There was also determined the level of triglycerides (hypertriglyceridemia is considered at the level 150 mg/dl (1,7 mmol/l) and more (Klimov A. N., 1999)), the body mass index was also measured (Kettle index II) (by formulae: $BMI (kg/m^2) = \text{body mass (kg)}/\text{growth (m}^2\text{)}$). As deficiency of weight the value of $BMI < 18,5 kg/m^2$ was considered, excessive body mass – in $BMI > 25 kg/m^2$, obesity – in $BMI \geq 30 kg/m^2$.

All patients filled in a questionnaire on tobacco smoking, in which there were taken into account frequency of smoking and quantity of cigarettes smoked, and also age at the beginning and duration of smoking. The patients smoking even 1 cigarette per day were considered as smoking.

The patients answered the questions of the questionnaire about the type of alcoholic drink (beer, wine, vodka etc.), about a typical single doze of a consumed drink and about frequency of consumption. By quantity of consumed alcohol all studied patients were divided into 2 groups: Group 1 not using alcohol within last year and usually not using alcohol within one week; Group 2 (drinking) — men/women consuming 160/80 g of alcohol and more per week.

The real nutrition was studied with use of the questionnaire including 142 names of products with the indication of portions of the given product and frequency of consumption for last 3 months, which was adapted for researches (Bingham S. A., 1994). With the help of mathematical model (developer cand. biol. sci. Verevkin E. G.) there was calculated nutrient and food set of a daily diet based on “the Tables of chemical structure of meals and culinary products” (Ckurikhin I. M., 1987). For estimation of the quality of life (QL) of the patients with pancreatitis we used two questionnaires: a questionnaire of a general type MOS Short Form-36 Health Survey (SF-36).

Statistical data processing was performed with application of the software package SPSS (version 10.0). The processing included: the analysis of the numerical characteristics of the signs and their distributions, reliability of distinctions in groups was estimated by methods of parametrical (by criteria of Student and Fisher) and not parametrical statistics (by criterion of Mann-Whitney).

Results of researches

As a result of the researches performed it has become known, that BMI in the patients with pancreatitis, on the average, accounted

for $25,6 \pm 0,53 \text{ kg/m}^2$ (in the patients with AP – $23,8 \pm 1,0 \text{ kg/m}^2$, in the patients with CP – $26,3 \pm 0,6 \text{ kg/m}^2$, $p > 0,05$). Among the patients with AP 8,3% are with insufficient mass of body, 50% of the persons are with normal mass of body, and 41,7% – with excessive body mass. Among the patients with CP 4,6% were with insufficient body mass, 40% of patients with normal body mass, 55,4% – with excessive body mass ($p > 0,05$). In the patients with edematous and necrotic form of AP the frequency of excessive body mass accounted 50% and 33,3%, respectively ($p > 0,05$). In the frontier form of CP the excessive body mass was met in the 61,1% of cases, in the possible form – in 45,2% of cases, in the definite form – in 45,5% of cases, ($p > 0,05$). In the patients with CP with various indexes of weight the frequency of excessive body mass did not differ ($p > 0,05$).

The average levels of TG in two groups of the patients were raised: CP – $1,86 \pm 0,1$ and AP – $1,88 \pm 0,11 \text{ mmol/l}$, $p > 0,05$. Among the patients with CP there were revealed 54% of the persons with HTG, among the patients with AP – 60% of the persons ($p > 0,05$). In the patients with edematous and necrotic form of AP the frequency of HTG accounted for 70% and 50% ($p > 0,05$). In the patients with the boundary form of CP HTG was revealed in 67,9% of cases, with probable form – in 40% of cases and with definite – in 20% of cases ($p < 0,05$).

The consumption of alcohol in the patients with CP, on the average, accounted for $29,8 \pm 10,7 \text{ g}$ of pure ethanol, in the patients with AP – $59,0 \pm 8,9 \text{ g}$ of pure ethanol per one week ($p < 0,05$). Among all patients with CP the patients with an index of weight D ($p < 0,05$) consumed alcohol much more often.

Among the patients with AP the mean value by the test AUDIT was higher ($9,0 \pm 1,3$ numbers), than in the patients with CP ($1,4,0,4$ numbers, $p < 0,05$). More than 8 numbers (sign of alcoholism) were noted in 10% of the patients with CP and in 90% of the patients with AP ($p < 0,01$).

Among all patients with AP and CP 21,8% of patients smoke, and 78,5% of the patients do not smoke. Among the smoking patients 68,2% are patients with AP, 31,8% – patients with CP ($p < 0,05$). Among the patients with AP 37,5% of them smoke, among the patients with CP – 11,9% of the persons ($p > 0,05$). By the index of the smoker these groups did not differ: AP – $15,8 \pm 2,2$ cigarettes, CP – $14,4 \pm 2,2$ cigarettes ($p > 0,05$). Among the patients with edematous form of AP 43,8% of them smoke, among the patients with pancreonecrosis – 34,8% of persons smoke ($p > 0,05$). Among the patients with CP with the index of weight A there was no smoking persons and persons smoking earlier. Among the patients with CP with index of weight D there were 50% of the persons smoking now and 75% of the persons smoking earlier. The frequency of smoking in the patients with AP and CP is in inverse proportion connected to BMI: $r = -0,27$, $p < 0,05$. In the smoking patients with AP and CP GTG came to light less often: $r = -0,24$, $p < 0,05$. Among the patients with AP and CP the direct association between smoking and consumption of alcohol was revealed: $r = 0,27$, $p < 0,05$, and between smoking and frequency of consumption of alcohol: $r = 0,34$, $p = 0,001$. Thus, the greatest number of the smoking persons was revealed among the patients with edematous form of AP (43,8%), with the certain form of CP (35,3%) and with an index of weight D of CP (50%).

Table 1. – Consumption of proteins, fats, and carbohydrates and daily caloric value of diet in the patients with AP and CP (g/day), $M \pm m$

Nutrients	Groups of patients	
	AP (n = 42)	CP (n = 81)
Protein total	$84,8 \pm 8,5$	$78,6 \pm 5,9$
Fat total	$125,3 \pm 13,5$	$114,9 \pm 11,5$
Carbohydrates total	$237,9 \pm 21,9$	$205,7 \pm 17,8$
Daily caloric contents of diet, kcal/day,	$2404,5 \pm 225,3$	$2194,4 \pm 182,5$
SFA	$42,9 \pm 4,4$	$42,5 \pm 4,8$
MSFA	$44,3 \pm 4,9$	$39,5 \pm 4,2$
PSEFA	$28,1 \pm 3,2$	$24,4 \pm 2,7$
Sugar	$93,7 \pm 12,7$	$89,2 \pm 11,9$

• – $p < 0,05$ – distinction between the patients with AP and CP.

Table 2. – Mean parameters of QL in the patients with AP and CP by the questionnaire SF-36, in values

Scales of the questionnaire SF-36	Patients with AP and CP (n = 123)	AP (n = 42)	CP (n = 81)
PF	$52,9 \pm 2,7$	$61,8 \pm 3,8^*$	$47,2 \pm 3,6$
RPF	$8,3 \pm 2,5$	$8,3 \pm 4,0$	$8,3 \pm 3,3$
PP	$37,4 \pm 1,9$	$37,6 \pm 3,5$	$37,4 \pm 2,3$
GH	$37,4 \pm 1,5$	$43,2 \pm 1,8^*$	$33,7 \pm 2,1$
VF	$46,1 \pm 1,3$	$45,6 \pm 1,9$	$46,5 \pm 1,7$
SF	$66,5 \pm 2,1$	$68,9 \pm 3,4$	$65,0 \pm 2,7$
REF	$11,1 \pm 2,9$	$12,8 \pm 4,7$	$10,0 \pm 3,7$
MH	$59,0 \pm 1,4$	$57,7 \pm 2,3$	$59,9 \pm 1,9$

• – $p < 0,05$ – differences between patients with AP and CP.

During the analysis of the diet there were not revealed distinctions between the patients with AP and CP (Table 1). In both groups diet is imbalanced on fatty and carbohydrate components: there was prevailed high share of consumption of the total fat – 46,9% and 47,1% of energy of diet in the patients with AP and CP, insufficient consumption of carbohydrates – 39,6% and 37,5% from energy of diet according to two groups. During the analysis of a diet in the patients with CP there were not revealed distinctions between parameters at various indexes of weight of CP ($p > 0,05$).

The mean parameters of the quality of life in the patients with AP and CP, appreciated with the help of a questionnaire SF-36, are presented in the table 2. At comparison of parameters of the quality of life in the patients with AP and CP the worse QL was revealed by scales FF and GH of a questionnaire SF-36 in the patients with CP in comparison with the patients with AP ($p < 0,05$) (Table 2).

Scales of the questionnaire SF-36: PF – physical functioning; RPF – role physical functioning; P – physical pain; GH – general health; VF – vital force; SF – social functioning; REF – role emotional functioning; MH – mental health.

The parameters of QL by the questionnaire SF-36 in the patients with boundary, probable and certain forms of CP did not differ.

In the patients with CP with an index of weight D the worse QL is marked on the scales PF and SF of questionnaire SF-36. In the studied patients without HTG in comparison with the patients with HTG the parameters QL were worse only on a scale GH of questionnaire SF-36 – $32,4 \pm 2,7$ and $40,7 \pm 2,3$ numbers. In the work of Martinez E. (2001) there was shown, that in HTG-induced AP there was not revealed deterioration of the QL. In the patients with AP both with pancreonecrosis and edematous form of disease the findings of Q_L studied with use the both questionnaires, did not differ at the normal and increased levels of TG of blood serum ($p > 0,05$).

The level of TG in the blood rises at consumption of fatty products, and if the patient with pancreatitis does not have postprandial

strengthening of the pain syndrome, then, probably, the functionally active tissue of the pancreatic gland is less damaged, and the patient is capable to eat normally, showing sufficient physical and social activity. Among the patients with AP and CP there was noted moderate direct correlation of HTG with parameters of QL on the scales HG ($r = 0,29$, $p < 0,05$), PF ($r = 0,24$, $p < 0,05$), RPF ($r = 0,24$, $p < 0,05$) of the questionnaire SF-36.

Among the studied patients the worse QL on the scales SF of questionnaire SF-36 was revealed at the persons with low and with normal body weight in comparison with the patients with changed BMI ($p < 0,05$).

Among the patients with CP and with an index of weight A in the persons with low, and also with normal body mass the parameters of the QL on several scales of a questionnaire SF-36 (RPF, GH, VF, MH and REF) were worse, than in the patients with excessive BMI ($p < 0,05$). Among the patients with AP and CP there was found moderate direct correlation of the excessive BMI with parameters of the QL on the scales of VF ($r = 0,28$, $p < 0,05$), MH ($r = 0,27$, $p < 0,05$) of the questionnaire SF-36. The increase of body mass in the patients with AP and CP, as a rule, was consequence of improvement of the processes of food assimilation, reduction of a degree of dyspepsia that resulted in increase of a level QL, to what these data testify.

Between the not drinking and drinking patients with AP and CP there were not revealed differences in the parameters of the quality of life, appreciated with the help of a questionnaire SF-36 ($p > 0,05$).

At the analysis of association of QL and ration of nutrition (table 4) in the patients with AP and CP with the normal or reduced energy of the daily ration of nutrition there were noted lower parameters of QL on the scale RPF of a questionnaire SF-36 ($2,9 \pm 2,9$ and $11,25,6$ numbers, respectively, $p < 0,05$), than in those patients with AP and CP, who had the energy daily ration of nutrition higher of the recommended norms (2500 kcal/day) (San Rules and Norms, 2002).

Table 3. – Average parameters of QL in the patients with AP and CP with various consumption levels of total fat, protein and carbohydrates by the questionnaire SF-36, in numbers, * – $p < 0,05$

Nutrients	Daily consumption	Scales of the questionnaire SF-36							
		PF	RPF	P	GH	VF	SF	REF	MH
Total protein, g/day	≤75	54,1±5,3	3,7±3,7	40,2±3,8	39,2±2,9	45,0±2,5	64,8±4,2	4,9±3,8	59,7±2,7
	>75	57,0±4,9	8,3±4,2	36,4±3,3	38,1±3,3	46,5±1,8	64,8±3,6	16,0±6,5	60,1±2,5
Total fat, g/day	≤83	47,6±6,3	5,3±5,3	39,8±5,2	36,6±3,6	45,5±3,3	61,8±4,6	7,0±5,4	58,1±3,6
	>83	59,8±4,3	6,4±3,3	37,4±2,7	39,8±2,7	45,8±1,5	66,4±3,4	12,4±5,1	60,9±2,0
Total carbohydrates, g/day	≤365	54,4±3,9	6,6±3,1	38,5±2,6	40,0±2,2	45,9±1,6	64,3±2,9	8,8±3,7	59,7±2,0
	>365	67,0±7,0	0	35,8±8,1	26,0±7,0	44,0±4,3	70,0±10,1	26,6±19,4	61,6±2,7
Energy of ration of nutrition, kcal/day	≤2500	51,2±5,0	2,9±2,9	38,5±3,3	37,6±2,5	45,4±2,1	61,2±3,6	6,8±4,2	59,6±2,3
	>2500	63,0±4,6	11,2±5,6*	37,9±3,9	40,5±4,1	46,2±1,9	70,0±4,0	16,6±7,4	60,4±3,0
		51,2±5,0	2,9±2,9	38,5±3,3	37,6±2,5	45,4±2,1	61,2±3,6	6,8±4,2	59,6±2,3
	>2500	63,0±4,6	11,2±5,6*	37,9±3,9	40,5±4,1	46,2±1,9	70,0±4,0	16,6±7,4	60,4±3,0

In the patients with AP and pancreonecrosis there was noted considerable improvement of QL on the scale MH of the questionnaire SF-36 at normal daily calories ($70,3 \pm 2,1$ numbers). In the patients with edematous form of the AP, on the contrary, on the scale SF of the

questionnaire SF-36 the level of QL was better in the patients with increased calories of diet, than at normal daily caloric content – $65,6 \pm 7,8$ and $46,4 \pm 4,9$ numbers ($p < 0,05$). In the patients with edematous form of AP there was not revealed significant connection of QL

with quantity of the total fat consumed ($p > 0,05$). In the patients with AP and pancreonecrosis at normal consumption of the total fat there was registered significant improvement of QL in comparison with the patients with increased consumption of the total fat on scales GH ($60,0 \pm 0$ and $41,8 \pm 3,6$ numbers, $p = 0,001$) and MH ($74,0 \pm 0$ and $60,4 \pm 4,3$ numbers, $p < 0,05$) of the questionnaire SF-36.

In the patients with CP and the index of weight B in the individuals with reduced and normal caloricity of RN the level of QL was worse on a scale PF of a questionnaire SF-36 ($p < 0,05$), than in the patients with increased caloricity of NR.

At the analysis of the contribution of investigated risk factors into the level of QL in the patients with AP and CP, studied by the questionnaire SF-36, with the help of multiple linear regress, it was revealed, that the excessive consumption of the fat provides the positive contribution to the level QL by scale PF ($B = 0,24$; $p = 0,003$) and REF ($B = 1,5$; $p = 0,005$) by a questionnaire SF-36. The excessive consumption of the protein provided gain in the level of QL by the scale SF ($B = 0,55$; $p = 0,001$) on a questionnaire SF-36. The increased caloricity of the daily nutrition ration gave positive contribution into the level of QL by scale PF ($B = 15,4$; $p = 0,001$), REF ($B = 0,006$; $p = 0,049$) and SF ($B = 0,015$; $p = 0,027$) on a questionnaire SF-36. The abusing of alcohol resulted in the more marked negative contribution into the level of QL by scale SF ($B = -25,0$; $p = 0,018$) by a questionnaire SF-36.

Thus, it is necessary to note high frequency of EBM, HTG in the patients with the various clinical forms of AP and CP. There has been revealed connection between alcohol consumption and tobacco smoking in the pancreatitis: the most intensive tobacco smoking and alcohol abuse were registered in the patients with AP and with the most severe clinical forms of CP. The patients with AP and CP, despite of inherent to this disease dyspeptic syndrome, consume fat 1,5 times more than it is recommended by the specifications of a balanced diet. The parameters of QL in the patients with AP on several scales were better, than in the patients with CP. These data are coordinated to opinion of Cinquepalmi L. (2006): in 68% of the patients with AP, even complicated by infected pancreonecrosis, by questionnaire SF-36 was good (more than 70–80 numbers). The level of QL in the patients with AP and CP with the lowered and normal parameters of the blood serum TG, body mass and daily caloricity of the NR was worse, than at rising of these parameters. Probably, the patients with good tolerability of the excessive NR differ not only by «good-quality» development of disease, but also more positive estimation of the state of health. In the research of Morkowiecka A. (2010) the positive connection was also noted between parameters of BMI and QL by the scale of general health state in the patients with CP. Thus, tobacco smoking and alcohol abusing are accompanied by lowering of the level of QL in the patients with AP and CP. The results obtained indicated that for improvement of the QL and CP it is necessary to optimize trophological status, mainly, with use of adequate replacement enzymotherapy, and, completely to exclude tobacco smoking and consumption of alcohol.

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*Fedotov Sergey Alekseevich,
Doctor of Medical Sciences, Director,
The State Budgetary Healthcare Institution of Moscow
“Scientific and Practical Center for Emergency
Medical Care of the Moscow City Health Department”,*

*Potapov Vladimir Igorevich,
Doctor of Medical Sciences,
Head of the Scientific Department of Emergency Medical Care Organization,
State Budgetary Healthcare Institution of Moscow
“Scientific and Practical Center for Emergency
Medical Care of the Moscow City Health Department”,
E-mail: potapof48@mail.ru*

*Krugovich Evgenij Anatolievich,
deputy director of medical unit
State Budgetary Healthcare Institution of Moscow
“Scientific and Practical Center for Emergency
Medical Care of the Moscow City Health Department”,*

*Gumenuk Sergey Andreevich,
deputy director of medical unit
State Budgetary Healthcare Institution of Moscow
“Scientific and Practical Center for Emergency
Medical Care of the Moscow City Health Department”,*

THE MAIN DIRECTIONS OF IMPROVING THE ORGANIZATION OF MEDICAL AND SANITARY SUPPORT FOR ACTIVITIES RELATED TO MASS CONCENTRATION OF PEOPLE

Abstract: The role of the Moscow Center for Disaster Medicine in the organization of medical support for events with massive concentration of people, the main tasks and conditions for medical provision of mass events of various types and sizes in Moscow, taking into account the parameters necessary to predict the number of people gathered and the possible number of victims, are presented.

Keywords: mass events, territorial center of medicine of catastrophes, medical forces.

Among the territorial features of Moscow, it should be noted that a significant part (up to 20% on average) of crisis and emergency situations occurring in the territory of the city is due to large-scale urban events with mass concentration of people considered as “risky events” and requiring proper organizational studying and involvement of significant medical forces [4; 9; 11].

Holding the events related to mass concentration of people requires compliance with security measures, and their medical support organization has a number of features evidenced by publications of recent years both in domestic and foreign literature [1; 5; 7; 10; 12].

The task of mass event medical support organization is entrusted to the State Budgetary Healthcare Institution “Scientific and Practical Center for Emergency Medical Care of the Moscow City Health Department” – the Moscow Territorial Center for Disaster Medicine (TCDM), which also performs the functions of permanent operational headquarters for the City Emergency Medicine Service Head – the head of the capital health care depart-

ment. The TCDM is the only organization in the city healthcare system having subordinated ambulance teams (AT), medical and nursing teams (MNT) formed by medical organizations of the state Moscow healthcare system, as well as medical and preventive institutions and sports medicine ATs. At the same time, the TCDM has its own emergency teams, transport, information collection and transmission system. Also, the TCDM function is to monitor the operative medical situation in the places of holding events with mass concentration of people.

Currently, the TCDM has extensive experience in organizing medical support for events with massive concentration of people including large-scale events of federal and international levels.

Based on our own experience, as well as the data presented in a number of publications [2; 6; 8], it becomes obvious that every event with mass concentration of people is unique in its way. At the same time, analysis of the previous experience makes it possible to identify main directions, concretization of which largely contributes to the rational planning of medical forces and facilities, as well as risk forecasting.

Upon the application receipt, preliminary planning of the medical provision is carried out taking into account a set of parameters characterizing the object, type, scale, participants and duration of the event with obligatory cartographic scheme of the medical forces location.

In previous years, organizational and managerial system of urban healthcare was developed and successfully used including the immediate provision of all types of medical assistance to victims and sick people during these events holding. The system is based on preliminary planning of the medical support with assessment of potential need for the medical forces and facilities depending on the type and scale of the event, its participants, venue and duration of the event, weather conditions and other factors [3].

The accumulated experience shows that effectiveness of the medical support for the mass events largely depends on completeness of taking a complex of preliminary organizational measures including the multifactor analysis of the event components and potential factors violating the normal event holding.

The organizational technology developed, tested and implemented by the Moscow TCDM is based on 3-stage preliminary planning of the medical support for the events with massive concentration of people:

Stage I – Integrated assessment of the planned mass event;

Stage II – Preliminary planning of the medical support:

A. Appointment of the person in charge and formation of the operational headquarters for preparation;

B. Assessment of the medical forces and facilities necessary for the full medical support.

Calculation of the medical forces and their composition is based on a combination of logical components and carried out empirically using the accumulated experience. The number of medical forces used in the event place cannot depend only on the number of participants; more important indicators are availability of evacuation transport support and specificity of the people present.

III stage – Adjustment, coordination and approval of the final plan for the mass event medical support.

At the stage of event holding, all involved medical forces are deployed in accordance with the developed scheme.

Based on the results of information generalization on the declared mass event and preliminary assessment of the medical care organization features in the process of its holding, “Medical Support Plan for the Mass Event” is developed. The plan includes medical forces location scheme at the event holding place.

According to the plan, the ATs are on duty at the event holding stage ensuring both the medical assistance provision to the applicants and emergency hospitalization in case of serious illnesses or injuries. In other cases, reserve ATs deployed at the nearest substations provide hospitalization.

During holding events including mass movement of people, the medical support is organized with deployment of medical forces along the movement way at pre-selected points.

For events involving more than 5 thousand participants, one or several fixed emergency medical centers are organized using TCDM buses with their location at pre-selected points taking into account their accessibility for the participants.

For the cases when crowds of people are dispersed over a large area, there is a system of medical and nursing teams from polyclinic network watching for certain sectors.

The medical support organization specificity is determined by the type of event and its basic type of participants.

The medical support organization requires taking into account the presence of a large number of elderly and senile people, people with disabilities, suffering from severe illnesses, i. e. real threat of participants’ state deterioration.

Also, specific influence of long events and weather conditions on the incidence of fainting and vascular crises due to high temperature and various types of cold trauma, asthma attacks due to low air temperature should be taken into account.

No less significant factor is the clear preventive vision of not only the structure of medical support in general, but also the work sectors for each employee.

The data presented above is the result of experience accumulated over a number of years and retrospective analysis of the medical support organization effectiveness during holding the events with mass concentration of people in Moscow.

A special place is taken by the planned organization of the medical support for large-scale complex mass events of the federal and international levels characterized by certain features.

Such events are typically united by common symbols; however, they include multiple components varying in scale, participant type, location and duration. Moreover, specific events are often held in different places simultaneously.

The most common events of this type are annual celebrations of the City Day, Victory Day, international sports championships, major religious holidays.

Taking into account the scale of such events and the need to pre-solve various tasks, the preparatory work on the medical support organization is held within at least several months before the start. To coordinate the organization of medical, sanitary, medicinal and technical support for the forthcoming event, the Department of Health medical headquarters are organized.

Both at the preparatory stage and during the event, the TCDM is responsible for the effective organization of the medical support. It also interacts with all involved and interested services and departments.

The TCDM’s experience of work on the medical support to the celebration of the 70th anniversary of the Victory in the Great Patriotic War of 1941–1945 and the 2017 FIFA Confederations Cup presented in the study demonstrated the effectiveness of the organizational technology developed by the Moscow TCDM.

It should be noted that the experience accumulated during the preparation for the celebration of the 70th anniversary of the Victory in the Great Patriotic War and the 2017 FIFA Confederations Cup is actively used and provided to the organizers of medical support for the 2018 FIFA World Cup and other significant socio-political, cultural and sporting events.

Thus, rational medical support of events with mass concentration of people can be organized only with the preliminary comprehensive assessment of the factors characterizing the level of people’s life and health safety and the potential need for the medical care.

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*Khaydarov Artur Mihaylovich,
Ph. D., Tashkent State dental Institute
Head of Pediatric dentistry department
E-mail: dr.khaydarovartur.ru*

INFLUENCE OF ECOLOGICALLY UNFAVORABLE FACTORS ON THE CLINICAL AND FUNCTIONAL INDICES OF THE ORAL CAVITY OF CHILDREN

Abstract: It was carried out the study of the status of certain clinical and functional indices of the oral cavity (hygienic index, tooth enamel solubility, electrical conductivity of hard tooth tissues, remineralizing ability of saliva, PMA index, and resistance of periodontal tissue capillaries in 357 children aged 12–15 years living in Saryasiya (119 children), Dzharkurgan (118 children) and Baysun (120 children) areas of Surkhandarya region.

The acid resistance of the enamel was significantly ($p < 0.001$) below the Jarkurgan district than in the children in the Saryasiya (24%) and Baysun (28%) regions.

The remineralizing ability of the saliva of children was significantly ($p < 0.05$) lower in children in the Jarkurgan district. In the children of the Saryasiya and Baysun regions it was within the limits of the physiological norm ($p > 0.05$). Regarding the state of conductivity of hard tooth tissue, the level of this parameter significantly ($p < 0.001$) higher in children of Dzharkurgan area compared to both Saryasiya (2.29 μA) and Baysun (2.48 mA) areas.

When analyzing the data of PMA index and Sample Kulazhenko it was established that among children of Saryasiya area PMA index was 10.9% ($p < 0.001$) more than in Jarkurgan and 44.2% ($p < 0.001$) more than in areas of Baysun. Capillary resistance of periodontal tissues in children of Saryasiya area was 9.1 seconds ($p < 0.001$) less than in Jarkurgan and 16.2 seconds ($p < 0.001$) less than in Baysun areas.

Thus, on the basis of the obtained results it can be said that there is a decrease of acid resistance of tooth enamel and remineralizing ability of saliva among children of Saryasiya and Dzharkurgan areas, increasing of electrical conductivity of hard tissues of teeth and indicators of PMA index and as well as reduced resistance of gum capillaries in comparison with the analogous data in Baysun Control area.

Keywords: region, saliva, remineralization, electrical conductivity, acid resistance, capillaries, resistance, periodontium, teeth, PMA.

Introduction. The human body is inextricably linked with the environment, being part of the biosphere. Therefore the determination of the actual accumulation of harmful compounds from the environment in various tissues and organs of the body, in determining their pathological effect on the organism as a whole is of great scientific and practical interest [1; 7].

In modern conditions human activity acquires the scale of geoeological processes, leads to a change in natural cycles on the ground, a violation of ecological balance in the biosphere, which in turn affects the person himself. Especially tense situation arises in large industrial cities and urban agglomerations, which is facilitated by the rapid pace of urbanization, urban industrial production and uncontrolled increase in motor transport [3; 5].

Children's health is considered one of the most sensitive integral and informative medical and biological indices characterizing the qualitative characteristics of the habitat. Therefore the level of health of the child population is directly related to the intensity, duration of the impact of environmental pollution and the degree of adaptation to it [4; 5; 9].

As it is known the oral mucosa is one of the first protective barriers of the human body when exposed to various ecological and production unfavorable factors [2; 4; 6].

Meanwhile it has been established that functional disorders from the mucous membrane of the oral cavity play an important role in the development of a number of dental diseases and it is an early preclinical indication of the effect of toxic substances on the body as a whole and on the oral mucosa in particular [1; 2; 3; 4, 8].

The aim of the research was to study the state of a number of clinical and functional indices of the oral cavity in children living in ecologically unfavorable regions.

Materials and methods

It was carried out the study for the status of some clinical and functional indices of the oral cavity (hygienic index, tooth enamel solubility, electrical conductivity of hard tooth tissues, remineralizing ability of saliva, PMA index and resistance of periodontal tissue capillaries in 357 children aged 12–15 years living in Saryasiya (119 children), in Dzharkurgan (118 children) and Boysun (120 children) areas of Surkhandarya region. These areas are similar in their natural and climatic and social conditions, but differing in nature and degree of environmental pollution, which corresponds to the methodological approaches adopted in studying the environmental impact on children's health.

The Saryasiya cotton-growing region (experienced) is characterized by combined pollution of the environment with pesticides,

mineral fertilizers and harmful emissions by the State Unitary Enterprise “Tajik Aluminum Company” (TALCO) with especially fluoride compounds.

The Jarkurgan cotton-growing region (conditionally controlled) is characterized by environmental pollution only by pesticides and mineral fertilizers.

Baysun cattle-breeding- gardening area (control) is a relatively ecologically clean area.

To assess the acid resistance of tooth enamel and remineralizing ability of saliva, there was used the method of T. A. Redinova et al. (1982), for the study of the electrical conductivity of hard tissues of teeth there was used the method of G. G. Ivanova (1984), the condition of the tissues of the marginal periodontium – the PMA index and the index of oral hygiene on the method of L. V. Fedorova

(1982), the determination of the resistance of capillaries of periodontal tissues- on the method of V.I. Kulazhenko (1960).

The received data was processed according to the Microsoft Excel program, the reliability of the differences was determined by the Student criterion.

Results and discussion

The data of the conducted studies showed (table) that the level of the hygienic state of the oral cavity it was equally low ($p > 0.05$) in the children of the studied rural areas. The acid resistance of the enamel was significantly ($p < 0.001$) below the Jarkurgan district than in the children in the Saryasiya (24%) and Baysun (28%) regions. Comparison of this index between the children of the Saryasiya and Baysun districts showed no significant differences ($p > 0.05$).

Table 1. – Comparative indices of clinical and functional studies of the state of hard and soft tissues of the oral cavity in children in rural areas with different nature and degree of environmental pollution by chemical substances (M ± m)

Indices	Observation areas		
	The Saryasiya (experienced)	The Jarkurgan (conditionally controlled)	Baysun (control)
Hygienic index, points	3,25 ± 0,61	3,17 ± 0,55	3,23 ± 0,65
	$P_{1-2} > 0,05$ $P_{1-3} > 0,05$	$P_{2-3} > 0,05$	
Tooth enamel solubility,%	33,41 ± 1,87	58,25 ± 2,56	
	$P_{1-2} < 0,01$ $P_{1-3} > 0,05$	$P_{2-3} < 0,001$	30,24 ± 1,59
Electrical conductivity of hard tooth tissues, mk A	0,31 ± 0,08	2,60 ± 0,53	0,12 ± 0,04
	$P_{1-2} < 0,001$ $P_{1-3} < 0,05$	$P_{2-3} < 0,001$	
Remineralising ability of saliva, days	3,51 ± 0,52	6,25 ± 1,31	2,81 ± 0,34
	$P_{1-2} < 0,05$ $P_{1-3} > 0,05$	$P_{2-3} < 0,05$	
PMA index	46,32 ± 2,56	35,9 ± 2,41	17,12 ± 1,32
	$P_{1-2} < 0,001$ $P_{1-3} < 0,001$	$P_{2-3} < 0,001$	
Resistance of periodontal tissue capillaries, sec	16,21 ± 0,65	25,30 ± 1,17	32,45 ± 1,36
	$P_{1-2} < 0,001$ $P_{1-3} < 0,001$	$P_{2-3} < 0,001$	

The remineralizing ability of saliva of children was significant ($p < 0.05$) lower in children in the Jarkurgan district. In the children of the Saryasiya and Baysun regions it was within the limits of the physiological norm ($p > 0.05$). Regarding the state of conductivity of hard tooth tissue the level of this index is significantly ($p < 0.001$) higher in children of Dzharkurgan area compared to both Saryasiya (2.29 uA) and Baisun (2.48 mA) areas.

The above reported data confirm the results of visual examination of the state of the teeth, showing the highest frequency of dental caries among children of Dzharkurgan area and somewhat less – among children of Saryasiya and even fewer – in Baisun areas. The same level ($p > 0.05$) of state enamel solubility, remineralizing ability of saliva conductivity and hard tissues of teeth in children in Saryasiya and Baisun regions are combined with environmental pollution by emission of Saryasiya State Unitary Enterprise “Tajik

Aluminum Company” (TALCO) and pesticides it is explained so, that the high content of fluoride in the saliva and teeth of children in the Saryasiya district obviously supports the remineralizing ability of saliva and increases the resistance of teeth to the caries.

When analyzing the data PMA index and Sample Kulazhenko it was established that among children of Saryasiya area PMA index was 10.9% ($p < 0.001$) more than in Jarkurgan and 44.2% ($p < 0.001$) more than in areas of Baisun. Capillary resistance of periodontal tissues in children of Saryasiya area was 9.1 seconds ($p < 0.001$) less than in Jarkurgan and 16.2 seconds ($p < 0.001$) less than in Baisun areas.

Conclusion

Thus, on the basis of the obtained results it can be said that there is a decrease of acid resistance of tooth enamel and remineralizing ability of saliva among children of Saryasiya and Dzharkurgan areas, increasing of electrical conductivity of hard

tissues of teeth and indices of PMA index and as well as reduced resistance of gum capillaries in comparison with the analogous data in Baisun Control area. The above indicated data can serve

as integral indicators of the adverse impact of emissions by the State Unitary Enterprise “Tajik Aluminum Company” (TALCO) on health and oral health of children.

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*Ergashev Vali Alimovich,
Senior Researcher of the Department of Hygiene
of Water and Soil of the Research Institute of Sanitary,
Hygiene and Professional diseases of Ministry of Health, Uzbekistan
E-mail: dildor-22@bk.ru*

COMPARATIVE CHARACTER OF OSTEOMYELITIS' MICROBIAL LANDSCAPES STUDIED DEPENDING ON AGE OF PATIENTS, FORMS AND CAUSES OF THE DISEASE

Abstract: The goal of the study was to compare the microbial landscape of osteomyelitis relate to patient's age and to the forms and causes of the disease in hot climatic condition of Uzbekistan. We found that, regardless of age, for patients with osteomyelitis the gram-positive cocci were cropped more often, in both: monoculture and association of microorganisms. There observed the significant differences between the inoculated strains as a result of the acute or chronic forms of osteomyelitis. The spectrum of etiological agents in the chronic osteomyelitis was more manifold than in the case of acute osteomyelitis. For the posttraumatic osteomyelitis, the sowing of the gram-positive and the gram-negative microorganisms was practically independent of the age of patient.

Keywords: osteomyelitis, sick children and adults, microbial landscape, the forms and causes of the disease.

Along with the treatment and prevention of osteomyelitis' complications, there is an essential importance to identify etiologic agents of the disease.

In literature we found that in 15.9–30.4% of cases the acute osteomyelitis transferred to the chronic forms, and in 1.6–22.4% of cases, the osteomyelitis is developed after surgery in to musculo-skeletal system of organism [1; 2].

In the studies of several authors we found the causative agents of osteomyelitis were the coagulase-positive and the coagulase-negative staphylococci, enterobacteria, pseudomonas, anaerobic microorganisms, Candida fungi, etc. [4; 5; 6; 7; 8].

By the numerous studies of osteomyelitis, it was recognized the relationship the etiological agents of osteomyelitis with its different forms and stages, with the duration of persistence on the bone's pathological process and on tactics of treatment [9, 10, 11].

In the present, a comparative study a microbial landscape of pathogens of the acute and the chronic osteomyelitis in relation of the age of the patients, the form and cause of the diseases should be carry out. The study of some taxonomic features of the inoculated strains and determination of main criteria of microbiological aspects of osteomyelitis' formation and development processes should be solved too.

In the connection with foregoing, in our study we have performed one comparative analysis of osteomyelitis' microbial landscape in depending on patient's age and on the forms and causes of the disease in the semi-arid climate of Uzbekistan.

Materials and methods. We have been examined the 448 patients with the acute (n = 53) and with the chronic (n = 395) osteomyelitis. From these patients, there were the children (up to 15 years of 68 (15.2 ± 1.7%) and 380 (84.8 ± 1.7%) were adult's patients. The chronic osteomyelitis in adult' patients were diagnosed more often than the acute osteomyelitis osteomyelitis: 92.1 ± 1.4% (n = 350) and 7.9 ± 1.4% (n = 30), respectively. The children's patients had also the same tendency: with the chronic – 66.2 ± 5.7% (n = 45) and with acute osteomyelitis – 33.8 ± 5.7% (n = 23), respectively.

Of the total treated population were female patients: 124 person (27.7 ± 2.1%) and 324 people (72.3 ± 2.1%) were male' patients. Among the adults, there were the 329 patient (86.6 ± 1.7%) from rural area of Uzbekistan and 51 person (13.4 ± 1.7%) were the urban residents. For the children' patients there were 91.2 ± 3.4% (n = 62) from rural area and 8.8 ± 3.4% (n = 6) from urban area. The age' distribution of patients was as followings: 0–6 years – 13 patients (2.9 ± 0.8%); 7–14 years old – 55 patients (12.2 ± 1.5%); 15–18 years old – 72 patients (16.1 ± 1.7%); 19–29 years old – 103 patients (23.0 ± 2.0%); 30–39 years old – 75 patients (16.8 ± 1.8%); 40–49 years old – 85 patients (19.0 ± 1.9%); 50–59 years old – 32 patients (7.1 ± 1.2%); 60 years old and older – 13 patients (2.9 ± 0.8%).

Osteomyelitis was caused: in adults in 66.3 ± 2.4% (n = 252) cases because of the posttraumatic osteomyelitis, in 25.0 ± 2.2% (n = 95) cases due to the hematogenous character and in causes of 7.9 ± 1.4% (n = 30) the reason of the disease was not established. For children, these indexes were differed significantly from the adults and consisted of 41.2 ± 6.0% (n = 28), 42.6 ± 6.0% (n = 29) and 16.2 ± 4.5% (n = 11), respectively.

The pathological processes were more often localized on the femur, on the shin's bones, on the humerus, and on the foot's bones. This trend was stable in regardless of patient' age. As for all adults, in 73.2% of cases, as for children in 74.9% of cases, the pathological processes were located mainly into the femur and shin's bones. For children, opposed to adults, osteomyelitis were not diagnosed in to the knee, in to the pelvis and into the clavicle.

All patients, which were diagnosed, osteomyelitis was been verified by clinical, clinical, instrumental, bacteriological and other laboratory methods for ICD-10 [1997].

All of observed patients have been hospitalized in 2007–2015 years, located in the Khorezm region's multiprofile medical Center of Uzbekistan.

Identification and differentiation of inoculated strains of pathogens were carried out according to Bergey's Manual Systematic Bacteriology [3].

Seeding of biological material (i. e., pus from the pathological focus) was performed according to Gold used an appropriate nutrient media; causative agents were considered to be the etiologically significant at the culture concentration of 104–105 colony forming units in 1 milliliter (CFU/ml).

A statistical analysis was carried using the traditional medicinal methods of varians. During of the organizing and conducting experiments, principles of evidence-based medicine were used.

Results and discussion. The obtained results all of 448 examined patients indicated that in 28 patients (24 adults and 4 children) there was not observed a growth of pathogens on the nutrient media – “negative bacteriological result”. However, result of other of 420 patients was reported as “positive bacteriological result”, in which there were inoculated of 477 strains of bacteria: 270 strains in

the monoculture’s form (mono) and 207 strains in the association’s form (asso) of microorganisms.

The comparative indexes of the pathogen’s microbial landscape in depending on the seeded strains displayed in (Table 1.) as following: the gram-positive cocci (29.5 ± 5.2%) were basically inoculated as monoculture (mono) for child, but its number was not significantly differing from number of the gram-negative bacteria (25.6 ± 4.9%). But, the similar indexes for adults were differed significantly from each other: 36.4 ± 2.4% and 20.6 ± 2.0% (P < 0.05), respectively for gram-positive and gram-negative.

The microorganism’s association (asso) manifested the following results: for children the ratio of gram-positive cocci to gram-negative bacteria was 1.2:1 (23.1 ± 4.8% vs 19.3 ± 4.5%), for adults this ratio compiled 0.8:1 (16.9 ± 1.9% vs. 21.1 ± 2.0%).

Table 1. – Comparative indexes of pathogen’s microbial landscape of osteomyelitis depend on the inoculated strains,%

Pathogens	Monoculture, 270 strains		Association of m/o, 207 strains	
	Child	Adults	Child	Adults
S.aureus	19,2 ± 4,5	22,3 ± 2,1	12,8 ± 3,8	6,8 ± 1,3
S.epidermidis	5,1 ± 2,5	9,0 ± 1,4	10,3 ± 3,4	6,3 ± 1,2
S.saprophyticus	1,3 ± 1,2	1,0 ± 0,5	1,3 ± 1,2	2,3 ± 0,8
Enterococcus spp	2,6 ± 1,8	1,8 ± 0,7	0	0,5 ± 0,4
S.hemolyticus	0	1,0 ± 0,5	0	0,5 ± 0,4
S.pyogenes	0	1,3 ± 0,6	0	0,5 ± 0,4
Gram «+» cocci, total	28,2 ± 5,1	36,4 ± 2,4	24,4 ± 4,9	16,9 ± 1,9
E.coli	7,7 ± 3,0	7,3 ± 1,3	6,4 ± 2,8	8,3 ± 1,4
Proteus spp	2,6 ± 1,8	1,0 ± 0,5	5,1 ± 2,5	2,8 ± 0,8
Klebsiella spp	3,8 ± 4,7	4,5 ± 1,0	2,6 ± 1,8	1,0 ± 0,5
Enterobacter spp	0	1,0 ± 0,5	2,6 ± 1,8	1,8 ± 0,7
Paeruginosa	11,5 ± 3,6	6,8 ± 1,3	2,6 ± 1,8	7,2 ± 1,3
Gram «-» bacteria, total	25,6 ± 4,9	20,6 ± 2,0	19,3 ± 4,5	21,1 ± 2,0
Bacteroides spp	0	0	0	2,7 ± 0,8
Candida spp	0	0	2,6 ± 1,8	2,5 ± 0,8
Sum of strains	53,9 ± 5,6	56,9 ± 2,5	46,2 ± 5,6	43,1 ± 2,5

Note: m/o – microorganisms; percentages were calculated with respect to total number of strains (n = 477)

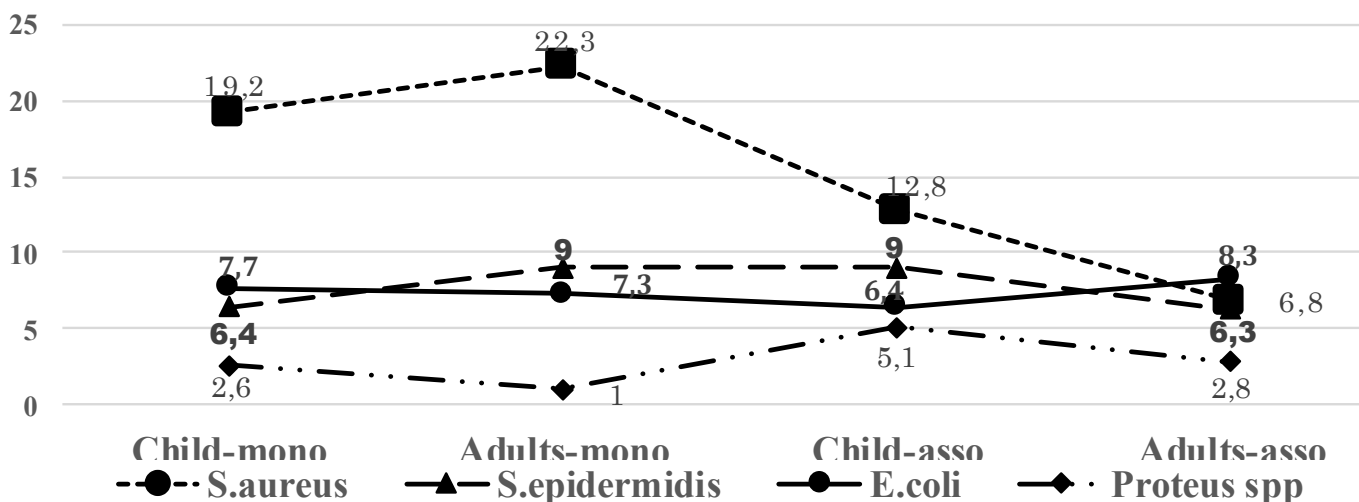


Figure 1. Comparative parameters of main pathogens of osteomyelitis inoculated in the form of monoculture (mono) and in the association (asso) for children and adults,%

In the form of monoculture, regardless of age, the most cropped strains were *S.aureus*, *P.aeruginosa*, *E.coli*, *S.epidermidis* and *Klebsiella* spp. In the fact, that for adults some microorganisms (*S.hemolyticus*, *S.pyogenes*, *Enterobacter* spp), which were sown as a causative agents, were not found in children. A resembling result was obtained from the cropping of the association (asso) of microorganisms.

Accordingly our results, for both: children and adults with osteomyelitis, gram-positive cocci were inoculated more often, as in the form of monoculture, as well in form microorganism's association. While, children did not indicate a significant difference between mono and association cultures, for adults these indexes were significantly different ($P < 0.05$).

As a result of this study following features were established: for child were not cropped as monoculture: *S.hemolyticus*, *S.pyogenes*, *Enterobacter* spp, *Bacteroides* spp and *Candida* spp, and as association: *Enterococcus* spp.

For children the *P.aeruginosa* in 1.7 times more seeded as monoculture's form than as association form, while for adults *P.aeruginosa* was more inoculated in the association's form. As the pathogen 'agent in the form of monoculture, were not cropped the

Bacteroides spp and *Candida* spp, however, these species were identified in the association forms.

All of mentioned above, is shown in Fig. 1, where are presented the comparative parameters of inoculation of main osteomyelitis' pathogens for children and adults.

The next phase of our study was a comparative analyses of the etiological agents subjectioned to the form of the disease – acute and chronic osteomyelitis (Table 2).

According to inoculated pathogens, there were noticeable differences between the acute and the chronic osteomyelitis, as well as due to age of patients. We have found for the child with both: the acute and the chronic osteomyelitis there was no significant differences in cropping of the gram-positive cocci between two osteomyelitis, while for adults there was great significant difference between acute and chronic forms: the patients with the chronic osteomyelitis were observed in 7.6-fold favor more than with acute osteomyelitis.

For children there was no significant differences between acute and chronic forms in the cropping of *S.aureus*, but for adults this difference was significant: patients with the chronic osteomyelitis were inoculated by *S.aureus* in 7.3 times more than patients with acute one.

Table 2. – Comparative indexes of pathogen's microbial landscape of osteomyelitis relay on disease' forms,%

Pathogens	Acute osteomyelitis		Chronic osteomyelitis	
	Child, n = 23	Adults, n = 30	Child, n = 45	Adults, n = 350
<i>S.aureus</i>	18,0 ± 4,4	3,5 ± 0,9	14,1 ± 3,5	25,6 ± 2,2
<i>S.epidermidis</i>	3,8 ± 4,7	0,8 ± 0,4	11,6 ± 3,6	14,5 ± 1,8
<i>S.saprophyticus</i>	0	0,3 ± 0,2	2,6 ± 1,8	3,0 ± 0,9
<i>Enterococcus</i> spp	0	0,3 ± 0,2	2,6 ± 1,8	2,0 ± 0,7
<i>S.hemolyticus</i>	0	0,5 ± 0,3	0	1,0 ± 0,5
<i>S.pyogenes</i>	0	0,8 ± 0,4	0	1,0 ± 0,5
Gram «+» cocci, total	21,8 ± 4,7	6,2 ± 1,2	30,9 ± 5,2	47,1 ± 2,5
<i>E.coli</i>	3,8 ± 4,7	1,5 ± 0,6	10,3 ± 3,4	14,1 ± 1,7
<i>Proteus</i> spp	2,6 ± 1,8	0,3 ± 0,2	5,1 ± 2,5	3,5 ± 0,9
<i>Klebsiella</i> spp	0	0	6,4 ± 2,8	5,5 ± 1,1
<i>Enterobacter</i> spp	0	0,3 ± 0,2	2,6 ± 1,8	2,5 ± 0,8
<i>P.aeruginosa</i>	0	0	14,1 ± 3,5	14,0 ± 1,7
Gram «-» cocci, total	6,4 ± 2,8	2,1 ± 0,7	38,5 ± 5,5	39,6 ± 2,4
<i>Bacteroides</i> spp	0	1,0 ± 0,5	0	1,8 ± 0,7
<i>Candida</i> spp	0	0	2,6 ± 1,8	2,5 ± 0,8
Sum of strains	28,2 ± 5,1	9,0 ± 1,4	71,8 ± 5,1	91,0 ± 1,4
Have not been sow	1	0	3	24

Note: percentages were calculated with respect to total number of strains (n = 477)

For child with the acute osteomyelitis, there was not identified the 9 pathogens of the 13 seeded, for adults was not identified the 3 out of 13 cropped pathogens; as for the chronic osteomilitis: were not cropped the 3 of the 13 studied pathogens from child'patients, but all studied pathogens were inoculated in adult's patients. In the case of the acute osteomyelitis the *Klebsiella* spp, *P. aeruginosa* and

Candida spp were not identified regardless of patient's age, but in the case of the chronic form the *Klebsiella* spp, *P. aeruginosa* and *Candida* spp seeding as the etiologic agents.

The obtained results is in Fig. 2, in which shown the comparative parameters of seeding of pathogen's groups relate to the forms of osteomyelitis.

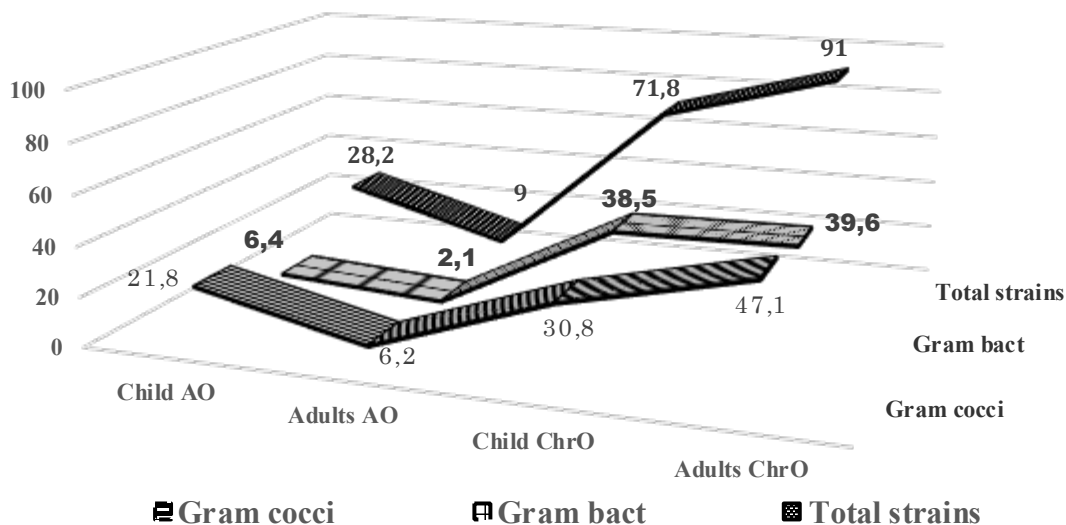


Figure 2. Comparative rates of inoculated pathogen' groups of osteomyelitis relay on the acute and chronic forms of the disease,% (AO –acute and ChrO- chronic osteomyelitis)

Thus, there were significant differences between the microbial landscape depending on the forms of osteomyelitis: the acute and the chronic, and between the adult and children patients with these forms of disease. It was remarkable, the spectrum of studied etiologic agents of the chronic osteomyelitis was much wider and greater than of studied agents in acute osteomyelitis.

As a next step of our study, we have conducted the comparative analysis of microbial landscape of osteomyelitis' causative agents of depending on the causes of the onset of the disease. In the future, we conducted a comparative analysis of the microbial landscape of osteomyelitis' agents regarding of onset causes of disease (Table 3).

Table 3. – The comparative indexes of pathogen' microbial landscape of osteomyelitis depend on the causative agents of the disease,%

Pathogens	Posttraumatic		Hematogenous	
	Child, n = 28	Adults, n = 252	Child, n = 29	Adults, n = 95
S.aureus	20,5 ± 4,6	23,1 ± 2,1	6,4 ± 2,8	5,3 ± 1,1
S.epidermidis	11,5 ± 3,6	13,5 ± 1,7	2,6 ± 1,8	1,5 ± 0,6
S.saprophyticus	2,6 ± 1,8	3,3 ± 0,9	0	0
Enterococcus spp	1,3 ± 1,2	0	1,3 ± 1,2	2,0 ± 0,7
S.hemolyticus	0	1,5 ± 0,6	0	0
S.pyogenes	0	1,8 ± 0,7	0	0
Gram «+» cocci, total	35,9 ± 5,4	43,2 ± 2,5	10,3 ± 3,4	8,8 ± 1,4
E.coli	2,6 ± 1,8	11,2 ± 1,6	9,0 ± 3,2	3,0 ± 0,9
Proteus spp	2,6 ± 1,8	1,0 ± 0,5	3,8 ± 2,2	2,0 ± 0,7
Klebsiella spp	1,3 ± 1,2	3,3 ± 0,9	5,1 ± 2,5	1,3 ± 0,6
Enterobacter spp	0	0	2,6 ± 1,8	2,8 ± 0,8
P.aeruginosa	7,7 ± 3,0	9,3 ± 1,5	2,6 ± 1,8	2,5 ± 0,8
Gram «->» bacteria, total	14,1 ± 3,9	24,8 ± 2,2	23,0 ± 4,8	11,6 ± 1,6
Bacteroides spp	0	1,5 ± 0,6	0	1,0 ± 0,5
Candida spp	2,6 ± 1,8	2,5 ± 0,8	0	0
Sum of strains	52,6 ± 5,7	71,9 ± 2,3	33,3 ± 5,3	21,3 ± 2,0
Have not been sow	1	8	3	10

Note: percentages were calculated with respect to total number of strains (n = 477).

As it is known, the causes of osteomyelitis are mainly post traumatic and hematogenous. It was established that both the gram-positive cocci and the gram-negative bacteria were more often sown in the post-traumatic cases of osteomyelitis. According with the microbial landscape of osteomyelitis' causative agents, relate to

the cause' agent of the disease there was no reliable differences between the adults and child. Furthermore, the species: S.hemolyticus, S.pyogenes, Enterobacter spp, Bacteroides spp, Candida spp, and in adults Enterococcus spp and Enterobacter spp were not identified for children with the posttraumatic osteomyelitis.

In the cases of the hematogenous osteomyelitis, the diversity of inoculated pathogens was much less, and the percentage of pathogen's detectability was a significantly lower level than in the case of posttraumatic osteomyelitis. The age differences, relate to the cause-agent of osteomyelitis, between the microbial landscape of child and adults were not identified.

So, it was found, that for adults the spectrum of inoculated microorganisms was larger as result of the posttraumatic osteomyelitis than in the case of the hematogenous, but for children this difference was not observed. Also, in the case of the posttraumatic osteomyelitis, the inoculation of gram-positive and gram-negative microorganisms was practically independent on the age of patients. It should be emphasized, that the spectrum of both: posttraumatic and hematogenous pathogens, was greater for adults than for child.

Conclusions

1. It was established for osteomyelitis'patients regardless of their age, gram-positive cocci were cropped more often than gram-negative bacteria, as in monoculture form as well in association form of microorganisms. While, for children did not have observed significant difference between these parameters, conversely, for adults, the number of seeded gram-positive cocci were significantly higher than number of inoculated gram-negative bacteria.

2. The following features were established: for child were not cropped as monoculture: *S.hemolyticus*, *S.pyogenes*, *Enterobacter* spp, *Bacteroides* spp and *Candida* spp, and as association: *Enterococcus* spp. For children the *P.aeruginosa* in 1.7 times more seeded as monoculture's form than as association form, while for adults *P.aeruginosa* was more inoculated in the association's form. As the pathogen 'agent in the form of monoculture, were not cropped the *Bacteroides* spp and *Candidas* pp, however, these species were identified in the association forms.

3. It was found the significant differences between the inoculated strains depending on the forms of osteomyelitis (acute and chronic). As a result, it was significant difference between adult and child patients rely on these parameters. The spectrum of etiological agents of the chronic osteomyelitis was greater than in the acute osteomyelitis.

4. It was established that in the posttraumatic osteomyelitis the spectrum of cropped strains for adults was more wider than in the hematogenous osteomyelitis, however, for children this difference was not observed. In the posttraumatic osteomyelitis, the cropping of the gram-positive and the gram-negative microorganisms was practically independent of the patient'age. The spectrum of pathogens was diverseforme compare to children in both cases: posttraumatic and hematogenous osteomyelitis.

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Section 4. Pedagogy

MSc. Keida Ushtelenca,
Department of Social Sciences and Education
Faculty of Movement Sciences. Sports University of Tirana

MSc. Genti Pano,
Department of Physical Activity Health and Recreation Research,
Sport Sciences Research Institute, Sports University of Tirana, Albania.

MSc. Blerina Mema,
Department of Social Sciences and Education
Faculty of Movement Sciences. Sports University of Tirana
Correspondence: K. Ushtelenca, Department of Social science and Education,
Faculty of Movement Sciences, Sport University of Tirana, Albania.
E-mail: kushtelenca@ust.edu.al

ANTHROPOMETRIC CHANGES, OBESITY, COORDINATION AND MOTOR SKILLS IN 7–11 YEARS OLD CHILDREN

Abstract: the phase before puberty 7–11 years are marked by very good learning abilities and are proven to be the best motor learning age in childhood [3], considering this age as a sensitive period [4].

The aim of this study was to review the latest literature with focus on anthropometric changes, obesity, coordination and motor skills in 7–11 years old children. We have searched in PubMed, JabRef, ResearchGate.

Only 10 studies have fulfilled the inclusion criteria's to be part of this review. More longitudinal and randomized studies need to be done in order to investigate periodically anthropometric changes, BMI levels, and coordination and motor skills abilities in this age group. In addition, PA programs need to be more focused in improving these parameters.

Keywords: Obesity, anthropometric, coordination, motor abilities, children.

Introduction

Childhood overweight and obesity have been increasing for the past two decades in developed nations and, to some extent, in other parts of the world [1; 2]. The phase before puberty 7–11 years are marked by very good learning abilities and are proven to be the best motor learning age in childhood [3], considering this age as a sensitive period [4]. Research in sport and physical activity settings has further shown that children who demonstrate athletic competence tend to be more popular with their peers than less skilled children [5; 6]. In contrast, children who are poorly skilled often become the target of criticism, ridicule and bullying [7; 8], and exclusion [9; 8].

Objectives

The main aim of this study was to review the latest literature with focus on Anthropometric changes, Obesity, Coordination and Motor skills in 7–11 years old children.

Methodology. We have searched in: PubMed, JabRef, ResearchGate using Key words as: Obesity, anthropometric, coordination, motor abilities, children.

Results. As we have mentioned we have used these ten researches with the main topic in obesity, in anthropometric changes

and in coordination and motor abilities win young children. These are the ten researches we are based on, attached in the table below.

1. Graf Ch et al., 2005 [10];
2. D'Hondt E et al., 2008 [11];
3. De Toia D et al., 2009 [12];
4. D'Hondt E et al., 2009 [13];
5. D'Hondt E et al., 2010 [14];
6. Castetbon K. and Andreyeva T., 2012 [15];
7. Khalaj & Amri S., 2013 [16];
8. Roebbers C. M et al., 2013 [17];
9. Gallotta M Ch., 2014 [18];
10. Burrows E.J et al., 2014 [19].

Results and discussion based on the studies

Graf Ch et al., 2005 [10] study has examined the effects of intervention on the body mass index (BMI) and motor abilities after 20.8 ± 1.0 months in 12 randomly selected primary schools compared with 5 randomly selected control schools. Overweight and obese children in both IS and CS produced significantly lower scores in coordination and endurance tasks than normal and underweight children during both examinations.

Table 1.

Author's Name	Year of publication	Type of study	Number of subjects	Type of intervention
1. Graf Ch et al.	2005	Children's Health Interventional Trial	651	The anthropometric data were assessed, BMI was calculated. Coordination was determined by lateral jumping and endurance performance by a 6-minute run.
2. D'Hondt E et al.	2008	Non specified	540	Participants had to perform a peg placing task under different postural constraints. The peg placing task for 9-and 10-year olds from the Movement Assessment Battery for Children (MABC)
3. De Toia D et al.	2009	Randomized control trial	27 kinder garden (Total 1300 children's)	The modified Karlsruher Motor Ability Screening Test was carried out to determine the motor abilities of speed strength, muscular endurance, coordination, flexibility, and speed.
4. D'Hondt E et al.	2009	Randomized control trial	117 children between the age of 5 and 10 years	Motor skill was assessed by means of the Movement Assessment Battery for Children (MABC)
5. D'Hondt E et al.	2010	Cross-sectional design	954	Body Coordination Test for Children (Körper coordination's test für Kinder [KTK]) to assess gross motor coordination
6. Castetbon K. and Andreyeva T.	2012	Repeated cross-sectional assessments of the national sample from EChLS Birth Cohort	5–6 year-old kindergarteners (n = 4700).	Multivariate logistic and linear models estimated the association between obesity and gross and fine motor skills in very young children adjusting for individual, social, and economic characteristics and parental involvement.
7. Khalaj & Amri S.	2013	Randomized control trial	40 (4–6 years)	The test of Gross motor development-second edition was used to evaluate gross motor development
8. Roebbers C. M et al.	2013	Randomized control trial	169 (4–6 years old)	Fine motor skills were assessed by the manual dexterity scale (3 tasks at each assessment) from the Movement Assessment Battery for Children 2
9. Gallotta M Ch.	2014	Randomized control trial	230 (8–11 years old)	5 months PA interventions PA interventions started with 15 min of warm-up, followed by 30 min of continuous moderate-to vigorous physical activities (MVPA) and ended with 5 min of cool-down and stretching.
10. Burrows E. J et al.	2014	Research project employed a quasi-experimental design	135 (6–10 years)	A skeleton schedule of programming to undertake each week, with a one hour time period for structured activity.

The main purpose of D'Hondt E et al., 2008 [11] study was to investigate fine motor control in obese and overweight children compared to normal-weight peers under different postural constraints. Placing performance of children was evaluated in 2 different postural conditions: sitting and standing in tandem stance on a balance beam. Remarkably, obese participants also produced lower scores in the sitting condition, i. e. when the complexity of postural organization was restricted to a minimum.

De Toia D et al., 2009 [12] study examined the association between motor abilities and weight status in kindergarten children. The modified Karlsruher Motor Ability Screening Test was used to determine the motor abilities of speed strength, muscular endurance,

coordination, flexibility, and speed. Obese children did not differ from their normal and underweight counterparts; except for underweight children which fared worse in flexibility.

The purpose of D'Hondt E et al., 2009 [13] study was to investigate gross and fine motor skill in overweight and obese children compared with normal-weight peers. Level of motor skill was assessed using the Movement Assessment Battery for Children (MABC). Scores for balance ($p < 0.01$) and ball skills ($p < 0.05$) were significantly better in normal-weight and overweight children as compared with their obese counterparts.

The purpose of D'Hondt E et al., 2010 [14] study was to investigate differences in gross motor coordination in healthy-weight,

overweight, and obese children of different ages. Gross motor coordination was assessed by means of the Körper coordination's test für Kinder (KTK). Overweight and particularly obesity were found to result in poorer KTK performances.

Castetbon K. and Andreyeva T., 2012 [15] study objective was to estimate the association between obesity and motor skills at 4 years and 5–6 years of age in the USA. Height, weight, and fine and gross motor skills were assessed objectively via direct standardized procedures. The relationship between motor skills and obesity varied across types of skills.

The aim of Gallotta M Ch., 2014 [18] study was to verify the effects of two 5-months physical activity (PA) interventions on motor performance of 53 overweight/obese children of a traditional PA, coordinative PA, or control group (no PA intervention). Results have showed that children who participated in our study improved four of the nine tests proposed after the school PA interventions.

Burrows E.J et al., 2014 [19] aim was to see the potential for after school and physical activity levels. Children were pre- and post-tested for FMS proficiency using the Test of Gross Motor Development-2. The sports-based program participants showed no improvement in FMS over the 11 – week study and the games-based program participants significantly improved their proficiency

Conclusions & Recommendation's

Based on the review studies we can conclude that:

Preventive intervention in primary schools offers an effective means to improve motor skills in childhood and to break through the vicious circle of physical inactivity — motor deficits — frustration -increasing inactivity possibly combined with an excess energy intake and weight gain. To prevent overweight and obesity these measures have to be intensified [10]. High number of overweight children and motor deficits results suggests that preventive measures should start at this early age [11].

BMI-related differences in gross motor coordination were more pronounced as children belonged to an older age group. Although this outcome needs to be confirmed in future longitudinal research, it emphasizes the need of an early focus on motor skill improvement to encourage overweight and obese children to be physically active [14].

Motor skills are adversely associated with childhood obesity only for skills most directly related to body weight [15]. Better training of after school program leaders on how to teach fundamental movement skills, may be necessary to assist children in acquiring sufficient proficiency in FMS [19].

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Section 5. Psychology

Bobrova Svetlana Grigoryevna,

Master

Head of the Center for Psychological Support "I and You"

E-mail: sv.0902@yandex.ru

PECULIARITIES OF THE RELATIONSHIP BETWEEN A MAN AND A WOMAN IN THE 21ST CENTURY

Abstract: This paper aims to trace the relationship of a man and a woman in the 21st century.

Keywords: man, woman, marriage, family, relations.

The issue of male and female equivalence and equality was relevant at all times. Extremely dissimilar and at the same time not equal and unequal or equally equal in the obvious difference between the beginning of the female and the male?

At different times, the views on what kind of role is intended for men and women in society. In the 20th century, there were many revolutions, in particular, the revolution in relations between young men and girls. This fact makes the issue of relations between the sexes quite acute.

In addition, the issue of relations between men and women is relevant for social activities as a work aimed at harmonizing relations between parts of society, in particular gender.

Sufficiently tangible changes in the relationship between men and women occurred at the end of the 20th century. "The main mediator and the figure of these transformations are not the male part of the population, but the female one. Status in society, the work and psychology of women are changing today much more rapidly and dramatically than men's psychology. This is, perhaps, not because of the most good adaptation of women, but taken together of social and class relationships. Mainly those who are interested in these changes, the female part of the population in this case carry out any fundamental metamorphosis in the society. Girls and women are gradually mastering all new spheres of activity for themselves, which in turn leads to a change in their psyche and collective consciousness, and the views of women are changing as to what their relations with men should and can be" [1, 29].

Cardinal changes in sexual behavior and stereotypes are not female "masculinization" or male "feminization" and the formation of a kind of "unisex", but a decrease in the polarization of gender differences and the conditioning of stratification in society. Most common differences between men and women are usually associated with sexism, they do not disappear but only transform and are no longer an obligatory social norm.

Despite the prophecies of radicals, the not officially registered permanent relationship between a young man and a girl, as well as a monogamous marriage, by no means leave the stage. The family

does not essentially disappear, but the values of the family change; in particular, the degree of sufficiency of the subjective is placed in the forefront. If we talk about traditional marriage, then it is a very tough social education, today's marriages tend to self-esteem relationships that are based on psychological intimacy and mutual understanding, irrespective of how they are officially registered [2, 21].

Such relationships are least stable than, for example, indissoluble church marriage or marriage of convenience based on common interests. That somehow cause the growth of divorce, and a hot topic in society is not only the strengthening of family ties, but also the increase in the level of culture of divorce, without which children often suffer.

Day-to-day relationships between young men and girls, called serial monogamy, become a young man or girl lives only one partner or partner, and this relationship lasts not until the end of life, but a certain relatively long period [3, 127].

Such relationships between men and women contradict both the principle of lifelong marriage, and talk about the uselessness of the marriage union as such. They help people to be less responsible and freer, but the situation as a whole is unstable and unreliable.

Despite the above, but I want to see the future development of relationships between boys and girls conditioned by the adoption of the society by their equivalence and equality.

Having considered briefly the specifics of the relationship between boys and girls in the 21st century, we can sum up.

Representatives of both sexes have distinctive psychological, biological and psychophysiological characteristics. Men and women are different, but this does not mean that boys and girls are unequal and therefore unequal.

The problem of equality between men and women is a question of the equality of the existence of human civilization. Sexual encroachment should not be. The experience of previous generations requires always treating others as people and without regard to sex do not violate human rights.

This view of the male and female roles in society is likely to become fundamental in their relations in the 21st century.

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*Moskvin Victor,
Dr. Psych., professor of psychology department of RSUPhCSYT
Russian University of Physical Education, Sport, Youth and Tourism*

*Moskvina Nina,
Ph. D., associate professor of psychology department of RSUPhCSYT
Russian University of Physical Education, Sport, Youth and Tourism*

*Tsangl Natacha,
postgraduate student of psychology department of RSUPhCSYT
Russian University of Physical Education, Sport, Youth and Tourism
E-mail: 1700018v@mail.ru*

PERSONAL CHARACTERISTICS AND MOTIVATION ACHIEVEMENTS OF SUCCESS IN TEENAGERS-FIGURERS IN CONNECTION WITH THE PECULIARITIES OF ASYMMETRY

Abstract: The relationship of personal qualities and motivation for achieving success in boys-figure skaters is studied in connection with the peculiarities of individual functional asymmetries. The study involved figure skaters aged 13–14 (adolescent boys, $n = 45$). Subjects were divided into two subgroups: the first included subjects with left-handed “cross-arm” test ($n = 23$), which reflects the partial dominance of the right frontal lobe (regulating block of the brain according to A. Luria), the second group included subjects with right indicators of this sample.

Methods were used: Ehlers’ test to study the motivation for achieving success, Eysenck’s test and R. Cattell’s personal test (HSPQ – teenage version). The working hypothesis suggested that adolescent boys aged 13–14 with right-handed “cross-arm” tests may show a higher level of motivation for achieving success compared to adolescent boys with left-handed “cross-arm” tests. According to the results of the study, the hypothesis was fully confirmed.

Keywords: sports psychology, figure skating, functional asymmetries, strong-willed qualities, motivation to achieve success.

Introduction. Motivational sphere of the athlete is of great importance in sports and sports psychology. Revealing the reasons why young athletes lose motivation for classes, stop in their development and eventually quit sports, deserves special attention of sports psychologists. Motivation for sports is associated with many mental characteristics, including those with strong-willed [2–8].

Methods of research. The method of diagnostics of parental dominance characteristics by A. R. Luria [1] (as a method of psychophysiological and neuropsychological diagnostics of individual features of human hemispheric asymmetry). When implementing the method of psychological testing, the test was used by T. Ehlers (on the study of the features of the motivation for achieving success), the teenage version of G. Eysenck’s test and the teenage version of the R. Cattell technique (for the study of individual psychological features of figure skaters). Statistical processing of data was carried out using the Wilcoxon-Mann-Whitney U-test.

Subjects. The study involved figure skaters aged 13–14 (teenage boys, $n = 45$). Subjects were divided into two subgroups: the first included subjects with a left index of the “cross-hands” sample, which reflects the partial dominance of the right frontal lobe related to the regulating block of the brain according to AR Luria ($n = 23$). The second group included subjects with the right index of the “cross-arm” test, according to A. Luria, which reflects the partial dominance of the left frontal lobe related to the regulatory block of the brain ($n = 22$). All subjects had approximately the same age and social status. The study was carried out on the basis of the figure skating schools of the city of Vienna (Austria).

Hypothesis of the study. Adolescent boys aged 13–14 with right-hand “cross-arm” tests (which reflect the partial dominance of the left frontal lobe of the regulating block of the brain) may show a higher level of motivation for achieving success compared to adolescents with left-sided characteristics of this test.

Purpose of the study. To study the features of the motivation for achieving success for skaters-singles (boys-adolescents 13–14 years) taking into account individual psychological characteristics and profiles of functional asymmetries.

Results and its discussion. The following statistically significant differences were obtained on the scales of the Ehlers questionnaire (based on averaged indicators). In the course of the study, differences in the degree of motivation to achieve success in the “right hemisphere” ($n = 23$) and “left hemisphere” ($n = 22$) subjects were found, which amounted to 15.2 points and 18.6 points respectively, the differences are significant ($p < 0,05$). Thus, the indices of the motivation of the first group correspond to the average level of motivation to achieve success (for “right hemisphere”, $n = 23$) and higher level of motivation to achieve success in the second group of figure skaters (in “left hemisphere”, $n = 22$).

Test Eysenck (adolescent version). In “right hemisphere figure skaters” on the scale of “neurotism-mental stability”, this indicator was 17.2 points (which corresponds to an increased level of neuroticism and indicates a higher emotionality). In the “left hemisphere” group, this indicator was 9.5 points, which corresponds to the normative indices ($p < 0.05$). Differences in other scales were not revealed.

Data of the teenage version of the test R. Cattell. According to the factors of the HSPQ questionnaire, the following data were obtained: the “left hemisphere” figure skaters had a higher level of emotional stability (factor C, 4.4 and 6.3 stenomas, respectively, $p < 0.05$), these adolescents are more self-sufficient and less dependent on the group (factor Q2, 4.5 and 7.6 respectively, $p < 0.05$), they also show a higher level of self-control (factor Q3, 5.3 and 7.2 of the stan, respectively, $p < 0.05$).

After analyzing the data obtained, we see that the indices of motivation for achieving success in the group of “left-hemisphere” figure skaters are higher than in the group of “right-handed” skaters. Psychodiagnostic indicators of “right hemisphere” figure skaters show higher values of neuroticism in Eysenck’s technique, which indicates their emotionality and lower level of neuropsychic resistance (less resistance to stress). The left-hemisphere figure skaters have a higher level of emotional stability (factor C in the HSPQ test),

these teenagers are more self-sufficient and less dependent on the group (factor Q2 in the HSPQ test), they also show a higher level of self-control (factor Q3 in the HSPQ test) In contrast to the “right hemisphere” figure skaters.

Conclusions. Psychodiagnostic indicators in “right hemisphere” and “left hemisphere” teenage figure skaters have significant differences related to individual features of interhemispheric asymmetries. Thus, the hypothesis of our study that the motivational sphere of adolescent athletes is associated with psychophysiological characteristics (individual interhemispheric asymmetry) is confirmed, the research goal is achieved. The received data can be used for the account of individual features in preparation of sportsmen.

The study was supported by the Russian Humanitarian Science Foundation, the project № 16–06–50146-a (f): “Complex research of the individual characteristics of the human regulatory processes in health and disease (developmental and physiological aspects)”.

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Section 6. Agricultural sciences

Ibazhanova Assem,
Shabdarbayeva Gulnar,
Kenzhebekova Zhuldyzai,
Khussainov Damir,
Kazakh national agricultural university,
Kazakhstan, Almaty
E-mail: sema.serikova@mail.ru

PATHOMORPHOLOGICAL CHANGES IN THE LIVER OF THE SHEEP IN ECHINOCOCCOSE

This publication is made in the framework of the project № 0115RK00730 "Epizootic and epidemiological monitoring of natural foci of zoonotic helminthes infections in Kazakhstan and development of complex controls using new technologies", funded by the MES – Grant funding.

Abstract: Echinococcosis is a severely leaking parasitic disease. Compared to other organs, the liver damage rate is very high and is 44–84% [1; 2].

In recent years, echinococcosis is often recorded. In Kazakhstan, there are a lot of invasive diseases that hamper the development of livestock. These include helminthiasis such as echinococcosis, coenurosis. Echinococcosis is anthroprozoosis, an asymptomatic disease that occurs frequently in sheep, goats, cattle, pigs, camels, deer, rarely in horses [3; 4].

At present, scientists in Kazakhstan and Russia are developing new methods of immunodiagnosics and immunization of echinococcosis, ways of operative and conservative treatment of pedigree animals, new anthelmintics for carnivores, new drugs for disinfection of territories [5].

Laboratory studies of echinococcosis do not provide the possibility of establishing a final diagnosis, they provide only supporting information. Analyzing the medical and veterinary scientific literature, one can be sure that in the last 5 years the disease is often registered among people and animals, and the treatment and prevention of the disease is still not fully resolved. In this regard, we believe that this topic is one of the current interests today.

Keywords: Echinococcosis, pathomorphology, histological examination, liver, parasitology.

Introduction. Echinococcosis is one of the very common and the most pathogenic helminths, causing huge damage to the health of the population and economy of the national economy. Echinococcosis is of great interest for the representatives of veterinary and medicine in all countries of the world. Kazakhstan is included into number of regions affected by Echinococcus. Over the last 5 years in Kazakhstan were registered 5949 cases of echinococcosis in humans. The main danger of the spread of cystic echinococcosis represents infected dogs and farm animals, especially sheep aged 2 years and older. With the increasing population density of sheep, more intensely expressed their invasion of the Echinococcus. So, from 4724 surveyed sheep at 33.1% were infected with Echinococcus.

Materials and methods of research. The work was carried out in 2014–2017 at the Department of Biosafety of the Kazakh National Agrarian University. The carcass of sheep which served as a study material, delivered to clarify the cause of death. An autopsy of sheep's carcasses was carried out according to established methods. For histological examinations from the internal organs (liver, kidney, heart, adrenals, spleen, lungs, stomach, small and large in-

testine, pancreas, thyroid gland, lymph nodes, brain), from the exposed sheep was took pathological material. From each organ, taking into account its histological structure, pieces 0,5 cm thick was taken. The pieces of organs were fixed in a 10% aqueous solution of neutral formalin, 96% alcohol and Carnoy liquid. The material was compacted in paraffin, celloidin-paraffin and a freezing microtome. From the compacted pieces, thin sections were obtained, which for the survey study were stained with hematoxylin-eosin, Van Gieson and Romanovsky-Giemsa.

Research results. Before opening the carcasses of sheep from the words of the owners and veterinarian who examined the sheep during their lifetime, we recorded in detail the anamnestic data. During the analysis of collected anamnestic data it was established that all sheep were sick with echinococcosis.

The changes revealed as a result of pathoanatomical autopsy were the same type. All the sheep were thin, the visible mucous membranes of them were pale, yellowish with a reddish hue, in the abdominal cavity there was a transparent, yellowish liquid in a volume of approximately 0,5–1 L.



Figure 1. Echinococcal blisters in the liver



Figure 2. Echinococcal blisters in the liver



Figure 3. Echinococcal blisters in the liver

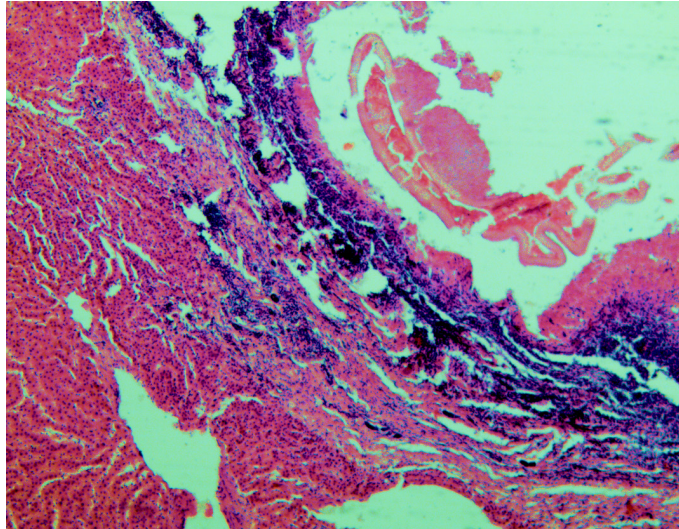


Figure 4. The liver. Echinococcus bladder. G. — E. x 150

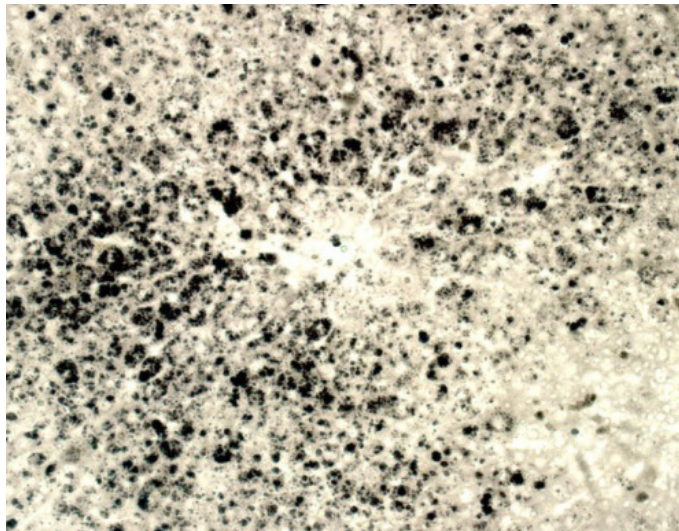


Figure 5. The liver. Fatty degeneration of hepatocytes. Sudan III.

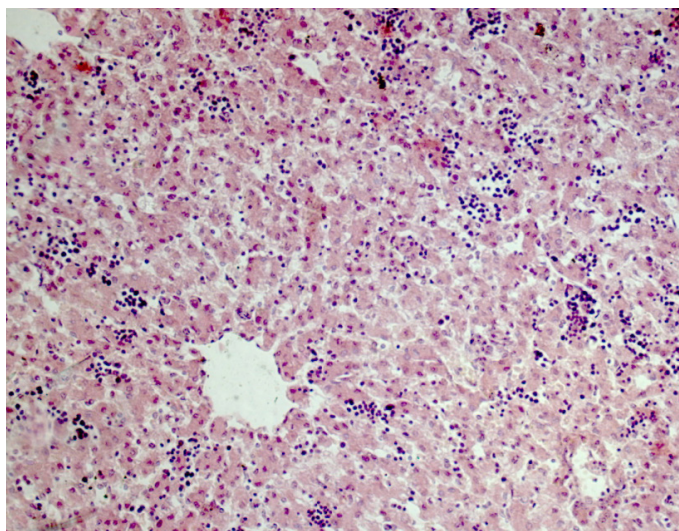


Figure 6. The liver. Parenchymatous degeneration in the liver

Results of macroscopic studies: the main changes were observed in the liver. The longer the course of the disease, the changes in the liver, characteristic for echinococcosis were clear. In the liver, various in size and quantity were found, whitish or grayish-yellowish, rounded or oval, egg-like, bubbles. Is there more their numbers, the smaller their sizes (Figure 1, 2, 3).

Along with this we met a bubble the size of a chicken egg, it was in a single copy. Echinococcus bubbles were light formations of a rounded shape, with a thin wall, inside filled with a transparent, colorless liquid. The tissue around the vesicles was compressed and compacted, and also atrophied. Individual bubbles located closer to the surface of the organ protruded in the form of an elevation above its surface.

Result of the histological studies. Liver – when examined under a microscope, the structure of the affected part was destroyed, and the parenchyma was atrophied. In this part, the hepatic cells were necrotic. In the damaged part, the bubbles were surrounded by a reactive shell (Figure 4).

It consisted of three zones. The inner zone consisted of epithelial cells of cylindrical form and single multinucleated giant cells, the middle zone – from lymphocytes and eosinophils, fibroblasts, external – from fibrous connective tissue. On the inside of the connective tissue, a dead mass was visible. Along with this, there were single plasmocytes, neutrophilic leukocytes, and full-blooded capillaries. The hepatic tissue closely located to the reactive shell was densified, atrophied, devoid of lobule structure. In the neighboring lobule, blood stasis was observed. Some preserved hepatic cells were in a state of fatty and granular dystrophy. In the hepatocytes, voids were seen that occupied all of their cytoplasm. These voids are the places of fatty droplets dissolved in the process of making histopreparations (Figure 5, 6). Some liver lobules completely disappeared, fibrous connective tissue expanded in their place.

Thus, under the capsule of infected liver echinococcosis, bubbles form, the tissue around such capsules is atrophied, and the remaining hepatocytes are subjected to fatty and granular dystrophy.

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Section 7. Technical sciences

Daliyev Shuxrat Latibjonovich,
research associate – the competitor,
Andijan machine-building Institute
Republic of Uzbekistan

Djurayev Anvar Djurayevich,
doctor of technical sciences, professor,
Tashkent Institute of textile and light industry,
Republic of Uzbekistan
E-mail: elmonovsirojiddin@gmail.com

DEVELOPMENT OF THE DESIGN AND JUSTIFICATION OF THE PARAMETERS OF THE COMPOSITE FLAIL DRUM OF A COTTON CLEANER

Abstract: The article presents a constructive scheme and principle of operation of the drum spinner with elastic elements of the cotton cleaner from small litter. The results of full-factor experiments of the recommended design of the spinner are presented. The equation of the output factor-purification effect is obtained and graphical dependences of the influence of the output parameters are constructed: the rotational speed of the drum, the distance between the tips of the pins and the mesh, and the rigidity of the rubber bushing. On the basis of the analysis of the graphs, the optimum values of the parameters of the pin drum with elastic elements are determined.

Keywords: Drum, elastic element, cleansing effect, cotton, speed, hardness, rubber.

In the well-known design of the cotton ginning unit, cotton cleaning sections from small and large litter are combined [1]. Under the brush drums there are two serrated drums and under them the grids forming a grid for cleaning raw cotton from large weed impurities. In the fine cleaning section, the pin drums and mesh surfaces below them are successively installed.

The main disadvantage of this design is the low effect of cleaning cotton from weeds especially from small litter. The total removal of isolated weed impurities resulting in the mixing of small weed im-

purities isolated in the fine-cleaning section with large coarse grains and volatiles in the large-scale cleaning section. This leads to additional difficulties in the regeneration and re-cleaning of cotton. In addition, in the existing design of the cotton cleaner from fine sora, the cleaning effect is not high. Due to the inadequate vibrations of the spear drum due to its greater mass (moment of inertia), as well as the inhibition of cotton in the transition zones between the spear drums due to the insufficient angular velocity of the subsequent spear drum.

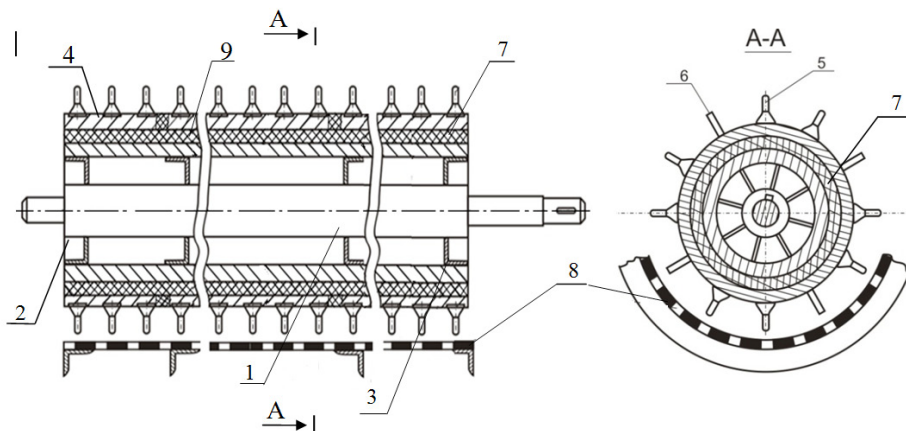


Figure 1. Scheme of the spinner with an elastic element

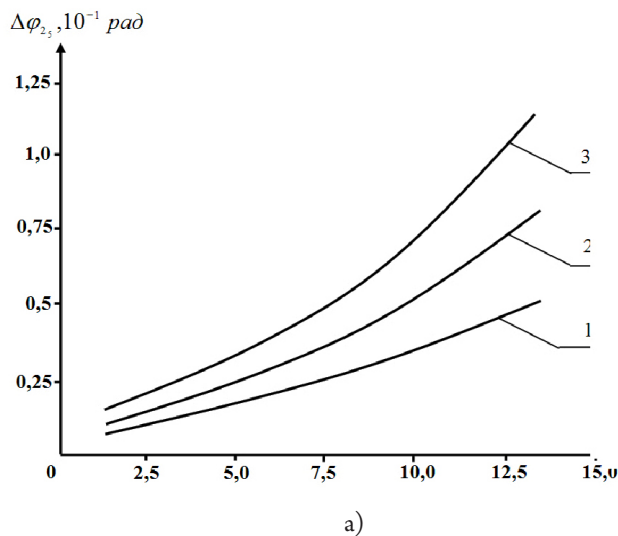
The proposed construction is explained by a drawing, where (Figure 1.) shows the general scheme of the cleaning section of a cotton ginning unit [2]. The cleaning section of the ginning unit contains, in the horizontal plane, a drum 2 in the form of sections consisting of a cylinder 4 with pins 5 and laths 6 mounted on the shaft 1 by means of flanges 3 and rubber annular sleeves 7. In this case, the cylinder 4 is made of sectional including three circumferential pins 5 and six-rowed rows. A dripping grid is installed under the drums 8. In the process of the cleaning machine operation, the clogged raw cotton transported in the ginning unit goes to the drum 2, the pins 5 and the straps 6 of which capture the cotton flies and drag them through the mesh surface 8. The separated fine weed is dropped through the openings of the mesh surface 8 and then out of the cleaning zone through the pneumatic siphon. Carrying the drum 2 sections of three circular rows of pins 5 and slats 6 allows a reduction in the mass (moment of inertia) of each section, there is the possibility of circular oscillations of sections during the interaction of the pins 5 and the strips 6 with the cotton flies. This leads to intense isolated weed impurities from the cotton loaves.

To determine the amplitude of the angular oscillations of the outer cylinder, a section consisting of sections with pins 5 and bars 6 carried out theoretical studies. The drum 2 was considered as a two-mass system for each section. In this case, the system of differential equations describing the dynamics of a system in the steady state has the form [3]

$$\begin{aligned} J_1 \ddot{\phi}_1 &= M_y \sin \omega t - c(\phi_1 - \phi_2) - b(\dot{\phi}_1 - \dot{\phi}_2) \\ J_2 \ddot{\phi}_2 &= b(\dot{\phi}_1 - \dot{\phi}_2) - c(\phi_1 - \phi_2) - M_c \end{aligned} \quad (1)$$

where, J_1, J_2 – Moments of inertia of the inner cylinder and the section of the spinneret; ϕ_1, ϕ_2 – Angular movements of the inner cylinder and section; c, b – Stiffness and dissipation coefficients of an elastic element; M_y – Amplitude of perturbation in steady state; M_c – Resistance from dragged cotton.

To determine the steady-state oscillation of the system, we seek solution (1) in the following form



$$\begin{aligned} \phi_1 &= A \sin \omega t + B \cos \omega t \\ \phi_2 &= C \sin \omega t + D \cos \omega t \end{aligned} \quad (2)$$

To determine arbitrary constants A, B, C, D, we obtain the corresponding equations. In the final form, we have expressions for determining the oscillation amplitudes of the inner cylinder and the corresponding section with the drum pins

$$\phi_1 = \sqrt{A^2 + B^2}; \quad \phi_2 = \sqrt{C^2 + D^2}; \quad (3)$$

where

$$\begin{aligned} A &= \frac{M_y}{k} [(c - J_1 \omega^2)(J_2^2 \omega^4 + b^2 \omega^2) - J_2 b^2 \omega^4]; \quad B = \frac{M_y}{k} b J_2^2 \omega^3 \\ C &= \frac{M_y}{k} [(c - J_1 \omega^2) b^2 \omega^2 - J_2 b^2 \omega^4]; \quad D = \frac{M_y}{k} J_2 b \omega^2 (c - J_2 \omega^2) \end{aligned}$$

$$k = \begin{vmatrix} c - J_1 \omega^2 & -b\omega & 0 & b\omega \\ b\omega & c - J_1 \omega^2 & -b\omega & 0 \\ 0 & b\omega & -J_2 \omega^2 & -b\omega \\ -b\omega & 0 & b\omega & -J_2 \omega^2 \end{vmatrix}$$

The numerical solution of the problem was carried out with the following values of the parameters: $M_y = 1,5 \div 2,0 \text{ Nm}$; $\omega = 45 \div 50 \text{ c}^{-1}$; $c = 400 \div 600 \text{ Nm/rad}$; $b = 7,2 \div 10 \text{ Nm/rad}$. At the same time, graphical dependencies of the change $\Delta\phi_2$ from variation M_c, J_2 and c , which are presented on figure 2. Analysis of the results shows that with increasing values of the rigidity of the elastic element, the amplitude of the oscillations ϕ_1 and ϕ_2 decrease.

It can be seen from the graphs obtained that with increasing technological resistance from raw cotton, pulled by the wheel barrel, nonlinear regularity increases the swing angle of the drum section headset. Thus, when $c = 400 \text{ Nm/rad}$ and increase M_c from 2,5 Nm till 12,5 Nm swing $\Delta\phi_2$ decreases from 0,01 rad till 0,054 rad, and when $c = 800 \text{ Nm/rad}$ angular displacement $\Delta\phi_2$ is within $(0,24 - 1,03) \cdot 10^{-1} \text{ pad}$. To select the necessary amplitude of the angular vibrations of the headset, it is expedient to select the values of the moment of inertia J_2 . According to the analysis of the graphs in figure 2b.

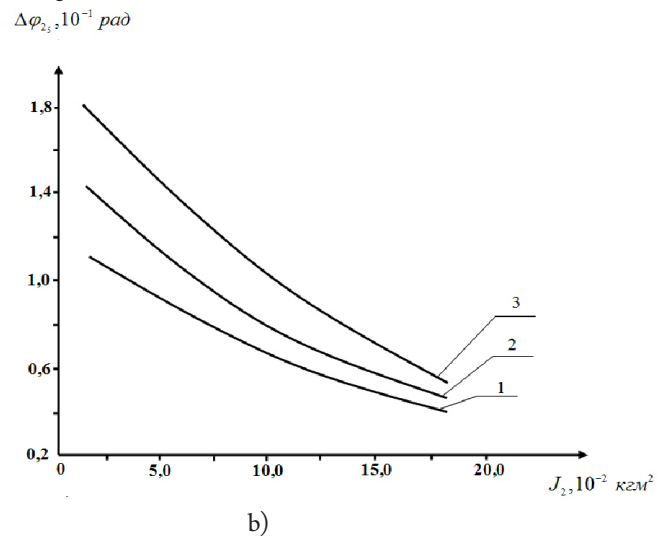


Figure 2. A – dependence of the change in the amplitude of the angular movements of the headset from the technological loading where, 1 – $c=800 \text{ Nm/rad}$; 2 – $c=600 \text{ Nm/rad}$; 3 – $c=400 \text{ Nm/rad}$; B – regularities in the variation in the swing of the oscillation of the headset from the change in its moment of inertia and the stiffness coefficient of the elastic element where, 1 – $c=800 \text{ Nm/rad}$; 2 – $c=600 \text{ Nm/rad}$; 3 – $c=400 \text{ Nm/rad}$

It can be noted that the increase of J_2 from $0,042 \text{ kgm}^2$ to $0,17 \text{ kgm}^2$ swing $\Delta\phi_2$ decreases from $0,16 \text{ rad}$ down to $0,059 \text{ rad}$ when $c = 400 \text{ Nm/rad}$, and at a value of the rigidity of an elastic rubber bush 600 Nm/rad $\Delta\phi_2$ decreases from 0.127 rad to 0.052 radians . To ensure the swing of the angular vibrations of the drum headset within $(0,08-0,11) \text{ rad}$ recommendable values it is been

$J_2 = (0,068-0,12) \text{ kgm}^2$, $c = (550-650) \text{ Nm/rad}$. Taking into account the recommended design parameters of the pin drum, a prototype design was designed and manufactured. During the experiments rubber bushings were made of various three brands of rubber, the characteristics of which are presented in table 1.

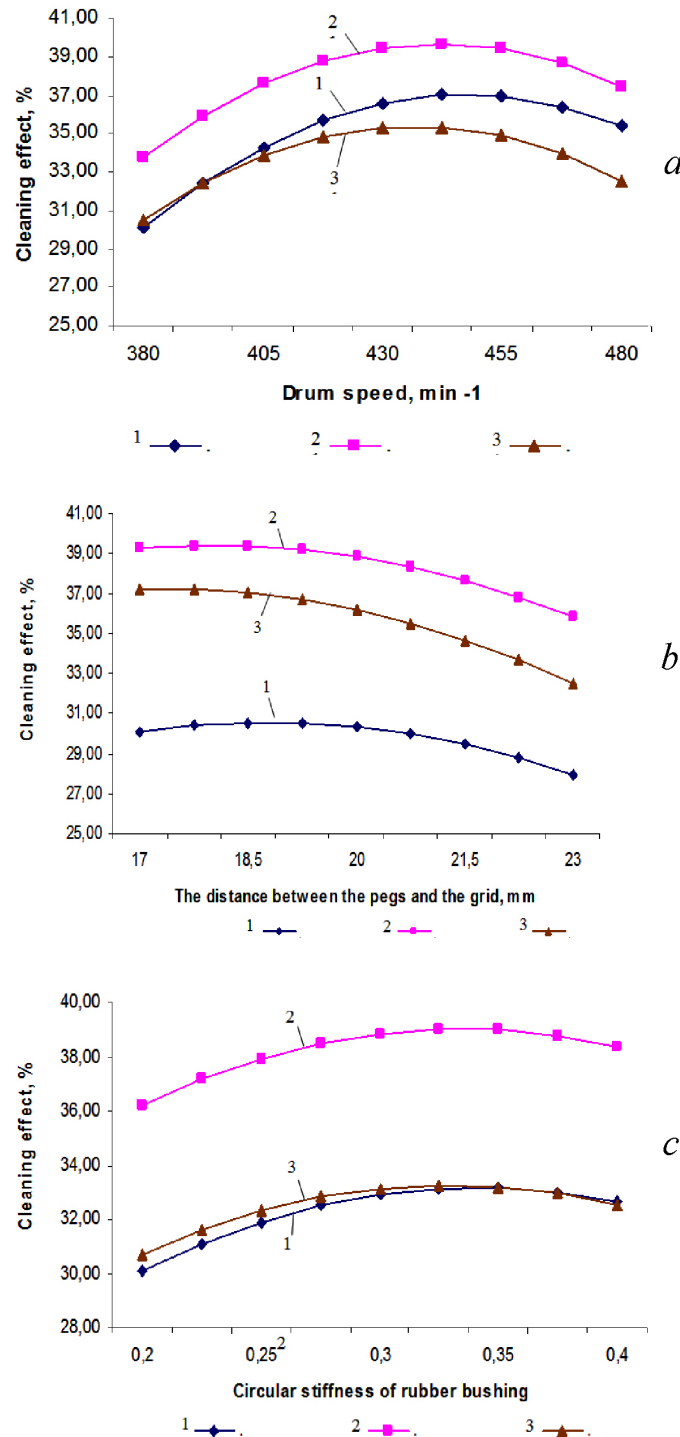


Figure 3. Dependences of the change in the cleaning effect on the variation of the drum speed (a), the distance from the end of the picks to the grid (b), and the coefficient of circular rigidity of the rubber bushing (c)

Table 1.

№	Brand of rubber	Relative extension at break,%	Shore hardness	Coefficient of stiffness, Nm/rad
1	3826 MBC	327%	60	$0.20 \cdot 10^4$
2	1338	360%	72.5	$0.30 \cdot 10^4$
3	3825 MBCS	287%	85	$0.40 \cdot 10^4$

To optimize the main parameters of the recommended drum spinner, a full-factor experiment was conducted. For the input factors were adopted: X_1 – rotational speed of the pin drum, min^{-1} ; X_2 – distance between the ends of the pins and the net surface, mm ; X_3 – circular stiffness of the rubber bush, Nm/rad . For the outgoing factor was to take the purifying effect of raw cotton. The investigations are given according to the procedure [4]. The resulting regression equation has the following form:

$$Y = 38,81 + 1,81x_1 - 1,71x_2 + 1,08x_3 - 0,63x_1x_2 - 0,2x_1^2 - 0,2x_2^2 - 0,21x_3^2; \quad (4)$$

The equation of the emerging factor is obtained in the following form:

$$M_z = -4,04 + 1,84n + 2,03t + 0,225v - 4 \cdot 10^{-3}n \cdot t - 8 \cdot 10^{-5} \cdot n^2 - 0,022t^2 - 10^{-3}v^2; \quad (5)$$

The numerical solution of the obtained equation (5) was carried out on a computer using the Excel program and graphical dependencies were constructed (see figure 3). In Figure 3 of 3a shows the graphical dependences of the effect on the cleaning effect of the rotational speed of the drum. Analysis of the graphs shows that, with an increase in the drum rotation speed from 380 min^{-1} to 480 min^{-1} , the effect of cotton cleaning changes according to a nonlinear regularity. The maximum cleaning effect is obtained when $(435-445) \text{ min}^{-1}$. It should be noted that the greatest cleaning effect was obtained at $X_2=20 \text{ mm}$ and $X_3=0,30 \cdot 10^4 \text{ Nm/rad}$ (see crooked 2, figure 3) Accordingly, at $X_2=17 \text{ mm}$ and $X_3=0,20 \cdot 10^4 \text{ Nm/rad}$ correspond to the 1-crooked a $X_2=23 \text{ mm}$ and $X_3=0,40 \cdot 10^4 \text{ Nm/rad}$ correspond to the 3-crooked. According to the 2-crooked curve in Figure 3a the effect of cotton cleaning reaches up to 39.6%. With an increased drum rotation speed of more than 445 min^{-1} , the reduction in the cleaning effect is explained by the fact that the cotton in the drag zone passes very quickly

and does not have enough time to loosen sufficiently, and at the same time the litter is reduced, and at rotational speeds.

The drum is lower than 335 min^{-1} , the strength of the interaction of the pins with the volatiles becomes insufficient, as well as the volatility with the cleaner grid, which does not allow the required isolated litter. In Figure 3b the driving curves of the change in the cleansing effect of cotton from the variation of the distance between the ends of the pins and the mesh. The first graph corresponds to the minimum values of X_1 and X_3 , the second to the middle and third to the high values of X_1 и X_3 . Analysis of the graphs in Figure 3b shows that the greatest purifying effect of raw cotton from small litter 39.8% was obtained with the distance between the ends of the pins and the grid (18–19) mm at $X_1 = 430 \text{ min}^{-1}$ and $X_3 = 0,30 \cdot 10^4 \text{ Nm/rad}$. In Figure 3c are graphs of the change in the cleaning effect of the increase cotton from the movement of the circular stiffness of the elastic sleeve of the pin drum.

The best cleaning effect in shallow litter 38,3% was obtained at average values $X_1 = 430 \text{ min}^{-1}$, $X_2 = 20 \text{ mm}$ within the following limits of the change in the circular stiffness of the rubber drum sleeve $(0,30-0,35) \cdot 10^4 \text{ Nm/rad}$ [5].

Conclusions. An effective design of a composite spear drum with a rubber bushing of a cotton cleaner from small litter has been developed. On the basis of theoretical studies, the laws of angular displacement of the headset and the shaft of the drum are determined, the calculated values of the parameters of the drum are justified. P The results of full-factor experiments recommended optimal values of outgoing factors: the drum rotation frequency is 444 min^{-1} ; The distance between the ends of the pins and the net is 19 mm; The circular stiffness of the rubber bush is $0,35 \cdot 10^4 \text{ Nm/rad}$, which provides the effect of cleaning cotton from small litter to 39.8%.

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*Kazakov Farkhot Farmonovich,
Assistant of the Department "Technology
and equipment of Light Industry"
Bukhara engineering-technological institute,
Republic of Uzbekistan
E-mail: Farhot-kazakov@mail.ru*

*Kodirov Tulkin Jumaevich,
Technical sciences associate, professor,
Tashkent institute of Chemical Technology,
Republic of Uzbekistan*

TANNING OF ASTRAKHAN SKINS MODIFIED BY CARBOAMID OF ORMALDEHYDE RESIN

Abstract: It is synthesized carbamide-formaldehyde resin modified with acrylic acid. The tanning action of the modified carbamide of formaldehyde resin on astrakhan skins is investigated. The tanning action is determined by temperature of a welding of comparable samples of astrakhan fur by processing of the modified carbamide-formaldehyde resin.

Keywords: Synthesis, carbamide-formaldehyde resin, modification, acrylic acid, fur, astrakhan fur, tanning, filling.

Researches of the last years and experience of the industry demonstrates prospects of application for improvement different types quality of skin which water-soluble synthetic polymers and especially amino resin.

Being products of polycondensation of nitrogen-containing organic compounds (urea, melamine, dicyandiamide or their derivatives) with formaldehyde, amino resins possess not only filling, but also with the tanning actions [1]. The most available of the amino resins applied in various industries around the world and including in the Republic of Uzbekistan, is carbamide-formaldehyde resin.

The standard technique of production of skin for a bottom of footwear provides filling of a semi-finished product a carbamide by formaldehyde resin (medicine KMU). As a result of such filling of skin gain a number of valuable properties [2].

However, a lack of such skin are characterized by the increased content of the substances which are washed away by water, the insufficient elasticity increased by a soakage and some other negative properties though in general on values of the corresponding indicators of skin meet requirements of state standard specification (SSS). The reason of these shortcomings, according to us introduction to a semi-finished products with resin of a significant amount of free urea which has hydrophobic effect on collagen, another is weakens communication of tannin and synthetic tannin with collagen. Besides, the applied resins are characterized by the increased hygroscopic.

By early researches it was established [3] that carbamide-formaldehyde- croton the aldehyde oligomer modified with acrylic acid improves physical, chemical and mechanical properties of skin and by that giving them high fullness. It was a prerequisite to development of a method which synthesis of resins on the basis of urea, formaldehyde and acrylic acid in lack of croton aldehyde for the purpose of application of filling a semi-finished product of astrakhan fur.

In this regard carbamide-formaldehyde resin modified with acrylic acid is synthesized by us. In this case formaldehyde wasn't applied until formaldehyde is formed in the course of interaction on a carbamide by sulfuric acid.

Acrylic acid is chosen as the modifier with the fact that for receiving the amino- aldehyde of resins only always for the beginning of reaction (initiation) and hardening various acids or sour salts are used.

In this research the modified is carbamide-formaldehyde resins (MCFR) at various consumption of acrylic acid are synthesized. For receiving MCFR the carbamide (99,8%) – 100, urotropin (99,4%) – 50, sulfuric acid (100%) – 32, acrylic acid 98,2) – 10 is used; 30; 50 and water – 250 (in masses. h). As a control sample the modifier acrylic acid isn't used.

Synthesis was carried out at a natural temperature by introduction to water solution of small portions of a carbamide, urotropin and sulfuric acid, during the 2 hours. At continuous hashing in solution filled in with small portions sulfuric acid, without allowing temperature increase of reactionary mix 55 °C are above. Then entered acrylic acid into solution without raising pH 6,7. Residual content of acid was determined with use of the indicator of a phenolphthalein. Consumption of acrylic acid to a molar ratio carbamide: acrylic acid, equal 1,0:0,5; 1,0:0,1; 1,0:0,3; 1,0:0,5. Duration of synthesis is 2 hours.

Use of urotropin is more preferable as from the point of view the quality of received product, and sanitary and hygienic conditions of its preparation.

The received resin light – brown color, soluble in water, ethyl alcohol, is besieged in acetone, with a density of 1,42 g/cm³. The exit made 82,6%. The dry rest is 26%.

Moreover, it is well-known [4] that acrylic acid is capable to copolymerization with various monomers which at the increased temperature in the course of formation a product of a sopolycondensation can initiate process and by that can react with disclosure of double communication. And its trailer carboxyl group can block further the allocated free formic aldehyde and react with active amino groups of a collagen of the skin protein tissue of fur.

The interaction of various is studied with protein of derma by the nature of tannin. Despite it, changes of properties of a derma as a result of processing by the bonds having the tanning properties occurs in one direction. In the course of tanning fastening by

particles of the tanning substance of interfacing protein molecules in thin structure of a collagen is reached.

The most typical implications of effect of tanning consider [5]: temperature increase of a welding of a collagen; rising of durability at stretching of the flooded derma and decrease of moisture capacity at a swelling in water; decrease of the general orderliness of thin structure of a collagen, etc.

Tanning is characterized not by the separate listed changes, but their set. Obligatory sign of tanning is irreversibility of process.

Temperature increase of a welding of a collagen as a result of interaction with the tanning substances continues to remain the most important proof of correctness of formation ideas of transversal communications between molecular chains when tanning [6]. The conducted researches [7] showed that polycondensation the

methylol of derivatives of urea in the conditions of chromic tanning leads to formation of chrome-urea- formaldehyde resin (CUFR).

In this work data on studying of the tanning action of MCFR which is formed immediately in structure of a derma are stated. Formation of MCFR in a derma was reached by introduction of a dimetilolurea (DMU) and not modified CFR and a formic aldehyde. Polycondensation was carried out at the expense of acid of the tanning chrome bonds. Concentration of DMM made 3,0 g/l, chrome bonds (including on Cr_2O_3) 1,0 g/l, fluid coefficient (FC) = 8,0, temperature of 35 °C.

The tanning action was determined by temperature of a welding of comparable samples of astrakhan fur by processing (M)CFR and formaldehyde with the subsequent tanning by compound of chrome (fig. 1).

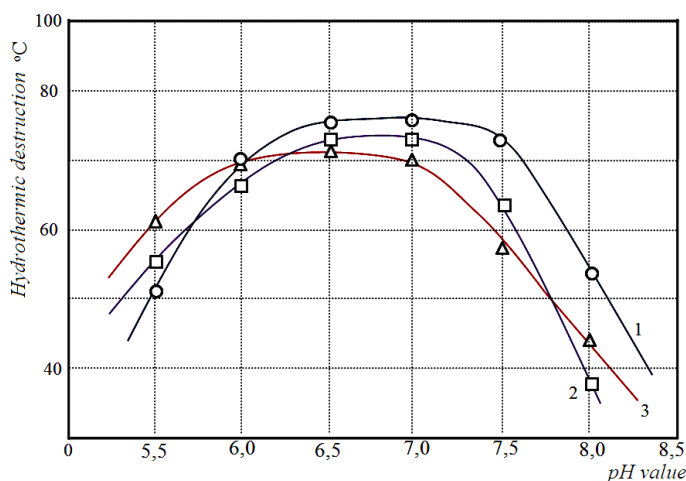


Figure 1. Temperature of a welding of an astrakhan semi-finished product after tanning: 1 – MCFR; 2 – CFR and 3 – formaldehyde

It is apparently from fig.1. joint processing of astrakhan fur metilol derivatives of urea and compounds of chrome gives to a semi-finished product more high temperature of a welding that demonstrates stronger tanning ability of MCFR.

Stronger fastening of molecular chains of MCFR collagen, formed in structure terms in the conditions of the carried-out tanning is the reason of it, than when tanning formaldehyde.

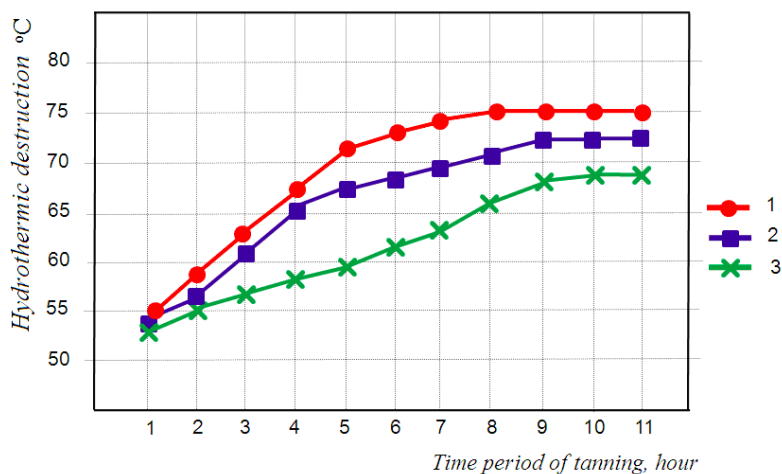


Figure 2. Change of hydrothermal destruction of an astrakhan semi-finished product when tanning: 1 – MChCFR (FC = 0,8); 2 – MChCFR (FC = 10,0); and 3 – Cr_2O_3 (FC = 10,0)

The maximum temperature of a welding is reached at initial value pH 5,5. The reason of it is that the tanning MCFR particle in these conditions becomes more reactive, than formaldehyde, due to emergence in its structure of additional active groups as a result of interaction with metilol derivatives of urea.

Increase in acidity of the tanning solutions (a curve 2) is followed by weakening of their tanning action. It is explained by speed increase of polycondensation over diffusion and the fact that the bulk of MCFR is fixed only in blankets terms or remains in the processing solution; on the other hand, the condensed MCFR support smaller the number of reactive groups, than low-molecular products of condensation.

Decrease in acidity (a curve 2) is also followed by weakening of the tanning effect of solutions as with increase in basicity of the sizes of chromic complexes with the subsequent chromic tanning increase. It complicates diffusion of tannin in thin structure of collagen and weakens the tanning ability [8].

The weakening of the tanning action is more considerably shown for formaldehyde solutions (fig. 1, a curve 3) that also con-

firms stronger «sewing together» of structural elements terms with MCFR.

The kinetics of tanning (M)CFR and formaldehyde was studied on change of temperature of a welding of astrakhan fur in the processing solutions.

Tanning was carried out by two options:

1. option. An expense (M)CFR of 3,0% (on the dry rest), compounds of chrome, considering on Cr₂O₃, NaCl of 50 g/l, FC=8,0, temperature of 35 °C.

2. option. The same as it is stated above but at FC = 10,0.

Control samples tanned formaldehyde.

The research is showed (rice 2, 3, 4) that introduction to solution of compounds of chrome the metilol of derivatives of urea — (M)ChFR promotes faster penetration of the tanning connections in an astrakhan fur term.

Process of the combined tanning is reduced in comparison with chromic. Increase in concentration of the tanning connections (without change of their general expense) intensifies tanning process.

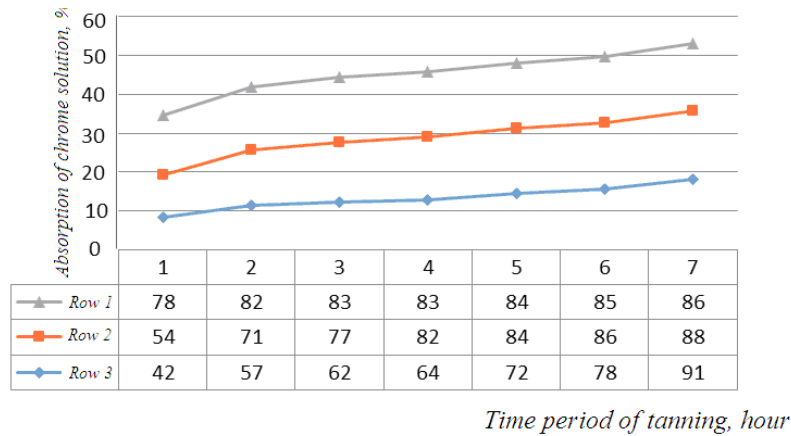
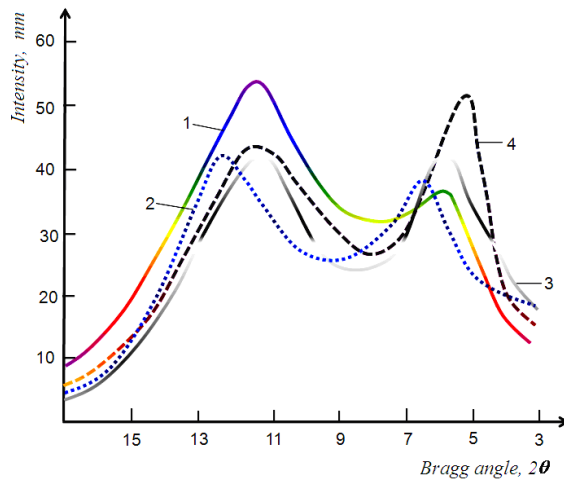


Figure 3. Absorption metilol of derivatives of urea astrakhan fur when tanning: 1 – Cr₂O₃ (FC = 10,0); 2 – MChCFR (FC = 10,0) and 3 – MChCFR (FC = 0,8)



From figure 4. it is visible that chromic tanning and tanning of MKFS leads to change of provision of the reflex (at a diffraction angle 2θ = 4,0 o) corresponding to an interval between axes of protofibrils

Radiographic researches of a collagen defined the major interplanar distances corresponding about 0,29; 0,45 and 1,10 nanometers. By authors it is taped [9; 10] that the distance 0,29 is a projection to an axis of a spiral of one amino-acid rest in the main chain, 0,45 nanometers – diameter of a round of the main chain, and distance of 1,10 nanometers correspond to distance between axes of three-spiral particles.

For a research the following is chosen: a collagen the tanned MKFS; a collagen of chromic tanning with MKFS (a mechanical admixture); collagen of chromic tanning; not tanned collagen.

Roentgenograms of a mechanical admixture and collagen of chromic tanning in some interval coincide. Emergence of a new reflex (at $2\theta = 1,10$ o) for a mechanical admixture is explained by MCFR additive.

It demonstrates that MCFR isn't just postponed for surfaces of structural elements of a derma, and has the tanning effect. Tanning of MCFR leads to essential changes in thin structure of a collagen.

These changes affected physic mechanical properties of a skin.

Thus, generalizing results of researches it is possible to conclude that, joint processing of astrakhan fur metilol derivatives of urea and bonds of chrome gives to a semi-finished product more high temperature of a welding that testifies about stronger the formaldehyde resin modified Carbamide tanning abilities. It is defined that introduction to solution of bonds of chrome the metilol of derivatives of urea — the formaldehyde resin modified chrome Carbamide promotes more intensive penetration of the tanning bonds into an astrakhan fur derma. Radiographic researches of a collagen not tanned, tanned the modified carboamide formaldehyde resin, chromic tanning with the modified carboamide formaldehyde resin of a mechanical admixture and chromic tanning defined the major interplanar distances. It is established that a Carbamide-formic aldehyde-croton the aldehyde oligomer modified with acrylic acid improves physical and chemical and mechanical properties of astrakhan skins, at the same time filling.

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Mavlyanov Aybek Palvanbaevich,
researcher,

Djuraev Anvar,
prof. doctor of sciences

Tashkent institute of textile and light industry

E-mail: elmonovsirojiddin@gmail.com

PIN DRUM WITH THE POLYHEDRAL SPLITS OF RAW COTTON CLEANER

Abstract: This article states a scheme of a new design of loosening drum with the polyhedral splits and its principle work.

Keywords: Pin drum, splits, polyhedral splits, loosening's, cleaning, uniform motion, fluff, work regime, heavy much damage of seeds and fibers, a cleaning effect.

The existing design of loosening drum of cleaning fibrous material [1] contain a cylindrical shell with the metal strips and fastening splits on them, installed longitudinal rows. Defects of known loosening drum of cleaner is that due to bad taking by splits a portion of material and dragging them on perforated surface an insufficient effect has been observing. Besides, that, measured installed a drum splits leads to monotonous force the last ones on the fluff of seed cotton. As dirty has been found in raw cotton in chaotic condition of various depth so monotony of percussive forces by splits don't secure the optimal terms for discharging the impurities with the arbitrary coordinates of finding and bedding on the surface of fluffy.

According to cleaner of fibrous material for cleaning of influence monotony has suggested to create the flat working surfaces on the work part of splits and install in mixed order in every row of a drum at angle 30° relative to direction of motion of seed — cotton particles. Defect of this design is low cleaning effect due to considerable influences of splits of their angle of meeting with the fluffy of seed-cotton.

Defect of this design is that everyone surfaces (sides) splits have been turned upon one direction that leads to appearances of horizontal composing a power of crush that is to say a peculiar displacement which occurs in an only direction. It leads to irregularity of treatment along the length of working part, as well as faces [2].

Which the purpose of increasing of cleaning effect of fibrous material a new pin drum has been recommended ensuring the percussive forces by splits, available polyhedral flat surfaces on the working part (polyhedral prism) what is more every flatness has turned regard to an axis of splits. In such fulfillment of splits a considerable increase of cleaning effect due to force of splits on fluffy of seed cotton which the various force as the same quantity as the direction [3].

The essence of this design has been explained by a scheme which is shown in picture 1, here in figure 1 – a total appearance of a drum, in figure 2 – a total appearance of a design of split, in figure 3 – a scheme of installation of splits on the drum, in figure 4 – scheme of interaction of splits on the fluffy of cotton.

The design consists of a drum 1 and polyhedral splits 2, installed on its surface and polyhedron has carried out only upper, working part of splits 2.

During the rotation of a drum 1 in process of work, split 2 interacts with seed-cotton, the last one undergoes direct percussive actions under different angle of meeting. It has been achieved due to

use of polyhedral splits 2, which allows the optimal terms for discharging the impurities in arbitrary coordinates of finding and bedding on the surface of fluffy. Because of interaction of pin sides 2 at various angle to a fluffy different quantity and direction the indignant forces which allows to discharge foreign impurities with the various parameters are arisen. This effect is forced due to turning of split sides 2, as well as mounting of splits 2 on the surface of a drum 1 as on a chess-board, moreover, neighboring splits 2 have been displeased on an axis of mounting to an angle $2\pi/n$, here, n — a quantity sides on the splits 2. Besides that, it should be noticed, that execution of working and of split 2 the polyhedral ones allows creating a local area in a zone of direct interaction of fluffy with the split 2 and to achieve simultaneous discharge of foreign impurities and their blow from working zone that it also gives a cleaning effect. It should be explained by scheme expressed in figure 4. At work seed-cotton gets under forces of splits 2, which have polyhedral plane on the working part 2, and depending on direction of received percussive impulse S , foreign impurities have been discharged by fluffy only with the certain position.

Impulsive action of drum split on the fluffy of cotton has been determined by system

$$J \frac{d\omega}{dt} = M_g - M_c$$

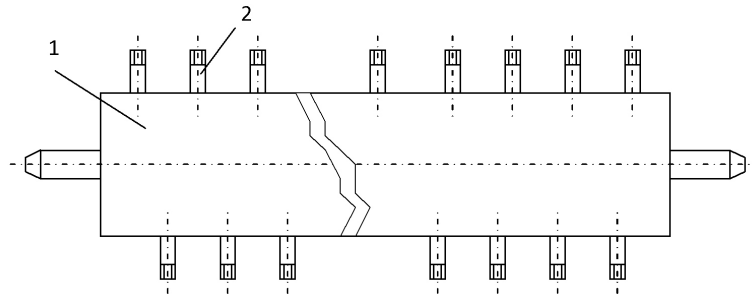
$$S = Rm(\omega_{\max} - \omega_{\min})$$

Here, J – a suitable moment of a drum; ω an angular velocity of a drum; M_g – motive force moment; M_c – a suitable moment of resistance, R – a working radius of a drum; m – mass of cotton fluffy, t – time.

For instance, with a blow of split 2 on a fluffy in variant A, because of rise of inert force a fluffy might has been discharged only foreign impurities a, b, c and d, and foreign impurities e, f, k, l, m, n, o, and p might have been discharged by a blow of splits 2, working parts are located at an angle of fluffy motion. A turn of every flatness of polyhedral split 2 in regard to its axis promotes to decrease of heavy damage of fibers and seeds during cleaning, as in this case is observed the principle, more easy a blowing interaction of working side of split with seed-cotton than with the straight, acute side.

To increase a cleaning effect of fibrous material faces and ensuring the uniformity of treatment of a material along the whole length of the working parts of machines we recommended a new working

drum. In this design polyhedral splits of loosening drum have been turned in both sides. Moreover, a turn of upper foundation of split in regard to lower on around an axis will be changed clock-wise, and a neighboring split will be changed counter clock wise.



Picture 1. Loosening drum of a cleaner of fibrous material

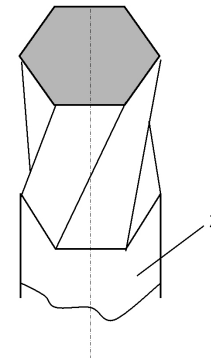


Figure 2.

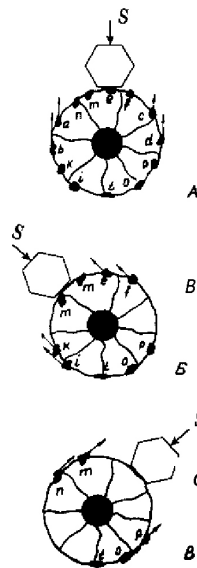


Figure 3.

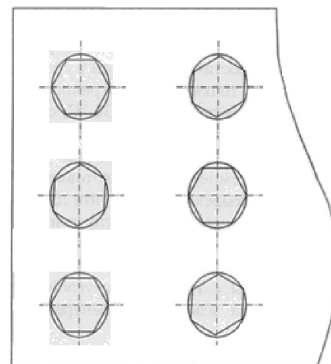


Figure 4.

In this case an angle of turn of upper founding of split 2 regard to lower one will be changed within the limits.

$$\phi = \frac{2\pi}{n} = \frac{2 \cdot 180^\circ}{(4 \div 10)} = 36^\circ \div 90^\circ$$

Here, n – a quantity of split sides 2.

A turn of very flatness of polyhedral split 2 in regard to its axis decreases much damage of fibers and seeds during cleaning, as in

this case is observed the principle, more easy a blowing interaction of a working side of split with seed-cotton than with the straight acute side (an increase of angle ϕ more than 90% leads to increasing of twisted fibers).

Conclusions: Developed a pin drum of a seed-cotton cleaner is allowed to increase the efficiency of loosening and cleaning of fibrous material from foreign impurities, particularly at rotation of a drum with the variable and an angular velocity.

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Mavlyanov Aybek Palvanbaevich,
researcher,

Djuraev Anvar,
prof. doctor of sciences
Tashkent institute of textile and light industry
E-mail: elmonovsirojiddin@gmail.com

ANALYSIS OF NEW SCHEME OF FEEDER WITH THE EFFECTIVE WORKING BODIES

Abstract: A scheme of effective design of seed cotton including feed rollers with the intermittent, inclined blades and vibrating screen have been presented in the article and principle of work recommending by feeder of raw cotton carried out in detail.

Keywords: A cleaner of seed cotton, a feeder, feeding rollers, polyhedral splits, a drum, loosening, an uniformity, an effective cleaning.

Introduction. Necessary loosening and uniformity of the supply of fibrous material to the machines for the primary processing of fibrous materials is achieved due to the carrying out of blades of feeding rollers with the intermittent and consisting of short length plates connected rigidly (on one horizontal line) on the surfaces of rollers moreover, a distance between plates have chosen the same length of plate. Besides the blades of feeding rollers are located on the surface of rollers in a staggered manner. In this case plates are located in horizontal flatness going through the axes of feed rollers rotation that opposite the left feed plates has an interplanar zone of the right feed roller [1].

Analyses. Cotton feeders which are used in production contain simultaneously installed the feed blade rollers and receiving spike drum. The draw backs of the known feeder are a low uniformity of feeder and possible slaughters due to insufficient adhesion of the layers of fibrous material with the blades of feeding rollers. In another design of the fibrous material feeder the side working surfaces of feed rollers have made in the form of sinusoidal curve [1].

This design in a certain degree eliminates the slaughters, but it does not ensure the uniformity of feed cotton flies both along the length of feeder and time to time. The principal functions of machines are: loosening of cotton and uniformity of feeding both over the time and along the length of spinner as well as maximum discharge of weed impurities [2].

Existing designs of cotton feeders do not provide a sufficient degree of carrying out of the listed functions.

To improve the effect of loosening, cleaning and uniform feeding of cotton the feeder with the effective working elements have been recommended in the article [3; 4].

Design of feeding rollers with the inclined blades increases the uniformity of feeding by 1,5–2 times [2]. But this design of feeding rollers increases the unevenness of the loading of the working elements along the length of machine, due to axial travel of product.

The essence of suggested design is explained by fact that the blades have installed on the surface of feeding rollers at an angle to the axis of the roller, moreover an angle of inclination of adjacent blades both in the row and along the circumference of a roller have opposite directions and are arranged chess procedure. The angle of inclination relatives to the axis of feeding rollers 25° C... 30° C.

In Picture 1 Figure 1. shows a total scheme of the feeder, Figure 2 shows a diagram of the arrangement of plates on the surface of feeding rollers (Form A in the Figure 1); Figure 3 shows a diagram of a polyhedron split, Figure 4 shows a vibrous mesh surface, Figure 5 shows a diagram of elastic support.

A feeder comprises a working drum 1 with splits 6, a mesh surface 2 disposed below it, feeding rollers 3 with the intermittent blades in the form of plates 4 with the sinusoidal, working surfaces and a loading window 5. Plates 4 are installed on the surface of the rollers 3 at an angle to their axis.

The splits 6 of a drum 1 are polyhedral (see Figure 1, Figure 3). The device works as follows: A fibrous material passes through the loading window 5 to the plates 4 of feeding rollers 3. A rotation of the rollers 3 is transferred to the material which is fed to the working drum 1. A working drum 1, pushes the fibrous material through the mesh surface 2, through which the weeding impurities fall down.

During the operation of a feeder, the fibrous material is loose and flexible. Therefore, during the operation of a feeder, plates 4 with a short length provide necessary retention of fibrous material in the space between feed rollers 3. In this case, each part of fibrous material will be influenced by plates 4 of the rollers 3 (see Figure 2). By placing the plates 4 at an angle α leading the whole area of the surface of the roller 3 in a zone of interaction of plates 4 with the fibrous material (a space between the rows of plates 4 is on the surface of the rollers 3). It leads to an increasing of contact area of plates 4 (one can increase a length of blades 4) with the fibrous material, it allows eliminating the fall-out of cotton lumps (fibrous material), thereby also the faces of a feeder.

An angle pitch α of the plates 4 is determined as following. The pitch between the rows of plates 4 on the surface of the rollers 3 is expressed by expression

$$t = l \sin \alpha + \Delta \quad (1)$$

Here: l – a length of a plate 4; α – an angle of inclination of plates 4;

Δ – the least clearance between the plates 4 of neighboring rows.

Clearance Δ has been assumed less than an average length of fibers. An average length of cotton fibers of middle-fibrous impurities is (32 ... 37) mm, and fine-fiber varieties is (35 ... 41) mm [2].

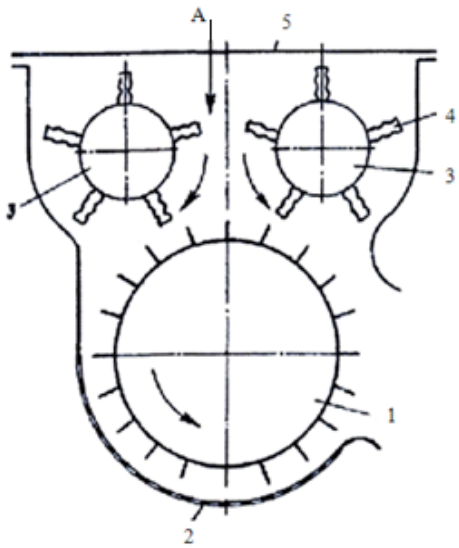


Figure 1.

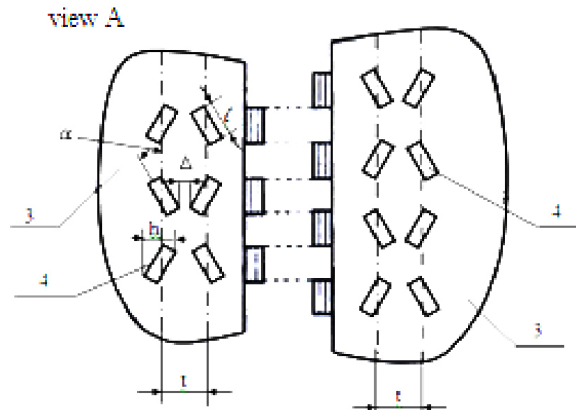


Figure 2.

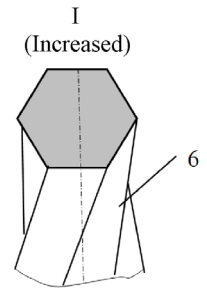


Figure 3.

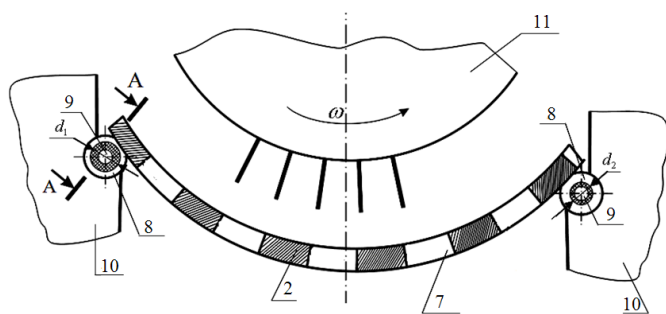


Figure 4.

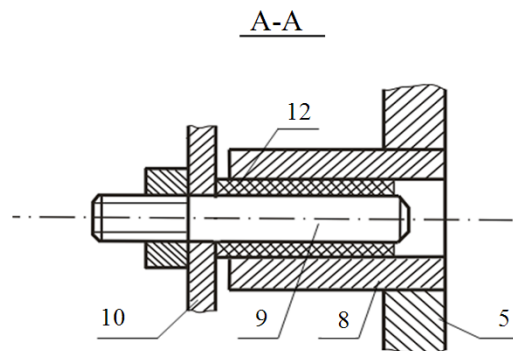


Figure 5.

Picture 1. Feeder to machines for processing fibrous material

To ensure $\Delta \leq \frac{h}{2}$ (a maximum clan of a space between rows) and taking accounts an average length of fibers, an angle of inclination of plates 4 is recommended to be chosen within $25^\circ \dots 30^\circ$. It should be noted that design that takes litter out grid 2 has done with the holes 7.

A descending grid 2 at the edges in four corners has connected rigidly with it sleeves 8, consists of fingers 9, connected with the body of cleaner 5. Between sleeve 8 and fingers 9 is installed elastic (rubber) sleeves 12. Above the descending grid is installed a split drum (it switched on for realization of work of descending grid). During the process a drum is gripped by splits 6 of a drum 1 and dragged along the grid surface 2.

In this case cotton in a zone of contact is subjected to cyclic action. As a consequence a raw cotton receives a high-frequency vibrations and is shaken. Weed impurities discharging by this way has dropped through the holes 7. At the same time due to change of a total mass of cotton on the surface of grid 2, some deformations of elastic bushings occur 12. Taking accounts, that a mass of

dragging of raw cotton and deformation of bush have been changing 12. It leads to vibration of grid 2 with a certain frequency and amplitude. Therefore, at the beginning in zone of dragging of seed cotton grid 2 vibrations will be occurred with a lot of amplitude due to a large diameter ($d_1 > d_2$, thickness) of elastic sleeves 12 in this zone, and at the end of dragging an amplitude of vibrations of seed cotton will be the least one 2. A frequency and amplitude of vibrations of grid 2 depends on rigidity of elastic sleeves 12, mass of grid 2, and changes the mass of dragging raw cotton. Vibrations of grid 2 intensifies with a great extent a discharge of foreign impurities, that leads to increasing of cleaning effect. Besides that, it is recommended to increase a velocity of rotation the left feeding roller at $(20 \div 25)\%$ relative to the right one.

Conclusions. The new scheme of cotton feed with the polyhedral blades of feeding shafts and drum with the polyhedral splits developed. Formulas for determination of unevenness cotton's feed for existing and recommended design of feeding shafts received, graph dependences built, parameters of feed proved.

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Djurayev Anvar Djurayevich,
 Professor,
 Murodov Orif Jumayevich,
 Tashkent state technical university
 E-mail: elmonovsirojiddin@gmail.com

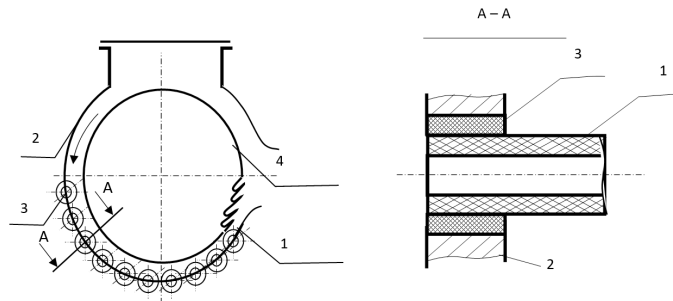
GROUNDATION OF THE PARAMETERS OF GRATE BAR ON ELASTIC SUPPORT WITH NON-LINEAR HARDNESS

Abstract: Groundation of the parameters of plastic grate bar on elastic support with non-linear hardness and stabilization of frequency of rubber hub vibration is considered in this article. Ranges of disturbing power changes of raw cotton on grate bar are shown, when intrinsic frequency must change within insignificant ranges. Parameters OF vibrational system with non-linear hardness of elastic element where definite link between period and amplitude exist were defined.

Keywords: clean zone, cotton, saw cylinder, impulsive, vibrational.

In cotton cleaners which cleans large litter the important thing is to perfect saw cylinder construction and bar, that allow increasing of cleansing effect while high productivity with maximal saving of natural properties of cotton-fiber (1). In this purpose the authors

recommend the construction of plastic grate bar 1 (look at pic.1) fixed at frame 2 by means of elastic rubber hub 3. Saw cylinder is fixed above grate bar 4 [2].



Picture 1. Scheme of zone of cleansing raw cotton from large litter

During the process of work fliers of cotton seized with saw cylinder teeth 4 are pulled through grate bar 1. Meanwhile due to deformation of elastic hubs 3 bars 1 vibrate with necessary amplitude and frequency, causing intensification of large litter mixtures out of cotton. It is necessary to point, that the rubber hub 3 can be fixed eccentric relatively to the axis of plastic bar. But hardness of elastic support will have non-linear character. During impulsive effect of raw — cotton on elastic bar instantaneous deformation of rubber support occurs 3 (Pic. 1, a, b). Defining of bar vibration frequency, which influences on cleansing effect of raw cotton is very important [3].

For approximate defining of value of deformation of rubber support of bar let us look kinetic energy of pulled through raw cotton together with bar in the process of strike which is transferred into potential energy. (4) of deforming support:

$$T = \frac{mV_y^2}{2} \quad \Pi = \int_0^{x_{\max}} (c_1x + c_2x^3) dx \quad (1)$$

Where T –kinetic energy of raw cotton and plastic bar; t- summary mass of plastic bar and raw cotton; V_y - strike seed of raw-cotton against plastic bar; C_1 –non-linear component of the coefficient elastic support rigidity; $c = \frac{c_2}{\mu}$ coefficient of non-linear component

of the coefficient of rigidity; Π - potential energy of deforming elastic support.

From the received condition of interaction we have:

$$V_y = \sqrt{\frac{2}{m} \int_0^a c_1 x dx + \int_0^a \frac{c_2}{\mu} x^3 dx} \quad (2)$$

Where, a – maximal deformation value.

According to researches (2) at non-linear rigidity of elastic element of unimass vibrational system in conditions from $x=0$ to $x=a$, vibration period will be:

$$t = 4 \sqrt{\frac{n}{\alpha}} \cdot \frac{1}{\alpha^{n-1}} \int_0^1 \frac{d\xi}{\sqrt{1-\xi^{2n}}} \quad (3)$$

Where α and n - constants, $n=1,2,\dots$, $\xi = X/a$, at regenerative power equal to αx^{2n-1} . In vibrational systems with non-linear rigidity of elastic element there is a definite link between period and amplitude. That's why we shouldn't use term "intrinsic frequency" with regard to such systems, as the frequency of free vibrations stops to be intrinsic parameter of the system. In this case the restoring force will be $c_1x + \frac{c_2}{\mu}x^3$ (3). And that's why quantity n takes value 1 and

2. Than period of vibrations of bar on elastic support with non-linear rigidity is defined out of expression:

$$t = 4\sqrt{m} \left[\sqrt{\frac{1}{c_1}} \int_0^1 \frac{d\xi}{\sqrt{1-\xi^2}} + \sqrt{\frac{2\mu}{c_2 a^2}} \int_0^1 \frac{d\xi}{\sqrt{1-\xi^4}} \right] \quad (4)$$

Where μ — coefficient, taking into consideration nonlinearity of elastic characteristics, m^2 .

In received expression (4) we make integration of members in brackets, in the same time the second summand is calculated with the help of tables of special functions according to work (5) we shall get:

$$t_k = 4\sqrt{m} \left[6,28 \sqrt{\frac{1}{c_1}} + \frac{1,8541}{\alpha \sqrt{c_2 / \mu}} \right] \quad (5)$$

For frequency of free vibrations with a glance $\rho_2 = 2\pi / T$ we have:

$$\rho_k = \frac{0,25a\sqrt{c_1 c_2 / \mu}}{\sqrt{m(2\pi\alpha\sqrt{c_2 / \mu} + 1,85\sqrt{c_1})}} \quad (6)$$

Calculus of derived formula (6) shows that, intrinsic frequency of vibrations nonlinearly decreases with increasing of given mass of bar with cotton.

With increasing of amplitude of vibration and coefficient rigidity c_1 and c_2 frequency of intrinsic vibrations changes by nonlinear dependence.

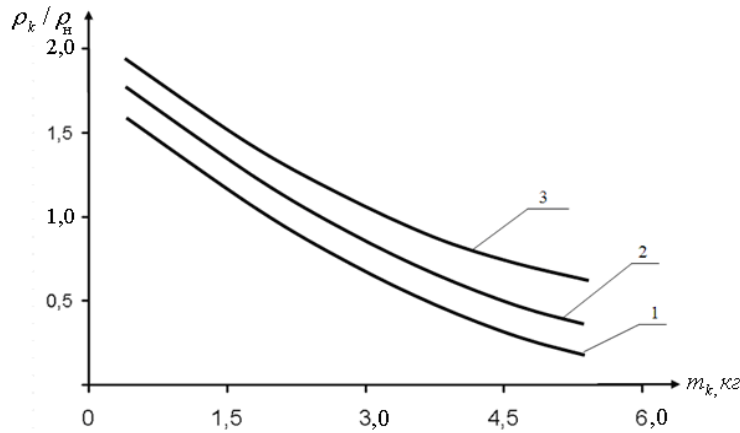
Providing of bar vibrations in pre-resonance area is important, as intrinsic frequency of bar vibrations also changes in dependence of value of reduced mass, amplitude, and nonlinear rigid characteristic of elastic support. In numerical work

The following is received as initial parameter:

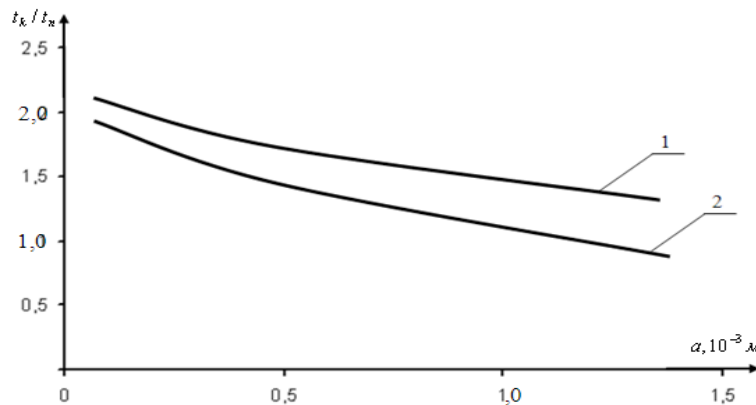
$$m = 1,8...2,9\text{kg}; c_1 = 1,1 \cdot 10^4 \text{H} / \text{M}; c_2 = 0,6 \cdot 10^4 \text{H} / \text{M};$$

$$\mu = (0,5 - 1,0)\text{M}^2; a = (1,0 - 1,2) \cdot 10^{-3} \text{M}$$

At pic.2 graphical dependence of changing relative value of intrinsic frequency of bar vibrations on increasing of its reduced mass is shown. Graph analysis shows that relative value of intrinsic frequency is reduced by nonlinear regularity with increasing of reduced mass of bar. The quantity of amplitude (elastic support deformation) practically doesn't effect this regularity, that is amplitude increasing leads to parallel shifting upwards of curve regularity with difference $\rho_k / \rho_n = 0,25 - 0,05$ (at increase $0,8 \cdot 10^{-3} \text{M}$ to $1,2 \cdot 10^{-3} \text{M}$).



Pic. 2. Graphical dependence of changing of relative value of intrinsic vibrations of bar on increase of its reduced mass: where 1 at $a=0,8 \cdot 10^{-3} \text{M}$; 2 at $1,0 \cdot 10^{-3} \text{M}$; 3 at $1,2 \cdot 10^{-3} \text{M}$



Pic.3. Graphical dependence of changing of relative value bar vibrations period on changing of maximal amplitude: where 1- $m_k=2,25 \text{kg}$; 2- $m_k=4,1 \text{kg}$

Picture 3 shows Graphical dependence of changing of relative value bar vibrations period on elastic support with nonlinear character-

istics from changing of amplitude of natural vibrations. Thus, at amplitude value of $0,5 \cdot 10^{-3} \text{M}$ vibration period $t_k / t_n = 1,9$, $m_k = 2,25 \text{kg}$,

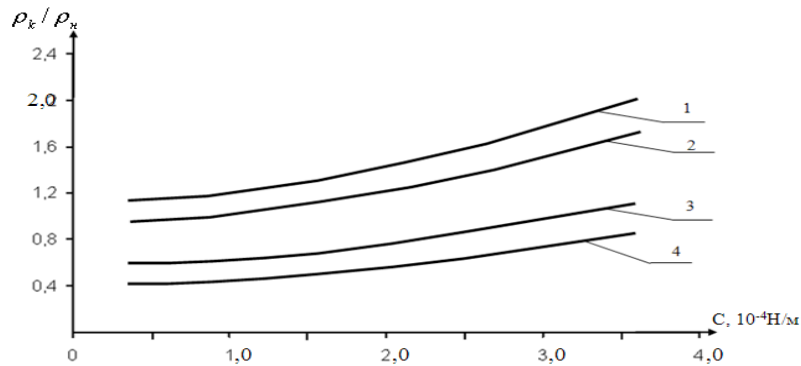
and at $a = 1,75 \cdot 10^{-3} \text{ m}$ and $m_k = 2,0 \text{ kg}$, period of vibration is $t_k / t_n = 1,49$. This means that bar vibration amplitude is slightly influences the period and frequency of vibrations. At the same time plastic bar mass includes intermediate cotton mass (fliers which are on the surface of bar).

It should be pointed that the amplitude of natural vibrations depends on the size of elastic support deformation or on its rigidity characteristics. You can see Graphical dependence of changing of relative value of intrinsic vibrations frequency (relation of current value of intrinsic frequency to calculated) on coefficient of rigid elastic support changing. The graphs show that the increase of elastic

support rigidity causes the increase of intrinsic frequency of the system by nonlinear regularity. Nonlinearity of elastic support depends on location of eccentric rubber hub through which plastic bars are fixed on the frame of cotton cleaner.

At rigidity coefficient of $c_2 = 0,75 \cdot 10^4 \text{ N/m}$ the increase of rigidity coefficient c_1 From $0,4 \cdot 10^4 \text{ N/m}$ to $1,45 \cdot 10^4 \text{ N/m}$, the value of relative frequency will grow almost twice from $\rho_k / \rho_n = 1,12$ to $2,21$. With decrease of value c_2 to $0,6 \cdot 10^4 \text{ N/m}$ intensity of increase of intrinsic frequency of bar vibrations falls (look at pic.4, curve 2)

At constant value C_1 with increase of c_2 from $0,6 \cdot 10^4 \text{ N/m}$ to $2,0 \cdot 10^4 \text{ N/m}$ also causes the increase of ρ_k / ρ_n from $0,55$ to $1,15$ two times. It means that to increase the limit of intrinsic frequency value



Pic.4. Graphical dependence of changing of relative value of intrinsic vibrations of bar on coefficient changing of rigidity of elastic support with nonlinear characteristics: $\rho_k / \rho_n = f(c_1), c_2 = 0,75 \cdot 10^4 \text{ N/m}$; 2-at $\rho_k / \rho_n = f(c_1), c_2 = 0,6 \cdot 10^4 \text{ N/m}$; 3-at $\rho_k / \rho_n = f(c_2), c_1 = 1,25 \cdot 10^4 \text{ N/m}$; 4-at $\rho_k / \rho_n = f(c_2), c_1 = 1,05 \cdot 10^4 \text{ N/m}$; at $m = 2,0 \text{ kg}$ bar vibrations the increase of elastic support rigidity (the thickness of rubber hub) is reasonable.

Taking into account the limits of disturbing force on bar by pulling through raw cotton intrinsic frequency must change within slight limits. That's why the following is reasonable for the being consid-

ered vibration system $c_2 = (0,5 \div 0,6) 10^4 \text{ H/m}$, at $c_1 = (1,25 \div 1,5) 10^4 \text{ H/m}$, $m_k = (1,7 \dots 2,0) \text{ kg}$.

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*Pisetskiy Yuriy Valerevich,
Tashkent University of Information Technologies
Tashkent, Uzbekistan,
E-mail: yuriy.pisetskiy@mail.ru*

THE DESIGN CONFIGURATION OF RADIO MONITORING SYSTEM AIMED AT ENVIRONMENTAL MONITORING

Abstract: This article proposes the design configuration of the radio monitoring system for environmental monitoring at production facilities. The configuration of the radio monitoring system and the block diagram of the central control panel are presented. The work of the radio monitoring system is described.

Keywords: Ecology, environment, radio monitoring, sensors, radio channel, transmitter, receiver, controlled objects, protection system, frequency.

Introduction

In science in general, for a long time, the classical definition of ecology as a branch of biology was accepted that was aimed at studying the interaction of organisms with the environment in which they live, including all living and non-living components. The environment is made up of physico-chemical and biological components. Physicochemical components are light, heat coming from the sun, humidity, wind, oxygen, carbon dioxide, nutrients in soil, water, atmosphere. Biological components are organisms of the same variety, plants and animals [1].

The problem of ecology and environmental pollution is currently at the core of all issues. The environment is the medium wherein people do live. The environment is constantly polluted with various exhaust gases from cars, emissions from industrial plants, thermal stations, combustion products, etc. Therefore, in order to preserve the biosphere, it is necessary to monitor negative impacts [2].

The most effective methods of control is the use of monitoring systems. There are many modern systems of environmental monitoring. Different systems are used in different conditions, depending on the goal. To develop a methodology and create an environmental monitoring system, it is necessary to know the conditions in which it will work. And also the requirements to developed method and system should be clearly defined [3].

Technique of experiments

Currently, there are many methods and monitoring systems. But it is difficult to choose the optimal one for specific conditions and requirements. This is due to the fact that existing methods can be too expensive, or too complicated, either not satisfying the goal. Therefore, new methods and monitoring systems are being developed for certain sites where monitoring is needed. The designed systems should have all necessary functionality and be optimized for price and quality.

In accordance with the requirements, the developed monitoring system should be adapted to the real conditions for working in desert conditions. The system should include a central console, data transmission channels and actuators. Monitoring will be carried out at gas production and refineries. Such enterprises have a complex infrastructure and considerable distance from each other major technological nodes around which monitoring is to be carried out. Therefore, when choosing a data transmission channel, we will stop

at the radio links. This will greatly reduce the cost of the purchase of cables and their installation. And there is no risk of damage [4].

To create a monitoring system, we also need executive devices that determine the components of the environment. To determine the physicochemical components of the environment, sensors suitable for a given composition of the medium are widely used. A sensor is a device that generates a signal under the influence of external irritating factors. The classification of sensors is based on the principle of their operation. The principle of action can be based on physical or chemical phenomena and properties.

For the required conditions, the choice of a thermocatalytic sensor is optimal, since it has all the necessary parameters for our monitoring system. These devices are used in monitoring devices for mines, mines, oil storages, gas pipelines. Such sensors are able to determine the content of gases: ammonia, methane, hydrogen, oxygen, carbon monoxide and the sum of hydrocarbons.

Experimental results and discussion

Since the monitored objects in most cases have a complex infrastructure, the proposed design uses a radio channel to transmit information from the sensors to the control center for the parameters. To increase the noise immunity of the radio channel, the signals are transmitted in digital form. The configuration of the developed radio monitoring system is shown in Fig. 1 [5].

The system consists of four transceivers located in the necessary areas for monitoring the environmental parameters and a central control unit (CCU), where information is received. In the central control panel, a transmitter and a receiver are installed, as well as an emergency alarm device from each one entering the transmitter system. Assess the current state of the environment allows the monitor to which the information received from the sensors is output.

Simultaneous operation of 4 transceivers is possible only at different frequencies, which complicates the circuit design of the system being developed. Therefore, the system was found to work at the same frequency. The frequency was chosen at 27 MHz. 27MHz (civil band), with the authorized output power of the transmitter up to 10W. At the same time, the communication range of the developed device is about one kilometer, with a transmitter power of up to 1W [5].

According to the development requirements, peripheral transmitters are located in places that can only be powered by batteries. Then assess the state of the environment better discretely, i.e.

within the certain time interval. In our case, the interval was chosen 20 minutes, and during these 20 minutes the transmitters operate

for 10 seconds, thereby achieving economical energy consumption of the batteries.

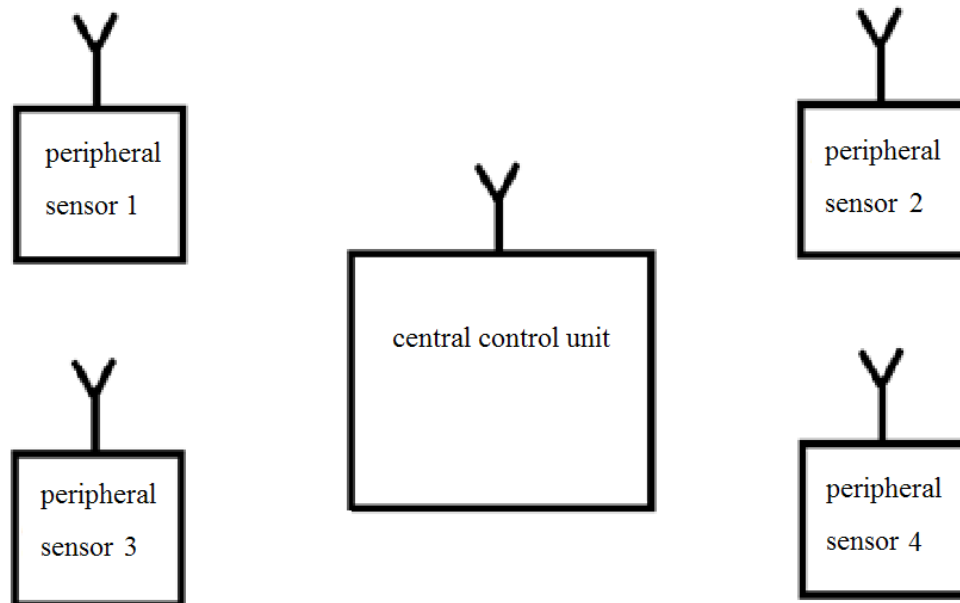


Figure 1. System configuration of the radio monitoring equipment

The operation of the transmitters is synchronized by a synchronization pulse, which is emitted every 20 minutes by a transmitter located in the CCU. The timers of the peripheral transmitters are triggered by this signal. Seconds of time are formed, 10 seconds the transmitter operates in the battery voltage monitoring mode, the next 10 seconds is the transfer of information from the sensor and 10 seconds – the guard interval. After 20 seconds of operation, the transmitters are turned off. Then the cycle of work is repeated.

Peripheral receivers serve to receive the synchronization signal and after the timer starts the synchronization signal, the receiver automatically turns off. This is necessary so that there are no false positives, since the receiver receives all signals at 27 MHz. The algorithm of the system is set by means of timers.

In Fig. 2 a block diagram of the CCU is presented. When the CCU is turned on, the timer starts. The signal from the timer goes to the clock driver, to the device controlling the operation of the transmitter and receiver. From the control unit, the signal is sent to the receiver, transmitter and antenna switch. The receiver is turned off. The transmitter is switched on by the timer only for the time of the timing output, which is received by the peripheral receivers simultaneously. After passing the clock, the transmitter turns off and the receiver turns on. At the same time, a control signal is sent to the antenna switch. The signal from the receiver is fed to the eight-channel receiver via a time slot generator. From an eight-channel receiver, the signal, divided by channels, passes through a digital-to-analog converter and is sent to an eight-channel monitoring device, which indicates the states of the sensors and the battery. In this way, the status of sensors located at a remote distance is controlled [6; 7].

The radio channel of the CPU is designed in accordance with the standard scheme, which includes: a transmitter, a receiver, an antenna switch. The control unit of the system includes a time interval

generator, a timer, a sync signal generator, a radio channel control device. The receiver-control unit contains an eight-channel receiver with a serial to serial converter, digital-to-analog converters, and an eight-channel monitoring device [8].

The radio transmitter device used in the system includes: a transmitter, a modulator, an electronic key, including a command transmitter and an adjustable voltage regulator, which serves to adjust the transmitter output power from 0.5 W to 5 W, depending on the supply voltage. To adjust the output power, there is also an attenuator connected between the antenna and the transmitter output. The manufacture and use of such radio transmitting devices throughout the world is regulated by the relevant legal norms [5]:

- A) The maximum power is 1 kW.
- B) Operating frequency 27, 12 MHz.
- C) Type of radiation: manipulated unmodulated carrier frequency.
- D) The level of radio interference from harmonic and spurious emissions at a distance of 30 m from the transmitter should not exceed 30 $\mu\text{V}/\text{m}$.

As the master oscillator in the transmitter a generator with quartz frequency stabilization, with a quartz resonator in the base circuit and modulation of the generator along the emitter circuit was used. Three-point circuits with resonators, respectively, and the collector of the transistor are distinguished from the point of inclusion of the resonator. A circuit with a quartz resonator connected between the base and the collector of the transistor is called a capacitive three-point circuit. With the inductive character of the reactance connected in series with the resonator, the latter can be excited at a frequency below or above the frequency of the series resonance. At a certain value of this reactance, the resonator is excited at a frequency of successive resonance.

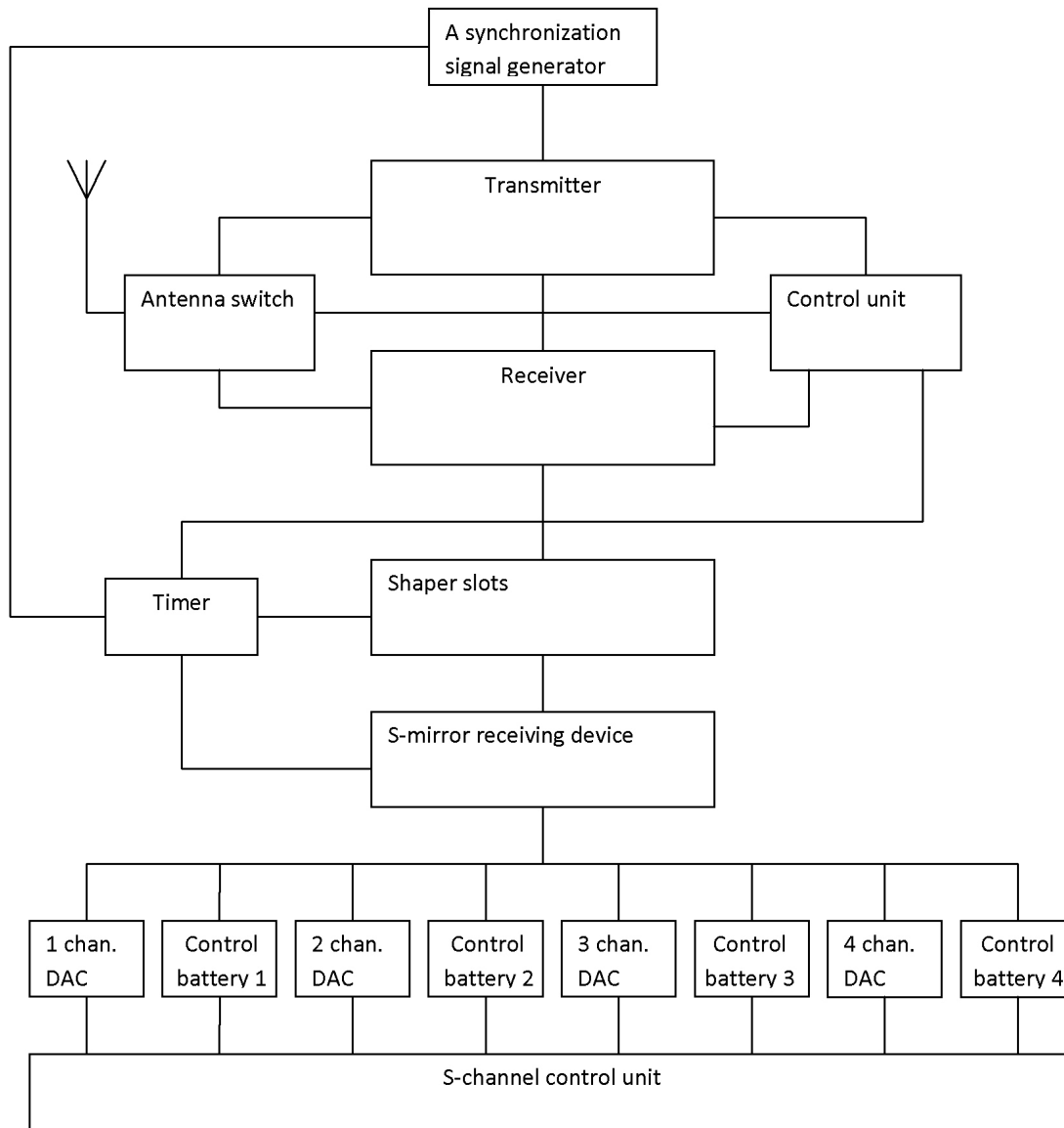


Figure 2. Block diagram of the central control unit

As mentioned above, all the transmitters and receivers of the system operate at one fixed frequency. Therefore, in order to improve the reliability and simplification of the circuit, as well as the tuning of the system, the receiver was based on a direct amplification amplifier with amplifying elements on the microcircuits.

Results and discussion

The developed radio monitoring system was successfully tested at gas stations and demonstrated very good results. With continuous monitoring for a month, several alarm triggers were detected. At the same time, the engineers took the appropriate measures in due time. All data from the online monitoring system was sent to server storage for further processing and diagnostics [9].

The developed radio monitoring system has its positive features, in comparison with analogues. First of all, this is a wireless connection of peripheral sensors, convenient in conditions of a complex in-

frastructure of industrial facilities. Secondly, it is the use of low power transmission, and in turn, the range of one kilometer, which largely solves the problem of electromagnetic compatibility. Thirdly, economical expenditure of battery energy is achieved by means of a discrete assessment of the state of the environment, since peripheral transmitters are often located in places where their power can only be supplied from batteries [5; 9].

Conclusion

The developed monitoring system can be used in the systems of protection of the gas processing, mining industry, shops and warehouses where toxic, explosive substances are stored. Also in emergency situations with possible accidents or malicious acts. Experiments have shown that the advantage of the developed system is the ease of maintenance, the accuracy of measurements and almost complete automation at a relatively low cost.

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*Pisetskiy Yuriy Valerevich,
Tashkent University of Information Technologies,
Docent, the Faculty of Telecommunication
E-mail: yuriy.pisetskiy@mail.ru*

RADIO MONITORING OF THE ENVIRONMENT

Abstract: The article considers the issues of the necessity of environmental monitoring. The variants of the application of the radio monitoring system, a number of the main advantages of its use and the purpose of observations conducted within the framework of monitoring are given.

A structure for constructing a radio monitoring system is proposed. The working principle of the modernized thermo catalytic sensor is considered in order to increase its selectivity.

Keywords: Radio monitoring, ecology, environment, sensors, hazardous gases, selectivity.

Introduction

In some regions of our planet, world scientists develop specific programs for monitoring the ecological state of the geological environment, monitoring the ecological state of surface waters, air and associated ecosystems. Such regions include the Central Asia with its unique geological environment and ecosystem that can easily be affected by anthropogenic influences [1].

The system of unified environmental monitoring provides for the development of mathematical models of industrial enterprises with various depths of study. The Simulation of the current situation allows to accurately identify focus of pollution and find adequate management at the interstate technological and economic levels [2].

Modern conditions of work at enterprises for processing mined gases or oil products require increased security measures. Therefore, the development of highly effective ways and means of continuous automated control of toxic and explosive components in the air is an actual problem. Safe operation of enterprises depend on the availability of such means of control which prevent emergency situations involving flammable substances release into the environment and provide effective work of warning systems.

At the moment there are many different ways to use the radio monitoring system, depending on the requirements of various industrial, household, strategic, or other objects [3]:

- System for collecting information on the status of elements and nodes of complicated mechanized systems;
- System for monitoring and collecting information on gas concentration;
- Pressure and flow monitoring system on the drainage area;
- Radio monitoring system for pumping station parameters;
- Radio monitoring and control of parameters of the filter station;
- System of remote gas control (the sensor is located in the selected area, collects, archives information on gas concentration, if necessary transfers data to a portable device, with a built-in radio module);
- Radio monitoring system for conveyor lines.

In all cases, the set of the radio monitoring system is a complex chain of interacting main devices, including: peripheral units containing radio modules, sensor modules equipped with the necessary sensors, a central control panel and information collection. Also, if additional services are needed, radio monitoring systems may include additional devices, depending on the requirements.

In general, the listed main devices must perform all the functional tasks for the uninterrupted operation of the system: measurement of physical quantities; Broadcasting of measurements on the radio channel; Sensor control; Providing the user with a convenient interface for collecting information from sensors and controlling sensors; Archiving of sensor information (if necessary); Work in data relay mode (if necessary).

Many enterprises today are still using wire monitoring systems, which, on the one hand, cheapens the control system for emissions of hazardous substances, on the other, makes it less reliable by the criterion of recoverability and non-mobile.

Most modern radiomonitoring systems are built on the basis of GSM networks. Such systems also do not always satisfy the reliability requirements, since in this case the exchange of information depends entirely on the radio channels of the cellular stations. Then the reliability of the system can be reduced by orders of magnitude, since the overall reliability of the system is the product of its own (circuit) and reliability of the cellular system servicing the monitoring system under consideration.

The use of the radio monitoring system has a number of main advantages [4]:

1. Increase the level of security due to the inability to intercept the signal from the radio sensor or simulate it;
2. The absence of cable jumpers allows to place sensors in hard-to-reach places to collect information;
3. In case of loss of general power at the object, the monitoring system continues to function and archive the received information;
4. Rapid deployment of the radio network.

Technique of experiments

The proposed developed radio monitoring system uses a radio channel in the civil band at a frequency of 27 MHz for transmitting information from the sensors to the central control panel, with a permissible output power of the transmitter up to 10W. The developed system is tuned to the transmitter power up to 1W, while the communication range between peripheral units and the central control panel is about one kilometer. The choice of range is due to the average size of the areas of the serviced enterprises. If necessary, it is possible to increase the power of the transmitters, which in turn will increase the communication range.

The system is designed for the fact that peripheral transmitters will be located in places where their power is possible only from batteries. Therefore, their work is configured discretely, i. e. In a certain

time interval. The interval is selected for 20 minutes, and during these 20 minutes each transmitter operates for 10 seconds. By this method economical energy consumption of batteries is achieved [5].

To increase the noise immunity of the used radio channel and to provide reliable protection against industrial interference and unauthorized access to system data, signal transmission is performed digitally. To this, analog-digital and digital-to-analog converters have been introduced into the circuitry of the receiving and transmitting devices of the system being developed.

The prototype of the developed radio monitoring system consists of four peripheral units, which are installed in the places of necessary control of the environmental parameters and the central control panel, which serves information processing. The peripheral unit consists of a radio block (transceiver) and a sensor module, which includes a sensor producing the concentration of dangerous gases [4].

A sensor, or gas analyzer, in such monitoring systems is one of the main elements. An important metrological characteristic of gas analytical instruments is the selectivity index. Selectivity of the gas analyzer is the ability of measuring instruments from the composition of a complicated gas mixture to extract and fix the sought-for component with the maximum minimization of the effect on the final result of measurement of other, unmeasurable components included in the same gas mixture. That is, the effect of the unmeasured components of the gas mixture on the result of the measurement of the sought-for component in its magnitude should be less than the specified maximum absolute error of the device. A means of measurement that satisfies this requirement is considered selective.

The transfer of thermochemical sensors from the function of detection and indication to the measurement function with observance of selectivity is a challenge in analytical instrumentation.

According to the conducted researches the technology of preparation of catalysts, providing selectivity for various ingredients, and also the technology of manufacturing the thermocatalytic sensors themselves, in which these catalysts are used, is proposed.

The principle of operation of the thermocatalytic sensor is based on measuring the concentration of the detected component from the gas mixture by the amount of heat released during the chemical reaction of catalytic oxidation. One of the methods used in the modernization of the thermocatalytic sensor to ensure its selectivity is to use its heat-sensitive elements containing catalysts having different degrees of activity to the components of the gas mixture. Sputtering of the thermosensitive elements of the experimental samples was carried out in a vacuum method with thermal magnetron evaporators, similar to the doping process described in [6; 7].

The work of the sensor, which provides the selectivity of determining CO in the presence of H₂, is as follows. The analyzed gas mixture is fed to the sensing elements of the sensor. When the analyzed gas enters the catalyst, a complete oxidation of the mixture of carbon monoxide and hydrogen takes place. As a result, the output signal of one arm, the measuring element of the bridge circuit, is proportional to the total concentration of carbon monoxide and hydrogen, and the output signal of the other arm, the compensation element, is proportional to the concentration of hydrogen. The difference in the signal of the measuring and compensating elements is proportional to the exact concentration of carbon monoxide.

The sensor, in general, is a chamber in which a bridge circuit with two arms containing a measuring and compensation element is located. The principle of operation of the thermocatalytic sensor and the way to ensure selectivity is as follows. The analyzed gas mixture diffusively or forcedly enters the reaction chamber and enters into mechanical contact with the surface of the catalysts preheated by an electric current to the oxidation temperature of the sought-for component. Catalysts, multi-layered platinum helices and have varying degrees of activity. The catalyst, fitting the compensation element, has an inert activity with respect to the measured sought-for component.

Before the measurement, in the absence of the sought-for component, the bridge is in a balanced state, the output current is zero. When a sought-for component appears on the thermo catalytic sensor, the bridge emerges from the equilibrium state due to a change in the resistance of the measuring element and a current appears in the diagonal of the bridge, in proportion to the measured concentration of the sought-for component from the gas mixture. In this way, in a thermocatalytic sensor, a selective separation of the detectable component from a mixture of gases is simultaneously performed and its content is indicated.

Each of the gases has special chemical and specific physical properties: molecular weight, density, viscosity, specific electrical conductivity and thermal conductivity, ignition temperature, etc. As the main physical parameter, to ensure selectivity, the ignition temperature of combustible gases is chosen. For example: $t(\text{H}_2) = 580\text{--}590\text{ }^\circ\text{C}$; $t(\text{CO}) = 644\text{--}658\text{ }^\circ\text{C}$; $t(\text{CH}_4) = 656\text{--}750\text{ }^\circ\text{C}$ and so on.

Setting by the temperature on the measuring element of the thermo catalytic sensor corresponding to the ignition temperature of the sought-for gas, complete burning of the sought-for component from the composition of the combustible gases is carried out.

Thus, the process of implementing selectivity occurs in two, functional stages [8]. At the first, chemical stage, takes place chemical separation of gases. This is done by selecting the activity of various catalysts intended for thermocatalytic flameless oxidation corresponding to a group of combustible gases on a thermocatalytic sensor.

And in the second stage, physical, the selectivity is provided by additional afterburning on the same sensitive element. This is due to a specially set temperature for afterburning the sought-for component. The temperature is set by selecting the appropriate size of the current flowing through the measuring elements from the stabilized power source of the secondary device.

Experimental results and discussion

The developed device differs from its analogues in several basic features. In the radio modules of the system, digital-analog and analog-to-digital converters have been added. The circuit and algorithm of the control device are designed taking into account the digital signal transmission. And also taking into account discrete interrogation of peripheral devices. The central control panel includes the battery status indication.

The sensor module is designed in such a way that it is possible to replace the sensors with any other necessary for monitoring other chemical or physical parameters. This property gives universality to the developed monitoring system.

Thermocatalytic gas analyzers, having a miniature size, have another serious and important advantage over other existing

instruments based on other methods. The above procedure for increasing the selectivity of a thermocatalytic sensor is an advantage and has shown very good practical results in laboratory tests.

The final debugging of the developed system was carried out in the laboratory, after the completion of the assembly of all blocks of the system. Experimental tests of the developed radio monitoring system were carried out in real conditions at a gas processing station.

Conclusion

The creation of remote automatic radio monitoring of the maximum permissible and explosive gas concentrations, is one of the most important tasks of safety engineering and the solution of various fire and environmental measures in many sectors of the economy.

The existing monitoring systems do not always meet the requirements of enterprises with specific conditions and regulations.

It is necessary to develop new systems that meet the requirements of enterprises and take into account the price policy in relation to the quality of the product.

The developed radio monitoring system takes into account the specific climate of Central Asia and the operating conditions for ensuring reliable, high-quality and autonomous work in the gas industry.

The upgraded thermo catalytic sensor showed positive experimental and practical results in the developed system of environmental radio monitoring. It can be used in other systems to determine the dangerous concentration of gases.

The proposed model of radio monitoring for the determination of hazardous gases has a wide range of applications in the oil and gas, chemical and other sectors of the economy, differing from the existing low cost, easy maintenance and high reliability indicators.

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Sakibaeva Saule Abdrazakovna,

Zhantasova Ulbala Sultanovna,

Orazymbetova Almira Omarova,

Issa Aziza Bakytzhankyzy,

M. Auezov South Kazakhstan state University,

Kazakhstan

E-mail: isa.aziza@mail.ru

APPLICATION OF OIL SLIME IN THE PRODUCTION OF RUBBER PRODUCTS

Abstract: In series rubber mixture on the basis of SKI-3 complete replacement of oil PN-6sh on an organic part of oil slime is made. Results of testing showed that the rubber mixes containing an organic part oil slime instead of traditional PSh-6 oil are effective that allows to expand a source of raw materials of production of rubber products.

Keywords: oil slime, organic part, rubber mixture, softener, vulcanization.

Introduction

At present in the world several approaches to solving of the problem of utilization of the oil slimes which are formed in processes of oil production and oil processing were created.

According to [1] it is known of application of the following methods (and their combinations) neutralizations and processings of oil slimes:

- combustion of oil slimes in the form of water emulsions and utilization of the marked-out heat and gases;
- dehydration or drying of oil slimes with return of oil products to production, and sewage in turnover circulation and the subsequent burial of a firm remaining balance;
- hardening of oil slimes by the special consolidating structures with subsequent use in other industries of the national economy, or burial on special grounds;
- processing of oil slimes on gas and steam and gas in oil products;
- use of oil slimes as raw materials (components of other branches of the national economy);
- physical and chemical division of oil slime (solvents, deemulgator, surfactant, etc.) on the making phases with the subsequent use.

The decisive factor defining the polluting properties of slimes and also the directions them utilization and neutralization of harmful effects on objects of the environment is the structure and physical and chemical properties.

Oil slime are represents the heavy oil residues containing on average (on weight) 10–56% of oil products, 30–85% of water, 1,3–46% of solid impurity [2; 3].

Method and results

The purpose of work is to study of oil slime influence on a complex of properties of vulkanizat on the basis of SKI-3.

Taking into account the chemical composition of the oil slime is considered more appropriate to demand and cost-effective use of waste in the production of rubber products.

As an object of research formulation batch rubber compound has been taken for the manufacture of cars rugs (Table 1).

We have made full replacement of oil PN-6sh on an organic part of oil slime in serial rubber mix on the basis of SKI-3. The dosage of an organic part of oil slime is made from 5.0 to 9.0 masses part on 100 masses parts of oil slime.

Rubber mixes were prepared by a standard technique of mixture. Test pieces were prepared according to the compoundings presented in table 1.

Table 1. – The recipes of rubber compounds for rugs car

Name of ingredients	On 100 masses parts of rubber							
	Reference rubber mix	The studied option of rubber mixes						
		1 variant	2 variant	3 variant	4 variant	5 variant	6 variant	7 variant
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
SKI-3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur technical	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Sulfenamid of "C"	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Whitewash zinc	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Acid stearin technical	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Rosin tall	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Phthalic anhydride	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Benzole acid	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

1	2	3	4	5	6	7	8	9
Wax protective	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Oil PN-6sh	9.0	–	–	–	–	–	–	–
Organic part of oil slime	–	5.0	5.5	6.5	7.0	7.5	8.0	9.0
Diafen FP	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Atsetonanil P	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Kaolin	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Carbon technical P 245	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Carbon technical P 514	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

Mixture of rubber mixes was carried out on laboratory rollers of PD 320 160/160. The general duration of mixture in all cases was identical and made 25 minutes. Optimum loading is 1 kg minimum. The order of introduction of ingredients is given in table 2.

Table 2. – An order of introduction of ingredients of rubber mixtures for rubber rugs of cars on laboratory rollers of PD 320 160/160

Name of operation	Time, min.	
	beginning of operation	end of operation
1 stage of mixing		
Loading of SKI-3 rubbers	0	3
Loading ½ parts of free-flowing ingredients (whitewash zinc, acid stearin technical, wax protective, rosin tall, atsetonanil P) and ½ parts of technical P514, P 245 carbon	3	8
Loading, ½ parts of free-flowing ingredients (phthalic anhydride, benzole acid, diafen FP, kaoline) and ½ parts of technical P514, P 245 carbon	8	12
Loading of plasticisers oil PN-6sh or organic part of oil slime, ½ parts of technical P514, P 245 carbon	12	17
Loading ½ parts of technical P 514, P 245 carbon	17	23
Removal of compound from valets	23	25
Total		25
2 stage of mixing		
Loading of a compound, heating	0	2
Loading santogard, accelerator Sulfenamid of C, sulfurs technical	2	5
Removal of a compound from valets	5	6

Difficulties when carrying out process of mixture weren't noted. An organic part of oil slime has good compatibility with SKI-3, is easily entered into rubber mix, and improves the dispersion of powdery ingredients. There are no sticking. It should be noted that distribution of ingredients in rubber at application of an organic part of oil slime quite satisfactory and doesn't demand change of the mode of rolling and curing.

For assessment of behavior of an organic part in rubber mixes and their influences on properties of vulcanizates used the following complex of methods of research:

- the method of determination of kinetics of curing on Monsanto's rheometer GOST 12535–78;
- the method of determination of hardness on Shora A GOST 263–75;

– the method of determination of elastic and strength properties in case of stretching GOST 270–75.

An important characteristic in the processing of rubber compounds is the resistance of rubber compounds to premature vulcanization, which is determined by the vulcanization characteristics, removed on the Monsanto rheometer. From these rheograms define parameters to assess the vulcanization properties of rubber compounds: Minimum (M_{min}) and maximum (M_{max}) of torque, the start of vulcanization (t_s), the torque at the optimum point of curing (M_{90}), the time to reach the optimum curing (t_{90}) [4].

Table 3 are presents data on research tendency to premature scorch investigated rubber mixtures for producing rubber rugs vehicles containing varying amounts of the organic portion of sludge, in Monsanto rheometer at 150 °C at test duration of 25 minutes.

Table 3. – Characteristics of vulcanising of rubber mixtures

The name of indicators	Rubber mix							
	Reference rubber mix	1 variant	2 variant	3 variant	4 variant	5 optimal variant	6 variant	7 variant
1	2	3	4	5	6	7	8	9
Minimum torque, N · m	10.2	10.5	10.3	10.1	10.1	10.0	10.0	10.0

1	2	3	4	5	6	7	8	9
Time of the beginning of curing, min.	5'00"	5'10"	5'10"	5'10"	5'10"	5'05"	5'05"	5'00"
The moment in an optimum of curing of M3, N · m	32.5	33.4	33.4	33.5	32.5	32.5	31.6	31.5
Time of achievement of optimum extent of curing, minutes	18'	18'10"	18'10"	18'00"	17'50"	17'40"	17'45"	17'45"
Maximum torque, N · m	35	36	36	36	35	35	34	34
Time of achievement of the maximum extent of curing τ_p , minutes	20'	20'	20'	20'	20'	20'	20'	20'

From the analysis of calculation data the vulcanization characteristics of rubber mixes it has been established that in the presence of an organic part of oil slime for the same time of test more cross links are formed. Time of achievement of 90% of extent of curing of the rubber mixes containing an organic part of oil slime increases, curing speed at the same time remains at the previous level. Optimum time of achievement of curing of rubber mix for production of rugs for cars was reduced from 18 minutes to 17 minutes 40 seconds in comparison with reference that is confirmation of positive influence of an organic part of oil slime on vulcanization properties of rubber mixes. It allows increasing performance of a

production process rubber of technical products due to reducing time of curing of finished goods.

With increase in maintenance of an organic part of oil slime, decrease in the maximum torque is observed, that is explained by the plasticizing properties of an organic part of oil slime, and thus, the developed rubber mixes are more technological [5]. Lack of reversion for all studied rubber mixes is also established.

Organic part of the oil slime has an impact not only on the kinetics of vulcanization of rubber mix, but also on physical and mechanical properties of rubber by changing the crosslink density of the vulcanizate and sulfide crosslinks [4].

Table 4. – Physical and mechanical properties of vulcanizates for rugs cars

The name of indicators	100 wt. parts of rubber							
	model	5.0	5.5	6.5	7.0	7.5	8.0	9.0
Conditional tensile strength, MPa, not less	7.5	7.5	7.0	7.5	7.7	7.8	8.0	8.5
Relative elongation at rupture, %, not less	300	270	252	280	300	300	310	320
Shore hardness, conditional unit	60	62	62	61	58	60	60	59

Discussion

Analyzing the physical and mechanical characteristics of rubbers presented in table 4 it is possible to note that additive influence most is considerably shown at a dosage 7.5–9.0 mass parts of an organic part of oil slime. Indicators meet standards of control. An organic part of oil slime exerts the strongest impact on indicators of values of relative lengthening at a gap which increases from 270% up to 320%. This effect is shown on rubber samples irrespective of curing

time. At slime dosage 7.5 wt.p the conditional durability of rubber significantly increases from 7.5 up to 8.5 MPas. Hardness indicators on Shore are identical with values of indicators of reference option.

Thus, the results of the above-described extended tests show that the rubber mixtures containing organic slime instead of the traditional oil PS-6 is effective and allows expanding the raw material base of production of rubber products.

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Utemuratov Makhset Maratovich,

Master of sciences

Scientific Research Institute of Irrigation and Water Problems

Senior Research Fellow

E-mail: max200779@mail.ru

CORROSION OF PRESSURE PIPELINES AND CONCRETE STRUCTURES OF LARGE PUMPING STATIONS IN UZBEKISTAN

Abstract: for the needs of irrigation and maintenance of land reclamation, according to the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan (MAWR), 8,940 pumping stations are operated, including 24 large ones with a total water consumption of 6.4 billion m³. The most important strategically important facilities for the Republic are the Amu-Zang, Amu-Bukhara and Karshi cascades of pumping stations that provide almost all irrigated farming and the population of the Surkhandarya, Kashkadarya, Bukhara and Navoi regions with water. Along with this, the Amu-Bukhara and Karshi machine channels provide water to the Bukhara oil refinery, Shurtan, Mubarek and other oil-gas chemical complexes, as well as Talimardjan power plant with a capacity of 3200 thousand kW. The largest of them — the Karshi cascade of pumping stations raises the Amudarya water to a height of 132 m.

Keywords: maintenance and operation, pumping station, pressure pipelines, irrigation canal, machine irrigation, water intake, suspended sediments, transportation, reservoir, cleaning, upstream, downstream, concrete, metal and concrete construction, chemical processes, microorganisms, corrosion, pumping units, substance, pumping units.

At present, 4268.1 thousand hectares of land are irrigated in the republic, including 1533 thousand hectares (38.3% of the total area) – machine irrigation. The cost of electricity with a machine water lift for irrigation of more than 1.5 million hectares is 7.5–8 billion kW. H per year.

On the balance of the MAWR there are more than 1,580 inter-farm pumping stations with a total installed capacity of 3,355,000 kW, and the annual volume of water supply is about 50 km³.

Of the total number of pumping stations 76 pcs. – unique (supply more than 100 m³/s) and large, 496 pcs. – medium (feed 1–10 m³/s) and 561 pcs. – small (supply less than 1,0 m³/s). A significant part of the pumping stations is functioning in conditions when the suspended water contains from 2 to 20 kg/m³ of suspended sediment in the pumped water. In this case, a particularly difficult situation has arisen with engine water supply in the presence of a large number of sediments in the basins of the Amudarya and Zarafshan rivers. In the design of pumping stations in conditions of rising water with a high content of sediments, special settling tanks were provided, but most of them, due to poor operation and design flaws, either did not work at all, or by now do not fulfill their functional purposes. In particular, during the construction of the Karshi cascade of pumping stations, the construction of a special river hydroelectric complex at the Kyzyl-ayak section of the river was planned. Amudarya, and on the right bank of the river a reservoir for reliable supply of water to the pumping units of the first rise of the reservoir. The latter, providing the necessary horizons for the non-cavitation operation of the pumping units of the first rise of the Karshi cascade, was to retain the bulk of the suspended sediments. Nevertheless, the Kyzyl-ayak hydroelectric complex and reservoir on the right bank of the Amudarya River were not built, and the supply channel to the first pumping station remained tied to a temporary, in-situ water intake from the river. The Amudarya River, in its average flow, in particular in the Kyzly-ayak line, flows in an unstable course.

The riverbed wanders, and in most cases, moving away from the left bank, where the water intake is located in the Karshi Machine Canal, rectification work is carried out to create normal water intake conditions. Hydro mechanical method of cleaning the feeding channel contributes to the disturbance, the eroded sandy part of its profile, which causes the flow of water into the machine channel with more than a natural turbidity. All this prevents the normal operation of the entire complex of pumping station facilities. Experience in the operation of irrigation pumping stations, especially in the basins of the river. Amudarya and Zarafshan, shows that because of the large amount of suspended sediments in the water, the functioning of the vestibule, the water intake, is complicated, and in places where there are narrowing or expansion of pipes, turns, junction or distribution nodes, and others. Elements, there are local resistance. Their presence in the pressure pipelines of pumping stations determines the accumulation, and in the future — the formation of serious obstacles to the movement of water. The presence of suspended sediment significantly affects the operation mode of the pumping units, reducing the efficiency, increasing the energy costs of water lifting and the most significant contributing to the danger of corrosion destruction of pressure water conduits due to the deposition of solid materials of mechanical and organic origin in the inner part of pipes.

The urgency of this research is due, first of all, to a sharp increase in energy prices, the cost of pumps and power equipment, an increase in the specific energy costs for water lifting, a decrease in the reliability of operation of the complex of pumping station facilities, and the growing scarcity of water resources to meet the needs of the Uzbek economy.

Introduction

Experience in the operation of irrigation pumping stations, especially in the basins of the rivers Amudarya and Zarafshan, shows that because of the large amount of suspended sediment in the water, the functioning of the vestibule, the water intake, is complicated,

and in places where there are narrowing or expansion of pipes, turns, junctions or distributions and other elements, its appears local resistance. Their presence in the pressure pipelines of pumping stations determines the accumulation, and in the future — the formation of serious obstacles to the movement of water. The presence of suspended sediment significantly affects the operation mode of the pumping units, reducing the efficiency, increasing the energy costs of water lifting and the most significant contributing to the danger of corrosion destruction of pressure water conduits due to the deposition of solid materials of mechanical and organic origin in the inner part of pipes.

1. Measurements of the thickness of the shell of pressure pipelines

Investigations of the motion of suspended particles have shown that there are no abrasive materials in the solid components of the water flow, as sand material with a diameter of more than 0.01 mm settles in the pumping station's outposts. Therefore, continuous wear of the entire internal surface of the steel pipeline is not observed.

Systematic supervision of the wear of the pipeline sheath is necessary to obtain data that provides:

- checking the static strength of pipelines, as a beam structure;
- checking the stability of pipelines, which determines the ability of the shell to withstand the external (vacuum) and internal pressure of the pumped water;
- analysis of the wear dynamics of the shell material in time, along the cross-section and along the pipeline route to localize the work to protect the inner surface of the shell from corrosion-abrasive wear.

The measurements are made in the characteristic (beginning, middle and end of each section of the pipeline between adjacent intermediate supports) and fixed sections of the pipeline of the Sherabad pump station in the Surkhandarya region.

On the pressure pipelines, 52 control sections were assigned, the layout of the sections was agreed with the department of pumping stations "Uzgirpovodkhoz".

The measurements were carried out according to a standard procedure with an ultrasonic thickness gauge of the UT-93 P brand with the following main characteristics:

- measuring range – 0.6 ... 300 mm;
- Discreteness of the digital reading device – 0.1 mm;
- limit of the allowed value of the basic error

In the working range – 0.1 mm.

Analysis of the measurements showed that the thickness of the pipeline shell is distributed relatively evenly along the length and perimeter, where the minimum thickness was 9.4 mm and the maximum thickness was 9.8 mm.

In general, taking into account that the device gives a certain measurement error, it can be concluded that at first the operation of the station for the period from 1966 till 2006. The thickness of the shell of the pipeline has undergone insignificant changes, and according to the measurements the wear averaged from 0.2 to 0.5 mm.

2. Corrosion of metal pressure pipelines

A significant danger to the operability and safety of the pumping station is the considerable wear of the pressure pipelines. In the study of all the above pumping stations, it was found that the most

common type of pipeline damage is the formation of fistulas and tears due to fatigue failure when the wear of the pipeline wall and vibration are combined. In conditions of pumping over river water of increased turbidity, the main type of wear of pressure pipelines is the corrosive wear of the inner surface of the wall of the pressure pipeline. In addition, as studies at the pumping stations Babatag, Amu-Zang-2 have shown, an important role in the wear of pressure pipelines is played by the usual and focal biological corrosion of the metal. Calculations made from the measurements of the residual thickness of the walls of pressure pipelines show that at an average wear rate of 0.08–0.15 mm per year, the wear rate of the wall of pressure pipelines is 45–55%. On the perimeter of the section wear is distributed unevenly, significant wear values fall on the lower part of the pipeline.

Static and hydrodynamic calculation of the stability of the pressure pipeline from the action of internal and external loads shows that at some pumping stations pressure pipelines are operated in conditions close to critical. In view of the constant reduction in the thickness of the wall of the pressure pipeline during its continuous operation, it becomes necessary to check this pipeline for strength against the loads perceived by it, taking into account the residual wall thickness of the pressure pipeline. Loads occurring in the pressure pipeline can be divided into: annular stresses, axial longitudinal stresses and stresses arising from negative pressure. They arise, mainly, from the static head during the operation of the pump unit. Investigations of the sediment transport regime in pressure pipelines have shown that excessive wear of individual sections of the pipeline is caused not only by the mechanical action of the flow of solid particles. The formation of cracks in pressure pipelines, uneven wear of the pipeline led to the need to study, among other things, the causes of corrosion of the pipeline. For this purpose, special investigations were carried out to detect corrosive and stress corrosion damage in pipelines of the pump station.

The object of the research was samples of mud, sand, rust and water, taken from separate sections of the pipeline, suction pipe and settler. As a control, water supplied to the station from the supply channel served. The microbiological analysis was carried out according to the generally accepted classical methods of investigation. The work used nutrient media to identify physiologically active groups of microorganisms involved in the corrosion process:

1. Fish hydrolyzate for saprophytic forms of microorganisms;
2. Glucose-mineral medium for the detection of acid-forming microorganisms;
3. Giltay medium for detection of denitrifying bacteria;
4. The environment of Vinogradsky for nitrifying bacteria;
5. Czapek's environment for mycelial fungi;
6. 9K medium for iron-oxidizing bacteria;
7. Medium for sulfate-reducing bacteria.

The pH of the liquid samples was 6.8–7.2, the humidity of the solid samples was 10–20%, the chloride content was up to 60 mg per 100 g of sand.

The averaged number of different physiological groups of microorganisms isolated from selected samples of samples on the investigated media are presented in Tables 1 and 2. The data of the tables show that in the overwhelming majority of the samples,

microorganisms of all these groups were detected. The most common are acid-forming, denitrifying and nitrifying bacteria. Their number varied from 102 cells/ml to 105/ml in liquid samples, and in solid samples from 103 cells/g to 106 cells/g. It should be noted

that in water samples taken from the suction branch of pumping units, pressure pipeline and settler, the number of microorganisms ranged from 102 to 105 cells/ml, while iron-oxidizing and sulfate-reducing bacteria were not detected.

Table 1. – The averaged number of physiological groups of microorganisms in the waters of the pump station, cl/ml

No. of samples	Place of selection	Iron-Oxide	Sulphate Reducing	Denitrifying	Nitrifying	Acid-forming	Saprophytes	Mineral-Mushrooms
1	2	3	4	5	6	7	8	9
9	Entering water to the pump station	–	–	$2,0 \times 10^3$	$2,5 \times 10^2$	$2,0 \times 10^3$	$5,2 \times 10^5$	$2,0 \times 10^1$
4	Water from suction nozzle	–	–	$2,5 \times 10^5$	$2,5 \times 10^2$	$5,3 \times 10^5$	$5,2 \times 10^5$	1×10^3
2	Water from the pipeline No.7	–	–	$6,0 \times 10^4$	–	$3,5 \times 10^4$	$5,6 \times 10^5$	2×10^2
3	Water from the sump	–	–	5×10^3	$2,5 \times 10^3$	$3,0 \times 10^5$	$8,4 \times 10^6$	5×10^3

Table 2. – The averaged number of physiological groups of microorganisms in silt, sand, rust and other solid samples

No. of samples	Place of selection	Iron-Oxide	Sulphate Reducing	Denitrifying	Nitrifying	Acid-forming	Saprophytes	Mineral-Mushrooms
1	2	3	4	5	6	7	8	9
4	Sand from the suction pipe	–	–	$2,5 \times 10^4$	$2,5 \times 10^4$	$4,0 \times 10^3$	$4,8 \times 10^6$	$3,5 \times 10^2$
7	Sand from the pressure pipe	$2,5 \times 10^1$	$0,6 \times 10^1$	$2,5 \times 10^6$		$7,0 \times 10^4$	$9,0 \times 10^6$	$4,0 \times 10^3$
6	Silt from the compensator of the pipeline no.8	$2,5 \times 10^1$	$2,5 \times 10^3$	$2,5 \times 10^6$	$2,5 \times 10^6$	$7,0 \times 10^4$	$9,0 \times 10^6$	$5,0 \times 10^3$
5	Rust precipitate from the suction nozzle	–	–	$2,5 \times 10^4$	$4,0 \times 10^4$	$4,0 \times 10^5$	$4,8 \times 10^6$	$1,0 \times 10^3$
8	Rust precipitate from the pipeline no.6	$2,5 \times 10^1$	$0,6 \times 10^1$	$2,5 \times 10^6$	–	$5,4 \times 10^5$	$7,0 \times 10^6$	$2,2 \times 10^2$

The total number of saprophytes was 105 ... 106 cells/ml, and the acid-forming bacteria – 102 ... 103 cells/ml in water samples and 104 ... 105 cells/g in solid samples, which indicates the presence of microbial corrosion in the investigated objects.

The presented data reflect the integral activity in the studied groups of microorganisms and can, in our opinion, serve as the main criterion for the potential hazard stress of corrosion damage to pressure pipelines of pumping stations.

Thus, preliminary studies indicate the development of corrosive processes, which can lead to the propagation of corrosive foci of destruction of pressure pipelines.

3. Corrosion of metal pressure pipelines

The question of the harmful impact on the concrete of hydraulic engineering structures of river, sea, ground, artesian, polluted subsoil, sewer, factory, and waste and swamp waters has not been studied sufficiently. From the above categories, uncontaminated river water has the least harmful effect on concrete structures. Groundwater, artesian and other groundwater, which in most cases contains relatively little harmful chemicals, can also be considered more or less

safe, with the exception of some mineral and thermo mineral springs. Marine and salt lake water, containing a relatively large amount of sulfuric acid and other compounds, are the most dangerous with respect to the destruction of concrete.

The noted adverse conditions are also largely encountered in contaminated sewage containing, as well as swamp waters, a large number of decomposition products of organic substances.

All the phenomena of damage and destruction of concrete flow almost exclusively in the wet state of concrete, and moreover from the direct permanent aggressive action of such liquids and gases that contain in considerable quantities mainly sulfuric, partly chlorine and nitrogen compounds, organic acids and free carbon dioxide.

Table No.3 gives the maximum standards for the content in waters of different categories of those principal substances whose excess content causes a destructive effect on concrete. Grasping or freshly hardened, as well as lean and cast concrete, especially porous, are much easier to cope with the destructive effects of the above chemicals than dense, tamped and little water-permeable concrete.

Table 3. – Permissible content of hazardous chemicals in water

No.	Most dangerous Chemicals	Content in mg for 1 liter of water
1	Sulfur (SO ₃)	Up to 100
2	Chloride (MgCl ₂)	20–30
3	Free carbon dioxide (CO ₂)	10–15
4	Organic matters (Total oxidation)	10–12
5	Nitrogen (N ₂ O ₂)	50

In fresh water, the fresh exchange of these substances enhances the processes of leaching and destruction of concrete. It should be specially noted that the significant fact that the question of the safety of concrete structures subject to the action of water should not be viewed from the point of view of only the aggressive influence of one or another substance, but in dependence on the aggregate qualitative and quantitative action of all those factors that can cause weakening and even gradual destruction of concrete. Such processes sometimes cause such a significant decrease in concrete resistance in the critical parts of the structure that a catastrophe with them becomes inevitable. Most of the studies and observations on the state of hydraulic structures show that the strong destruction of concrete foundations and walls is due to the content of sulfuric acid salts (up to 140 mg per liter) in soil and river water penetrating into porous concrete and forming calcium sulphoaluminate. This cement bacillus in turn tears the inside of the porous concrete, due to its swelling (32 times) in the water.

The conducted inspections of the hydro technical structures of the Sherabad pump station, in particular, the station buildings, showed that the concrete masonry and the foundation of the pumping station building are exposed to chemically aggressive influences, which threaten the strength and stability of the structures. And that the choice of these or other measures can be made only after a detailed study of the chemical processes that took place in the concrete.

Carefully conducted studies of damaged concrete showed that the bulk of the destroyed concrete (78%) consists of calcium carbonate and magnesium; A small amount of gypsum shows that the destruction of concrete was not caused by sulfuric sodium salt. The formation of nests and the erosion of concrete cannot be explained by the leaching of lime and magnesia from it.

This could only happen if the carbon dioxide is aggressively attacked by carbonates and the carbon dioxide lime that is soluble in water is produced. Groundwater analyzes showed a carbon dioxide content of 8.14 mg/l.

The destruction of concrete could not be explained by the impact of carbon dioxide contained in groundwater. The state of the concrete made it necessary to search for the cause of its destruction by calcium sulphoaluminate, the so-called «cement bacillus», which crystallizes into a compound with water ($3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{CaSO}_4 + 3\text{OH}_2\text{O}$) and increases its volume by 32 times. This assumption was confirmed by chemical analyzes showing a high content of sulfuric anhydride in the concrete in the range from 1.9 to 5.9% to the cement content, while the maximum allowable content of sulfuric anhydride for Portland cement should not exceed 2.5%. The content

of sulfuric anhydride was greatest at the bottom of the basement and decreased to the top.

Groundwater analyzes showed a significant content of both table salt and magnesium chloride and gypsum, as can be seen from Table No. 4.

Table 4. – Results of water analysis

No.	Name of chemical substances	Groundwater	
		Test No. 1	Test No. 2
1	Common salt, mg/l	317	227
2	Sulfuric anhydride	70	102
3	Lime	99	81
4	Magnesium	34	26

The revealed causes of destruction of concrete, as well as the proposed measures to combat the destructive effect on concrete carbon dioxide and sulfur dioxide, showed that the most reliable means in this case is to increase the water tightness and density of concrete, which can be achieved by increasing the amount of cement and the appropriate selection of the particle size distribution Inert materials.

It should be noted that in addition to the phenomenon of corrosion of concrete in many hydraulic structures, corrosion of reinforcement, which is part of reinforced concrete structures, is noted.

In accordance with the basic principles of fracture mechanics, the products have initial defects, which continue to develop during the operation when various loads are applied to them. The experience of operation of large pumping stations shows that different types of corrosive factors act on reinforced concrete structures simultaneously with power loads. Corrosion of reinforcement in concrete occurs due to the penetration of filtration water through the pores and cracks formed in the concrete. The following basic types should be considered among the corrosive factors:

- Aggressive action of groundwater and filtration water;
- Constant exposure to electric current.

All these factors lead to a significant decrease in their strength properties and to the violation of hydraulic structures. At many pumping stations on the back side of the building, the water accumulates at the basement, which comes as a result of leakage of pressure pipelines. So, as a result of the research carried out on the «Sherabad» and «Amu-Zang-2» pumping stations, the above-mentioned processes in the form of corrosion of concrete and reinforcement are clearly manifested. The most typical destruction of hydraulic structures, which occurs during the corrosion of reinforcement in concrete, is a gradual decrease in its working section due to the transition of the outer layers of metal into corrosion products. There are different types of corrosion of metal:

- Uniform throughout the surface for a certain length of the reinforcement.
- Acute local, in the form of ulcerative lesions.

The conducted surveys of hydraulic structures, in particular, at the pumping stations «Amu-Zang-2» and «Sherabad» have shown that the most common defects are the destruction of the protective layer with exposure of the reinforcement, corrosion of the reinforcement

ment and corrosion of concrete, mainly in the form of stains and smudges Lime leaching.

The studies carried out above have mainly revealed the cause of excessive wear and destruction of metal and concrete structures of pumping stations. It should be noted that the process of manifestation of biological corrosion at pumping stations, primarily due to the presence of water with suspended sediments, which are the focus of microbiological processes. At present, studies of the temperature regime on the activation of biological organisms that cause corrosion of the metal are conducted.

In science, methods for preventing and methods of protecting pressure water lines from biological corrosion are known. The methods of prevention include the choice of a scheme for constructing pressure pipelines and the creation of favorable hydraulic conditions for sediment transport, as well as coating the metal surface with anticorrosion. To protect the structure from corro-

sion, first of all, it is necessary to determine the type of iron-eating bacteria, and then to choose the means of protecting the surface of structures.

Conclusion

1. As a result of field studies and laboratory experiments in which leading scientists of the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan took part, it was established that the destruction of metal shells of pressure pipes is due to corrosive processes.

2. Corrosion processes mainly take place at the places of sedimentation and adherence of sediments whose particle diameter is less than 0.01 mm. In this case, focal accumulations of solid materials occur in places where the formation of local hydraulic resistances.

3. The presence of sediments, materials of biological origin leads to the development of corrosive processes in other structures, in particular, on reinforced concrete structures of pumping stations.

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Section 8. Philology and linguistics

Msc. Misiri Laureta,
Phd., candidate,
"Aleksandër Xhuvani" University, Elbasan, Albania
Qendra e Studimeve Albanologjike, Albania
E-mail: misiril@yahoo.com

Shkrepa Xhilda,
University "Aleksandër Xhuvani" Elbasan, Albania,
The Faculty of Italian Language
E-mail: anjaxhilda@hotmail.com

ZEF ZORBA, THE HERMETIC ALBANIAN POET

Abstract: Analyzing the poetry of Zorba it is a difficult challenge to carry out, not only for the fact that there is a volume of nearly seventy of poetries, but of an European poet, gathering a conglomerate of motifs, techniques, unique verses like those of the Italian poet of the first half of twenty century, Giuseppe Ungaretti. There is a great interest of his poetry, either by critics, such as: Sabri Hamiti, Stefan Çapaliku, Ali Aliu, Leka Ndoja, Eldon Gjika, or by readers themselves even though the "discovery" of Zef Zorba poetry, was published only after his death. One unique feature of his verses, besides being hermetic, is that of a musically optimistic, causing a rhythm of positivity feelings much more than a simple melody of words. Moreover Zorba introduced into Albanian language the philosophies such as Immanuel Kant, B. Croce, H.Xh. Gadamer, even though yet unpublished.

Keywords: Zef Zorba, hermetic verses, Albanian poet, poetry, Hermeticism ...

Introduction The whole literary work of Zef Zorba constitutes a galaxy in the universe of literature, which is already perceived with surprise by the critics after the publication of the full volume of his poetry [7]. Albanian readers of poetry are now fairly astonished, either by essential meaning verses, or because of nearly thirty-five year-time standing preserved in the manuscript. The poet was afraid of publishing, for the consequences that would bring such publication during Enver Hoxha's dictate, to his family and his relatives.

Zef Zorba is undoubtedly one of the greatest poets of the Albanian letters of the second half of the twentieth century, though isolated, with his work, he shows the wonder that faces the reader while reading, thinking of his poetry which paved with his own way of expressing verses, a bright era, that of Albanian Hermeticism in poetry [5, 64]. Moreover he paid a special, attention to dramaturgy, which was his dream to perform on stage, but because of the dictatorship he couldn't publish his verses, translations, or two his own librettos.

The volume of poetry written by Zef Zorba, it is studied by Sabri Hamiti, [4, 516] a critic, who classifies Zef Zorba "a modern alternative" in one of his books "Albanian poetry", by Ismail Kadare, the most known Albanian writer in the world, who wrote the introduction in the volume of poetry "Frozen lips in smiling" [7; 1], even by the writer Dritëro Agolli who read one of Zorba librettos at the time of the dictatorship when he was chairman of the Union of the Albanian Writers. Moreover Nehas Sopaj made his article for hermeticism in

filologic Magazine, "Anthology of pure verses", or Stefan Çapaliku who published the volume of poetry, above mentioned.

Superlative estimates come to us argued by the contemporaries of the poet, who attach scientific thought to the real fact of life. There are quite interesting the deep commentaries on Zef Zorba for two lyrical poetries, by Ali Aliu in his anthology of modern poetry individualities "How to read poetry", who takes in consideration these verses as a new format that is closer to the individual, nature and crisis of its identity and sensitivity. More over these verses are a starter of a tendency of literature that is essentially being incomprehensible, which takes time to be able to penetrate in depth giving the superior quality of his poems which are an active communication, coated with the veil of mystery, until his incomprehensible essence for a recipient, not just to have culture but deeply profound intuition, the feeling to feel the poetry as deeply as he can.

Zef Zorba, and Italian Hermeticism: A rush of free thought through the verses can be evaluated extensive connections opinion of Zorba with classic Italian and European culture. Referring to the life circumstances of his life and significantly impact on Western civilization, especially to one of its founders Ungaretti, who not only was dominant for Zorba's work, but also because it is the stimulus that intrigued to depth his verses.

Despite being dictated by hermetic Italian poets, its poems themselves affirm the essentiality method causing feelings and emotions, or unifies every artistic use of complex tools and even of

rhymes, becoming the poet of his freedom of the individuality to live his time through poetry.

A special influence in the poetry of Zef Zorba was that of Albanian well known, painter Kol Idromeno that inspired his poetry, not only the motives, the technique followed but even attempt full success to achieve oneness with the music, through inherent rhythm because it affirms and the poet himself more than a mere poet, *a musician of the poetry*. It is quite in the fourth and fifth cycles of poetries which are dedicated all his memories associated with the appropriate rhythm indicated by the title of the poetries which show the kind of instrument such as: *bassoon, xylophone, percussion instruments etc...*

Zef Zorba read the poetry of Ungaretti, and the tendency of Italian poetry in those verses caused the impact that it had in particular to Zorba's phenomenon in poetry, and we may classify it as an ontological poetry that semantically itself should hold the concern of the people, unfolding this concern primarily about the fate of people who fatally suffered the sentences, the fate of relatives showing care to keep secret his love for art of drama and poetry, without publishing it during all his life. Also, it is worthy to emphasize that poetry can really be a hermetic one, as well as a direct poetry, provided that they both express and cause immediate feelings themselves, regardless of the techniques used.

The critics of Ibrahim Rugova [6], in his book on semantic analysis of some modern Albanian poetry titled "Strategy of meaning". Sabri Hamiti classifies Zef Zorba's poetry of as *a modern tendency*, and more over he analyzes some poems of Zef Zorba as a curious admirer of his verses.

The hermetic poetry is a synthetic one, standing between a reflex-meditation lyric and narrative poetry, displaying a balanced relationship between reason and emotion, clarity and mystery of conception both in form, and essence articulating overall structure, rounded, poetry where the core is the meaning, concentrated into the center, with the idea of supporting in separate, independent reflexes.

Poetry, in principle comes out as an internal necessity of voice-synthesis between idea and sentiment. This idea and the image subject filters the laboratory artistic of the poet, who was able to keep focused, "*stuck*", living as in the conception of inspiration to the articulation of the full-text of poetry, then poetry, claims to universalism in time and space even though the "discovery" of Zef Zorba poetry, or phenomenon, one of the rare special poetry published only after his death.

The problem of *pure* poetry of Albanian phenomenon, however difficult, or change the style of writing, which affects not only the Albanian literature, but also to Balkan literature.

Analysis of Zorba's hermetic verses: Zorba's hermetic verses are philosophical, deep, fully of sad emotions of a difficult life. There are numerous motives in his volume, since in the very introductory verses:

In the place of introduction

Dark this path. I can't

The road to find the light

Yours. (What hurts me?)

On the very edge of ...

Luring, making feel still,

Aren't you watching that I am shaking?

As it is perceivable, more than any other text, above it is expressed unconsciousness, that's the why large emotions shake human spirit more, when the human soul of a poet conveys images of dark or absurd in relation to his life.

In the case of Zef Zorba it would be unfair that his poetry to be seen only in the context, as the spokesman of a pessimism even though seeming not very clear and very motivated for the joy of the moments living. If this chaos is only pain to his faith in verses expressed deep down in the first cycle of his poems, in subsequent cycles it does not sound as such in the following verses. This miracle is performed in verses that embodies feelings and optimistic thoughts about the future, such as: the key word "*light*" as *precede* in his creativity with confidence that *the good* whenever wins, throws poetry Zorba from the mists of pessimism in the light of the strong optimism. It seems like life and poetry for the poet gets a real sense, if it finds the space, expanding horizons and look beyond poetical borders, watches and spiritual resistance of Albanians wherever they are with a sincerity of thinking. Fatalistic idea about the fragility of what is joyful, beautiful, innocent, is poured into a simplicity suggestive verses with a fine lyricism.

His poems recreate the image of a world that sleeps in the conscience of humankind, but that needs to be awakened to awareness to reassess universal pain, a world in which human virtues are desecrated values of spiritual rape, which shares the feelings when the first thing to consider is the existence itself.

Zef Zorba did not imitate in Hermeticism, or Italian, hermetic poets, he was inspired by it in a creative way so deeply as to say that somehow resurrected in a new form, so paradoxically he reached what many other poets didn't, or couldn't.

"*Ballad of lights for Lali (a nick name for his daughter)*" is the latest creation of the poetic volume of poetic Zef Zorba, which is the code of his ballads which incorporate the various elements of his life. Zef's little girl, Luçia, at age seven was diagnosed with hipermetriopia, and at age twelve suffering from a rare and serious disease of which may lose the sight. Perhaps this is the starting point that the key word means *light*, eye perception, as the first meeting with reality, all the good things that can be perceived and recalled are thanks to this direct communication with nature, and a terrible nightmare that his daughter would lose her sight.

Zorba was one of the band members of that time, playing saxophone in the high school, and knew very well the musical instruments, so he wrote the cycle entitled "*Roads impressions*" as he included all the sensations created by all the instruments in the line for an original classical concert.

Another noble feature belonging to the poet is that he speaks for all of the vital truths of the life he loves best, his own world, his family, wife, daughters, nature, but sadly to bitterness of the fate of Albanian human souls who could not resist to dictatorship. He, in solitude and loneliness, was taught to live in harshly inevitable conditions avoiding the evil which influences to his friends, to his life itself. His life, even though was obscured by the regime circled around with the sad story, with purgatory fires without cause "half human totalitarian", mourns for the dead athlete, for the child, for the old man, inside his spirit, led the beauty of memories, appeared as light on his consciousness.

His knowledge, judgment, and talent it was better than personal kindness, wisdom and universal love matches even this clearly and to poetry "*Shkalla e Kakarriqit*"-meaning a very deep place in border where can be excaped, talking to "*a wild goat*" which symbolizes temptation towards freedom fleeing westward. He was spiritually free living in harmony with himself with a willingness to admirable with his family and his freedom was poetry because freedom for art, theater was denied by another nomenclature.

Moreover than only poetry Zef Zorba proved a fervent love for Tomas Elliot that lasted a whole lifetime. Elliot was fully translated from Zorba, even Zorba translated a part of the aesthetics of Benedetto Croce.

Conclusion

The poet, being a modern representation of literature that still flourish, even though in isolation from the west, was secret, as long as she could harm him and his family from the totalitarian system. After 1994, when his work fell into the hands of readers it took its rightful place as one of the founders of modern poetry and, moreover, a poet who raises Albanian poetry at the European standards.

In his creations he's restrained, subtle things rarely mentioned, as expressed in his verses. In deep silence of this half-century, Zorba, equipped with a wonderful culture of intellectual drew real figure, away compromises, having and translated poets a strange affinity with modern literature and philosophy such as R. Frost, J. Ungaretti, S. Kuazimodo, E. Montale, T. S. Eliot, playwrights like Shaw, Pirandello, Martin, philosophers like B. Croce, H. G. Gadamer etc...

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Msc. Misiri Laureta,
"Aleksandër Xhuvani" University, Elbasan, Albania
Phd candidate,
Qendra e Studimeve Albanologjike,
Albania
E-mail: misiril@yahoo.com
Etrit Misiri,
High School Teacher
University of Elbasan, Albania,
History, Geography, "Miranda Baku" Gostima,
E-mail: etriti@live.com

DHIMITËR XHUVANI, THE WRITER OF TWO PERIODS OF ALBANIAN LITERATURE

Abstract: Dhimitër Xhuvani, Albanian novelist who wrote for a long period of time (1959–2007) challenged his ancestors as a writer emancipating himself, at the same time his characters. The paper aims to provide a critical awareness of Dh.Xhuvani's style, reality, originality of his prose.

Keywords: Dh.Xhuvani, critics, novels, socialist realism, generation of novelists, reception of readers etc ...

Introduction: Nowadays, the novel is read more in comparison with other literary genres, as the most favorite spiritual *catharsis* of our readers. The creation of the *reading world* that Albanian novel offers, is in fact the pillar towards reader emancipation in general. The novel as a long genre is an unlimited form of the *inner world* of the individual and the society in time and space, and in the examples of the Albanian novels, are manifested the most relevant features that characterise the Albanian spirit. Generally Albanian novels broaden the horizon of action and thinking, or that of the monological novel of action, in defining its structure, integrates more actions, events, in contrast to the monological novel of thought that in its essence preserves thought, resonance, empirical reflection as an inner concern.

The novels of *Dhimitër Xhuvani* conclude an area of concern in modern times. It comes as a necessity because of the complexity of the topics, as published in the early years of the system of socialist realism. It should be noted that the canon of revolutionary optimism of socialist realism method and its effects are reflected in two Dh. Xhuvani's literary creative periods.

This study aims to deepen a critical multi-dimensional analysis to the prose, which with its diversity receptor manages to emancipate the philosophy of time as the internal time and space based chronologically, and theoretically treated the problematic in today's world. Changes in system conditions Albanian literary, creative personality of Dh. Xhuvani between two generations 1960's generation and the generation of the 1970's [challenged, that he had received the shadow of the ancestors] is the overview of a writer as challenging time in which was emancipated.

The one who confesses, that is, the storyteller in the author's name, wants to convince the reader to the degree of truth that is not possible without being convinced by himself. Even in terms of dictatorship, he has lived with the truth, and sometimes has expressed it, the privilege of surviving through works with environments and characters, with powerful texts and charts, does not lack philosophy,

but simply emphasize exactly where he was a master in creating realistic characters and their environment and typical as an emotional writer; Participant, uncovered, to the deepest experiences as well as the slightest feelings of the characters.

Novels of Dhimitër Xhuvani are dramatized and screened. Beautiful, nerve-like and solid color that captures the reader, a tragic and tangible reality, shocking stories, stories of pains and pains that are experienced with emotions. The erudite reader does not find it difficult to remove parallels between the reality that describes the work and actuality. Even in our time of computer and cybernetics, his numerous novels such as "*I don't sell my soul*" create the impression that it is the origin and continuation of the tragedy of Albanian life against which the writer, with his humanity, raises claims against any violence and arbitrariness.

But in the antithesis of this, the writer's relation with the work was quite different from the relationship with the dictatorship, sometimes frightened of how the *Party* would expect it, even with extreme thought to "*put it in the stove*" (to burn it). So it is a great initiative for writers and artists to go and write in the big industrial centers, such as the Fierza hydroelectric power station, the Elbasan metallurgical, etc.

Without this active acquaintance of the worker's world in these great objects, which are the main front of the material and spiritual transformations of our society, thematic spontaneity, determined not by personal desire or by what is called freedom of creation. There are numerous novels such as: "*The latest Bell*" 1959 "*Between two nights*" (1962), "*The tunnel*" (1966), "*Fan Smajli*" (1971), "*The naked woman*" (1971), "*Selected tales*" (1975), "*White Path*" (1976), "*Awakening of Nebi Surreli*" (1976), "*We will live differently*" (1979), "*The death of Mr. Kaloti*" (1981), "*My world*" (1984), "*I don't sell my Soul*", (1988), "*The woman of tomorrow*" (1989), etc... The relationships that exist between the characters, the different situations that surround the character, the situations of various natures that help the reader to understand the characters. Particular attention is paid to the role

of the narrative in the appearance of the reader, where depending on the author's own choice to confess lies the character-character. A considerable part of the work is devoted to the diversity of characters and moreover the typing of the main archetypal characters of socialist realism. The underlying axis revolves around the mentalities and attitudes of the characters in time, on the move as spiralingly moves the big changes towards the '90s.

Personality, the inner world and everything that characterizes it. These changes are constantly occurring every day, in time and space, unstoppable, continuous, and challenging for society. As influencing these changes, there are some aspects that have the recognition of the values of originality, radius, and power of influence on the novel "*White Path*", novels about our working class, Its great features and influence in the new physiognomy of our socialist society, Xhuvani wrote the novel "*White Path*", where I am a new angle of our present reality, a little faded by prose, "*Pain of Light*" (1990), "*Sunday after death*" (1992) "*Life in Casket*" (1996), "*Broken Bell of Kremlin*" (1996), "*Second Crucifixion of Christ*" (1996) "*Otranto's drowning Tirana*" (1998), "*Face of Death Tirana (stories-1999)*", "*God's Eyes*" (1999), "*Poison Cup*" (2001), "*Forgotten Love*" (2007),

Theoretical knowledge of the problem is manifested by Floresha Dados's references as essential, as well as complementary to equilibrium thought for the whole study, because it can be defined simply as "*uninterpreted literature*".

The question arises: – *Have the novels, Dhimitër Xhuvani's stories, vanished from the literary system? Literary intuition, expressive simplicity, rich themes, development and change of time adapting to periods ...* and shown a little devilish opens up the horizons of study, as in diachronical reports, where it can be seen as a classical and modernist product as well as in synchronous reports with realistic grades often through traditional narrative mode, where the novel story is realized mainly in the third person, with variety Characters who are non-intrusive, with replicas sometimes creating internal dialog, with and without author's intervention. The novelist, once writer, novelist, even the storyteller, confesses to the spirit world of the characters, their lives, the truthfulness, the facts that apparently do not depend on who.

Interesting is the fact that a writer changes and communicates with the reader in the case of "*creative freedom*" and more apparently are the stories published in 1996 by Dh. Xhuvani, which order to capture the details of a vital roll of conscience and the unconsciousness of a nation that did not You can decide which standards of values, ways, how to survive people thanks to the work, ability and self-esteem of everyone ... pride, dignity in war with the new ... Foretells the "*Kremlin's broken bell*" a 18-story book that best communicates to the younger generation the pain of a generation that has been denied to love marrow since the first story about the Albanian-Russian relationship. The narratives themselves communicate in the nets, want to translate what apparently is an anxiety to the unknown to the globality as a child who has been cautious and now leaves him free to walk alone. The motives found in the painting teacher, the motive of the brotherhood's re-enactment with the Russian sister, the modern variant of the reincarnation of nishan elements as a popular psychology, even using the perception of death/call to subconsciousness ... always seek out love. One author can not avoid the absence, what drives a literary text, but these shortcomings in the texts, the

Judaic stories are too much, they are already shaped in the author's conscience to say as they burden the Albanian conscience in one Original form ... Characters on sketches, just like portraits sketches in a minute of drawing teacher 1 Zamir Spaho, people.

The message that draws on Dhimitër Xhuvani with his novel is scaling the wrong mentalities for the literature of socialist realism, especially by Albanian intellectuals wherever they are, because the only way of writing that prevails at all times is that of man's love for one another But especially for her, but for her virtuality, sustainability or inherited self-sacrifice since Skanderbeg's time ... The female characters of Dh. Xhuvani converge around the infinite expressive potentials offered by a new aesthetic category, beginning with reflections by raising it to the same dignity as the sublime, standing up in the very symbol of modernity. The polyvalent and multifaceted category, inclusive of constituent elements: divination, deformation, excess, caricature and laugh, grotesque is imposed because of the ability to increase the spectrum of artistic possibilities and express the plurality and complexity of an era that can no longer be known.

The universe as harmonious and balanced, built by strong rules and static power patterns, privileging the new aesthetic category as a powerful critical instrument for social and artistic observation of the endless contradictions that characterize the workshop of their time. The act sometimes enters into the course of a psychological novel when retrospectives become numerous and cause so much mental and spiritual turbulence as the core elements of the narrative structure. They are not just ways to illuminate any element of the past, they are the main organic structure in the development of the novels.

The writer is much aware, aesthetically different messages and facts in order to assist the idea of a full retrial literary personality expressed in the course of time re-evaluation of this figure is realized in the course of the years. Synthetically required to be rebuilt and we plan to establish comparative aesthetic lines after viteve '90 opinion, for the literary heritage of one of the most prominent authors as the author's presentation of values under the critical eye sighting to contribute to writing Albanian literary historiography full.

Theoretical considerations have been fulfilled by fulfilling the research on a space-time line for this work and the contribution of this figure in the development of 20th Century literature, from today's literary scientific analysis. Is a man among the original songs in the Albanian prose of the lewd art, the spiritual shelter of man. He entered the Albanian prose; he did not find it difficult to create a connection between life and death ... let him breathe freely the language without censorship, without rules, so he gives us a rare prose, his style, Which is unique in Albanian literature. A typical example of such a politicized and partial treatment is the academic text "*The History of Albanian Literature of Socialist Realism **", compiled by a group of authors (A. Mufti, D. Shaplllo, D. Siliqi, J. Bullo, K. Bihiku, L. Kokona), defining the political circumstances of the time in which they worked.

Recognition and study of today's Albanian literature makes it difficult to identify, inadequate denomination, diffuse object, wide variety, specific literary geography and lack of specialized and integral studies, another, universal, lack of time distances. Literary works and processes are seen from afar, meaning from a certain distance, better

and clearer than near, because time is, how? Is known, a factor that selects works and verifies the values. The distance theory has had in the past and continues to have even today, at much smaller numbers, its own people. Of course today nobody is going to go looking for a distance of 50 to 70 years from the aesthetic object, how? The fanatical positivists acted, because in this way contemporary literature would remain out of the sphere of interest in the history of literature, A distinctive feature of the poetic structure of today's literature and require a careful and active reading of its works – in most cases.

To deal with today's systematic tracking and judgment, means doing a terribly pragmatic job, not to mention all the passion and professional awareness and moral responsibility, literature will surely awaken dissatisfaction and even merit of their own writers, who, almost all without exception, claim the highest places from the 9th is given and from the 9th belongs to the hierarchy of literary values.

Conclusion

Dhimitër Xhuvani phenomenon that has been ascertained and formulated in his unique art. The quality of a literary work does not depend, a priori, on the capture of a familiar topic or by the treatment of an unknown subject. An artist who is inspired will know to renew a familiar theme, but otherwise an artist without inspiration would break a beautiful subject. In order to find this topic in the best of this open debate, main topics of the *emancipation of women*.

The great writer has survived as much as possible, the clichés of the method of realism, because *humanism* and not communist dogma were subject to the objective of the work that was not even much stimulated at that time. That is why, for all these, goes to the past reader is a meeting with the beloved writer, a re-evaluation of the work as a human destiny biblical. His novels seem to be linked through a consistent, internal cohesion. Even when the axis of the story is confessed.

Dhimitër Xhuvani, the writer who, for more than 75 years of his life, lived different times, experienced them with the sensitivity of an artist's soul and brought them to the talents of a realistic, modern writer for whom the truth of life was holistic. He did so in his work even when it came out of the schemes in which the time forced to conceive the work of the Albanian writer of the second half of the century. With devotion to truth Dhimitër Xhuvani, a storyteller, novelist and scriptwriter, created a library of all the artistic works that make up our spiritual wealth. He belongs to that generation of writers who brought a change in Albanian literature by giving it a more humane lifestyle to a human dimension and a more cultivated artistic expression. Dhimitër Xhuvani's great merit valued the humans pain and love in his stories and novels in a whole corpus, and in the history of the Albanian novel. This vast and multifaceted work is the result of the creative thought of a work of letters for which work was the motive, passion and meaning of his life.

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Section 9. Chemistry

*Bejanidze Irina Zurabovna,
doctor of chemistry, Batumi Shota Rustaveli State University,
Full Prof. of chemistry department
E-mail: irina-bejanidze@live.ru*

*Tavdgiridze Gultamze Niazovna,
doctor of biology, Batumi Shota Rustaveli State University
Assistant professor department of chemistry
E-mail: tavdgiridze-46@mail.ru*

*Kharebava Tina Shalvovna,
doctor of chemistry, Batumi Shota Rustaveli State University
Assistant professor of chemistry department,
E-mail: t.kharebava@mail.ru*

DETERMINATION OF AMINO ACID CONTENT DEPENDENCE OF ORANGE FRUITS "WASHINGTON-NAVEL" ON AGROCHEMICAL ACTIONS AND STORAGE PROCESS

Abstract: The article examines the amino acid composition of orange fruit of the Washington-Navel variety, the effect of fertilizers on its composition, and the change in the quantitative composition of amino acids during the storage of fruits.

Keywords: amino acid, fertilizer, citrus.

Proteins are an important part of the body. They exist in various forms and participate in all the processes of the vital activity of the organism. Proteins are part of tissues, bones and liquids, all organs, hair, nails, glands, muscles, tendons are formed from them; In the form of hormones and enzymes, they catalyze and regulate almost all the processes occurring in the body, and are specific and unique, each has its own purpose and function in the body. When there is a lack of proteins in the body, the water balance is disturbed and effusions appear.

In the body, proteins are synthesized from amino acids, which are the result of the cleavage of proteins obtained by a person with food. Amino acids contain up to 16% nitrogen, which distinguishes them from such vital elements as carbohydrates and fats. Amino acids serve as neurotransmitters (neurotransmitters), some are necessary for normal brain function, others contribute to the fact that vitamins and minerals adequately perform their functions, and some amino acids directly supply energy to muscle tissue.

A human needs only twenty amino acids out of 150 existing in nature. An organism can independently synthesize 12 amino acids, the remaining eight amino acids are not synthesized. In the human liver are synthesized: alanine, arginine, asparagine, aspartic acid, citrulline, cysteine, γ -aminobutyric acid, glutamic acid, glutamine, glycine, ornithine, proline, series, taurine, tyrosine. However, some of them can not be synthesized in the body, so a person must neces-

sarily get them with food. Such amino acids are called irreplaceable: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.

The protein in the body is synthesized constantly. If even one indispensable amino acid is absent, the formation of proteins is suspended, the body begins to consume amino acids from connective tissue proteins, muscles, blood and liver, which causes such serious problems as digestive disorders, depression and growth retardation. Deficiency of essential amino acids can cause a violation of absorption in the gastrointestinal tract, infection, trauma, stress, the intake of certain medications, the fascination with fast-food, the aging process and the imbalance of other nutrients in the body. Nowadays, essential and substitutable amino acids can be obtained in the form of biologically active food additives.

In this case, preference should be given to products containing L-crystalline amino acids, which are suitable for the biochemical processes of the human body. This is especially important in various diseases and in the application of reduction diets. Vegetarians need supplements that contain essential amino acids, so that the body gets everything they need for a normal protein synthesis. Free or unbound amino acids do not need digestion and are absorbed directly into the bloodstream, absorbed very quickly and do not cause allergic reactions. As follows from the above, not proteins are the most valuable elements of nutrition, but amino acids.

The purpose of this work is to determine the amino acid composition of orange fruit varieties “Washington-Navel”, the influence on the composition of fertilizers, which were used to cultivate soil to improve the yield and the quality of fruits, as well as changing the quantitative composition of amino acids in the process of fruits storage.

Washington-Navel (Washington Navel), belongs to the group of seedless umbilical oranges, having inside the fetus another small underdeveloped fruit. It is grown up since 1650. The most common variety, differs with early maturation, high yield, frost resistance, as well as keeping capacity and transportability. One of the few varieties that can grow in the subtropics of the Transcaucasus. Fruits weigh 170–300 g or more. The shape of the fruit is spherical or oval, with easily separable thick skin. Peel has orange color, tightly attached to the pulp. Pulp is dense, light orange, juicy, sweet and sour, pleasant to taste and with a small amount of pits [1].

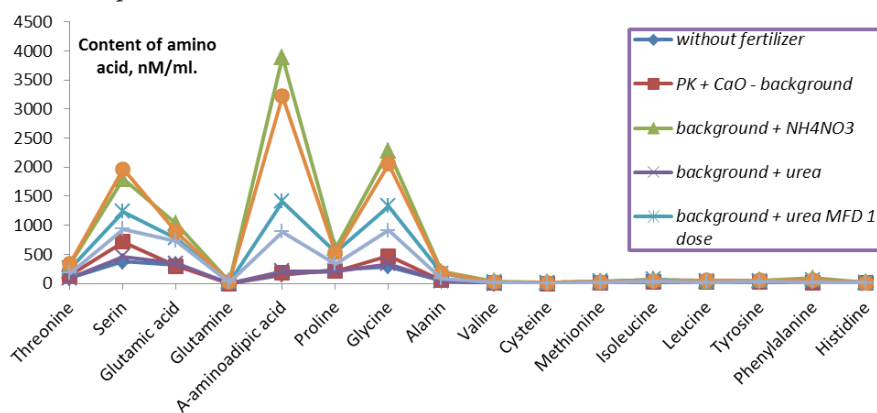


Figure 1. Amino acid composition of orange fruits “Washington-Navel”

It has been established that soil cultivation positively affects the amino acid composition of orange fruits: in fruits ripened on treated soils, the content of amino acids is 10 times higher than in untreated ones.

As can be seen from the data given (Fig. 1), the highest amino acid content was observed when the soil was treated with ammonium nitrate (NH_4NO_3).

In order of increasing content, the amino acids are located in the following order: *glutamine – ornithine – arginine – tyrosine – histidine – glutamic acid – serine – γ -aminobutyric acid – alanine – aspartic acid – proline (maximum content)*.

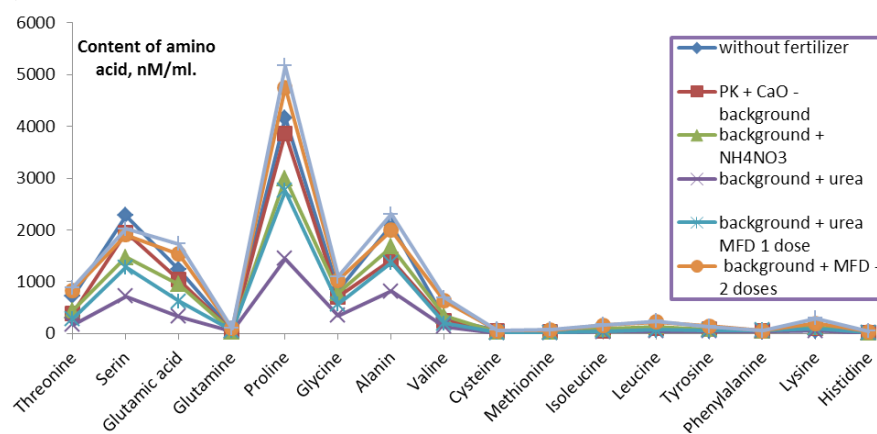


Figure 2. Change in the amino acid composition of orange fruit “Washington-Navel” in the process of storage

The research was conducted on the fruits of orange “Washington-Navel”, grown in Adjara (Georgia), at an altitude of 50 meters above sea level. The amino acid composition of the fruit was determined before and after storage, the dependence of the qualitative and quantitative composition of amino acids on soil composition, in particular, on soil treatment with various fertilizer compositions: background (PK-CaO-phosphorus potassium + calcium oxide), background + NH_4NO_3 (ammonium nitrate), Background + urea, background + MFU (urea – formaldehyde fertilizer) – 1 and 2 doses, background + $(\text{NH}_4)_2\text{SO}_4$.

Determination of amino acids was carried out on the amino acid analyzer AAA 400. The obtained data on the qualitative and quantitative composition of the amino acids of the fruit are presented in Fig. 1.3. Figure 2. 4 shows the change in the composition of amino acids during the storage of fruits.

From Fig. 2 it also follows that the fruit is better stored when treating the soil with $(NH_4)_2SO_4$. From the obtained data it is seen that the content of the amino acid proline is higher than the content of other amino acids before and after storage.

Amino acid – proline is of great importance for the human body. Proline increases the formation of collagen and promotes its retention with age, resulting in an improved skin condition. Proline also takes part in the restoration of the cartilaginous surfaces of the joints, strengthens ligaments and cardiac muscle. In combination with vitamin C it is used to strengthen connective tissue. Proline enters the body mainly from meat products, but its content is also sufficient in the fruit of orange.

The relatively high content of γ -aminobutyric acid (GABA) in Washington-Navel orange is 10% lower than proline. In the body, γ -aminobutyric acid is formed from another amino acid, glutamine. It is indispensable for the metabolism of the brain, it functions as a neurotransmitter of the central nervous system, reduces the activity of neurons and prevents overexcitation of nerve cells, removes excitement and has a calming effect; it can also be taken as tranquilizers (diazepam, phenazepam, etc.), but without the risk of addiction. This amino acid is used in the complex treatment of epilepsy and hypertension. Since it has a relaxing effect, it is used to treat disorders of

sexual functions. γ -aminobutyric acid is prescribed for attention deficit disorder [2].

Slightly different from each other are the data obtained for serine, aspartic and glutamic acid. They play an important role in human life, in particular, like γ -aminobutyric acid, glutamic acid and aspartic acid also transmit impulses to the central nervous system, i. e. is a neurotransmitter. This amino acid plays an important role in carbohydrate metabolism and promotes the penetration of calcium through the blood-brain barrier. Cells of the brain use glutamic acid as an energy source. In the process of formation of another amino acid – glutamine, glutamic acid detoxifies ammonia, taking away nitrogen atoms, which is the only way to neutralize ammonia in the brain. Glutamic acid is used in the correction of behavioral disorders in children, as well as in the treatment of epilepsy, muscular dystrophy, ulcers, hypoglycemic conditions, complications of insulin therapy for diabetes mellitus and mental development disorders.

Serine is synthesized in the body from glycine. It is necessary for the normal metabolism of fats and fatty acids, the growth of muscle tissue and the maintenance of the normal state of the immune system. Serine is used as a moisturizer, it is part of many cosmetic and dermatological preparations.

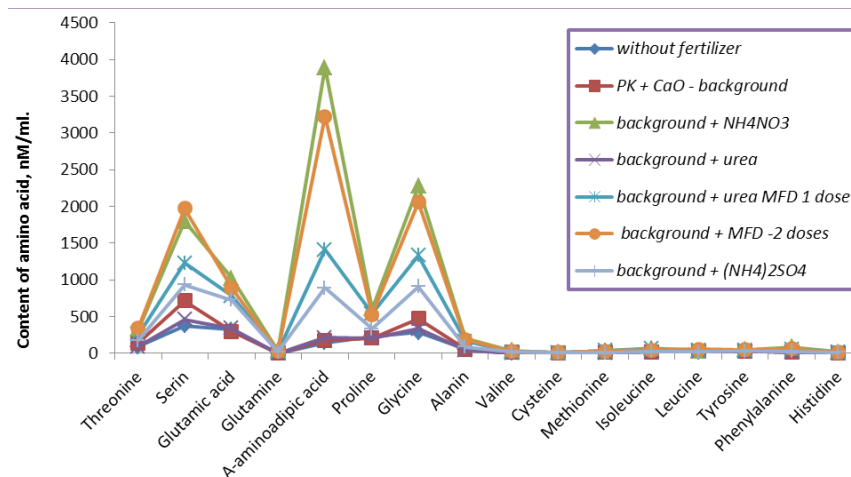


Figure 3. The content of essential amino acids in fruits of orange "Washington-Navel"

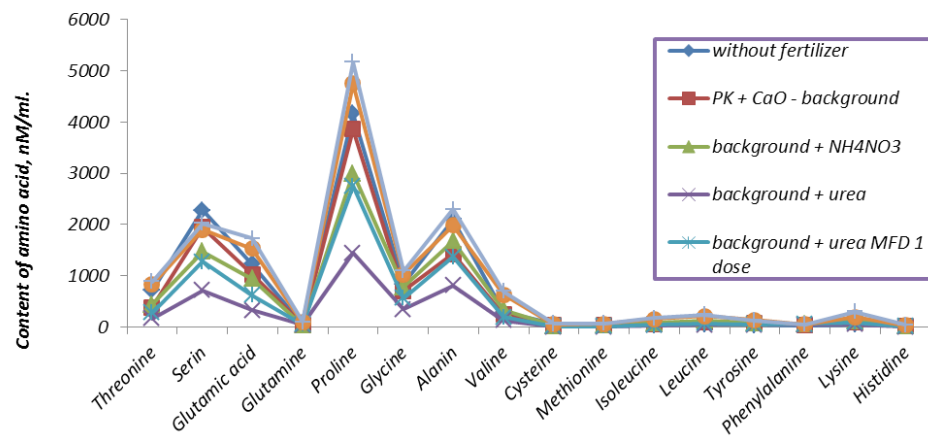


Figure 4. Change in the content of essential amino acids in fruits of orange "Washington-Navel" in the process of storage

Figure 3–4 shows the amino acid composition of orange fruit of independent amino acids and their change during the storage. Before and after storage, fruits contain the most threonine, the content of which increases 2.5–3 times during the storage. The maximum amount of threonine is contained in the fruits when treating the soil with ammonium nitrate and urea-formaldehyde fertilizer MFU-2 doses. An analogous dependence on the type of fertilizer was observed for all independent acids. In order of decreasing the quantitative content, the essential amino acids are arranged in the following order: threonine-valine-lysine-leucine-phenylalanine-isoleucine-methionine.

After storage, this series of dependencies is preserved.

Threonine regulates tissue metabolism, increases mental performance, suppresses pathological attraction to alcohol, stops alcohol withdrawal syndrome, improves the cardiovascular system, liver, central nervous system and immune function. Threonine allows you to strengthen the muscles (including the myocardium) and ligaments, makes the bones less brittle, increases the strength of the enamel of teeth, along with methionine improves lipotropic function of the liver, that is, the breakdown of fats and fatty acids. From threonine, glycine and serine can be synthesized in the body [3].

The daily requirement for threonine for an adult is 0.5 g, for children about 3 g.

Conclusion. It is established that:

- Soil treatment positively affects the amino acid composition of orange fruits: the content of amino acids increases ~ 10 times;

- The highest amino acid content is observed when the soil is treated with ammonium nitrate (NH_4NO_3) and in order of increasing content, the amino acids are located in the following order: glutamine-ornithine-arginine-tyrosine-histidine-glutamic acid-serine- α -aminobutyric acid-alanine-aspartic acid- Proline;

- Ammonium nitrate and MFU (2 doses) have an almost identical effect on the amino acid composition of fruits, however, in our opinion, it is preferable to use MFIs, since this fertilizer is well absorbed and retained by the soil and can be introduced less often than ammonium nitrate;

- Fruits are better preserved when the soil is treated with ammonium sulfate ($(\text{NH}_4)_2\text{SO}_4$);

- During the storage, the threonine content increases 2.5–3 times;

- In order of decreasing the quantity content, the essential amino acids are arranged in the following order: threonine-valine-lysine-leucine-phenylalanine-isoleucine-methionine.

After the storage of fruits, this series of relationships is preserved.

From the data given, it follows that with the appropriate agrochemical processing of the soil, it is possible to obtain fruits of the orange “Washington-Navel” with a high content of interchangeable and essential amino acids, thereby replenishing the daily requirement for them.

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Kharebava Tina Shalvovna,
doctor of chemistry,
Batumi Shota Rustaveli State University
Assistant professor of chemistry department,
E-mail: t.kharebava@mail.ru

Bejanidze Irina Zurabovna,
doctor of chemistry,
Batumi Shota Rustaveli State University,
Full Prof. of chemistry department
E-mail: irina-bejanidze@live.ru

Tavdgiridze Gultamze Niazovna,
doctor of biology, Batumi Shota Rustaveli State University
Assistant professor department of chemistry
E-mail: tavdgiridze-46@mail.ru

MICROBIOLOGICAL ESTIMATION OF ELECTRODIALYTIC PROCESS OF OBTAIN POTABLE WATER

Abstract: In following work is studied the species composition of microscopic fungi that cause corrosion of polymeric materials used in membrane technology, the results of microbiological studies of working solutions of electro dialysis desalination process of sea waters are presented.

Keywords: electro dialysis, microscopic mushrooms, membrane.

Water, covers 70% of the earth's surface, but today it is a scarce product, because Due to natural and anthropogenic impact, it is polluted and unfit for drinking. Clean fresh water is the guarantee of human health. According to the international health organization, 80% of the diseases are caused by the inapplicability of drinking water. Bacterial water pollution is often a pandemic of infectious diseases. Human health is also strongly influenced by the chemical content of water. Frequent use for drinking mineralized water causes nephritis, high calcium content – urolithiasis. Diseases of endemic goiter and caries depend on the concentration of iodine and fluoride ions in water, and ischemic heart disease from its stiffness: with a shortage of calcium, the number of diseases will increase by 20–40% [1].

There are both classical and relatively new methods for purifying drinking water. New methods of water purification include membrane methods. Electro dialysis is a membrane method based on the transfer of ions of the substances dissolved in water through ion exchange membranes under the action of an electric field. The electro dialysis method is most widely used for the desalination of sea water in the production of drinking and/or industrial water. The structural fragments of the electro dialysis unit: ion exchange membranes, distribution frames and turbulence grids for liquid flow, are organic polymeric materials and, therefore, should be a good substrate for microorganisms.

The purpose of this work was to study the possibility of microbiological fouling of structural elements of the electro dialysis unit, the establishment of microorganisms that cause their corrosion and microbiological evaluation of solutions obtained by electro dialysis treatment of sea water.

Microbiological fouling studies were carried out on samples of ion-exchange membranes MK-40, MA-40, MK-40-4, MA-41I

reinforced with capron, made on the basis of KU-2-8, EDE-10P, KU-2-8 ionites Cross-linked with 4% divinylbenzene and AB-17, as well as samples of polypropylene, obtained by casting and pressing.

The intensity of microbiological corrosion depends on many factors, among which the most important are: temperature and humidity, the structure and chemical composition of the material, and the degree of environmental pollution [2]. For the study, samples of the structural elements of the electro dialysis unit were placed on a mycological stand and a warehouse (with an earthen floor) and kept in a humid subtropical climate, i. e. in the most favorable conditions for the development of microorganisms. The samples were tested for three years, with daily monitoring of humidity and air temperature, and periodically, according to a standard procedure [3], the degree of microbiological corrosion of the samples was evaluated. From damaged materials, to identify the pure cultures of microscopic fungi, a culture was planted on the culture of Capek and Suloagar and mycelium was obtained. The degree of microbiological fouling of samples located on the mycological stand and warehouse was determined by the temperature and humidity of storage. On the mycological stand, the temperature varied between 11–25 °C, and humidity –76–85%. However, in winter, in some cases, there was a sharp drop in temperature, and humidity was 30–40%. Mycological storehouse did not show any sudden fluctuations in temperature and humidity, the temperature varied between 15–24 °C, and humidity in the range of 55–68%.

In natural conditions, i. e. on the mycological stand and warehouse, a high degree of microbiological fouling of ion-exchange membranes MK-40, MA-40, MK-40-4, MA-41I was observed. On the mycological stand, in atmospheric conditions, with no stable temperature and high humidity, after 6 months the degree of

fouling of the samples was estimated at 4–5 points, and in the warehouse it was only 2–3 points. Most fungi isolated from materials damaged by mycological corrosion belong to the genus *Penicillium* and *Aspergillus*. These fungi appear first on the surface of the material and occupy most of it, have a well-developed mycelium, in excess form spores that are clearly visible even to the naked eye. It is they who cause the main loss of material. Then there are *Alternaria*, *Cladosporium*, *Stemphylium* and other kinds of representatives. They have a small mass of mycelium, do not form a large number of spores, adversely affect the materials, for example, the membranes lose color and spots appear on their surface. The following types of micromycetes were isolated on the surface of the polypropylene samples studied, both by injection and compression, *Cladosporium herbarum* Fr, *Paecilomyces variotii* Bainier, *Mucor* sp., which develop as a sterile mycelium and do not form spores. As a result of a high degree of microbiological corrosion, the microflora on the surface of ion-exchange membranes is characterized by a variety of species composition. From the surface of the membranes, the following micromycetes were isolated: *Aspergillus niger* z. Tiegh; *Aspergillus terreus* Thum; *Aspergillus versicolor* (Vuill) Tiraschi; *Penicillium chrisogenum* Thom; *Penicillium cyclopium* Westling; *Penicillium funiculosum* Thom; *Penicillium lanosum* Westling; *Trichoderma viride* Fr; *Stemphylium pyriforme* Bon; *Alternaria alternata* Fr (Kiessl).

In the conditions of mycological stock, the species composition of micromycetes on the surface of membranes is less diverse: only five species from four genera of fungi have been identified: *Aspergillus versicolor*; *Aspergillus niger*; *Cladosporium herbarum*; *Paecilomyces variotii*; *Alternaria alternata*. It should be noted that the specific signs of micromycetes are not characteristic only for a certain substrate. Thus, some species of micromycetes, for example: *Aspergillus niger*, *Cladosporium herbarum*, *Penicillium cyclopium*, *Penicillium funiculosum*, are found on almost all the test samples, actively causing damage to the surface.

Thus, the structural polymeric materials MK-40, MA-40, MK-40-4, MA-41I used in electro dialysis technology during the storage are covered with atmospheric spores of micromycetes, which persist for a long time and, under favorable ecological conditions, germinate, develop normally and reduce the corrosion resistance of membranes. On the surface of membranes most often occurs the release of *Penicillium* and *Aspergillus* genus of fungi. They adapt well to these materials, are diverse in species composition and form spores in large numbers. Fungi of the genus *Alternaria*, *Stemphylium*, *Cladosporium* are represented by only one species, but are found on almost all the samples studied.

Ion-exchange membranes are used in the electro dialysis process of desalination of waters of different concentrations and chemical composition. It is known that most heterotrophic bacteria have a negative charge [5; 6], which causes their transfer through anionite membranes, as well as their accumulation on the surface of membranes. Since the process of electro dialysis desalination of water occurs under the influence of an electric current, the resulting water must be clean from microorganisms, because in addition to the electric field, other factors (pressure, chemical components of solutions) act on them, which must cause the death of microorganisms.

However, the microbiological index of such working solutions often does not improve, but on the contrary, due to secondary pollution deteriorates.

A microbiological evaluation of the operation of industrial electro dialysis units "Rome", "Rodnik-7" and the model installation "EDA-K" was done in the process of desalination of sea water at different technological regimes. At the "Rome" installation, observations were made for one year, during which the apparatus was periodically switched off for the revision. During the operation of the apparatus, a mud sediment was formed on the surface of the membranes, the amount of which depended on the operating time of the apparatus. The muddy sediment contained organic and inorganic substances that contributed to the growth and development of microorganisms. From 1 cm² of the membrane surface, 20–90 microscopic fungi and up to 200 marine heterotrophic bacteria of various forms were isolated: large white, thin yellow and white color colony of mix bacteria.

Among the microscopic fungi were isolated the representatives of the genus *Penicillium*. The number of microorganisms on the surface of membranes was determined by their number in solutions, dialysis and brine chambers. In 100 ml of desalinated water, 3–5 microscopic fungal cells were found, which were not found in brine chambers. In 1 ml of brine and desalinated water, marine heterotrophic bacteria were detected in the amount of 30–45 microbial cells.

The electro dialysis installation "Rodnik-7" operated for 250 hours and unlike the "Rome" installation, in a more "soft" technological mode, therefore, a muddy sediment did not form on the membrane surface. Investigation of solutions revealed that, in spite of the fact that 100 ml of the initial solution contained 8–25 cells of microscopic fungi, the fungi were not found in the desalinated by electro dialysis water and brine. In 1 ml of sea water, up to 500 microbial cells of heterotrophic bacteria were detected, in 1 ml of brine and desalinated water, 40–90 microbial cell. Microbiological studies were also carried out on the model electro dialysis unit "EDA-K", which operated on the principle of salt concentration. The operating mode eliminated the formation of a lumpy sediment on the membrane surface and, consequently, the growth and multiplication of heterotrophic microorganisms on its surface. The operating mode of the apparatus affected the results of the microbiological study: 1 ml of the initial solution contained 20–160 microbial cells, and after electro dialysis treatment their amount in desalinated and concentrated solutions fell to zero, i. e. a complete bactericidal effect was obtained. The study of the microbiological resistance of membranes found that to eliminate the negative effects of microorganisms on membranes and, consequently, on the electro dialysis process, it is necessary to reduce their amount in the initial solution.

Thus, it follows from the conducted microbiological studies that the microflora of working solutions of electro dialysis apparatus is mainly heterotrophic organisms (microscopic fungi, bacteria), the number of which depends on the parameters of the technological mode of the apparatus. During the storage of polymeric materials in conditions of a moist subtropical climate, from the surface of ion-exchange membranes, mainly microscopic fungi of the genus *Penicillium* and *Aspergillus* belonging to the genus of imperfect fungi are isolated.

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Gurbanova Zumrud Ramazan,
Ph. D, associate-professor of the department
"Chemistry and Chemical technology of inorganic substances"
Azerbaijan State Oil and Industry University,
E- mail: kerem-shixaliyev@mail.ru

THE USE OF WASTE PRODUCTS OF SODA PRODUCTION TO MAKE NON-SHRINKAGE OIL-WELL CEMENT

Abstract: the use of OJSC "Soda" waste as a carbonate component for the production of sulfated clinkers was investigated. The optimum conditions for hydrating and qualitative cement obtaining have been studied. Physico-chemical and physico-mechanical properties of synthesized clinkers were determined: setting time was from 8h 15 min to 9 h 30 min, when the ultimate strength of cement was within 2 days; linear expansion of cement was within the limits of the norm; and concentration of the solution was 1940 kg.m³. On the basis of synthesized clinkers, it was found that the results of cement compositions refer to non-shrinkage cement compositions for oil wells.

Keyword: waste products of soda, oil-well cement, hydration, sulfated clinker.

In most cases destruction of the cement ring on the back surface depends on the tension generated during compression. Thus, the problem of non-shrinking material production remains urgent. As an object of researches the raw materials used in experimental cement plant of Podolsk – clay, gypsum and also man made materials of "Soda" OJSC-carbonized and non-carbonized sludge have been

chosen [1–3]. As a result of X-ray phase and petrographic analyses it has been determined that limestone consists of mainly calcite (more than 50%) and clay component consists of montmorillonite and hydromica. Chemical composition of chosen materials is given in table 1. For investigation mineral formation process a mixture was prepared.

Table 1. – Chemical composition of raw materials

Material	The composition of oxides, mass%					
	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	SO ₃
Limestone	6.56	1.58	0.86	50.02	1.18	–
Clay	51.93	15.17	6.86	7.29	1.75	2.92
Gypsum	4.59	1.18	0.55	34.08	3.13	38.20
Sludge: Carbonized	4.10	0.35	0.15	63.50	3.50	4.10
Non-carbonized	1.80	0.30	0.10	46.20	4.00	4.20

This mixture was used for the investigation of low base, high base sulphofritric clinker and intermediate base clinker. According to their compositions they are similar. According to X-ray phase analysis the material contains calcium sulfate, calcium and aluminum oxychloride and a little magnesium hydro oxychloride. The composition of raw-material mixture was calculated for obtaining sulphofritric clinkers to determine carbonized or non-carbonized sludge [2–3]. The obtained results show that man – made materials of OJSC "Soda" can be used as a carbonate component. Presence of sulfate calcium in their content considerably decreases gypsum amount used for mixture preparation. Using carbonized sludge, a mixture can be made on the base of 4,5% traditional components [4–5].

Experimental part

As a sample clinkers made from the raw material of Podolsk cement plant have been taken. This raw-material is made by wet grinding method in laboratory porcelain mill within 6 hours. Then the sludge is dried in the drying apparatus at temperature 60 (5 (C with 1–2% moisture content. The content of raw materials is given in table 2. During hydraulic process cylinders with 5 sm² diameter and 3 sm² height were made to produce raw-material mixture with kg (sm² pressure)).

High temperature furnaces with chromite lanthanum heaters of 1100, 1150, 1180 and 1200°C and 5, 10, 15, 20, 30, 60 isothermal stability are used to burn the samples. The experiment shows that complete mixing of CaO with the raw-material depends on the composition of the clinker. 0,98–1,0 bond degree of low base clinker reaches up to 1180 °C temperature. Isothermal is (T = 1180 °C) and amount of CaO in the mixture is 0,73–0,78 mass fraction and while increasing its stability, it reaches up to 0,98–1,0 within 5 minutes. High-base clinker is required for mixing calcium oxide with raw-materials and it needs to be heated at 1250 °C temperature. Mixing of limestone is carried out within 30 minutes. CaO bond degree of intermediate composition of clinkers is 0,98–1,0 and it reaches up to 1200 °C (= 30 min.). Bond degree of calcium oxide is shown in table 2.

Bond kinetics in the mixtures on the base of solid residues with CaO soda content and its presence in simple content controlling mixture show that synthesis process of sulphofritric clinkers occurs more quickly than controlling mixture in the obtained composition. Probably mineral formation frequency of the reaction is related to the role of mineralization while burning the clinkers and being of chlorine compounds in sludge [6; 7].

Table 2. – Bond rate of calcium oxide with raw –material mixture

Mixture	Minute	–at temperature, °C		
		1100	1180	1250
Sulphofritric clinker: low base sulphofritric clinker (LBSC)	5	0.78	0.97	–
	10	0.83	0.98	–
	20	0.89	0.99	–
	30	0.92	0.99	–
High-based – HBSC	60	0.95	1.0	–
	5	0.75	0.87	0.99
	10	0.79	0.90	0.99
	20	0.83	0.96	1.0
Intermediate-based	30	0.88	0.99	1.0
	60	0.88	1.0	1.0
	5	0.73	0.85	0.98
	10	0.79	0.92	0.99
Controlling clinker	20	0.81	0.98	0.99
	30	0.85	0.99	1.0
	60	0.85	1.0	1.0
	5	0.72	0.85	0.97
	10	0.78	0.88	0.99
	20	0.83	0.92	0.99
	30	0.86	0.96	1.0
	60	0.88	0.97	1.0

During the formation of sulfated clinkers, the constant of CaO bond reaction rate was calculated due to the results. The analysis of the obtained data shows that the rate of bonding process is limited by diffusion process and described by Yander equation. Phase composition of the synthesized clinkers was defined by X-ray phase and petrographic analyses. It was determined that while burning of

low-base sulphofritric mixtures consisting of man made materials at temperature (T_b (1180–1200 (C) the phase composition of the obtained clinkers differs from calculated one. It depends on the formation of alloys and high-base liquid phase. Phase composition in the clinkers having high-base mixture and intermediate composition is nearer to the calculated one (table 3).

Table 3. – Phase composition of sulphofritric clinker

Experiment	Clinker	Phase composition,%			
		C ₂ S	C ₃ S	3CF (CS)	C ₂ F (CS)
1	LSFC	32	10	32	18
2	HSFS	16	32	7	40
3	ISFK	24	25	17	28

The results obtained during the investigation of hydration process of the clinkers synthesized in micro-preparations by petrographic method, testify great hydration activity of the product takes places namely on the base of man-made materials [7–8]. Durability of iron ettringite formed in the sample within first hours of hydration continues up to 14 days. And it enables to get an intensive, durable effect maintaining the system and liminating displace-

ment deformations. The obtained cements were tested due to the requirements. The results of physico-mechanical experiments are shown in table 4. Thus, by increasing the quantity of sulphofritric clinkers added into the cement content from 5 to 15% mass, linear expanding of samples increases from 0,03 to24%. Practically durability of cement in small doses of sulphofritric clinkers doesn't change.

Table 4. – Content of the cement

Experiment	Composition of component,%				
	PCC	LSFC	HSFC	ISFC	gypsum
1	2	3	4	5	6
1	90	5	–	–	5
2	83	10	–	–	7
3	75	15	–	–	10
4	90	–	5	–	5

1	2	3	4	5	6
5.	83	–	10	–	7
6.	75	–	15	–	10
7.	90	–	–	5	5
8.	83	–	–	10	7
9.	75	–	–	15	10

But at 15% mass increase of the quantity of sulphofritric clinkers durability of the cement decreases. Formation of a great amount of three-sulfate hydro- sulphofritric calcium occurs. Solidification in hydration process reaches to such extent that destruction process decreases the durability. Electron-microscopic investigation of cement shows that, during hydration process of

sulphofritric phase mainly iron ettringite, mono hydro-sulphofritics and calcium hydroferrite, iron hydroxide gel are formed. In joint hydration of the minerals of sulphofritric clinkers and portland cement the phases cause occurrence of expanding solidification of cement system.

The results have been shown in table 5.

Table 5. – Durability of cement

Code of cement	Increase of durability, MPa/day				Expanding,%	
	bending		compression (pressing)		2	28
	2	28	2	28		
1.	2.3	4.9	5.8	11.3	0.03	0.08
2.	2.2	4.5	5.2	10.7	0.05	0.10
3.	1.7	3.4	4.0	8.7	0.11	0.18
4.	2.7	5.6	6.6	13.4	0.07	0.12
5.	2.4	5.3	6.2	13.0	0.10	0.15
6.	1.8	3.2	4.1	8.8	0.14	0.24
7.	2.5	5.1	6.0	12.1	0.05	0.09
8.	2.3	5.0	6.1	11.6	0.08	0.11
9.	2.2	4.7	5.2	10.4	0.10	0.18

The results of estimation of cement hydration rate allow to place sulphofritric cements in the following order: low base, intermediate base and high base. Namely it enables considerably to decrease the amount of sulphofritric addition of the system in equal values of linear expanding of the system.

Sulphofritric clinkers are obtained by burning the raw-materials containing limestone, gypsum of Podolsk cement plant and carbonized sludge of OJSC “Soda” at 1180°C temperature. The analysis of the clinker obtained by physico- mechanical method shows that, this composition is nearer to high-base sulphofritric clinker. The composition of carbonized double-calcium ferrite is 38% mass. Oil-well cement was produced by grinding in a batch mill consisting of 80% mass of Portland cement clinker, 10% mass of sulfoferritic clinker and 10% mass of gypsum. The fineness of the cement grinding was 13% residue on sieve N 008 on 3300 sm²g⁻¹ specific surface areas.

According to GOST 1581–78, physico-mechanical properties of the obtained cement are as follows: 0,44 for 195mm; setting time: beginning – 8h 15 min.; end- 9 h 30 min: concentration of the solution – 1940 kg.m³; the ultimate strength of cement within 2 days was

3.0 MPa, at a bend of at a compression – 11.2 MPa; linear expansion of cement was 0.06%.

So, the tested cement refers to the non-shrinkage formations of oil-well cement.

Conclusion

1. Chemical and mineralogical composition of man-made materials (carbonized and non-carbonized sludge) OJSC “Soda” can be used as a raw material component in the production of sulphofritric clinkers.

2. Physico-chemical analysis established the optimal compositions of sulphofritric clinker used as an expanding additive in the production of non-shrinkable cements. By the degree of hydration and the physical and mechanical properties of cements, the clinker containing high base sulfated minerals is most effective.

3. Physical and mechanical properties of sulphofritric-containing cements showed the possibility of creating a non-shrinkage cement of high quality. The optimal composition of cement should contain no more than 10% mass of sulphofritric clinker.

4. Experimental-industrial tests carried out on the SRI of experimental cement plant confirmed the results of laboratory studies.

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Gurbanova Zumrud Ramazan,
 Ph. D, associate-professor of the department
 "Chemistry and Chemical technology of inorganic substances"
 Azerbaijan State Oil and Industry University,
 E-mail: kerem-shixaliyev@mail.ru
 E-mail: zumrud.qurbanova@bk.ru

PHYSICO-CHEMICAL STUDY OF THE ALUMINIUM SALT OBTAINED ON THE BASIS OF SLIME WASTE OF BENTONITE CLAY AND ALUNITE TREATMENT

Abstract: Aluminium fluoride samples obtained on the basis of various raw materials have been studied by modern physico-chemical analysis methods (x-ray-phase, IR spectroscopy). Phase content, material-structural properties of aluminum fluoride samples obtained using aluminum silicium containing raw materials and waste have been researched.

Keywords: bentonite clay, alunite, slime waste, aluminium fluoride, silicium hexafluoride.

Reaction rate, its completion, quality of the product are determined depending on the crystallization condition of solid phase formed on the inter influenced phase of multi-phase system being in balanced liquid-solid phase of aluminium salt obtained from the waste, that is aluminium fluoride and the saturation degree of the system with it. That's why it is necessary to study the content of aluminium fluoride salt obtained by various methods and raw materials.

As we know fluorine content gases (HF , SiF_4) are separated to the gas phases during the decomposition of phosphate raw-materials with sulphuric acid and from their absorption with water, silicium hexafluoric acid has been obtained. [1–4]. It is considered as raw

material for acidic aluminium fluoride. Due to the existing technology aluminium fluoride is obtained as a result of decomposition of aluminium hydroxide with silicium hexafluoric acid. As aluminium hydroxide is expensive and heavily obtained raw material its substitute with the cheaper and easily found materials having aluminium oxide in the content is one of the urgent problems [5–6]. From other side during the obtaining of aluminium fluoride for decomposition of aluminium hydroxide, when necessary silicium hexafluoric acid is heated to 85°C in advance, its definite part is decomposed and fluorine loss takes place. It prevents full decomposition of the raw material and influences negatively the quality of the obtained product.

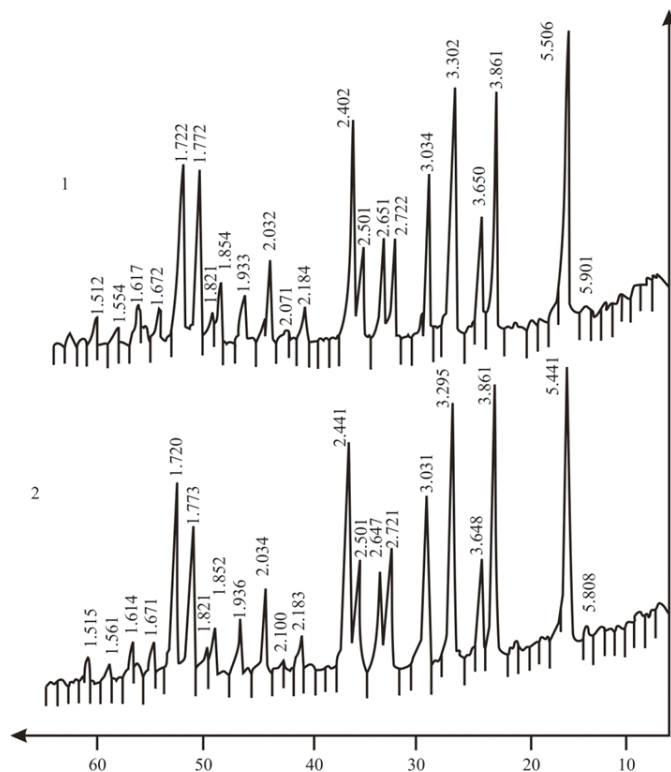


Figure 1. Diffractogram of aluminium fluoride (2) obtained on the basis of aluminium hydroxide (1), slime waste mixture of bentonite clay and alunite processing

To solve the problem of obtaining of aluminium fluoride using new raw materials and technological regime on the base of existing aluminium fluoride obtaining has been researched. That's why bentonite clay having aluminium oxide and SiO_2 and slime waste of alunite processing have been used. In the offered technology decomposition of low norm of silicium hexafluoric acid of mixed suspension consisting of various ratio of bentonite clay having aluminium and silicium oxide and slime waste of alunite processing has been carried out. The temperature of the process was $85\text{ }^\circ\text{C}$, reaction proceeded within 25–30 minutes. Differences between phase-structure content of various studied samples were compared by x-ray researches.

X-ray photographs of the products have been taken on DROH-3 diffractometer, Cu K_α - radiation and Ni filter. During the carrying out of it, movement speed was 2 and 4 degree/minutes calculation accuracy on the diagram was $\pm 0,2\text{mm}$, the error on determining distance between spaces was 1%. X-ray photographs have been given in figure 1. The results of X-ray analysis show existence of $\beta\text{AlF}_3 \cdot 3,5\text{H}_2\text{O}$; $\text{AlF}_3 \cdot 3\text{H}_2\text{O}$; $\text{AlF}_3 \cdot \text{H}_2\text{O}$ and the structures corre-

sponding to dehydrated AlF_3 . There are also lines corresponding to $\text{AlF}_3 \cdot 0,5\text{H}_2\text{O}$ in the samples. Thus, the results of the researches show that diffractograms of aluminium fluoride obtained on the basis of bentonite clay with aluminium oxide content and slime waste of alunite processing don't distinguish from aluminium fluoride obtained from aluminium hydroxide due to their phases content (fig 1), that's displacement of the lines in the obtained samples doesn't take place, that's new solid phases don't appear.

The interphase distances of the same samples (d), relative intensities (I) and phase contents have been given in table 1. To clarify material-structural properties of the obtained samples IR-spectroscopy has been used. IR-spectroscopy is reliable for identification of atom groups in complex mixtures in the inorganic synthesis processes and it is widely applied and gives effective results when used together with X ray photographic research in parallel. Thus, atom groups distinguishing for their weight, bond type or position in molecule have definite absorption stripe in the same area of spectrum.

Table 1. – Results of the X-ray photographic researches of the samples

Sample 1			Sample 2		
d	J	Phase content	d	J	Phase content
5,901	4	$\text{AlF}_3 \cdot 0,5\text{H}_2\text{O}$	5,808	4	$\text{AlF}_3 \cdot 0,5\text{H}_2\text{O}$
5,506	100	$\beta\text{AlF}_3 \cdot 3\text{H}_2\text{O}$	5,441	100	$\beta\text{AlF}_3 \cdot 3\text{H}_2\text{O}$
3,861	50	$\beta\text{AlF}_3 \cdot 3\text{H}_2\text{O}$	5,861	50	$\beta\text{AlF}_3 \cdot 3\text{H}_2\text{O}$
3,650	6	–	3,648	6	–
3,302	45	AlF_3	3,295	45	AlF_3
3,034	30	$\beta\text{AlF}_3 \cdot 3\text{H}_2\text{O}$	3,031	30	$\beta\text{AlF}_3 \cdot 3\text{H}_2\text{O}$
2,722	16	–	3,721	16	=
2,651	14	$\text{AlF}_3 \cdot 3,5\text{H}_2\text{O}$	2,647	14	$\text{AlF}_3 \cdot 3,5\text{H}_2\text{O}$
2,501	16	AlF_3	2,501	16	AlF_3
2,402	40	$\text{AlF}_3 \cdot 3,5\text{H}_2\text{O}$	2,441	40	$\text{AlF}_3 \cdot 3,5\text{H}_2\text{O}$
2,184	2	–	2,183	2	–
2,032	16	–	2,034	16	–
1,933	6	–	1,936	6	–
1,854	3	$\text{AlF}_3 \cdot 3\text{H}_2\text{O}$	1,852	3	$\text{AlF}_3 \cdot 3\text{H}_2\text{O}$
1,821	5	$\text{AlF}_3 \cdot \text{H}_2\text{O}$	1,821	5	$\text{AlF}_3 \cdot \text{H}_2\text{O}$
1,772	40	$\beta\text{AlF}_3 \cdot 3\text{H}_2\text{O}$	1,773	40	$\beta\text{AlF}_3 \cdot 3\text{H}_2\text{O}$
1,722	50	$\text{AlF}_3 \cdot 3,5\text{H}_2\text{O}$	1,720	50	$\text{AlF}_3 \cdot 3,5\text{H}_2\text{O}$
1,672	4	–	1,671	4	–
1,617	4	–	1,614	4	–
1,554	2	–	1,614	2	–
1,512	2	–	1,515	2	–

IR-spectroscopic researches have been carried out to testify the content and structure of the obtained aluminium fluoride crystalline hydrates. IR spectra have been taken on UR-20 and SPECORD M-80 spectrometers at $400\text{--}4000\text{ cm}^{-1}$ frequency interval in the form

of suspension in vaseline and in some cases in the compressed samples as a tablet with KBr. In figure 2 IR-spectra of both alone aluminium hydroxide (1), and aluminium fluoride (2) obtained on the basis of bentonite clay and slime mixture of alunite processing have been given.

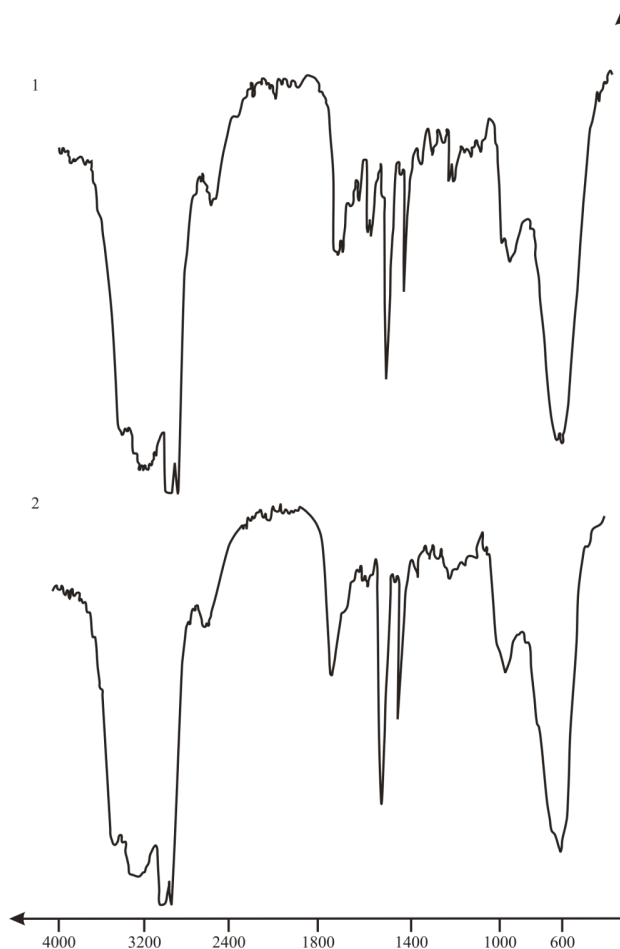


Figure 2. Two spectra of aluminium fluoride (2) obtained on the basis of aluminum hydroxide (1) and slime mixture of the processing of bentonite clay with alunite

The content of all samples is the same. There are the same maximum $3200\text{--}3500\text{ cm}^{-1}$ lines in $3100\text{--}3500\text{ cm}^{-1}$ area of IR spectra. They can be referred to valence vibrations of hydroxyl groups. On maximum 2595 cm^{-1} average intensive lines spectra in $2500\text{--}2700\text{ cm}^{-1}$ area reduced frequency of valence vibrations of hydroxyl

group show strong inter molecule hydrogen relations in molecules. Deformation vibrations of hydroxyl groups occur as wide and intensive line with maximum 1705 cm^{-1} in $1600\text{--}1750\text{ cm}^{-1}$ area. There is a wide line in $500\text{--}700\text{ cm}^{-1}$ area in the spectra of all samples.

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Shikhaliyev Karam Sefi,
Doctor of technical sciences, Professor, academician EANS.
Professor of Azerbaijan State University and oil Industry,
Azerbaijan State University of oil and Industry

Abdullayeva Irada Kurban,
Ph. D., associate-professor
Azerbaijan State Oil and Industry University

HEAT-RESISTANT COMPOSITIONS BASED ON ELASTOMERS

Abstract: Mae cyfansoddiad yn datblygu ar sail polymerau addasedig gweithgynhyrchu cylchoedd uplotitelyh a podklatki neftopromyslovyh a neftepererabotujushih yn seiliedig ar CKH y offer-40, biopolimerai PVC gwneud rwber cymysgedd halltu modd diffinio.

Keyword: cyfansoddiad, uplotiteli, biopolymer, vulcanization, priodweddau mecanyddol gorfforol o vulcanizates, aggresivnaja dydd Mercher, bolyfinyl clorid (PVC), nitrilnyj styren rwber (JMC-40).

The composition for producing packers and gaskets used in aggressive medium in oil extraction and refining equipment has been prepared.

The composition has been prepared on the bases of SKN-40, PVC and biopolymer and optimal regime of its vulcanization has been determined.

Vulcanization regime was 155°C and minutes. Bag IKS analysis method availability of (COOH, OH, O) functional groups has been determined in the used biopolymer. Vulcanization time provides stability of rubbers for aggressive medium obtained as a result of phase structure formation in polymer macromolecule during cross-linking reaction producing.

During the refining of elastomers in the mixer as, a result of their macromolecules breaking high activity centers-free macroradicals form.

Mechanico-chemical processes take place during d polymers in the extruders and inixers 1) mechanical decomposition; 2) mechani-chemical synthesis; 3) formation of copolymers and etc.

As a result of mechanico-chemical influence process of formation of active centers, that is macroradicals takes place [4]. Mechani-chemical processes can be expressed as a total of the following elementary reactions: mechanical exciting; formation of reaction chain; development of chain process in various directions depending on the condition; formation of end constant products [5].

As a result of interaction of formed macroradicals with oxygen peroxide radicals and depending g on elastomer structure high molecule oxidizing products are produced: by IR-spectroscopy method formation of strict structure changes in the polymer has been determined as a result of mechanical.

Formation of polar groups in non-polar groups, and double relations in saturated structural polymers has been determined.

Such transfers show proceeding of complex transformations in polymer during mechanical destruction [6; 7; 8].

A number of experiments proved speeding up air oxygen destruction [9; 10].

Producing of grafting copolymers during joint refining of various of polymers and improvement the properties of the compositions obtained on the bases of these mixture have been shown [11].

During the mechanical refining of two non-mixed polymers as a result of the inter macromolecular relation formation of copolymers and polymer-polymer solid disperition having globular particles has been considered [12].

Obtaining of grafting copolymers by mechanico-chemical ways, that's in solid phase has been shown recently. To improve physic-mechanical properties of various polymers their modification is carried out by functional monomers and polymers. It is possible to obtain grafting copolymers with controlled properties at definite stages of mechanical destructing of polymer properties. Joint influence of high pressure and displacement bringto the increase of physico-chemical properties of PP-PE and PP-SKEP (40:10) polymers systems, ouo it is explained the reduce of SKEP phases dimensions.

During the refining of polymers procuding of various processes tn the mixer has been shown: increase of the temperature, deformation, oxidizing and etc. As a result of these influences energy limit of the exciting reactions of polymer passing through the shafts reduces, heat oxidizing and heat decomposition of polymers become easier. The indicated temperature can take place at ordinary and low temperatures. At mixing processes advantage of decomposition and structuring depends on chemical structure of the polymer, its molecul mase, temperature and refining period [13, 14].

During the joint refining in the extruder polystyrene has been modified by isobutene-isoprene copolymer. At 180–190 °C and 220 °C passing through 2–3 times through extruder polystyrene is mixed with BR. As a result effective viscoïd and polystyrene melt reduces, breaking resistance limit and other indices unprove. 180–190 °C temperature has been accepted as optimal variant of refining in the extruder [15; 16]. Low density polyethylene and polystyrene mixture has been shirred with 5% BSK in two-rotor extruder at 180–190 °C within 10 minutes. It the presence of BSK improvement of mixing of LDPE with PS is observed and it is explained with closeness ofthe rubber macrostructure to LDPE and PS structure and formation of the microlayer having absorbtion and diffusion properties in the interphase boundary of BSR [17; 18].

The advantage of polymer modificatore in solid phase is that the processes as solution, precipitation of polymers and etic, are eliminated. But there are also disadvantages.

During the modification cross-linked, unsalable fractions form un the solid phase and properties of the system depend on the formed heterogen phase dispersion.

When refining parameters have been chosen correctly it is possible to obtain block and graftingsopolymers having the indicated properties by mechanico- chemical modification.

Compositions obtained as a result of mechanico- chemical influence of polyolefins, including functioned polyolefins (CPS, SCPS, CAPP, SAXPP and etc.) with elastomers when mixing make it possible to get compositions with special properties. These compositions are of industry significance.

A number of researches have been carried out on the mechanico- chemical modification of butyl rubber with polyolefins having functional groups.

Mechanic — chemical processes take place during refining and exploitation of the polymers. These processes are of great sgonificancein the directed cation of polymers. That's why mechanism and nature of decomposition processes of polymers during mechanico-chemical influence have been studied deeply.



Figure 1. Thermal decomposition of SKEP modified with PVDC depending

On the emollescence modulus (E) and change of mechanical loss times tangent g (E''/E') show relaxation peculiar to glass-like poly-

mers at dynamic condition of SKEP –PVDC and $-80+50$ °C temperature interval. It is -50 °C for in modified SKEP (13,6% mass PVDC).

T_g b maximum correspond to E transition point. As a result of braining of maximum – sopolymerrelaxtion areas interinfluence of phases to their internal structures intermediate structure forms values of relative tensility (ϵ_g) modifiedsopolymer in extension is higher. The value of mechanical psendohomogeneous mixture ϵ_g is 36%.

Mechanical antvemollescens properties are completely expressed by relaxation properties. Isothermal (25 °C) relaxation process of the tension at the given stable deformation ($\epsilon = 0,15$) has been studied: $f(t)$ the results of $f(t)$ measure have been given in the form of dependence of relaxation modulus on time $\epsilon_2(t) = f(E)$ and retarded emollescence model of Maxwell- Vihkert:

$$E_r(t) = E_\infty + \sum E_i e^{-\frac{t}{\tau_i}}$$

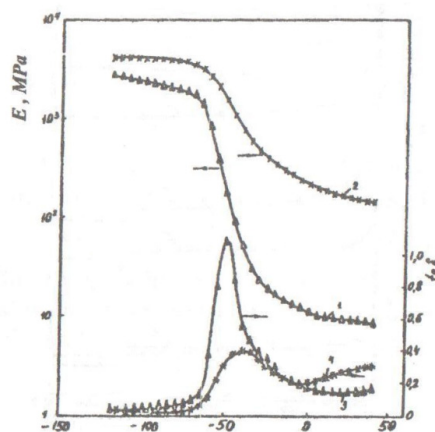


Figure 2. Dependence of dynamic modulus and mechanical loss tangent on the time, 3 – by unmodified SKEP, 2,4 – SKEP modified PVDC (13,6% mass)

Unmodified SKEP is characterized by a very small 0,5 MPa original $E_r(0)$ modulus. As a result of high elasticity of polymer tension is relaxed very quinely and in 10 minutes E_r value is equal to 0,03MPa and then reduces to zero. Relaxation curves of modified SKEP distinguish from unmodified polymer relaxation curves strictly. When quantity of modified polymer (PVDC) increases, value of $E_r(0)$ raises up to 8,0 MPa.

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Turaev Erkin,
Ph. D., Independent researcher,
Tashkent chemical-technological institute,
The faculty of chemical technology of fuel and organic substances
Uzbekistan, Tashkent

Sottikulov Elyor,
Independent researcher,
Djalilov Abdulakhat,
Doctor of Chemistry, Professor,
Director of Tashkent State Unitary Enterprise Research Institute,
Uzbekistan, Tashkent
E-mail: Turaev08@yahoo.com

INFLUENCE OF NANO AND MICRO SIZE PARTICLES ON PHYSICAL MECHANICAL PROPERTIES OF POLYPROPYLENE

Abstract: The effect of nanoscale particles on various properties of polypropylene has been studied. The influence of the nature of nano-sized particles and micro-sized particles on the properties of polypropylene is estimated.

Keywords: polypropylene, ethylene-propylene elastomer, tensile modulus, flexural modulus, elongation, impact strength.

Keywords: propylene, nanoparticles, talc, tensile modulus, flexural modulus, elongation, impact strength, HDT.

Introduction. One of the most attractive and voluminous applications of polypropylene (PP) is the automotive industry, where the PP successfully competes with the metal, replacing it in individual parts of the car's design, in ever-increasing quantities every year.

However, in majority of cases, the physical-mechanical characteristics of the PP are insufficient in themselves for the effective application in this field. Therefore, almost immediately after obtaining industrial production of PP, it is begun to resort to its modification, compounding with fillers of various nature, in order to improve the exploitation character of the material. Thus, the introduction of mineral fillers and modified nanoparticles is widely used to increase the hardness and heat resistance of polymers. In most studies, it is noted that the magnitude of the modulus is mainly determined by the volume fraction of hard inclusions [1].

The shape of the filler particle has a noticeable effect on the modulus of the filled compositions. In the case of anisotropic talc and kaolin particles, the increase in the modulus of the compositions is more pronounced than in the case of quasi-isotropic calcium carbonate particles [2].

The aim of this work is to study the effect of modifiers such as organomodified montmorillonite, organomodified vermiculite and

talc on the properties of composites based on polypropylene. And also, for the first time, using organomodified vermiculite as nano sized particles to modify the basic properties of polypropylene.

Experimental method. It used copolymer polypropylene (PP) of EP 5074, with a melt flow index (MFR) of 30 g/10 min, produced by PolyMirae Co. Ltd. As the filler, fine-dispersed talc of T6300 (talc) with a particle size of less than 5 microns, manufactured by Koch Co. Ltd, montmorillonite (organoclay1) of Navoi (Republic of Uzbekistan) and montmorillonite (organoclay2) of the Gerpegezhsy (Kabardino-Balkaria Republic), Vermiculite of the Tebin bulak (Republic of Uzbekistan). Montmorillonite and vermiculite were crushed in a ball mill for 12 hours and modified with quaternary ammonium salts. Stirring of the compound composition was carried out in a laboratory two screw extruder at a temperature of 180 °C – 210 °C and a screw speed of 80 rpm. Preliminary, all the components were mixed manually, for 15 minutes and loaded into a laboratory extruder. Specimens for testing were prepared by the injection molding method.

Results. Various physic mechanical properties of the base PP and a mixture with talc, organoclay1, organoclay2 and organo vermiculite were studied, the data of which are presented in Table 1.

Table 1. – Physical and mechanical properties of PP compounds

Name	Test methods	Base PP	PP 95% + talc-5%	PP 95% + organoclay1-5%	PP 95% + organoclay2-5%	PP 95%+ organo-vermiculite-5
1	2	3	4	5	6	7
Density, g/cm ³	ISO1183-A	0,9	0,932	0,921	0,926	0,929
Melt flow index, g/10 min	ISO-1133	30	29	30,2	30,3	30,3
Flexural Modulus, 2 mm/min, MPa	ISO-178	1128	1310	1600	1600	1700

1	2	3	4	5	6	7
Tensile Modulus, 50 mm/min, MPa	ISO-527-1/2	29	29	31	31	31,5
Elongation at break,%	ISO-527-1/2	80	50	70	73	70
Notched Izod impact strength + 23 °C, kJ/m ²	ISO-180	6,0	4,9	5,8	5,8	5,8
Notched Izod impact strength -30 °C, kJ/m ²	ISO-180	2,2	1,8	1,9	2,0	2,0
HTD (1.8 Mpa), MPa	ISO-75-2	47	50	55,5	56,3	57,0
Shrinkage after 48 hours,%	ISO-294	1,49	1,32	1,39	1,41	1,40

Table 1 shows the physic mechanical properties of compounds with different additives. The concentration of the modifiers was 5% of the mass. This was done to assess the effect of the nature and the particle size on the properties of the base PP. When adding additives with 5% by weight in PP, the density of the compounds increases insignificantly, and the melt flow index remains at the level of the base PP. This is due to the low concentration of added additives. It is noted that when the mineral fillers, such as talc, are added in

large amounts (10–20% by weight), the density of composites increases from 0.90 to 1 g/cm³, the melt flow index decreases from 30 to 22 g/10min.

In our opinion, this is due to the high density of the talc itself ($\rho = 2.8 \text{ g/cm}^3$), the decrease in the melt flow index can be explained by the fact that mineral fillers have a blocking effect on PP melt flow index, since at the melting temperature of the PP, mineral fillers do not undergo to physicochemical changes.

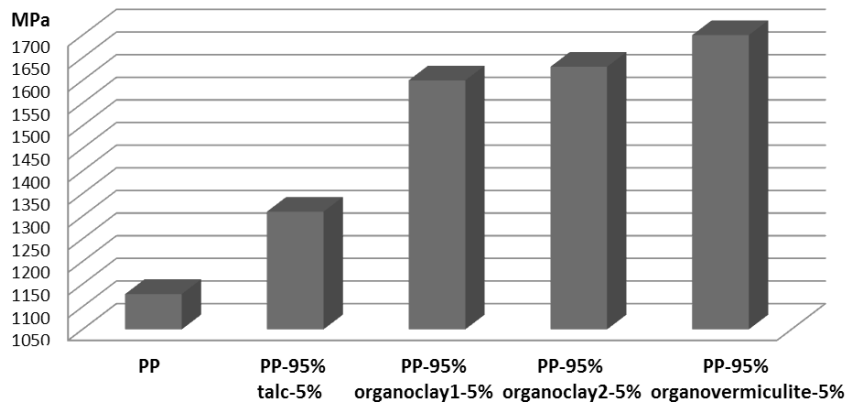


Figure 1. Flexural Modulus of the PP compounds

Fig. 1 shown that when talc is added at a concentration of 5% by weight, the flexural modulus of the composite increases by 14%, with the addition of nanoscale particles in 5% by weight. Such as, organoclay1, organoclay2 and organovermiculite the modulus of nanocomposites are increased by 30, 31 and 34%, respectively. As can be

seen from the obtained results, when adding micro and nano sized additives in an amount of 5% by weight, nanoscale particles have an effect more than 2 times in comparison with micro sized particles.

Relative tear removal and Izod impact strength also decrease slightly due to the anisotropic properties of micro and nano sized particles.

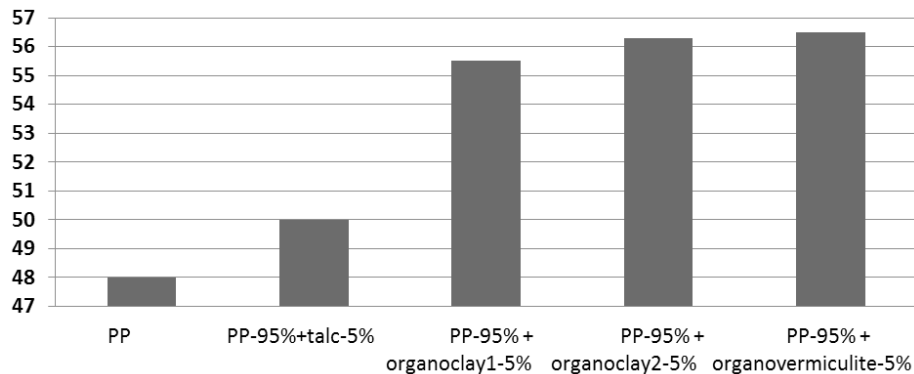


Figure 2. HDT of the PP compounds

Fig.2 shows the diagrams of the change in the heat resistance of the base PP from the content of micro and nano sized particles. When the micro sized talc is added, the bending temperature under the 1.8 MPa load increases by 4%. Such a low value can be the result of the fact that the micro-sized particles of talc are not evenly distributed throughout the entire PP matrix with a low concentration of talc. Micro-sized talc can only give effect when a minimum of 15–20% of the mass is added. And, in the case of the addition of nano sized particles, the bending temperature under the load of 1.8 MPa is increased by 14%, 15% and 15%, respectively. An increase in the heat resistance of nanocomposites can be the result of the fact that montmorillonite itself does not undergo to changes to a temperature of the order of 500 °C. Between silicon and oxygen

atoms there is a strong chemical bond; The energy of the Si-O siloxane bond is 89.3 kcal/mol. Hence there is higher heat resistance of layered silicate polymers. Consequently, the role of organoclay and organovermiculites in this case is reduced to a modification of the supramolecular structure of the polymer matrix.

Conclusions

It is possible to adjust the value of the modulus and heat resistance, adding not a large number of nanoscale particles, than adding micro sized particles of 10–20% by weight particles. This method can achieve maximum results with the addition of a minimum amount of nanoscale particles. It is established that, with the help of organoclay and organovermiculite, it is possible to radically change the properties of composites and bring them completely to a new level.

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Section 10. Economics and management

*Borisik Olga Viktorovna,
PhD., Belarusian State Economic University BSEU
E-mail: olga-star79@mail.ru*

COMMODITY SUPER-CYCLE: SPECIAL FEATURES AND CONSEQUENCES OF ITS TERMINATION FOR NON-COMMODITY-BASED ECONOMIES

Abstract: The article reveals theoretical fundamentals of a commodity super-cycle, determines special features of the most recent commodity super-cycle and gives arguments in favor of its termination. Special attention is paid to the factors that affect the formation of price environment on specific commodity-based markets. The author analyzes the consequences of the termination of a commodity super-cycle for non-commodity-based economies, including the economy of the Republic of Belarus.

Keywords: commodity-based markets, commodity super-cycle, price environment, non-commodity-based economies.

The debates concerning the commodity super-cycle have recently sharpened among analysts. The opinions of analytical agencies and international organizations have divided: some adduce arguments in favor of its termination; others assert that the demand for commodities in developing countries is still far from saturation and will be maintained still for some period of time. In addition, much has been said about negative effects from the reduction of commodity prices for commodity-based economies, whose incomes depend on the export of commodities. On the contrary, the reduction of prices on commodity-based markets has a favorable effect on commodity importers, improving the country's basic macroeconomic indicators. At the same time, non-commodity-based economies, which depend on the import of commodity resources, can both gain and not gain a positive effect, especially if they simultaneously export and import commodities. In this regard, it is interesting not only to determine special features of the most recent commodity super-cycle and arguments in favor of its termination, but also to analyze the consequences of its termination for non-commodity-based economies.

The concept of a commodity super-cycle was introduced by economists of the 20th century. The commodity super-cycle usually means a long-term increase of commodity prices (that lasts for 1.5–2 decades), the termination of which is manifested through the drop in prices and the change of trend [1, 198–211].

4 commodity cycles have happened since 1894. The first cycle reached the peak in 1917 and ended in 1932 with the outbreak of the Great Depression. The second cycle lasted until the Oil Crisis in 1971, having reached the peak in 1951. The third cycle reached the peak immediately after its beginning in 1973 and lasted until 1999 [2]. The most recent commodity super-cycle reached the highest point by the middle of 2011 and now it is coming to an end.

Simultaneous movement of actual prices for all commodities, except oil, occurred during these cycles. In general, the trends were characterized by a long-term decline, probably associated with en-

gineering achievements. In each peak they reached the maximum in correlation with the global economic growth, but then they dropped each time below the level of the previous cycle.

Super-cycles differ from short-term fluctuations, which are conditioned by microeconomic factors, in two special features. Firstly, a full cycle covers a longer period of time (20–70 years) with upturns in 10–35 years. Secondly, a super-cycle is observed in a wide range of commodities that are required mainly for industrial production and urbanization of developing economies.

Special features of the most recent commodity super-cycle are as follows:

- the strengthening of correlation of commodity prices, which is associated with the increase of demand for commodities on the part of China and the use of commodities for the resource production (sugar cane for biodiesel production, etc.);
- high price volatility, conditioned by several short-term and long-term factors (speculative attacks; natural disasters and social-political conflicts; technical and political risks, associated with the discovery of new deposits of oil, gas and precious metals; the failure of market to promptly respond to the increase of prices for agricultural products). These factors increase the historically established volatility of commodity-based markets, combined with the weakening adaptation mechanism of supply and demand to the market prices on these markets;
- synchronization of actual prices almost for all commodities, except oil. The oil prices challenged for some time the Prebisch-Singer hypothesis concerning the fact that in the long term the commodity export prices drop against the import prices for imported finished industrial products;
- the increase of the financial sector share in the commodity trade. The most recent super-cycle is unusual due to the sharp increase of the involvement of the financial sector in the commodity trade. This could cause the price distortion, firstly, because the use of

financial instruments prevents from perceiving the cycle peak, and secondly, because the correlation has increased;

- the early entry into the super-cycle expansion phase. Such increase is defined as the movement of prices for a wide range of material values above the primary trends during several decades [3].

- the increase of inward foreign investment volume for exploration and extraction of mineral reserves and energy resources, especially in Africa.

The formation of the downward price environment on various commodity-based markets (food, agricultural commodities, ores and metals, fuel) was influenced by various factors.

The market of ores and metals. Fast economic growth, construction of new production facilities, urbanization and infrastructure development in China initially boosted the demand for metals such as aluminum, copper and steel. Nowadays, due to the economic slowdown in China, the metal prices demonstrate minimum values (aluminum – over the last 7 years, copper – over the last 8 years, nickel – over the last 10 years). The prices for cobalt and silver continue to develop a bearish trend against the background of China's economic slowdown. Only the gold prices increase in the current year. All this suggests that gold is not going to lose the position of one of the leading financial tools. Until the economies of the largest countries become stable, the gold cost per ounce will rise and gold will pull ahead from the general direction of commodity trends.

The fuel market. As opposed to the previous commodity cycles, there is a reason to believe that the oil price becomes synchronized with other commodity prices. The American boom of shale, the increased use of alternative energy in Europe and the increase of energy efficiency in developed economies resulted in lower prices for hydrocarbon energy resources. Cars are switched to alternative energy – electricity and hydrogen. China's energy demand ceased to grow, which is caused by the economic growth slowdown and the environmental concern. Some of these factors fall under Schumpeter's definition of *creative destruction* [4, 467].

The market of agricultural products and foodstuffs. It is more difficult to explain the reduction of prices for agricultural commodities. The growth of world population provides an entirely sufficient demand. Moreover, no *creative destruction* is observed in agriculture. This price reduction may be explained by the cutting of production costs against the background of cheap oil.

The termination of a commodity super-cycle affects both exporters and importers of commodities. If commodity exporters face the worsening of economic performance, net importers of commodities experience the increase of economic growth level, financial improvement and the trade surplus increase. As commodities become cheaper, the economy spends less money on their purchase and thereby saves funds that can be spent on the financing of government expenditures. As a result, national GDP increases, living standards improve, unemployment reduces and economy comes out of recession and enters the next phase of economic cycle.

For commodity importers, the reduction of commodity prices is similar to tax reduction. The released currency assets help to increase savings, discharge debts and increase consumption. In most countries consumers increase their expenditures, i. e. consumption, which in turn leads to the growth of income and the further

growth of consumption (multiplicative effect). The termination of the current commodity super-cycle has brought substantial benefits to countries that do not have significant volumes of their own commodity resources, such as the countries of Eastern Europe and some Asian countries, including India, South Korea and Japan. So, according to Bloomberg New Energy Finance's calculations, European countries won 300 billion dollars from the drop in oil prices, the Asian countries – almost 400 billion dollars.

The consequences of the termination of a commodity super-cycle for net importers of commodities are as follows:

- cheaper commodities promote the increase of productivity of other production factors, thus increasing the real GDP;

- the effect of income from lower commodity prices is manifested through the expansion of demand for domestic goods and services. As the result of the commodity price reduction, the country's purchasing power on world markets increases due to the change of global prices for its import;

- the commodity price reduction can decrease the government's financial expenditures on regulation of domestic prices. So, many governments subsidize the consumption of local fuel. Due to the reduction of global commodity prices, these governments get the possibility to reduce subsidies;

- the significant reduction in the transfer of funds from the commodity-importing countries to the exporting countries allows the importing countries to spend the released funds on their own development.

As commodities become cheaper, the economy spends less money on their purchase and thus saves funds that can be spent on the financing of state expenditures. As a result, national GDP grows, living standards improve, unemployment reduces and economy comes out of recession and enters the next phase of economic cycle. As a result of the termination of a commodity super-cycle, exactly the countries that do not possess significant volumes of their own resources managed to demonstrate high economic growth rates. Such economies include the countries of Eastern Europe and some Asian countries, including India, South Korea and Japan.

Being a specific participant of a commodity-based market, acting both as importer and exporter of commodities and having a significant import component in export, Belarus eventually gains a negative effect from the termination of a commodity super-cycle. This is associated with the fact that economic losses, resulting from the reduction of foreign exchange earnings due to the reduction in the export of oil, oil products and potash fertilizers, exceed the economy's profits from lower prices for imported commodities. So, if we compare the effects from the commodity price reduction for Belarus, as for the importer and exporter of commodities, the losses of Belarus-exporter from the reduction of oil product prices and thus the reduction of foreign exchange earnings, exceed the profits of Belarus-importer from low import prices for commodities. The proof of that is the economic growth slowdown by 3.9% in 2015 and 2.6% in 2016%.

Thus, the consequences of the termination of a commodity super-cycle are different for non-commodity-based economies, depending on whether they are net importers of commodities, exporters and importers simultaneously, and also depending on the commodity import component in their export.

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Dr. Mikel Alla,
Accounting Studio & Tax Consultancy
University of Elbasan
Elbasan, Albania
E-mail: mikel-alla@yahoo.com

HAS THE VAT IMPROVED THE TAX REVENUES RATIO IN THE BALKANS?

Abstract: VAT is a special type of turnover tax, applied at each stage of production and distribution process. VAT as a tax on consumption based on the principle of self-declaration, self-assessment and the tax deduction, which means that taxpayers are encouraged to file and assess tax liabilities and may seek reimbursement of tax paid. The study aims to examine the VAT and effect of VAT and other factors on tax revenues of Balkan countries. The empirical results of this study have identified that factors such as; the presence of VAT in a tax system, open trade, inflation, the share of agriculture to GDP etc. are important factors that affect the stability of the ratio of tax revenues. Adoption and implementation of VAT, for a long period in the tax systems of countries of the Balkans, has increased the ratio of tax revenue with 5.12%. The orientation of Albania towards the model of taxation through VAT, towards keeping under control the inflation rate, formalization the agriculture sector and the trend towards open trade, positively affects to the ratio of tax revenues.

Keywords: VAT, Tax System, Income Tax, Tax Revenues Ratio.

Introduction

There is a resonance among the authors that VAT generates more stable and higher income than sales tax. Applying VAT to a tax system tends to increase the level of tax collected Keen and Lockwood [9]. Agha and Haughton [10], using data from 17 OECD countries, concluded that VAT efficiency is achieved when a standard rate is applied to a tax system when a reduced rate and fewer VAT exemptions are applied. De Mello [11] uses data from 42 countries, including mostly OECD countries and other countries. Its findings confirm the Agha and Haughton thesis [10] that VAT efficiency is achieved by applying a standard non-high rate. Michael Keen and Ben Lockwood [9] gave a significant contribution to the effects of adopting VAT on a tax system using data from 143 states for a period of 25 years (1975–2000). The essence of their analysis has to do with the efficiency of adopting a VAT system. According to their study, VAT increases the income ratio by 3.4%. That's about 0.5% of GDP. Auriol and Warlters [12] conducted a study to assess the costs of public funds management for five tax instruments in 36 African countries. They concluded that VAT was the lowest-cost tax instrument. Ebeke and Ehrhart [8] confirmed this result for African countries (for the period 1980–2005). The purpose of Ebeke and Ehrhart's study was to assess the presence of VAT on a tax system and its impact on increasing tax revenue stability in developing countries. They concluded that VAT has a stabilizing effect on the tax revenue ratio.

Purpose and methodology of the study

Purpose of the study: This study aims to analyze the VAT and other determining factors of the tax revenue ratio of the Balkan countries.

Research question: What are the determining factors of tax revenues in Balkan countries? What is the effect of VAT? Is it positive or negative impact?

Hypotheses: $H_0: B_1 = B_2 = B_3 = \dots = B_n = 0$

H_a : At least one of the parameters is different from zero

Methodology: This paper is based on study of Michael Keen & Ben Lockwood [9] and Christian Ebeke & Helene Ehrhart [8], on

the economic impact of VAT on tax revenues, and even the variables used are based on study of these authors. For the analysis of the impact of tax revenue factors, the variables are presented in the form of time series for a 24-year period (1991–2014), with the exception of qualitative variables "VAT" and "VAT model". The analysis will be carried out with cross-data of the Balkan countries. The alpha level will be 5% for all empirical analyzes.

Data analysis and results

After reviewing theoretical and empirical literature, variables that have been taken into account for carrying out the empirical analysis are: the ratio of "total income from taxes/GDP, VAT (0 – VAT periods, 1 – periods without VAT), openness (exports + imports/GDP), income per capita, agriculture weight to GDP, inflation, VAT model, country size, population over 65 years of age and population below 14 years of age. The probability rule has been used to validate the hypotheses and the chosen level of significance is 0.05. To test the Regression Model assumptions, are used these tests: Ljung-Box test for stationarity, Durbin Watson test for autocorrelation, Kolmogorov-Smirnov test for normality and White test for heteroskedasticity. The determination coefficient R^2 is used for the explanation of the model. The sample consists of 240 observations. From testing the data, it turned out that all the variables are not sustainable. As a result, the relevant transformations have been made and the conclusion is reached, that all the variables are stable with a difference. In the case of our model has resulted that $DW = 2.3$. Since it is within autocorrelation values we conclude that the term of error has no serial autocorrelation and this assumption of the regression model is also fulfilled. From the analysis performed with SPSS has resulted that $K-S = 0.2$, which means that the data distribution is normal. The assumption of normality is met. So derived model is sustainable in the long term. White test = 0.63, which is statistically insignificant. The assumption of homoskedasticity is met and the estimated parameters are BLU. From the regression results $R = 0.81$ and $R^2 = 0.67$. Under these conditions, 67% of the tax income ratio is ex-

plained by independent variables that have been taken into consideration while the remainder may be explained by other variables that are not the subject of this study. Since the probability of the model is 0 and lower than the 5% (significance level), we conclude that the model is statistically significant and can be used for political prediction, control and decision making purposes. From the final results it turned out that all variables taken into account have been statistically significant except “the income per capita” variable. Although its impact is positive, in line with expectations, its parameter has not been significant. According to the results, in the case where VAT has not been applied, another form of taxation on consumption is used, tax returns/GDP in the Balkan countries is 32.4%, while in the case of VAT, this indicator increases with 5.12%. So this form of consumer taxation affects positively on tax revenues. To avoid tax accumulation and to tax only once the value of goods and services, the VAT model provides for tax deduction, thereby guaranteeing fiscal neutrality with no double charge on taxation. Cross-border trade increases tax revenues by 1.2%. As a result, the possibility of applying the reverse-charge scheme for cross-border trade between these countries is likely to increase the effect of this variable on tax income Alla M. [13]. The income per capita effect is very small. This variable has been statistically insignificant. Agriculture/GDP ratio reduces tax revenues by 1.16%. The negative effect of this variable on the tax revenue ratio is related to the fact of the fiscal facilities that have enabled this sector as well as the difficulties in formalizing this sector. Also, inflation decreases by 3.2%. Thus, price volatility reduces the tax revenue ratio in the Balkans by 3.2%. The mixed VAT model increases tax revenues by 1.5%. It seems that for a long time, the Western Balkan countries may be outside the EU area. The results show that the European VAT model with the application of a low threshold and many standard norms and many reduced rates is not particularly appropriate for the countries of the Western Balkans. This also relates to the easier access to tax evasion schemes, which become more difficult to find and fight. For these countries, a mixed VAT model, where a standard rate is applied and some reduced rates for sectors of importance to the community and sectors to be stimulated, increases the ratio of tax revenues. Also, the positive effect of

the size of the country, of the category of population under 14 and over 65 years, is observed. Population over 65 years of age increases the tax revenue ratio by 0.9% and the population under 14 grows this ratio by 0.55%, while the effect of the population related to the size of a country is very small. Children up to the age of 14 are under the tutelage of the parents and the latter do everything to meet all their needs. As a result, the greater this category of population, the more benefits will be consumed, as a result of more taxes on the state budget. The same logic is with the category of people over 65 years of age. Generally this category of population is retired and tend to consume due to their savings.

Conclusions

The main objective of this paper was the analysis of VAT, its effect and other factors on the tax revenues of the Balkan countries. VAT, the share of agriculture to GDP, inflation, mix model of VAT, openness and the share of the population over 65 and under 14 are all important indicators that affect the ratio of tax revenues to countries Balkans. The only statistically unimportant factor is “income per capita”. “The size of the Balkan country” has a very small impact on tax revenues. The implementation of VAT for a long-term period in the tax systems of these countries has contributed to the increase of tax revenues by 5.12% compared to other taxation models on consumption. The application of the mixed VAT model, which combines the characteristics of the European model with the non-Europian model, has contributed to the increase of Tax Revenues/GDP ratio, as in the ten countries analyzed, six of them are out of the EU and most likely tend to be outside of the EU for a long time. Therefore, for these countries, a mixed VAT model, where a standard rate and some reduced rates for sectors of importance to the community, is better. It is better to administer and increase the ratio of tax revenue. Inflation and agriculture/GDP ratio negatively impact on tax revenues, while openness contributes to their growth. Taking into account the empirical results achieved by this study, I think this model is a contribution to policy makers. The orientation of Albania towards the model of taxation through VAT, towards keeping under control the inflation rate, formalization the agriculture sector and the trend towards open trade, positively affects to the ratio of tax revenues.

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*Dilrabo Nadirovna Sharipova,
Ph. D., associate professor,
lieutenant colonel of the customs service
of the Higher Military Customs Institute
of the State Customs Committee of the Republic of Uzbekistan
E-mail: dilrabo.sharipova.1964@mail.ru*

SOME ASPECTS OF IMPROVING THE MANAGEMENT OF PERSONNEL IN THE CUSTOMS BODIES OF THE REPUBLIC OF UZBEKISTAN

Abstract: This article indicates the need to implement the strategy of large-scale modernization of the personnel policy of the customs bodies of the Republic of Uzbekistan, the economic and social essence of improving the management of personnel in customs bodies. The author points out that in the context of increasing requirements to the quality of the work of customs bodies, the fulfillment of tasks and functions of customs legislation faces the problem of limited internal resources, which requires the development of methods for improving the management of personnel in the customs bodies of the Republic of Uzbekistan. To solve this problem, the author considers the possibility of using popular methods of the self-learning system, suggests some aspects of the formation of the professionalism of customs personnel, which determine the modern approach to improving the management of customs personnel.

Keywords: negative consequences of globalization, improvement of personnel management, main functions and tasks of customs authorities, methods of self-learning system, methods for improving the quality of advanced training for customs officers, modern approach to the management of customs personnel.

At present, the Republic of Uzbekistan is undergoing radical changes in all spheres of society. Changing economic relations in the context of liberalization of foreign economic activity made it possible to simplify many customs procedures, to adapt customs legislation to international standards in the customs sphere. In these conditions, the quality of customs services is directly related to the quality of personnel in the system. The study is proving the fact that improving the management of personnel in customs authorities is an important part of the implementation of the customs legislation aimed at ensuring the effective use of customs regulation in order to protect the economic security of the Republic of Uzbekistan. With the expansion of foreign economic activity, the requirements to the quality of public services in the sphere of customs administration, clearance and control are also increasing.

Existing conditions for conducting foreign economic activity are characterized by a high degree of dynamism, requirements to the quality of the work of customs bodies, efficiency and adequacy of customs operations and therefore customs control procedures are increasing. The need to accelerate the passage of all customs and border formalities, meet the requirements and rules of customs legislation as participants in foreign trade activities, as well as officials of regulatory bodies [1, 3 p].

The task of Uzbekistan achieving sustainable economic growth by increasing the competitiveness of the national economy and equitable integration of the country into the world community is closely linked with the tasks of ensuring economic security. Since the adherence to globalization processes is possible in combination with the protection of national production and the domestic market, the establishment of partnership, mutually beneficial relations between states that are at different levels of development. The development of such competitive capabilities of the country is strongly associated with the activities of the state economic security agencies, where

more than three thousand customs officers work. Specificity of innovations in personnel matters is connected, first of all, with the personal factors of customs officers.

The reality of today has revealed the problems of personnel management, the methods of solution that are most vulnerable in the overall system of customs administration. The following are a high degree of uncertainty of risk situations in the selection and placement of personnel and relationships from external (unmanaged) factors;

- complex functional interactions and connections of customs departments, the unresolved nature of which forms duplication of functions and irrational workload of both individual employees and the departments themselves;

- constant change of functional duties, workplace of rotated employees and the influence of the adaptation period on the quality of the work performed;

- in the increased risky conditions of economic integration in the provision of economic security, the human factor is growing, which was emphasized in the Program on Reforming and Modernizing Customs Services of the states, developed by the World Customs Organization. All this confirms the urgency of implementing preventive and preventive measures to use human potential in customs administrations around the world, including the improvement of the personnel management system in the customs bodies of the Republic of Uzbekistan.

The strict implementation of these tasks and functions is faced with the problem of limited internal resources, which ultimately affect the competitiveness of the national economy, diversification of production and exports. Therefore, in the development of the economy and ensuring the economic security of the country, it is necessary to concentrate the efforts of all interested parties in understanding the role of personnel management in the customs bodies of

the Republic of Uzbekistan, which is related to the realization of the economic and social essence and significance of the applied customs regimes, customs clearance, registration, control, Customs value, determination of the quality of goods under the Commodity Nomenclature for Foreign Economic Activities, etc. A deviation from the established requirements and standards may lead to a reduction in the level of customs payments or their incomplete receipt in the state budget, which may lead to a decline in economic development, to an increase in unemployment and dependence on competitors.

The customs bodies of the Republic of Uzbekistan have achieved a number of successes, which prepared it for the adoption of World Customs Organization standards and international standards, as well as for the introduction of international practice implemented on the basis of Uzbekistan's accession to the International Conventions on Customs and Customs Regulation of Foreign Trade Activities.

In order for the customs service of the Republic of Uzbekistan to meet the requirements of the international standards of the World Customs Organization (WCO), it is necessary to implement the strategy of large-scale modernization of its personnel policy. This activity consists in improving the system of personnel management and ensuring its effectiveness.

The World Customs Organization (WCO) «Framework of Standards for Security and Facilitation of World Trade» defines that the efficiency of the customs service should be directed to the needs of the private sector and society, and also to achieve a balance between these goals. The customs bodies use the policy of protectionism and trade liberalization to protect the economic interests of the state, producers and consumers by applying tariff and non-tariff measures of state regulation of foreign economic activity [3]. This is done through the streamlining of commercial activities, the introduction of effective customs regimes, the application of restrictive protective measures, the granting of benefits and preferences, the adequate evaluation of goods and services, specific rules for determining the origin of goods, modern customs infrastructure and other measures that form the customs mechanism of state regulation.

In order to counter the negative consequences of globalization and, at the same time, make the most of its benefits, the customs authorities should have a sufficiently calibrated and persistently implemented personnel policy implemented through well-selected, high-quality professional personnel [4, 316 p].

The report of the International Analytical Bureau The Economist Intelligence Unit in the analytical report "Trends in the economy, industry and corporate life. Forecast for 2020" emphasizes that the greatest added value will be achieved at the expense of intellectual, not material component. Hence, any work will require a large expenditure of creative forces [5]. Creativity will become more important than the ability to follow traditional thinking. Managers will appreciate the ability to build relationships with people and organizations [6, 12 p].

The aforementioned facts urgently require the improvement of the personnel policy and international cooperation in the field of personnel management in the customs authorities.

The solution to this problem can be achieved by introducing into the organization a certain system, which is generally called a self-learning system. Or you can simply say in another way: an or-

ganization should become self-learning. This principle is successfully applied in many companies, its application in public service systems can also affect the efficiency of the performance of functional duties. At present, there are many different approaches, created in different years, the implementation of which is acceptable to the study of the problem of self-learning organization in the customs authorities.

One of the most popular methods of self-learning organization are:

System thinking – a set of knowledge and tools developed in recent years in the field of customs and regulation of foreign economic activity, mastering customs methods based on the requirements of international standards that are designed to better understand the integrity of phenomena in the customs sphere, which should help in achieving the upcoming changes. Every customs officer is part of the whole system and must be involved in all interactions with the outside world;

Mastery in personal development – a special level of skill through which workers are able to consistently achieve significant results, tirelessly learn and gradually improve;

Intellectual models – models of what can and can not be done in specific managerial situations, how much employees can change common for them frozen views and adapt to new requirements;

Movement towards a common vision — employees should be provided with a general picture of the future that stimulates commitment to the cause;

Group training – the opportunity to work in a team, develop a sense of team, share knowledge and skills in a group, transfer experience and skills to another. This method will improve the skills of existing personnel, rationally use human resources, resist corruption, and malfeasance, prevent rash actions and other negative phenomena, and use the mechanism of discussing a certain work situation productively. This method will allow to identify possible mistakes made by employees during the implementation of customs control, registration, comparison of financial information in the cargo customs declaration, reconciliation of information on foreign trade contracts, use of regulatory documents and instructions.

All of the above methods will contribute to the formation of professional competence of heads and specialists on the basis of the relationship school mentoring and succession of frames. Provision of personnel to senior positions should be implemented through the introduction of mentoring schools (in the implementation of mentoring salary increments), to organize the management of continuity of personnel, which will facilitate the transfer of experience growing young professionals and is in form and substance, not only staffing management personnel in the market conditions, but also the "cultivation" of adaptive management, and with it the development of an organizational culture that yavl etsya foundation for the introduction of international standards for customs administration.

Drawing the conclusion, the author suggests some aspects of improving the management of personnel in the customs bodies of the Republic of Uzbekistan as ways of forming professionalism that determine the modern approach in the management of customs personnel. These are:

Firstly, the constant monitoring of the impact factors on the process of forming the competencies of customs officers and the formation of the required capabilities;

Secondly, in the Charter of the Higher Military Customs Institute to determine the role of the “Faculty of Retraining and Advanced Studies” as “courses of prevention and development of professional competencies” as a system for training personnel and professionalizing officials of customs authorities and develop a “card of competencies of the trained customs officer”, which forms the bank (Information resource of the Main Personnel Management Department of the State Customs Committee of the Republic of Uzbekistan) for the development and formation of the professionalism of the employee (the card indicates the place and period of work, position, education status, list of acquired skills in the specialty in each position. The studied disciplines in the courses of advanced training, the assessment of the commission of the Faculty of professional development of High Military Customs Institute of Uzbekistan, the results of examinations). This card will accompany the employee during all work activities in all his official travels and testify about the level of competence, the quality of his personal and professional growth, determine the worthiness of the customs service. Information indicated on the map must be carried out with technical difficulties in order to prevent forgery. It is lawful to use the information of the “competence card” when deciding on the appointment to a higher position and recommendations to the personnel reserve, in the system of rotation and certification of customs officers;

Thirdly, before the preparation of training plans for the advanced training courses, it is necessary to analyze the long-term and short-term plans of the State Customs Committee of the Republic of Uzbekistan for determining the profile and subject of training, determining which training (content, methods used) will allow employees to reach the required level of qualification and training for Compliance with the required parameters according to the system of continuous maximum professional readiness of employees – the development of human resources of customs authorities;

In order to improve the quality of professional development of customs officers, the following is proposed:

– The training process for customs officers should be based on the principles of andragogy (a scientific approach to the learning process of adults). During training, the following characteristics of adult employees should be taken into account: a conscious attitude towards learning; The desire for independence; The desire for meaningful learning: knowledge is needed not only for professional growth, but also for solving a specific problem and achieving a specific goal; Practical orientation: the desire to apply the acquired knowledge and skills; Presence of life experience; Influence on the training of social, domestic and time factors;

– in the training courses for all levels of professional development, including staff included in the personnel reserve on the conclusions of the certification commissions, to introduce the discipline “Customs Management”, “Personnel Management in Customs Authorities” for the formation of scientifically grounded managerial skills and knowledge on the prevention of officials Offenses, personnel control and audit;

– professionalism is based on experience, which is formed over the years, promotion through the career ladder and appointment to higher positions should be strictly linked with the experience of work in customs bodies, in this situation, experienced professionals do not compete with young employees, therefore they will willingly transfer their knowledge to newcomers and young people, and to promote the development of staff continuity and the formation of a school of mentoring. This method of step-by-step personnel growth and staff continuity will be an incentive for selfless promotion through the ranks and contribute to the prevention of corruption;

– the organization of psychological diagnosis of employees (the introduction of full-time position of a psychologist for educational and preventive work with employees who received official penalties and punishments).

– to develop an organizational and functional mechanism for managing the process of forming the professionalism of the personnel of the customs body and to make proposals on the structural improvement of the system of professional training of customs personnel;

– in order to save financial and material resources (travel expenses, office equipment costs, personnel costs, maintenance costs of buildings, administrative costs), use the training of personnel directly in the customs authority, i. e. organize in-house or distance learning.

Thus, in our opinion, the staffing of the system of personnel management of customs authorities in the context of liberalization of foreign economic activity requires a special system and methods that allow to attract into the customs sphere and stimulate management personnel, to increase quantitative and qualitative potential, to integrate high discipline, professionalism, and Rational organization of new socio-economic relations, promoting initiative, creative activity, independence of customs officials in the And also non-standard situations in the conditions of liberalization of foreign economic activity of the Republic of Uzbekistan.

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