

European science review

Nº 5–6 2019

May–June

European Sciences review

Scientific journal

№ 5–6 2019 (May–June)

ISSN 2310-5577

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European Journal of Arts is an international, German/English/Russian language, peer-reviewed journal. It is published bimonthly with circulation of 1000 copies.

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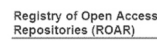
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Typeset in Berling by Ziegler Buchdruckerei, Linz, Austria.

Printed by Premier Publishing s.r.o., Vienna, Austria on acid-free paper.

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MULTIPLE ANTIBIOTIC RESISTANCE OF SOIL STRAINS OF PSEUDOMONAS CHLORORAPHIS

Abstract. *P. chlororaphis* is a very common in nature. It includes few subspecies (*P. chlororaphis* subsp. *chlororaphis*, *P. chlororaphis* subsp. *aureofaciens*, *P. chlororaphis* subsp. *aurantiaca*, *P. chlororaphis* subsp. *taetrolens*, etc.) with wide usage as a soil inoculum in agriculture and horticulture. Representatives of *P. chlororaphis* have a big potential for agrobiotechnology for creation of plant bioprotectors against phytopathogenic microorganisms, as an alternative of classical antibiotics. Besides, some strains of *P. chlororaphis* are being used as growth and fruiting biostimulator products for horticultural and agricultural crops.

Therefore, according to permanently enlarging of antibiotic wide usage, the research of antibiotic resistance of *P. chlororaphis* and the ability to spread this property among other microorganisms are very important.

Keywords: *Pseudomonas chlororaphis*, multidrug resistance, plasmids, PCR.

Introduction

P. chlororaphis is a group of very common Gram-negative bacteria of soil and other wet media. It is often being used as a soil inoculant in agriculture and horticulture. *P. chlororaphis* can act as a biocontrol agent against certain fungal plant pathogens via production of phenazine-type antibiotics [1; 2]. They produce phenazine-type antibiotics, which are effective against some phytopathogens. Based on genetic analyses, similar species have been placed in group. *P. chlororaphis* lends its name to a subgroup within the genus, including *P. chlororaphis* subsp. *chlororaphis*, etc. The other members of group are *P. aurantiaca*, *P. aureofaciens*, *P. fragi*, *P. lundensis*, and *P. taetrolens* [3]. *P. chlororaphis* subsp. *aurantiaca* is an orange soil bacterium, of rhizosphere of potatoes. In *P. chlororaphis* subsp. *aurantiaca* produces di-2,4-diacetylfluoroglucylmethan, which is antibiotically active against Gram-positive organisms. *P. chlororaphis* subsp. *aureofaciens* is a yellowish, soil bacterium isolated from clay near the River Maas. *P. chlororaphis* subsp. *taetrolens* is motile, rod-shaped bacterium that causes mustiness in eggs [4]. Wide usage of antibiotics in different scopes of human activity often becomes a cause of forming of new pathogenic antibiotic resistant strains, which have inherited their resistance from native Gram-negative soil bacteria [5, 6].

In current paper, the mechanisms of antibiotic resistance of different strains of 4 subspecies of *P. chlororaphis* were researched.

Materials and Methods

18 strains of 4 subgroups of soil strains of *P. chlororaphis* from The National Culture Collection of Microorganisms of the MDC of "Armbiotechnology" SPC NAS RA (*P. chlororaphis* subsp. *chlororaphis*, *P. chlororaphis* subsp. *aureofaciens*, *P. chlororaphis* subsp. *aurantiaca* and *Pseudomonas chlororaphis* subsp. *taetrolens*) were researched. As the control samples there were used non-plasmid sensitive strains *P. aeruginosa* and *E. coli* DH5 α [7]. All the researched strains were cultivated on liquid and solid agarised cultural media at the temperature 37 °C. Antibiotic resistance was tested according to standard protocols using the following antibiotics, produced by "Astoria": β -lactamic (Amp/ampicillin, Amx/Amoxicillin, Amc/Augmentin, Cfx/Cefixime and Ctx/Ceftriaxone); aminoglycoside (Kan/kanamycin, Stp/Streptomycin); fluoroquinolone (Cip/Ciprofloxacin); Tcn/Tetracycline, Macrolides (Azm/azithromycin); amphenicol (Cam/Chloramphenicol) [8; 9; 10; 11]. The genetical analysis was done by DNA electrophoresis on 0.8–2.5% agarose gel, transformation by Mandel's method and PCR. DNA isolation was done by alkaline extraction for plasmids and with benzyl-chloride method for total DNA. PCR analysis of antibiotic modification enzyme genes was done with the following primers: *aph(3')IV*, *aac(6')II*, *pCAT639*, *blaOXA-10* and marker standard fragment mix EcoRI/Hind III [12; 13; 14].

Results and Discussion

The research of antibiotic resistance of different strains of *P. chlororaphis* are presented in (table 1). According to

(table 1), in frame of researched group of strains, the quantitative prevalence of multidrug resistant representatives is makeable.

Table 1. – Antibiotic resistance of *P. chlororaphis* different strains. (classes of antibiotics in 50 mkg/ml concentration: 1 – aminoglycosides, 2 – amphenicols, 3 – β -lactams, 3(1) – aminopenicillins, 3(2) – cephalosporins, 4 – tetracyclines, 5 – azalides, 6 – fluorquinolone; “+” – growth, “-” – absence of growth, C – control on solid agarised cultural media)

Strain <i>P. chlororaphis</i>	1		2	3					4	5	6	C
	Kan	Stp		3(1)			3(2)					
subsp. <i>aurantiaca</i>	Kan	Stp	Cam	Amc	Amx	Amp	Cfx	Ctx	Tcn	Azm	Cip	
9064	-	+	+	-	+	+	+	+	+	+	+	+
9061	-	-	+	+	+	+	+	+	+	-	-	+
9062	-	-	-	-	-	-	-	-	-	-	-	+
subsp. <i>aureofaciens</i>	Kan	Stp	Cam	Amc	Amx	Amp	Cfx	Ctx	Tcn	Azm	Cip	+
9200	+	-	-	-	-	-	-	+	-	-	-	+
9060	-	+	+	+	+	+	+	-	+	-	+	+
9192	-	-	-	-	-	-	-	-	-	-	-	+
9197	-	-	-	-	-	-	-	-	-	-	-	+
9026	-	-	-	-	-	-	-	-	-	-	-	+
subsp. <i>chlororaphis</i>	Kan	Stp	Cam	Amc	Amx	Amp	Cfx	Ctx	Tcn	Azm	Cip	+
9329	-	-	-	-	-	-	-	-	-	-	+	+
9158	-	-	+	-	+	-	+	-	-	-	-	+
9156	-	-	+	-	-	+	-	+	-	-	-	+
9167	-	-	-	-	-	+	-	+	+	-	+	+
9175	-	-	-	+	+	+	+	-	+	-	-	+
subsp. <i>taetrolens</i>	Kan	Stp	Cam	Amc	Amx	Amp	Cfx	Ctx	Tcn	Azm	Cip	+
9246	+	+	+	+	+	+	+	-	-	-	-	+
9243	-	-	-	-	-	-	+	-	-	-	-	+
9242	-	-	-	-	-	-	+	+	+	-	-	+
9241	-	-	-	+	+	-	+	+	-	+	+	+
9248	-	-	+	-	-	-	-	+	-	+	+	+

The results of comparison of DNA analysis of researched sensitive and resistant strains are presented on (table 2 and 3). The electrophoretic analysis showed the presence of plasmid

containing and non-plasmid strains. PCR analysis showed the presence of 2 types of genes of antibiotic modification enzymes.

Table 2. – DNA analysis of *P. chlororaphis* different strains (p – plasmid, presence (“+”)/ absence (“-”) of plasmid or gene correspondently)

Strain of <i>Pseudomonas chlororaphis</i>	P +/-	PCR analysis of antibiotic modification genes			
		aph(3')IV	aac(6')II	pCAT639/catB7	blaOXA-10
subsp. <i>chlororaphis</i>					
1	2	3	4	5	6
9329	+	-	-	-	-
9158	+	-	-	-	-
9156	+	-	-	-	-
9167	-	-	-	-	-
9175	-	-	-	-	-
subsp. <i>aureofaciens</i>	P +/-	aph(3')IV	aac(6')II	pCAT639/catB7	blaOXA-10
9200	+	-	-	-	-

1	2	3	4	5	6
9060	+	-	-	-	-
9192	+	-	-	-	-
9197	-	-	-	-	1.6kb
9026	-	-	-	-	-
subsp. aurantiaca		aph(3')IV	aac(6')II	pCAT639/catB7	blaOXA-10
9064	+	-	-	-	-
9061	+	-	-	-	-
9062	+	-	-	-	-
subsp. taetrolens	P +/-	aph(3')IV	aac(6')II	pCAT639/catB7	blaOXA-10
9246	+	-	-	1.4kb	-
9242	+	-	-	-	1.6kb
9243	+	-	-	-	-
9241	+	-	-	-	-
9248	+	-	-	1.4kb	1.6kb

In *P. chlororaphis* subsp. *aureofaciens* 9197, *P. chlororaphis* subsp. *taetrolens* 9248, *P. chlororaphis* subsp. *taetrolens* 9242 the gene *blaOXA-10* of β -lactamase OXA-10, defining the resistance to β -lactams was detected by PCR analysis. In *P. chlororaphis* subsp. *taetrolens* 9246 and *P. chlororaphis* subsp. *taetrolens* 9248 the gene *catB7* of chloramphenicol acetyltransferase was detected by PCR analysis with primer *pCAT639*. Genes of

aminoglycoside modification *aac(6')II* of N-aminotransferase and *aph(3')IV* of O-phosphotransferase were not detected. For the definition of detected genes localization and the evaluation of resistance transfer potential of strains, there were done transformation of sensitive strains of microorganisms from different taxonomic groups [15; 16; 17]. The results of transformation are presented in (table 3).

Table 3. – Analysis of transformation. (“-”) absence of transformation)

Plasmid Donor Strain of Pseudomonas Chlororaphis	Transmission of antibiotic resistance to <i>P. aeruginosa</i> 9056	Transmission of antibiotic resistance to <i>E.coli</i> DH5 α
<i>P. chlororaphis</i> subsp. <i>chlororaphis</i> 9158	-	-
<i>P. chlororaphis</i> subsp. <i>chlororaphis</i> 9156	-	-
<i>P. chlororaphis</i> subsp. <i>chlororaphis</i> 9329	-	-
<i>P. chlororaphis</i> subsp. <i>aurantiaca</i> 9064	Resistance to all β -lactams	Resistance to all β -lactams
<i>P. chlororaphis</i> subsp. <i>aurantiaca</i> 9061	-	-
<i>P. chlororaphis</i> subsp. <i>aurantiaca</i> 9062	-	-
<i>P. chlororaphis</i> subsp. <i>aureofaciens</i> 9200	Resistance to Ctx	Resistance to Ctx
<i>P. chlororaphis</i> subsp. <i>aureofaciens</i> 9060	Resistance to Amp, Amx, Amc, Cfx	Resistance to Amp, Amx, Amc, Cfx
<i>P. chlororaphis</i> subsp. <i>aureofaciens</i> 9192	Resistance to Amp, Amx	Resistance to Amp, Amx
<i>P. chlororaphis</i> subsp. <i>taetrolens</i> 9246	-	-
<i>P. chlororaphis</i> subsp. <i>taetrolens</i> 9242	-	-
<i>P. chlororaphis</i> subsp. <i>taetrolens</i> 9243	-	-
<i>P. chlororaphis</i> subsp. <i>taetrolens</i> 9241	-	-
<i>P. chlororaphis</i> subsp. <i>taetrolens</i> 9248	-	-
Control (<i>E. coli</i> DH5 α /pUC18)	Resistance to Amp	Resistance to Amp

According to (table 3), resistance to both aminoglycosides and β -lactam antibiotics is caused by plasmids in 28% of researched strains, which belong to subgroups *P. aureofaciens* and *P. aurantiaca*. The phenotype of transformants was same in both cases of *P. aeruginosa* 9056 and *E.coli* DH5 α .

Conclusion

The strains with wide diapason of resistance were observed. The sensitive strains are presented by the minority. In a majority of cases they are resistant to more than 1 antibiotics. Plasmid containing, non-plasmid resistant and sensitive

strains were detected. Thus, the direct correlation between the plasmid presence and resistance was not detected. The genes *catB7* and *blaOXA-10* were identified in 5 strains of *P. chlororaphis* subsp. *aureofaciens*, subsp. *aurantiaca* and subsp. *taetrolens*. These genes have both plasmid and nucleoid localization. In current group of strains of subsp. *taetrolens* the plasmid genes were not detected. Chloramphenicol resistance is not transferred by plasmids and is caused by nucleoid genes,

such as like in case of streptomycin. Kanamycin and β -lactams resistance is transferred by plasmids for 4 strains of subsp. *aurantiaca* and subsp. *aureofaciens* of *P. chlororaphis*.

Acknowledgments. This work was supported by the RA MES State Committee of Science, in frames of the research project № 18T-2I036 and the research grant from the Armenian National Science and Education Fund (ANSEF), № microbiology-5133.

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Section 2. Demography and ethnography

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ROAD HANDLING POLICY IN IMPROVING HUMAN DEVELOPMENT INDEX (HDI) IN PEMALANG DISTRICT

Abstract. Research Objectives describe how the Road Management Policy in Improving Community Development Index in Pemalang District. The problem is the still low HDI of Pemalang Regency seen from the health dimension (Life Expectancy) and the dimensions of Education (School Length Expectations and Average School Length) linked to the road handling policy in Pemalang District. Descriptive research type is qualitative approach. Data collected through interviews, observation, focus group discussions, and literature. Determinations of informants are with purposive technique. Head of Department of Public Works, Head of Bina Marga, Bappeda, Department of Education and Culture, Health Office, Trans Naker Service, and Social Affairs Office. Data analysis means of data condensation, data verification and conclusion drawing. Data validation uses source triangulation. From the research it seen: (1) Road Handling Policies in Pemalang District have been effective in handling road problems that exist in all districts, except village and sub-district roads that were handed over by villages because there were village funds (2) Policy for handling roads in Pemalang District was not effective relating to the area around the toll road project. Because they are, pull of interest, the MOU, and the conflict of authority between the Central Government and the District Government. (3) Field findings the handling policy the road is not the only cause of the low HDI in Pemalang Regency, because there are other factors seen from the dimensions of health, education, and economy, which is the cause of the low HDI. Research recommendations: In implementing the road handling policy especially for the area around the toll road area, it is necessary to embrace, community elements (NGOs) to pressure the central government and toll road of project builders. Where with formal authority cannot reached and subsequent researchers are advised to focus on different loci or do a comparison with the same focus.

Keywords: Road Policy, TOL Project, HDI (Community Development Index), NGO. and Pemalang District.

I. Introduction

Good transport links will bring an impact on increasing of the economic activity region. The development, maintenance and improvement of road infrastructure become a priority program along with the growing population and road user vehicles. A lot of road network damage in Central Java province is currently on the Pantura line, especially in Tegal City, Pemalang District, and Pekalongan City, which is widely traversed by heavy vehicles coming from the West or from the eastern direction of Central Java province. The road net-

work in Pemalang District is currently a length of 790.490 km, with a weight damage status of 116.040 km and the status of moderate damage is 34.030 km. The large number of damaged road network in Pemalang District One of them is due to the construction of a toll road of development project where the road often passed by the Dump truck suffered severe damage.

The accessibility and mobility of road network in Pemalang District still not able to overcome when the volume of vehicles that passes through the area. Therefore, the more comprehensive road handling is in solving to be more effective

and efficient for the users and the user of the highway. Not only the mobility and accessibility problems that are still widely perceived by the community but also the rider safety factor at the time on the highway. The safety of the district community at the time of the road that related to the condition of the network and roads damaged and its acceleration during driving on the highway still suffered a lot of interference. The number of road users who have an accident in Pemalang District indicates interference caused by network condition and damaged road roads. The number of accidents in Pemalang District currently amounted to 382 events, with a death toll of 134, and a weight injury of 27 inhabitants, and a minor wound as many as 382. (Pemalang District in numbers: Data processed 2016). There are still many problems in the field of road handling from the national level, the province, to the district/city level then the government issued in [5].

In [5] about the road mentioned, that road maintenance is an activity that encompasses the arrangement, coaching, development, and supervision of a road. According to this condition, classify as benefit, safety and safety, harmony, alignment and balance, fairness, transparency and accountability, usability and success, and togetherness and partnership. Furthermore, the rules used in road handling for district/city level are currently contained in the regulation of the Minister of Public Works number: 14/PRT/M/2010 about the standard of service of Minimal Public works and spatial arrangement. Article 5 paragraph 1 and 2 are explained that the implementation of district/city level handling should be based on performance indicators of minimum road Field Service standard. Law Number 38 in 2004 governing the road and regulation of the Minister of Public Works number: 14/PRT/M/2010 about standards of service Minimal field of public works and the arrangement of the current space has created and takes place in the midst of Community. However, the problems related to road handling at national, provincial, and Regency/city level are still a lot of happening. Congestion and accidents that occur make the road handling related to accessibility and road segments have not been effective and efficient in Pemalang District.

In relation to the Human Development Index of the Regency/City in the lowest central Java province is Brebes District with an index of 63.18. Then the next HDI District/city is the district Pemalang with an index of 63.7. In addition, the lowest third of its IPM is Banjarnegara District with an index of 64.73. The low Human Development Index (HDI) in the district of Central Java province Pemalang suspected by researchers caused three basic dimensions used to measure the HDI. They are as follows: the health represented by the life expectancy figure at birth, Education that is represented by the school's old hope numbers (*Expected Years Schooling*) and the average old school (*Mean Years Schooling*), and a

decent standard of living that represented the expenditure or purchasing power of society is still low. Currently the achievement of life expectancy figures, *Expected Years Schooling*, *Mean Years Schooling*, overall the regency of Pemalang achievement is still below the average cannot go beyond the achievement of Central Java province. Where the life expectancy rate (AHH) in district Pemalang amounted 72.77 while in Central Java Province the life expectancy figure (AHH) has reached 73.96.

Then the old school hope figure (EYS: *Expected Years Schooling*) in district Pemalang amounted to 11.86 while the achievement in Central Java Province has reached 12.38. Average Old School (MYS: *Mean Years Schooling*) residents in Pemalang District also still very low of only 6.04 while the average achievement in Central Java Province has reached 7.03. The low achievement of life expectancy (AHH) after birth, the school's old Hope figure (EYS: *Expected Years Schooling*) The average old school (MYS: *Mean Years Schooling*) in Pemalang District, also followed by the low standard of living decent (decent Standard of living) in Pemalang Regency compared to Banjarnegara District, Brebes, and Central Java Province. Of the three IPM assessment indicators based on the above data can be noted that the two indicators of HDI assessment in Pemalang District, namely the people's purchasing power size index and the old school average are the lowest two indicators, when compared With two other districts namely the district of Banjarnegara and Brebes at present. So the research on the improvement of Human development index that focus related to road handling policy in District Pemalang important. The purpose of this research is to describe how the road handling policy in improving the Human Development Index (HDI) in Pemalang District.

Previous research that relevant and supported the research was. 1) (Boarnet [2]), the results of this research showed that there are two explanations to help equalize the perception that develops in the community namely some of the economic developments observed Near the highway may not be true – due to the road. Then some economic development near the highway may influenced by shifting the economic activity of other regions, one explanation indicates the need for Analysis and funding of highways. 2) (Sudha Singh [8]), the results of this study suggested that the addition of driver warning systems to electronic cars that operate automatically when the car is on the highway because in the future In front of the car use experiments. The road infrastructure with wireless technology will occur and become something commercial for the automotive manufacturer to improve the safety and safety of the driver on the highway. 3) (David [4]), the results of the study explained that Japan is in a period of rapid transition, deregulation, and privatisation of freeway also in A considerable debt repayment program of more than 40 trillion yen in

less than 40 years. The rest of this article is about the history of highway development, especially the toll road of sector category in Japan.

4) (Christian & Newton [3]), the results of this study contained the development of three cost prediction models to determine the cost of Accurate road maintenance, conclusion of the results of this research reviewed in terms of management need to increase maintenance funds by 25% accompanied by a comprehensive maintenance management system. If the Ministry of Transportation meets the current and future of this necessity, it will be adequate maintenance of the existing road network. Compared to some previous research the novelty of the research is a road handling policy in relation to the improvement of Human Development Index (HDI) that has never researched before. The basic theory used in this study was public policy theory from (Anderson [1]) in (Randy R. Wrihatnolo [6]) and Human Development Index (HDI) (UNDP: 1990).

II. Research method

This research approach uses a qualitative approach. The type of research is a descriptive study of the writing that contains the description of an object as a certain time, to describe in detail a series of data obtained through observations and interviews that have conducted (Riris Ning Pambudi 2014:41). Data collected through Interviews, observations, FGD and libraries. Determination of informant is with *purposive* technique. Head of Dinas PU, Kabid Bina Marga, Agency for Regional Development abbreviated as *Bappeda*, Office of Education and Culture, Office of Health, Office of Trans Naker, and Social Institutions abbreviated as *Dinsos*. Data validation is using *triangulation* source. Data analysis is done by means of data condensation, data verification, and data conclusive (Sugiyono [9]). The observed phenomenon is road-handling policy in Pemalang District seen from aspects of road and road network and IPM and road handling policy in the improvement of IPM in Pemalang District seen from the dimensions of health, education and Economic.

III. Result and discussion

The policy definition posed by (Anderson [1]) in (Randy R. Wrihatnolo [6]) defined the policy as: “*A relative stable, purposive course of action followed by an actor or set of actor in dealing with A problem or matter of concern.*” (The policy is the direction of action that has the intent set by an actor or a number of actors in addressing a problem or issue).

Based on the concept of such policy can then the manager needs to have an understanding of the evaluation policy not only focuses on the evaluation of policy implementation only, but the policy evaluation includes evaluation of policy formulation, evaluation Policy implementation, and environmental evaluation policy. Because these are three sections determine the success of a policy.

Human development, according to UNDP, defined as a process aimed at expanding the choices for people. In this concept, the population (*human*) as *the ultimate End* (the final) and the development effort itself as the primary means (*principal means*) in order to achieve that goal.

The paradigm of human development sees that the efforts of increasing human quality have intrinsic value, in a sense, as a goal on itself. The perspective differs from human resource development, which places humans as the source or input of development and sees human quality as *means* to generate income. As a holistic development paradigm, human development looked at the designed development program, supposed characterized “*of, for and by people*”. The purpose of these features is as follows: First, about the population (*of people*), namely the empowerment of people sought through investment in the areas of health education, and other basic social services. Second, *for people*, the empowerment of people sought through the creation of employment opportunities and the expansion of the opportunity to strive (by expanding the economic activity of the region); Third, by the population (*by people*), namely the empowerment of the population that can improve the dignity and respect through participation in decision making in all areas.

In this case, it means a decision-making in the development process. The Human Development Index (HDI) introduced by the United Nations Development Program (UNDP) in 1990 and published periodically in the annual report HDR (Human Development Report). IPM is an important indicator to measure success in building the quality of human life that can explain how people can access development outcomes in obtaining income, health, and education. The Human Development Index (HDI) formed by a composite indicator of education, health and *Purchasing Power Parity*. With three indicators that used as its parameters is expected to be one of the instruments how the policy of development in Pemalang District is able to guarantee at least three of the most basic choices are options for long-lived, Choice to have knowledge and the choice to live worthy. That is why the demand for improving IPM not only intended in order to fulfill the basic rights of residents but also in order to build a solid foundation of Pemalang District.

Regency development of Pemalang as contained in Local Regulation Number 12 in 2016 about the plan of medium-term development of District Pemalang Year 2016 is a development that adheres to the concept that requires improvement of quality Live the population both physically, mentally and spiritually. In fact, it explicitly mentioned that the development focused on the physical and mental development of human resources that contain the meaning of increasing the basic capacity of residents who will then enlarge the opportunity to

participate in sustainable development processes. Along with the economic growth, the increase in the physical and mental quality of residents carried out by the District government Pemalang through development in the field of education and health, which its development program designed to expand the range of services Education and basic health.

In the economic sector, the implemented equity estimated to have a big influence on the absorption of work force. The creation of occupational and health opportunities is taken by macroeconomics through high and sustained economic

growth pathways. This is because with the growth of employment opportunities and striving will allow for a real increase in population revenue. In the end, it will reduce the number of people living below the poverty line. It is the main bridge in improving the empowerment principle.

From the results of the research known that, the Human Development Index in Pemalang District until 2016 showed a significant increase in realization. In the period 2011–2016 there was an increase of 4, 51 points with HDI in 2016 which was obtained by 64.17 as in the following table.

Table 1. – Development of Human Development Index

Indicators	2011	2012	2013	2014	2015	2016
Life Expectancy (Th)	72.37	72.48	72.59	72.64	72.77	72.87
School Old Hope Numbers (Th)	10.45	10.64	11.05	11.26	11.86	11.87
Average Old School (Th)	5.19	5.51	5.72	5.87	6.04	6.05
Customized per capita expenditure (Rp.000)	6.488	6.725	6.863	6.911	7.177	7.447
IPM	59.66	60.78	61.81	62.35	63.70	64.17

Source: Central Statistical Agency of Pemalang District

Although the number of IPM of Pemalang District continues to increase every year but the achievement of IPM is not optimal. Compared with the District/City in Central Java Province, IPM of Pemalang District is at the position to 34 from 35 District/City. This kind of condition makes it a concern for the Government to pay more attention to the human development process itself. Moreover, in the presence regulation of Pemalang District Number 12 in 2016 about Medium Term Development Plan of Pemalang District during the period 2016–2021. Surely, the reference of local regulations makes local governments should be prioritizing development, good infrastructure development, facilities and infrastructures, even in the field of education, health and income/purchasing power as Composite indicators that make up the human development index. Meanwhile, the potential of Pemalang District to support the improvement of Human Development Index (HDI) is also possible given that the regency of Pemalang has quite abundant natural resources such as agriculture, plantation, fisheries, industry, services and Trade. The results of the economic activities should be able to contribute a substantial value to the economy of the area and community welfare in Pemalang District.

Human development includes a very broad dimension. Efforts to make the measurement of human development achievement that has done in a region should be able to provide an overview of the impact of human development for the population and can give an overview of the percentage achievement to the ideal target. The Human Development Index (HDI) is a single composite indicator that, despite not being able to measure all dimensions of human devel-

opment, but measures the three-dimensional foundation of human development that assessed to reflect basic capability status (*basic capabilities*) of the population. These three basic capabilities are long, healthy life aimed at measuring living, knowledgeable, and skilled opportunities, as well as access to the resources needed to achieve a decent standard of living.

Given that the IPM is intended to measure the impact of the underlying effort, it uses an impact indicator as the underlying component of counting result, i.e. the life expectancy of birth, the achievement of the education measured With the number of old school expectations and the average length of school, as well as consumption expenditure. The value of the IPM of a country or region indicates how far the country or region has reached the specified target, which is 85 years of life expectancy, primary education for all levels of society (without exception), and the level of expenditure and Achieving decent living standards. The closer the HDI value of the region to the 100 number, the closer the road has reached to achieve that goal.

In addition, IPM is a sensitive measuring instrument to be able to give an overview of the changes occurring, especially in the purchasing power components that heavily influenced by income levels, employment opportunities and inflation. Declining employment opportunities in the context of human development is a bridge that connects between economic growth and efforts to increase the basic capacity of residents. The impact of the crisis on human development is the decline in purchasing power and this means the delay in efforts to increase physical capacity and intellectual capacity of the population.

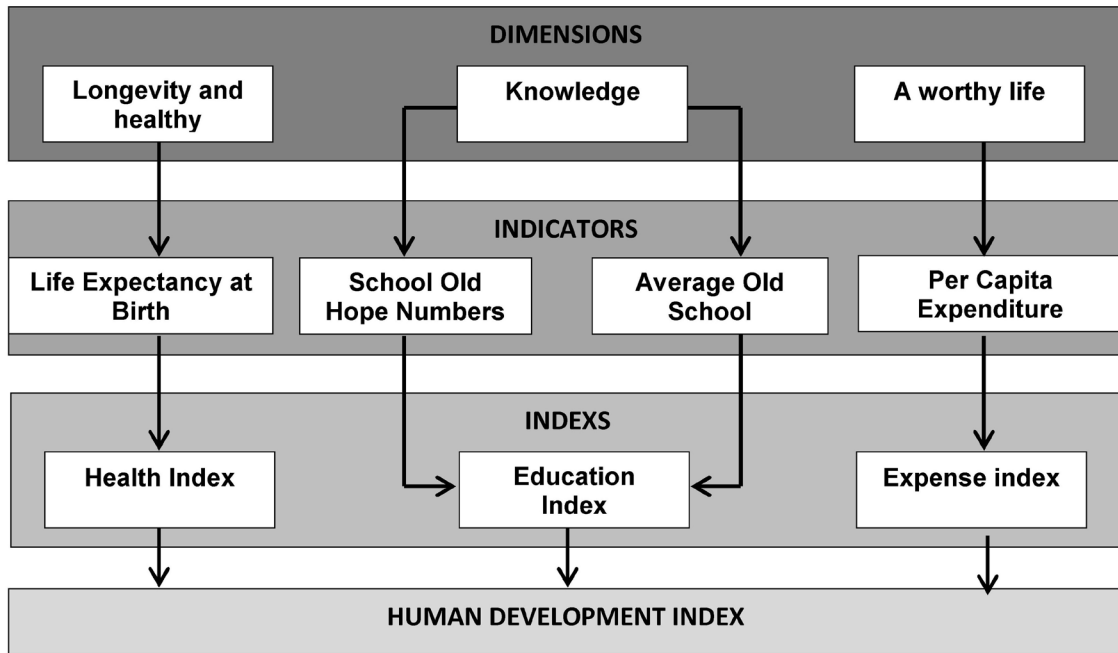


Figure 1. Human Development Index Measurement Diagram

The Human Development Index (HDI) consists of three types of indices:

- a. Health index
- b. Education index

The education index consists of two types of indexes

- 1) Old Hope Index of school
- 2) Old Average school index
- c. Expense index

To compute the indexes of each IPM components are used the maximum and minimum limits as follows:

Table 2. – Maximum and Minimum limits of IPM components

IPM Components	Unit	Maximum	Minimum
Life Expectancy at Birth	Years	20	85
Old School Expectations	Years	0	18
Average Old School	Years	0	15
Per Capita Expenditure	Rupiah	1.007.436	26.572.352

Source: Central Statistical Agency of Pemalang District

The Human Development Index (HDI) in Pemalang District lower compared to the average of central and national Java. Meanwhile, when compared to regional and surrounding

regions, the number of district IPM Pemalang of 64.17 slightly higher than the Brebes regency of 63.98.

Table 3. – Regional Level of IPM Comparison, Central Java and National

District/ City	2012	2013	2014	2015	2016	Growth 2012–2016
Batang District	63.09	63.60	64.07	65.46	66.38	5.21
Pekalongan District	65.33	66.26	66.98	67.40	67.71	3.64
Pemalang District	60.78	61.81	62.35	63.70	64.17	5.58
Tegal District	62.67	63.50	64.10	65.04	65.84	5.06
Brebes District	60.92	61.87	62.55	63.18	63.98	5.02
Pekalongan City	69.95	70.82	71.53	72.69	73.32	4.82
Tegal City	70.68	71.44	72.20	72.96	73.55	4.06
Central Java	67.21	68.02	68.78	69.49	69.98	4.12
National	67.70	68.31	68.90	69.55	70.18	3.66

Source: Central Statistical Agency of Pemalang District

For the past five years (2012–2016), the IPM of Pemalang District grew 5.58 percent. This growth was highest in Central

Java for the past 5 years, even over the national (3.66) and Central Java (4.12%).

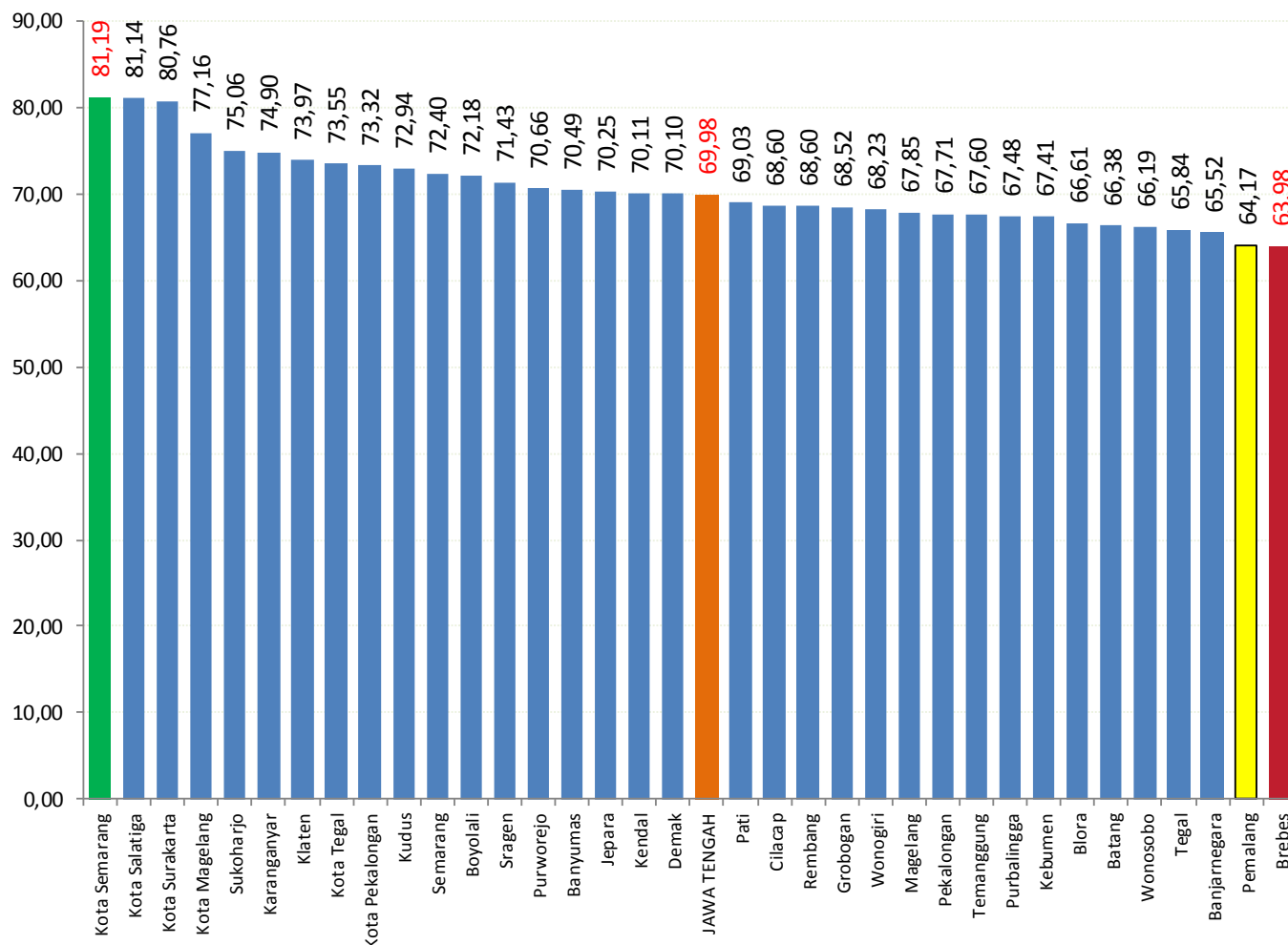


Figure 2. IPM of District/City in Central Java in 2016

– **Life expectancy**

Life expectancy (AHH) is the approximate average of many years that someone has been able to reach from birth. AHH reflects the health of a society. It calculated in a way indirectly with the program package *Micro Computer Program for Demographic Analysis (MCPDA)* or *Mortpack*.

AHH developing countries are lower than AHH developed countries because AHH influenced by high infant mortality rates. AHH Pemalang grows on average 0.13% per year, under the average growth of Jateng (0.29%) and national (0.26%). AHH of Pemalang District grew fastest number 7 between District and City in Central Java.

– **Educational dimension**

a. Average length of school (RLS)

The average length of school (RLS) defined as the number of years spent by residents in formal education. The calculated population coverage of RLS is the population aged 25

years and over. The RLS is calculated for ages 25 and above assuming at the age of 25 years of education is over. The calculation of RLS at 25 years old also follows the international standard used by UNDP. The length of education that has been lived by the population from year to year is longer. RLS is an indicator of the educational output, while the HLS is a process indicator.

b. Old school expectations (HLS)

The school's old Hope Number (HLS) defined, as the length of the school (in years) that expected perceived by a child at a certain age in the future. HLS used to determine the condition of educational system development at various levels.

HLS calculated at the age of 7 years as it follows the government's policy of compulsory learning program. To accommodate people who not covered in (Statistik Lanjut Usia [7]), HLS corrected with students attending Religious School known as *Pesantren*. The data source of Religious School

known as *Pesantren* is from the Directorate of Islamic Education. Harapan Lama School closely related to school participa-

tion. Many of today's schools will be members of future school expectations for new children in school age.

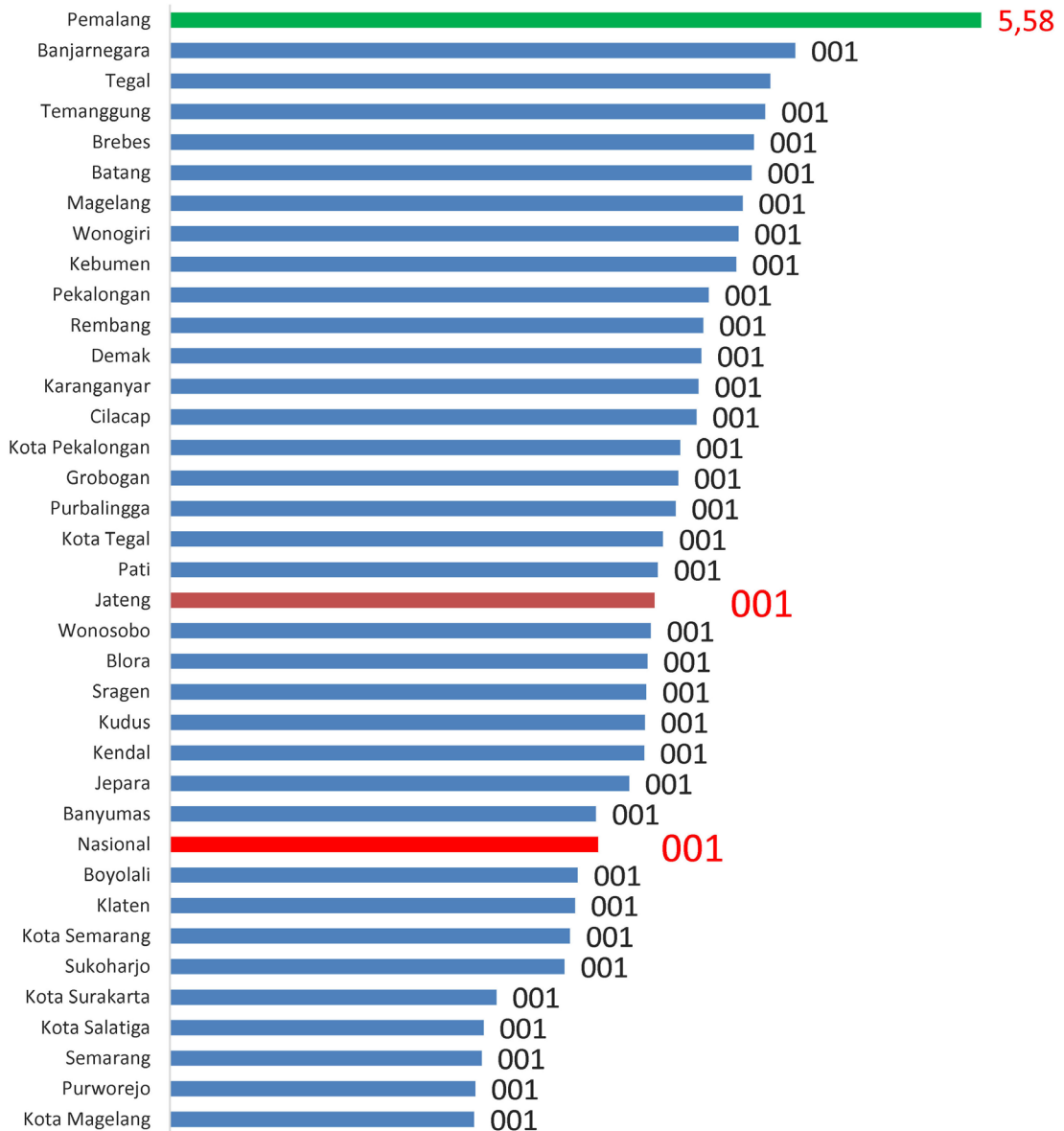


Figure 3. Average IPM Growths per year, 2010–2015

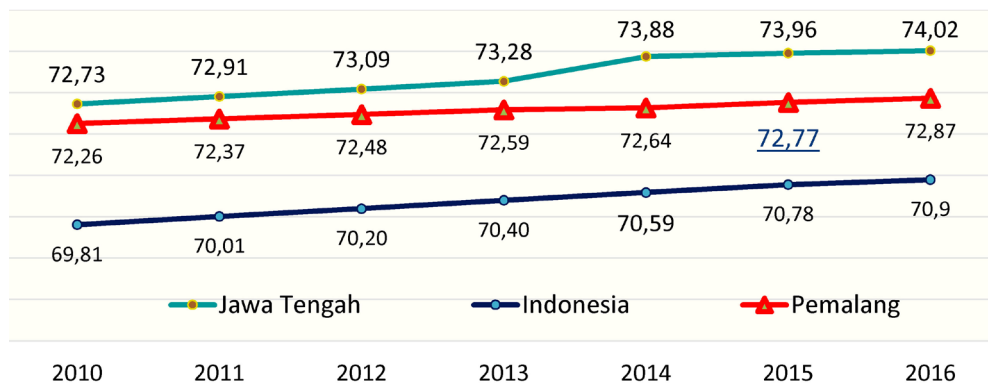


Figure 4. AHH Trend of Pemalang District in 2010–2016

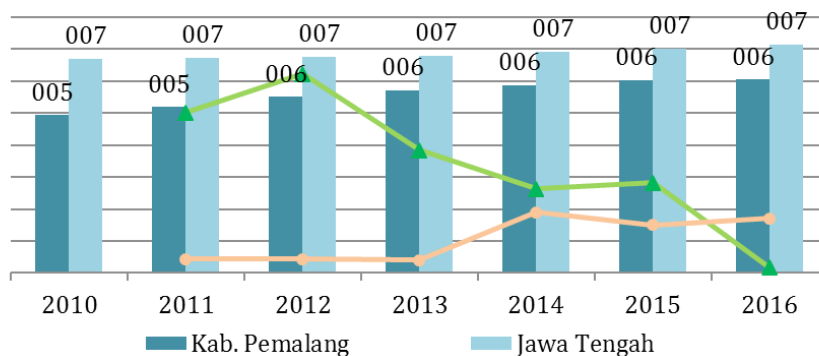


Figure 5. Average Old School and Growth 2010–2016

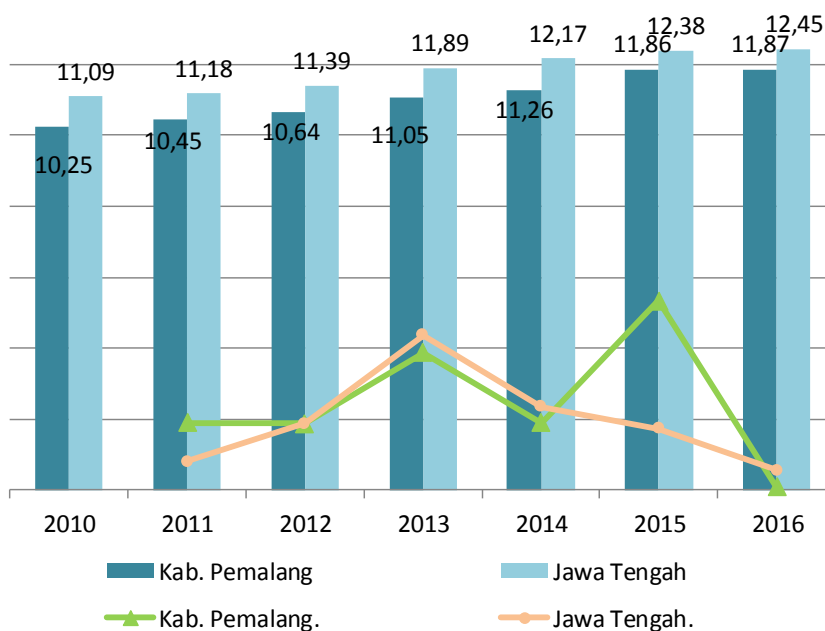


Figure 6. Old School Expectation and Growth 2010–2016

– **Economic Dimension**

The average year per capita expenditure obtained from (Statistik Lanjut Usia, [7]) module, calculated from provincial level to district/city level. The average per capita expenditure made constant/real with a base year of 2012 = 100. PPP Growth 2010–2016:

- Pematang District = 18.98%
- Central Java = 12.91%

PPP Achievement for 2010–2016 is still in Central Java, but the rate of growth is higher than Central Java. Per capita production adjusted to increase. However, the growth rate decreases, occurring in Pematang and Central Java. (*Slope* is more ramps).

– **Road handlers policy on human development index of improvement in Pematang district**

Road handling policy especially damaged road in the area of villages, districts and districts so far handled through a scale of priorities and phasing because it is adjusted to the existing budget or financial. Road handling is broken for areas that

connect places such as hospitals, schools and centers – Economic activities (markets/shops) are preferred to support the activities.

The issue of health facilities is often not due to the availability of the facility, but rather because of economic problems. Cost limitation is the primary consideration of the patient’s family to send patients to adequate maternity services. Meanwhile, the participation of the patient in the health insurance borne by the Government can not fully guarantee the participant for access, because, for example the card lost and do not know that the health insurance program can bear the costs Labor. As revealed from the following interview results:

“... They have Public Helath Insurance abbreviated as Jamkesmas card, but because their parents do not primpen the cards are lost, when the UK 9 months their legs swollen, I refer to Hospital but have no cost. They have Jamkesmas card, but because their parents do not primpen the cards are lost, when the UK 9 months their legs swollen, I refer to the Hospital but have no cost. ...” B3

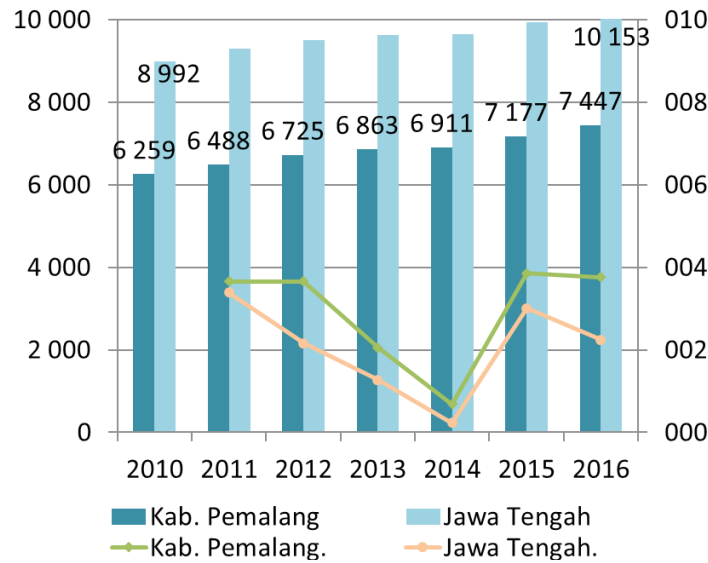


Figure 7. Percapita Expenditure and Growth 2010–2016

The main cause of maternal death is actually preventable through early recognition and access to quality service. The current maternal and neonatal health services and programmes are focused on improving accessibility as well as quality of service related to the various risk factors that are the main cause of maternal mortality [(Depkes, 2001), in the AKI report, Bappeda of Pekalongan District, 2017]. From the above data, known related to *AHH* is not the only one because of the road access factor but the economic and cultural factors of the myth about not good give birth on Sunday, which is what the cause is. Health problems, others are environmental problems are still a major problem in the field of health. This seen from the many health facilities in households that still categorized unworthy.

Poverty factor is the main problem for households in providing decent health facilities. In terms of health infrastructure also still perceived very less especially the hospital in the region of the southern and eastern Pemalang. They are not to mention plus the lack of implementation of health supervision for pregnant women and poor nutrition. The disease factor of *Meskin* is small but its existence cannot ignored in improving the degree of public health. They are not to mention the public awareness of healthy living behavior.

The low of Human Development Index in Pemalang District not separated from various problems related to each other. The Issues other than health are as well as educational areas. Education facilities and infrastructure are still a problem in increasing the average of old school and old school expectations. Meanwhile, the effort to pursue the lack of education for people who are over 40 years old also still lacking. Then the economic is field. In the economic field also shows the low level of community consumption. Low consumption of

society influenced also by the lower level of public income. Low income can be due to the low ownership of production factors such as capital. Meanwhile, the inflation rate tends to raise which causes community consumption capability to decline. The High inflation also triggered by some distribution infrastructure unwell and a long chain of trade in goods.

Therefore, the road handling policy that considered during this period is less effective especially in the toll road of project area is not the only cause of low HDI in Pemalang district, considering there are other factors that are the cause. They are such as cultural, behavioral, environmental, motivation, social and economic values, supported by the research from (Boarnet [2]), *Highways and Economic Productivity: Interpreting Recent Evidence*: The University of California Transportation Center University of California Berkeley. Which stated that the economic developments observed near the highway are likely not right actually caused by highways, then some economic development the road is likely influenced by shifting the economic activity of other regions; one explanation shows the need for reforms in the analysis and funding of highways?

IV. Conclusion and suggestion

Based on the results of the research and discussion could express the following conclusions:

Policy on road handling in Pemalang District seen from (Network Road) namely the accessibility aspect, mobility, and safety and from the aspect of roads. That are the road Condition and speed can be said *to be good* for areas other than those affected road projects Toll road, where there are reports about the roads in the district area will be immediately handled gradually and scale priorities. The Considering existing of financial condition. The road handlers in the toll road of project area

are not yet good. This is because for the area around toll road projects there are obstacles of MOU made between toll road project builders with the central government so that the toll road handling policy carried out by the government of Pemalang District less response Even as if ignored.

In this case, through demo action by the community to fulfill their demands considered more effective, because of the actions undertaken by society during this by closing the road so that activity cannot run new then the demands of the community fulfilled by the road builders told a central government. Success of road handler's policy in Pemalang District of the research results also shows quite successful. Through public complaints, routine reports of officers every three months, and the optimization of the general auxiliary Unit of the Department of Public Works the general office problems that exist from the village, subdistrict and district levels can be resolved well. Moreover, for the village road now handled by the village itself through the village fund or village fund allocation. PU also conducts service programs by providing consultation assistance in the calculation and construction of roads in the village. The problem is still happening obstacles in handling the road around the toll road projects because there is a pull of the interests, MOU, law and authority.

Human Development Index in Pemalang District during the period until the last report 2017 known that: Human Development Index (HDI) in Pemalang District is lower than the average of Central Java and National, but the growth of 5.58 during 2012–2016 is the highest in Central Java (4.12) and even above the national (3.66). The life expectancy figure (AHH) of Pemalang grows on average 0.13% per year, under the average growth of Jateng (0.29%) and national (0.26%). AHH of Pemalang District grew fastest number 7 between District and City in Central Java. The average length of the school (RLS) of Pemalang District is 6.05 years lower than Central Java for 7.15 years. Old School of Pemalang District is 11.87 lower than the Java Province of 12.45.

PPP Achievement of Pemalang District during 2010–2016 is still under Central Java but PPP Growth of Pemalang District in 2010–2016, which is 18.98% higher than Central Java of 12.91%. In an effort to improve the achievement of the field of health, the strategies and programs that taken are environmental development, health services improvement, health behaviour enhancement, disease management due to hereditary factors. The effort to improve the achievement of the field of education, the strategy and the programs taken are improving facilities, infrastructure education, and operational assistance organizing. In an effort to improve the achievement of the economic field, the strategies and programmes that taken are increase in capital/investment, improvement in labor quality, control of goods price, and development of consumer behaviour.

Policy on road handling in Human Development Index improvement is in Pemalang District. Road handling policy conducted by district government Pemalang is always pay attention to complaints, reports, and survey results of the police officers do not have an error in determining the policy. Then after careful study, it will taken a priority scale and done gradually according to the financial condition. In relation to the efforts of improving Human Development Index then the government has its own strategy in the field of health, education, and economics so that what is done in the handling of roads will be in sync with the strategy taken. All of them geared to help improve of the Human Development Index in Pemalang District.

Suggestions

1. For government

As input in the policy in handling the road, the advice submitted is reports and complaints from the community remain in contact, either through mosque, come directly, or through *public hearing*, remembering their information is important in order to achieve the road handling policy objectives. The addition of a WEB plan to the Community report of the coming year is very good and innovative, but it needs the maximum socialization movement considering the unfriendly society in terms of the Web and many are do not understand about technology. In addition, the signal to the area of the region that is rather remote also needs noticed. Therefore, it is necessary to examine first the plan of implementation of the Web. For UPU strategic task in accelerating the implementation of the road handler's policy, so it is important to be in the legal basis so that UPU can carry out tasks according to their regulatory. NGOs need embraced directed and not deviated from the purpose of the establishment so that it can be a long hand of the government if the formal not reached.

2. For education and cultural institution

In order to improve the EYS and MYS, Institution has an important role to support this government policy. Where the provision of scholarships and BOS that have rolled out must subjected to fixed objectives.

3. For health agency

From the results of AKI reports, it is necessary to socialize pregnant women and their families to pay more attention to the pregnancy condition by increasing knowledge about pregnancy complications, childbirth, and period. Making the right decision when a family member is pregnant and or giving birth with complications or problems to immediately lead to health care and referred to a hospital that is able to deal with complications or problems by health workers Skilled. In addition, the socialization of old culture that is not relevant to society needs to be encouraged to press AKI. Another expected impact is that AHH becomes even better.

Human Development Index enhancement efforts can be made through: 1) improving infrastructure, infrastructure in the form of health, education and economic facilities can at least impact the improvement of community welfare. Its existence needs expanded mainly focus on the poor to improve the degree of health, level of education and economic ability independently; 2) Encouraging the growth of business climate that is conducive to increase investment/ Investing or capital investment can significantly promote the acceleration of development widely that can increase the production of goods and services, and the absorption of manpower so as to increase public income. Its existence needs supported through ease in licensing services and adequate infrastructure availability; 3) Cost incentives to improve the quality and quality of manpower, cost incentives can be made through government investment in Education and special

skills in accordance with the needs of the work market and employment opportunities through the improvement of educational facilities and infrastructure; 4) Increase local production capability of goods that could potentially cause inflation, especially Agricultural products. Inflation is generally due to the increasing demand of goods on the one hand while on the other hand the quantity of goods available very small. Especially for agricultural products the level of distribution can actually be made possible through the arrangement of production patterns and crop patterns and; 5) socialization of increased consumption behaviour in the region of Pemalang District.

The consumption of communities in the district of Pemalang in addition can increase the income of production sectors thus encouraging the growth of greater investment for the development of the regional economy.

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Section 3. Journalism

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THE SKILL OF JOURNALIST DURING THE INTERVIEW

Abstract. This article outlines the nature of the interview, its peculiarities, the role of journalists and respondents in the communication process. In the study, interviews on contemporary TV interviews were also analyzed by the creative experiments of experienced interviewers.

Keywords: Interview, journalist, speaker, master, Larry King, Urmas Ott, Barbara Walters.

It is no secret that the person who chooses journalism is entrusted with a great responsibility. This profession also requires that a person not only have practical skills in various social spheres of the society, but also to communicate with different people and to have a high level of legal and psychological literacy. When receiving information from the actual person, the journalist really addresses the interview genre. Naturally, the journalist prepares materials for the media in the coverage of a socially significant theme, depending on the specificity of the genre.

In the broadest sense, we understand the interview with the well-known people in the community who are the master of their profession, and to introduce them to the public. Interviewing in the journalism is also a way of getting information and providing important information. Researcher I. V. Ivanova points out the following as the main feature of the interview genre: 1) The specific purpose of the interview prepared for mass media; 2) mass character of conversation; 3) Being an interesting figure for a public speaking journalist; 4) Live chat with an interlocutor; 5) question and answer complex; 6) Dual orientation – the dialogue is designed not only for the two people who are interacting, but also for the audience, the viewer, the audience [1, 9; 10].

As V.L. Tsvik points out in “Television Journalism”, journalist addresses this genre only when the source can provide more information than the journalist. In a traditional interview, the journalist acts as an intermediary between the person and the audience he or she receives. In this case, the journalist does not deny his opinion, adds it, and does not reflect his personal position in the dialogue. “An experienced journalist basically self-restraints to maximize his inner self. In the traditional interview, the answers to the questions asked by the journalist should be approximately 70–90 percent of

the text. Kolesnichenko “If the journalist speaks the same or more as a speaker during the interview, this is evidence that the journalist does not have enough qualifications and experience yet” [2, 53].

Before interviewing, a journalist must be well prepared. A talented journalist begins preparing for an interview with consistent preparation for an interview. The most important of these is the definition of the topic and the interlocutor. The author clearly identifies the main topic of the upcoming conversation, develops a dialogue and strategies based on the type of interviewee and interviewee, and creates targeted questions that reveal the subject of the selected discussion. During the interview, the task of the journalist is to support the natural and logical development of the dialogue, to “speak” with any interlocutor.

The interview wizard creates a positive or negative image in the audience about the interlocutor in the communication process. At this point, the journalist is quitting to ask his hostage-taker for provocative questioning. As a result, the respondent loses control over an interview and gives an impulsive, “passionate” answer to an unexpected question. The hero, who lost control of the audience, is totally unusual. Or, conversely, a journalist can create an opportunity for a journalist to justify himself before a public audience.

The majority of interviews in the newspaper are traditional interviews. We do not know how journalist was prepared for the interview while observing newspaper interviews. Whether or not the journalist has raised questions during the interview, it is not clear to us. Interviewing in print can never be a shorthand for true conversation. He will always be a reputed media product by a journalist and editor.

The hero of the interview will be known as a well-known person in any sphere of public life. Usually such heroes are cho-

sen from artists. They are of particular interest to both public and private audiences as the creator of public expression. In a traditional interview, he focuses primarily on the “personality”. In this case, the task of the journalist is to put his “I” in one direction and pay attention to the disclosure of the characters.

Very rare reporters will be able to communicate with interlocutor without having to worry about the conversation. Estonian television journalist Urmas Ott, for instance, was one of the first to test television experience in the leading world countries on one of the local TV channels. This journalist skillfully conducted the program “Play to Europe” on Estonia Television for many years. He wrote many books on the subject. Although the books of U.O. give a general idea of his way of doing things, nobody has mastered the experience of such an interview. However, the famous interviewer also had a defect in his speech. Since he spoke with an accent, his fellow citizens accepted him as a foreigner. U. Ott’s creation and its activity were the time of the “rebuild” and “openness” period. During the years he worked on TV, social issues through the teleconference were openly criticized, and many closed issues were open.

For the interview to be open and emotional, the journalist uses his or her psychological and acting skills. She expresses her interest in the subject and her interest with her appearance and looks. It is important for a journalist to be in the process of communicating in some places with suspicion and sometimes compassion. Even if the journalist does not understand something to help him understand his or her position more clearly, it is in vain. Many young journalists are afraid to appear as “stupid” in the interview. So even though they do not hear the speaker’s excitement, they blindly nodded as if they were all well aware.

Successful interview is a product of long-term preparation and journalistic self-sufficiency. As the journalist understands the theme of the interview, he should not let the interlocutor go out of the topic. He needs to keep up the conversation system to capture exciting questions and seamless cadres as well as subordinate the respondent to his strategic plan. The atmosphere of the interview and the external environment are less important than the chosen subject. The interviewer should be in contact with the journalist’s eyes, not the television camera. Most experienced interviewers speak a lot about the emergence of mutual intuition and intuition that can not be explained in the real dialogue between the two parties. The author of the book “Art of Craft” P. Soper says: “Look around. Ensure that two or more educated people are discussing a subject in one place. They are not ashamed of each other. They have a serious dialogue environment that develops in a system. Blazing eyes, facial expressions, head and hand movements that convey the view of people’s minds, or vice versa, encourage interlocutors to interconnect and interconnect each other just like electricity” [7, 25].

In many cases, the artificial environment in the studio (camera, lamps, technicians) prevents the respondent from expressing his or her point of view. A journalist who prepares a television interview should also be careful not to allow the subject to be influenced by his behavior and sincerity, but rather create a favorable atmosphere for the hero to completely engage in the subject. If the eye does not have contact, then there is no interview. The communication is based on the ideas of the participants. The attitude of the journalist to the interviewee can begin with deep sympathy and can continue until the “frustrated” humor. He should draw the attention of the interviewer as soon as his first sentence. The phrase “I and you are a sister” or “I respect you” by the English writer Nobel laureate Rederd Kipling plays an important role in the interview.

An experienced Estonian journalist Urmas Ott in his talk with actor Evgeny Estingneev, forgot to make a mistake, said: “How do you feel about the great contribution of journalists to the popularity of actors?” That question, It is noteworthy that an inappropriate question ends because of this failure. Of course, this was the reason for her questioning. U. In conversation with Ott, many art historians, scientists, film stars have always been accustomed to speaking openly before the camera, regardless of the quality of the question they are asked by the journalist. But not everyone is the same. According to psychics, some are introvert, the rest are extravagant. In this case, the journalist did not take into consideration the character of the hero, but addressed him with an irrelevant question.

The talent and the gift of nature have made Matvei Ganapolskiy, a Russian and Ukrainian telegraphist, the lead author of the radio station “Exo Moskvi”. “It’s important for me that the game is important,” he said. Ganapolsky: I do not want to know the truth. I just create a beautiful, bright portrait of people. Almost all of my guests have said that I have a very unusual conversation with them. I think it is the result of years of knowledge, experience, and intuition.”

Previously, western Europe and American media have been misinterpreted that male journalists are more successful than female journalists. However, Barbara Wolterer, the lead singer of The View, on the American channel En-bi-es, has proved that this idea is absolutely wrong. B. When Walter began talking to the television on television, nobody took him seriously. Most reporters have been laughing at him as a “housewife”. However, B. Uolters was impressed with the exclusive interview with audiences and audiences. For 18 years, the car company king Henry Ford ignored the ridiculous questions of journalists and did not interrupt anyone.

Barbara Walters uses the actor’s skills to persuade Henry Ford to take part in her evening show. There was only one condition in the conversation. Henry Ford had to tell about the construction of the Detroit Center sponsored by his car

company. He admits the demand of journalist Henry Ford. The whole interview is about building a center. The critical questions about the hero's personal life are left to the end of the interview and receive remarkable answers. His interview has a specific rule: "If some of your questions are frustrating the interviewer, leave them to the end of the conversation. At the start of the interview, it is better not to spoil the conversation and not to break the conversation. If communication is broken at the beginning of the interview, it will not be possible to restore it".

Barbara Walters, who interviewed many famous people, is not asked a question not from her own name, referring to another address. When she interviewed the Iranian king, she said: "Your Excellency, everyone says that you are a dictator. You may be a good person. But you are still a dictator. Of course, you have heard such critical thoughts about yourself. Today you can answer this question in our studio. "Developing original questions is one of the most important steps in preparing an interview. Larry King, the "king of interviewers," deals with his "iron laws." He will never answer the respondent beforehand. Others hope to get an interesting answer with questions that can upset the other person. For example, Yuri Chernichenko said: "Although I ask something about potatoes, I know a lot more about this than the respondent. But potatoes are more interested in the language of the interlocutor. " Interviewer Brian Meiji also asked his interlocutor in the following question: "What are you afraid of when you think about your son?" The interviewer sighs: "That he is a criminal to the end of his life." Of course, this question illustrates the image of a poor father who worries about the future of his son. This question conveys pity to the harsh politician.

What kind of tactics do I have to ask in the interviews? Ted Koppel spoke with his Irak counterpart in the evening news program, asking him questions about United Nations politics and military operations. But a week later, the same Iraqi broadcaster Larry King's "Larry King Live" broadcast on "Si-en-en" channel. In contrast to the previous annoying conversation, the protagonist reacts with enthusiasm for questions asked by the journalist. Larry King, a member of the

Iraqi government, asks, "Is not it difficult to live in America in the midst of a war between the United States and Iraq?" The interlocutor replied, "Yes, the rooster is very difficult for me personally." The only answer is that the initiator speaks highly of the position of the interviewer.

Larry King also does not give him technical questions about the Gulf War, when he meets with the American commander-in-chief, Lieutenant General Thomas Kelly. The initiator does the opposite. When asked by President Richard Nixon, who quit, he asked: "What happens when you cross the Vogtorgate hotel every time you go?" The question is, "When did you decide to become a general?" President Ronald Reagan says: will you not be disappointed when you forget your memory?" [4, 110] will receive unexpected answers from his interlocutor in connection with unsuccessful questions. His questions are remarkably natural and attract the attention of the audience, and the guest is highly respected by the host.

At that time, "TV-Revue" editor Y. Bogomolov said that he had not yet encountered any unusual issue in Russian TV shows: "It's not interesting to see that heavy stones I can carry for myself are lifters. I want to see record results. I love beautiful questions. Such questions are as rare as in football; rare cases are more important questions in interviews. Now, I think lovers are more popular than professionals. The main rule of Interview Master is if you want an interesting answer, use your mind and ask interesting questions! A journalist working in the interview genre should be an intelligent person who can understand people well. That is why our talented craftsmen are very rare in our days" [3, 220].

If we watch most of the interviews in our Uzbek national TV channels, the majority of the interviews we are watching show the same misinterpretation of the journalist and the respondent. Live on screen, lack of free communication. In some interviews, the unusual approach and details highlight the ongoing dialogue on the screen, and the audience's interest in the audience. Therefore, the study of the professional skills of masters in foreign countries, work experience will greatly contribute to the professional development of Uzbek journalists.

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Section 4. Materials Science

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APPLICATION OF NANO-DIAMOND IN TISSUE ENGINEERING

Abstract. The aim of this project is to highlight the importance, applications and possible advancement of nanodiamonds in scaffold tissue engineering. The use of polymeric matrices and nanodiamonds in the development of scaffolds as replacements for damaged or injured tissues is discussed. Due to the need for advanced and high mechanical and biological properties of materials in biomedicine, materials such as nanodiamonds have been used in this nurturing stage of tissue engineering.

Nanodiamonds (ND) can combine with other materials to form advanced and excellent hybrids. An example of such possible applications is biomimetic and osteoconductive scaffolds for bones. This is because nanodiamonds in combination with polymeric matrices such as chitosan possess high mechanical strength over weak, ordinary and conventional hydrogels.

Keywords: polymeric matrices, nanodiamond, biomimetic and osteoconductive scaffolds for bones, polymer based nanocomposite, chitosan.

Introduction

With the advent of tissue engineering, the potential of treating and replacing damaged tissues with artificial materials have been noticed. With regards to bone injuries, the main therapy for bone repair and regeneration up till date is bone grafting [1]. But this method is ineffective because overtime, these grafts get jeopardized. Failures and unreliability come up as a result of lack of complete integration with the physiology of that body part. Figure 1 shows a transplanted allograft with poor osseointegration. In such cases, engineered tissue scaffold is an option in solving the problem or improving the treatment process [2]. There are also challenges in creating these improved hybrid materials for tissue replacement and regeneration.

Over the years, many materials have been developed in order to fit the bone tissue demands. Even with these developments, it is very difficult for one material to possess the required biological and mechanical characteristics. This is why

there is a continuous quest for advanced composite materials through scientific research. When replacing damaged tissues in vivo, it is necessary and required that the replacement material (possibly scaffold) is very similar with regards to the biological and mechanical property of the tissue or part being replaced. In order to avoid the drawbacks of using a single material to imitate the natural tissues such as bone, polymer based nanocomposites show good signs of success.

Nanocomposites and Nanodiamonds

Nanodiamond has a carbon nanostructure. It has a diamond-like crystal structure and are used widely in various biomedical applications. The characteristic size of a single nanodiamond crystal is about 10–100 angstroms. Nanodiamonds or “ultrafine” diamonds can be considered as a specific nanocarbon material that is part of an extensive or increasingly popular family of nanocarbon clusters including nanotubes, nanographite, and carbon onions. Nanodiamonds have an outer layer which is

composed of graphite layer and inertly some heavy metals [3]. Nanodiamonds have unique physicochemical properties which substantially depends on the method of synthesis.

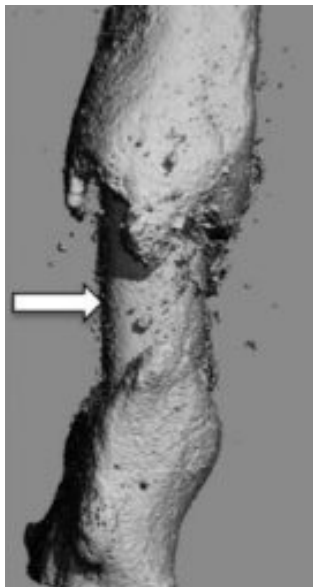


Figure 1. An allograft used to replace a damaged bone showing poor osteo-integration and healing

Today, ND could be synthesized through several methods. One of the simplest methods is the milling technique. It begins with milling of natural microdiamond and the bigger sized diamond particles are removed, the remaining smaller diamonds with a size below 100 nanometers can be obtained [4].

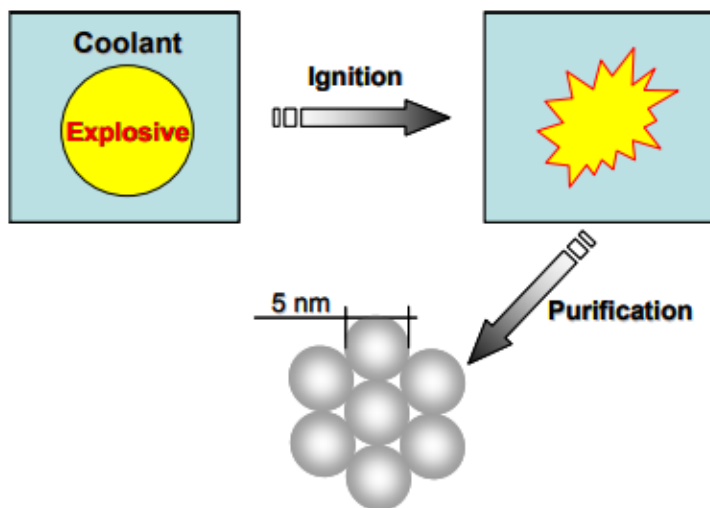


Figure 3. The detonation synthesis method

In recent years, nanodiamonds have attracted the attention of tissue engineers. They possess desirable physical, chemical and biological properties. These properties include hardness, thermal and chemical resistance, large surface area, ease of surface functionalization and non-cytotoxicity. Atoms on the

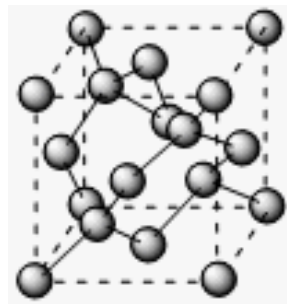


Figure 2. Structure of a nanodiamond

Chemical Vapor Deposition technique could also be used to produce nanodiamond (Frenklach et al. have reported on a substrate-free CVD for nanodiamond preparation in 1989) [5]. The resulting diamond particles are in a size range below 500 nm. Among other methods are:

1. Synthesis at ultra-high pressures and temperatures.
2. Electron and ion beam methods using irradiation of carbon (using electron beams and argon ions).
3. Chemical precipitation of carbon at high temperatures and pressures.
4. Through electrochemical deposition at an anode.
5. Through detonation synthesis (figure 3) The detonation synthesis involves placing an explosive charge into a detonation chamber and igniting it. [62]. During the process, there is no need for additional carbon material for the formation of diamond soot [6]. The detonation product or soot, produced by detonation synthesis, contains up to 80% of diamond.

bonding. These advantages make nanodiamonds a potential or promising component of nanocomposite for tissue scaffold. ND films could be suitable for coatings on medical implants especially for hard tissues and for prosthetics in order to enhance their interaction with the surrounding bone tissue.



Figure 4. Nanodiamond powder obtain as a product of the detonation synthesis (10 nm)

Recently, so much effort has been put into developing advanced composite with fillers in nanoscale. Hybrids such as nanocomposites with nanodiamond and polymer matrices appear to show better performance (more bioactive) compared to the micro-sized ones. This is because nanodiamond fillers when combined with the polymer matrix result in a larger surface area and a new interphase is formed. The interphase is strong and so takes load and heat from the polymer matrix to the nanodiamonds. There is a great improvement in mechanical and thermal properties. Due to high surface area to volume ratio, highly porous scaffolds with exceptional mechanical properties can be fabricated with a wide variety of features that encourage cell adhesion and proliferation. Nanodiamonds can be incorporated into polymer matrices consisting about 1% to 10% in mass [8].

Nanodiamond is a very suitable filler in polymer matrix for biomedical applications because of its favorable properties [9]: high strength and stiffness, resistance to corrosion in natural hazardous environment, non-toxicity, biocompatibility and low costs.

Biocompatibility of Nanodiamonds: When designing scaffolds and selecting scaffold materials, the biocompatibility of the materials is a vital characteristic to be considered. Living organisms including the human body is made up of carbon majorly. Nanodiamond is also mostly made up of carbon. The biocompatibility of ND has been proven already [10] but considering the amount of impurities on the surface, the method of its synthesis defines that. The existence of metallic components or other impurities even though in small amounts, will cause harm to the body and to the future of the use of ND in tissue engineering. The research on the cytotoxicity for pure nanodiamonds showed that they have no cytotoxicity to cells [11] The case is different for other carbon nanomaterials such as carbon nanotubes which exhibit cytotoxicity [12].

High affinity for biomolecules

It has been reported from various research projects that nanodiamonds have strong affinity for biomolecules such as enzymes, antibodies, proteins and peptides. From the work of Chang et al, nanodiamonds were subjected to different tests and their functional characteristics in a various biological environments showed that they can adsorb biomolecules and their functionalization even with other existing functional groups. From this research conducted by Chang et al [13], the affinity of nanodiamond was investigated. Using cytochrome c (protein), the adsorption capability of nanodiamond with sizes of 100 and 5 nm was studied. It was observed that the cytochrome c adsorption isotherms showed very steep slope with low concentration ranges, and this shows that the affinity of ND for cytochrome c is very strong.

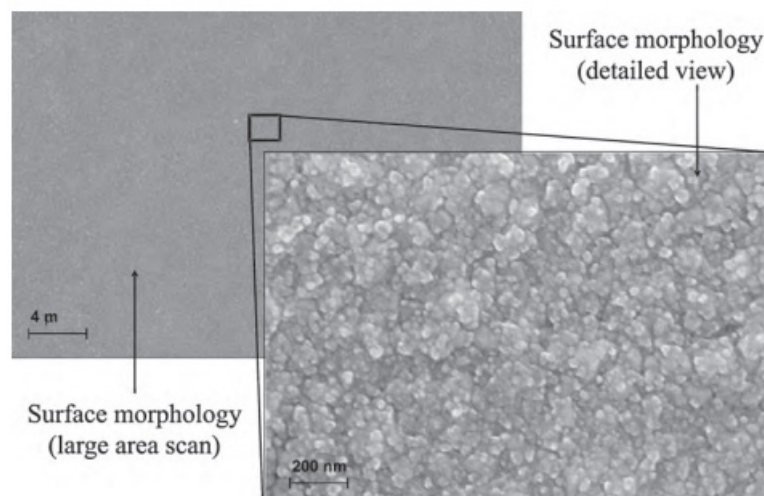


Figure 3. SEM of nanocrystalline diamond films showing its surface morphology on a flat substrate

In the same research, the adsorption of horse heart myoglobin (Mb) and bovine serum albumin (BSA) on the the 100 nm diamonds were analyzed. The above research on ND-protein interaction showed the high affinity of ND material and for biomacromolecules, which concludes the fact that it is suitable for biomacromolecule immobilization applications. Also, ND has high specific surface area (figure 3) and a chemically inert diamond core. These properties make ND an appropriate material or surface for biomolecular immobilization [14].

Integration of Nanodiamond with polysaccharides and its application

As earlier mentioned that proteins, enzymes, antibodies and peptides can be immobilized on the nanodiamond sur-

face, the immobilization of polysaccharides on ND has not been widely studied. Polysaccharides are important organic compounds that have great potential for functionalization in tissue engineering. Chitin, cellulose, and starch are the most common polysaccharides.

Chitin, is the second most abundant natural polymer on earth obtained from the cuticles of insects, crustaceans and cell wall of fungi [15] – only cellulose is more abundant. Chitosan (CS) is the material obtained from the deacetylation of chitin and has shown very good hydrophilic property and biocompatibility. The structure of chitosan obtained from chitin is shown below.

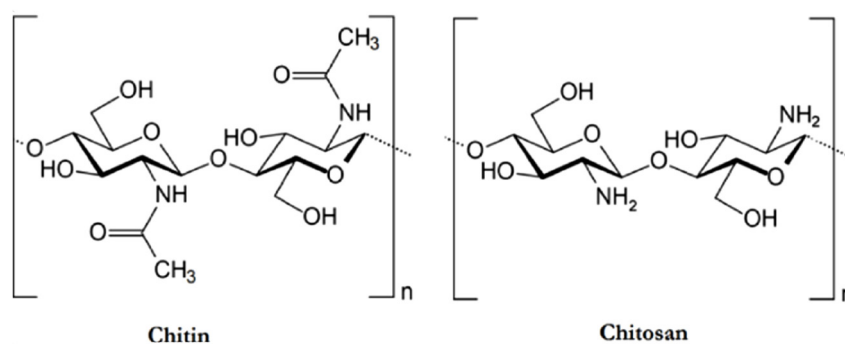


Figure 4. Deacetylation of chitin to chitosan

Recently, chitosan has been widely studied and will be used in biomedicine. This is because it has special properties-can dissolve in acidic environment and that means it can be molded into different shapes and structure(membranes,

fibers, and porous 3D forms). This indicates that it is suitable for tissue scaffold engineering [16]. Chitosan is also biocompatible and biodegradable [17].

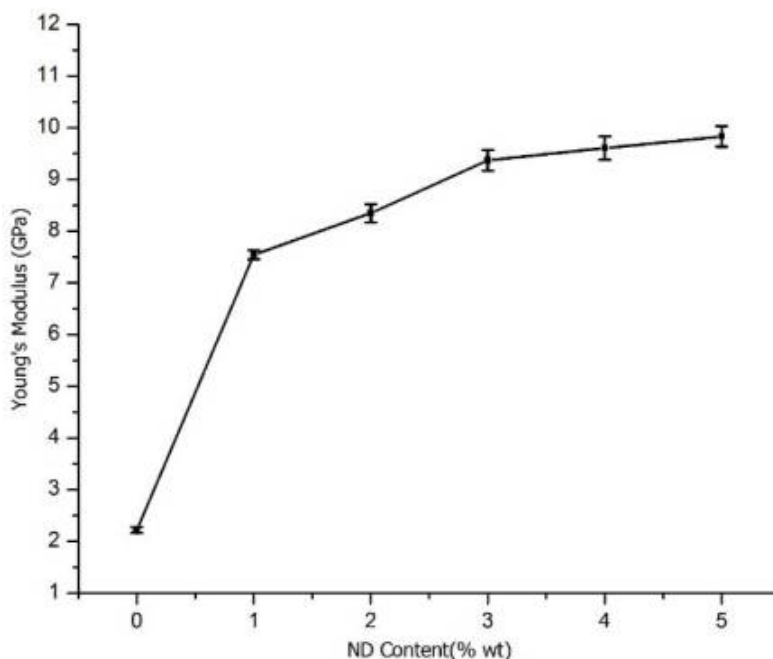


Figure 5. A graph showing the young modulus of CS without ND and CS/ND composite with increasing amount of ND (1%–5%)

As regards the biological functionality or property of chitosan, its cationic characteristic makes it easy to bond or interact with anionic surface of living tissues made of nucleic acids and proteins. However, the CS polymer matrix has low strength and using it alone will not match the structural and physical demands of tissues such as bone. CS is mainly investigated for bone tissue replacement but bones are able to withstand higher stresses and strains (depending on what part of the body) as compared to just 'ordinary' chitosan. A typical cancellous bone has a modulus of about 50–500 MPa which is a design point of reference for scaffolds. As stated earlier, nanodiamond fillers enhances the mechanical properties of polymer matrices, the same applies to chitosan. From the research by Yang et al [18], ND was applied as a filler in CS matrix to produce a reinforced CS/ND composite. There was a significant improvement with the tensile strength, hardness and young modulus of the nanocomposite obtained with increasing amount of ND [18].

From the experimental results obtained by Yang et al, the graph above indicates the effect of ND to CS. It is observed that the young modulus of pure CS is 2.2 GPa but with increasing concentration of ND from 1% to 5%, the young modulus obviously changed. The modulus for CS/ND with 5 wt% ND, is 9.8 GPa which is approximately 3,4 times that of CS with no ND.

Table 1. – Improvement of Pure CS with the addition of ND

Sample Composites	Young' Modulus (GPa)	Improvement
CS/0wt%ND	2.22±0.06	0
CS/1wt%ND	7.55±0.09	2390
CS/2wt%ND	8.35±0.17	2760
CS/3wt%ND	9.37±0.20	321
CS/4wt%ND	9.61±0.23	333
CS/5wt%ND	9.83±0.20	343

The table above shows the improvement of CS with the addition of Nanodiamond.

The good interaction between ND surface and the chitosan matrix is attributed for the improvements obtained above. I also mentioned earlier that the the ND surface can be easily functionalized. Functionalized surface groups on ND takes part in the reaction with CS chains and cross link the particles and polymer matrix to form a strong hybrid.

The case for possible advancement

As regards the use of nanodiamonds in the creation of tissue scaffolds, many pluses have been observed. However, the problem of avoiding impurities in the synthesised nanodiamonds is still an issue. Materials such as heavy metals do pose harm to the body(toxic). Therefore, I would suggest that better and intensive scientific research should be carried out in order to discover the most economical and efficient method for the synthesis of nanodiamonds to completely avoid impurities or reduce their concentration as much as possible.

Conclusion

In this project, the importance of nanodiamond (ND) in the creation of a very functional tissue scaffold was outlined. Nanodiamonds characteristic high mechanical property and biocompatibility was attributed for this possible application. The strong affinity (adsorption) of ND for biomolecules such as proteins and polysaccharides makes it very suitable for in vivo applications such as bone replacement. This is due to the large surface area that nanodiamonds possess. Chitosan which is a natural polymer matrix was studied and the resultant nanocomposite got (CS/ND) when nanodiamonds are combined in various percentages was analyzed. Pure CS showed great improvement in mechanical properties such as young's modulus with the addition of ND. In conclusion I would state there is a great potential of this nanocomposite material for tissue engineering applications such as bone replacement. The CS/ND composites have also shown great biodegradability and biocompatibility and this is very promising in the bone tissue scaffold creation.

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Section 5. Machinery construction

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DEVELOPMENT OF THE GAS-FORMING COMPOSITION OF ELECTRODE COATING FOR A HIGH-QUALITY CAST WELD STRUCTURE

Abstract. This article proposes the mathematical model of the gas-forming part of the electrode coating that ensures a high-quality cast metal weld with manual arc covered-electrode welding.

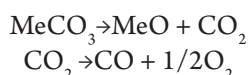
Keywords: Electrode, manual arc welding, gas-forming components, marble, potash, magnesite, dissociation, carbonate.

The gaseous protection of the reaction zone of welding and molten metal of the main electrodes is provided by carbonates of alkaline and alkaline earth metals, which oxide participates in the formation of slag [1–3] after the carbonate decomposition.

As carbonates in electrode coatings, marble CaCO_3 , magnesite MgCO_3 , potash K_2CO_3 , sodium carbonate Na_2CO_3 , carbonates of other metals, as well as combined materials are used.

The presence of CaO , MgO , K_2O , Na_2O oxides upgrades the arc stability, removes harmful impurities of sulfur and phosphorus from the weld metal and affects the physico-chemical properties of slags.

The dissociation of carbonates proceeds according to the scheme:



Dissociation of carbonates of different metals is accompanied by the release of different amounts of carbon dioxide. The volume of gases formed during the dissociation of carbonates make up the electrode coating charge. We shall consider the

calculation of the amount of CO_2 formed during the carbonates dissociation on the example of the dissociation of CaCO_3 .

The coating mass ratio makes $R_{\text{CM}} = 0.30 \dots 0.32$, the share of carbonate CaCO_3 , which provides CO_2 during the dissociation, makes 5.6% in the electrode charge. Then 1 g of the molten electrode accounts for 0.37 g of the charge, and in terms of the amount of CaCO_3 in grams

$$m_{\text{CaCO}_3} = 0.37 \cdot 0.048 = 0,0178 \text{ g}$$

To determine the mass of CO_2 emitted, we have to know the molecular mass of all substances of the chemical reaction of carbonate decomposition. With regard to the dissociation of CaCO_3 , the molecular weights of the substances are

$$M_{\text{CaCO}_3} = 100, M_{\text{CaO}} = 56 \text{ and } M_{\text{CO}_2} = 44.$$

Calculation of the amount of carbon dioxide per 1 g of molten electrode metal gave the following results

$$m_{\text{CO}_2} = m_{\text{CaCO}_3} \frac{M_{\text{CO}_2}}{M_{\text{CaCO}_3}}$$

Calculation of the volume of CO_2 produced by melting 1 g of an electrode shall take into account that the volume of a gram molecule of gas is equal to 22.400 cm^3 . Then

$$V_{CO_2} = 22400 \frac{m_{CO_2}}{M_{CO_2}}$$

The calculated gas volume is specific since it corresponds to a temperature of 273 K. As temperature increases, the gas volume increases too and is determined by the formula

$$V_{\alpha} = V_T + \alpha(T - 273) \quad \text{where } \alpha \text{ is the gas formation volume factor, } \alpha = 0.00366 \text{ K}^{-1},$$

T – gas temperature, K.

The results of calculating the emitted amount of CO_2 by the above method for various carbonates are given in (Table 1).

Table 1. – The results of calculating the emitted amount of CO_2 for different carbonates

Carbonate	$T_{dis}, ^\circ C$	m_{CO_2}, g	$V_{CO_2}^{273}, cm^3$	$V_{CO_2}^{1700}, cm^3$	$V_{CO_2}^{2500}, cm^3$	$V_{CO_2}^{2700}, cm^3$
$CaCO_3$	880–1200	0.0078	4.0	26.2	35.3	40.6
$MgCO_3$	350–650	0.0093	4.7	31.3	42.0	48.2
Na_2CO_3	1000	0.0074	3.8	24.9	33.0	38.3
K_2CO_3	1200	0.0057	2.9	19.1	25.6	29.3

Calcium and sodium carbonates contain a sufficiently large amount of carbon dioxide, however, they dissociate incompletely and continue to dissociate in the weld pool, contributing to porosity in the weld metal due to the relatively high dissociation temperature and high movement speed in the arc gap.

Magnesium carbonate reveals high protective properties and is characterized by a lower dissociation temperature. It completely dissociates in the arc gap, increasing the resistance of the weld metal against pores. Potassium carbonates emit a smaller amount of CO_2 , have a high dissociation temperature, which degrades the protective properties and contributes to porosity.

The process of developing an electrode coating that provides an integrally alloyed cast metal is faced with the problem of reducing the number of components of the electrode coating. The content of alloying components (ferroalloys) in the electrode coating in the required amount allows optimizing the gas-slag component of the coating. This is achieved by reducing the slag-forming and gas-forming components in the coating composition and may cause deterioration in the protection of the cast metal, leading to the appearance of internal defects and a decrease in the strength properties. Therefore, the relevant task is to optimize the content of gas-forming and slag-forming components in the composition of the electrode coating to provide reliable protection against the interaction with air nitrogen.

The analysis of these data served as the basis for creating a rational composition of the gas-slag-forming part of the coating. Varying the content of the gas-slag-forming composition allows influencing the kinetics of gas generation, the

uniformity, and completeness of decomposition of the gas-forming components of the electrode coating. Based on the results of calculating the emitted volume of CO_2 during the dissociation of carbonates and the data on their dissociation temperature, the composition of carbonates $MgCO_3$, $CaCO_3$, K_2CO_3 , Na_2CO_3 was used as the gas-forming part of the electrode coating.

The relationship of nitrogen content in the cast metal of the weld to the percentage composition of carbonates of sodium, potassium, magnesium, and calcium was studied. To develop a mathematical model of the relationship of nitrogen content in the cast weld metal to the percentage composition of sodium, potassium, magnesium, and calcium carbonates, 15 electrode coating compositions for manual arc welding were studied which had a varying content of carbonates of alkaline and alkaline-earth metal (Table 2). The content of the main slag-forming components CaF_2 and SiO_2 in the charge of the electrode coating is 80%.

The nitrogen content in the cast weld metal, obtained by eight-layer welding, was determined using special cut samples with a diameter of 4 mm with the help of a TS-136 (TC-136) gas analyzer no later than 36 hours after the build-up. The following surface build-up mode was used: $I_w = 160 \dots 180 \text{ A}$, $U_D = 29 \dots 30 \text{ B}$, $V_w = 19.3 \text{ m/h}$.

A mathematical model was created based on a simplex-centroid four-factor experiment plan, a randomized order of experiments, and a special cubic model.

The results of the study showing the effect of the carbonate composition components ratio on the nitrogen content are shown in (Table 2).

Table 2. – Experimental results

№	Carbonate content, relative units				Average nitrogen content in the build-up [N], %
	$CaCO_3$	$MgCO_3$	Na_2CO_3	K_2CO_3	
1	2	3	4	5	6
1.	1	0	0	0	0.0362
2.	0	1	0	0	0.0326

1	2	3	4	5	6
3.	0	0	1	0	0.0378
4.	0	0	0	1	0.029
5.	0.5	0.5	0	0	0.0333
6.	0.5	0	0.5	0	0.0376
7.	0.5	0	0	0.5	0.0325
8.	0	0.5	0.5	0	0.0338
9.	0	0.5	0	0.5	0.0297
10.	0	0	0.5	0.5	0.0336
11.	0.334	0.333	0.333	0	0.0354
12.	0.334	0.333	0	0.333	0.0319
13.	0.334	0	0.333	0.333	0.0341
14.	0	0.334	0.333	0.333	0.0328
15.	0.25	0.25	0.25	0.25	0.0337

As (Table 2) shows, the adequacy of the results obtained according to the mathematical model is checked by the Fisher factor F . The calculated statistics F is compared with the tabular value of the Fisher factor. If the model is inadequate, then transition to a more complex model is required. The significance of this model during testing the adequacy is $p = 0.011$, therefore the resulting model is adequate with a confidence level of 98.9%.

The significance of the regression factors is assessed using Student's t -test. Coefficients of the model for various factors are considered statistically significant at $p = 0.05$. If $p = 0.05$, then the coefficient is considered insignificant and should be excluded from the model.

Given the significance of the model coefficients for all factors, the mathematical description of the response surface is following:

$$\begin{aligned}
 [N] = & 0.0362 \cdot \text{CaCO}_3 + 0.0326 \cdot \text{MgCO}_3 + 0.0378 \cdot \\
 & \cdot \text{Na}_2\text{CO}_3 + 0.029 \cdot \text{K}_2\text{CO}_3 - 0.004785 \cdot \text{CaCO}_3 \cdot \\
 & \cdot \text{MgCO}_3 - 0.004785 \cdot \text{MgCO}_3 \cdot \text{Na}_2\text{CO}_3 + 0.002617 \cdot \\
 & \text{Na}_2\text{CO}_3 \cdot \text{K}_2\text{CO}_3 + 0.022295 \cdot \text{CaCO}_3 \cdot \text{MgCO}_3 \cdot \\
 & \cdot \text{Na}_2\text{CO}_3 - 0.01973 \cdot \text{CaCO}_3 \cdot \text{Na}_2\text{CO}_3 \cdot \text{K}_2\text{CO}_3 + \\
 & + 0.01609 \cdot \text{MgCO}_3 \cdot \text{Na}_2\text{CO}_3 \cdot \text{K}_2\text{CO}_3
 \end{aligned} \quad (1)$$

Magnesium carbonate has the lowest dissociation temperature; it dissociates completely when approaching the arc

gap and provides gas protection at relatively low temperatures. Sodium carbonate has the highest temperature of dissociation; it dissociates incompletely in the arc gap with excessive content in the composition and continues to dissociate in the weld pool, contributing to porosity in the weld metal. Calcium carbonate begins to dissociate at lower temperatures than sodium carbonate, thereby ensuring their more complete dissociation directly in the arc gap, which prevents the formation of pores in the weld metal. The established influence of the content of the carbonate composition is due to a decrease in the CO_2 content at the early stage of the arc process, which is compensated by an increase in the volume of CO_2 directly in the zone of the arc and molten metal. Calcium oxide also favorably affects the efficiency of sulfur and phosphorus harmful impurities removal from the weld metal.

Thus, based on the analysis of graphical relationships and the literature data presented, the following composition ratio of carbonates $\text{CaCO}_3 = 96\%$, $\text{K}_2\text{CO}_3 = 1 \dots 2\%$, $\text{MgCO}_3 = 2 \dots 3\%$, $\text{Na}_2\text{CO}_3 = 1 \dots 2\%$ is considered as the most effective composition of carbonates, providing a low nitrogen content in the weld metal. This ratio provides reliable protection of metal from nitrogen due to the uniform release of protective gases in a wide temperature range increases the resistance of the weld metal against pores and improves both physical and technological properties of slags.

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Section 6. Medical science

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ERECTILE DYSFUNCTION AS A LOCAL MANIFESTATION OF SYSTEMIC HORMONAL AND METABOLIC DISORDERS

Abstract: This article presents the latest research data on erectile dysfunction. It addresses the issues of mitochondrial dysfunction, leading to increased oxidative stress and progression of endothelial dysfunction. Systemic hormonal and metabolic disturbances are considered to be hypothalamic dysfunction, and erectile dysfunction is a local manifestation.

Keywords: erectile dysfunction, mitochondrial dysfunction, hypothalamus dysfunction.

The well-known pattern of erectile dysfunction (ED) is a polyetiological organic progressive chronic disease of the cavernous bodies of the penis with a multifactorial neuro-vasculo-hormonal pathogenesis due to endothelial dysfunction [1]. ED is defined by the development of the inability of a man to maintain and achieve an adequate erection of the penis for full sexual intercourse. The key mechanisms of the pathogenesis of ED are psychoneurogenic (non-vascular)/arterial infringement disorders/impaired venous outflow [2]. It is regrettable that in the most cases a narrow approach to ED (viewing it as an organ pathological process) still dictates main pharmaceutical principles of ED treatment. Moreover, mainly selective drugs that affect local symptoms (phosphodiesterase-PDE inhibitors; E1 prostaglandins; α -1 and α -2- adrenoblockers, herbal medicinal products, bioregulatory peptides, biologically active food supplements). One of the ED paradoxes is the symptomatic treatment. Why do not we use effective pathogenetic drugs to treat patients with ED, when we know that ED is only a local manifestation of a systemic pathological process?

The second ED paradox is that modern data shows whole ED development occurs in conditions of progressive endothelial dysfunction, then there are no screening and screening of oxidative stress and mitochondrial disorders in any of the modern guidelines for managing patients with ED?

The researches have established the involvement of damaged mitochondria in the development of endothelial dys-

function, activation of programmed cell death processes in atherosclerotic plaques, which leads to a violation of their stability and the initiation of local thrombogenesis. Objective data were obtained indicating the development of structural and functional disorders in the mitochondria of endothelial cells, smooth muscle cells, monocytes and macrophages in the atherogenic process [3; 4].

It has been established that mitochondrial dysfunction is a major factor in the formation and maintenance of a wide range of urological diseases (shrinking processes in the urinary bladder, chronic prostatitis with chronic pelvic pain syndrome, renal failure, erectile dysfunction, male infertility, hyperactive bladder, etc.) [5].

Mitochondrial dysfunction is accompanied by excessive formation of free radicals and oxidative stress. Today, it is proven that oxidative stress is the universal mechanism of many diseases [6; 7].

Mitochondrial dysfunction is a typical pathologic process that develops in presence of many different pathologies caused by various pathogenic factors. They do not have etiological and nosological specificity and are a special concept in relation to a particular disease, being included in it as one of its elements and mechanisms, and may develop in many different diseases [8].

The most common factors that cause secondary mitochondrial dysfunction are hyperglycemia, dyslipidemia, the formation of protein aggregates in cells, tissue ischemia/re-

perfusion, and toxic damage [9–11]. As a result of mitochondrial dysfunction, the level of adenosine triphosphate acid in the cell decreases, the production of reactive oxygen species increases, and the cell death mechanisms are activated.

It is known that hormonal metabolic homeostasis (integration and regulation of autonomic, metabolic, endocrine and trophic functions) is controlled by the hypothalamus. This part of the brain has the most developed vascular system, with a strong capillary network, characterized by the highest permeability for large-molecule protein compounds. The hypothalamus is very sensitive to various kinds of disorders: intoxication, infections, disorders of circulation and cerebral fluids circulation, as well as pathological impulses from other parts of the central nervous system.

Those noxas cause mitochondrial dysfunction of the hypothalamus cells. Over time, unidirectional disorders with a reduced or elevated tone of the autonomic nervous system are added to progressive dysfunction of the hypothalamus. Increased tone of the neurohormonal system is characterized by the predominance of the sympathetic orientation of the vegetative reactions; lowered tone – by the predominance of parasympathetic vegetative reactions. The state of balance between these two systems determines the body's response to various factors.

Hormonal imbalances caused by hypothalamic dysfunction develop not at the same time and in a long period.

Hormonal imbalances caused by hypothalamic dysfunction develop have two ways of development based on tone of neurohumoral systems:

- changes in the tone in the hypothalamus are primary – as a result of these noxas, an organ dysfunction develops;
- changes in the functions of the organs are primary – as a result of constant irritating impulses from the organs, dysfunctions of the hypothalamus develop.

Psychologic, somatic and emotional overloads, high amount of xenobiotics and toxins in the body, violation of intestinal microflora – all these factors that affect a man's body for months and years lead to functional disorders of the hypothalamus. Without elimination of these factors in time, by the age of 30 many modern men can detect endothelial dysfunction of the cavernous arteries, which at this age in most cases remains asymptomatic, and therefore undiagnosed and untreated. The progression of dysfunction of the hypothalamus with hormonal imbalance leads to the predominance of the sympathetic vegetative reactions. This is linked with an increase in the synthesis and release of the tropic hormones of the pituitary and an increase in the release of the catecholamines of the adrenal cortex.

It is known fact that catecholamines activate muscle and liver glycogenolysis, as well as stimulate lipolysis in adipose tissue, which increases glucose and fatty acids content in the blood plasma. Hyperglycemia increases insulin secretion (hyperinsulinemia), which leads to the growth of vascular endothelium and hyperplasia of smooth muscle cells of the vascular wall, which narrows the lumen of the vessels and the violates microcirculatory hemodynamics. The erosion of insulin concentration in time at the periphery occurs, which increases the duration of hyperglycemia. Through the control system, the pancreas receives a signal to increase insulin synthesis, which leads to prolonged hyperglycemia and hyperinsulinemia. A deeper violation of hemodynamics (vicious circle) and the emergence of relative insulin deficiency occur.

Hypothalamic dysfunction causes a progressive increase in the frequency of hormonal-metabolic and psychosomatic disorders in modern men. Hypodynamia and improper diet causes obesity development, which nowadays affects even younger people and has become the most important mechanism for the pathogenesis of most diseases, including metabolic syndrome, type 2 diabetes, cardiovascular diseases [12–15].

Later, the deepened noxas (psychologic, somatic and emotional overloads, xenobiotics, toxins, intestinal dysbiosis) at the age of 40–45 years some new hormonal imbalances develop. These are age-related androgenic deficiency, accompanied by estrogen balance disorders, as well as the age-related phenomenon of hyperinsulinemia/insulin resistance. Their synergism causes obesity progression, endothelial dysfunction worsening, systemic chronic inflammation, cellular and tissue hypoxia increase. As a result, many men of 40–45 years can already show organic signs of ED.

Conclusion

In summary, an integrative approach to ED, based on an analysis of modern mechanisms of disease pathogenesis, makes it possible to clearly understand that all local pathological processes accompanying ED are inextricably linked with systemic age-related neuro-hormonal imbalances, which have a simultaneous effect on the cavernous metabolism of the penis, so on systemic aging men in general. This approach makes it necessary for modern urology to form a new interdisciplinary view of ED as a hormonal and metabolic disease with systemic pathogenesis and local clinical manifestations. This will require fundamental changes in traditional narrow approaches to pharmacotherapy and prevention of this common age-related disorder.

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RESULTS OF COMBINATION THERAPY FOR SQUAMOUS CELL CARCINOMA OF THE MAXILLA

Abstract. Surgical treatment of these patients is very important – After post-operative treatment, complicated prosthesis using dental implants. Which is the goal of our article.

Keywords: combination therapy, dental implants, prosthesis using, oncological diseases, maxillary cancer, primary and secondary maxillary.

Upper jaw cancer, Squamous Cell Carcinoma, Postoperative rehabilitation, Complicated prosthesis, Dental implants.

Malignant tumors of the maxilla make up 2–4% of all oncologic diseases and are equally common in men and in women. Although this pathology mainly occurs in patients aged 40 years and over, it also may be encountered in children and young people. Most frequently the tumorous process develops from the maxillary sinus epithelium. In the second and third place are ethmoid labyrinth tumors followed by those originating from the tissues of the nasal cavity.

Significant etiological factors of maxillary malignant tumors can be chronic inflammation of the maxillary sinuses, trauma of these structures etc. Depending on the onset of the disease, primary and secondary maxillary and mandibular malignant tumors have been classified.

Primary tumors originate in the bony tissue, while secondary malignancies involve tumors that develop from the ethmoid sinus of the maxilla, soft and hard palate and the mucous membrane of the alveolar process.

Maxillary cancer is characterized by a diverse symptom-complex – dull, persistent pain, difficult nasal breathing or purulent bloody nasal discharge, lacrimation, exophthalmos, and swelling of facial soft tissues.

In maxillary cancers, not all of these symptoms manifest themselves simultaneously, which can be explained by their complicated topographic and anatomical features.

42 patients diagnosed maxillary malignant tumor underwent treatment in Konstantine Mardaleishvili Medical Center (Oncology Scientific-Research Center of Georgia) within the period of 2014–2019. Of them 29(69.8%) were men, 13(30.2%) – women. 7 (18.8%) patients aged 40, 33(78.9%) patients over the age of 40, 2 (4.7%) cases under 20. Malignant tumor of the right half of the maxilla was revealed in 19(4.5%), left half of the maxilla- 15(3,9%) patients. Malignant tumor of the maxillary central incisors area (bilaterally) was found in 8(1.9%) patients. The duration of disease for 6 months was observed in 16(36.2%) patients, for one and a half year and over –

in 26(62.8%) patients. 4 patients associated their illness with cystic neoplasm, 6 (18.8%) patients had a history of chronic rhinosinusitis with recurrent acute exacerbation, 3(8.1%) patients associated their illness with a tooth extraction, 7(19.4%) –with the use of completely disposable dental prosthesis, the rest of the patients could not indicate the cause.

Diagnosis making in maxillary cancer is rather difficult. Diagnostic errors due to the numerous symptom-complexes and complex topographic and anatomical features of the disease are not rare. Therefore, if a malignant tumor is suspected, it is necessary to conduct a consistent clinical and morphological study, starting with a visual examination of the patient's face with a proper assessment of the condition of nasolabial wrinkle and the nasal breathing on the affected side.

33(89%) of the patients admitted to the Center received fibroscopic examination, 9(11%) underwent fibroscopy with targeted biopsy. In 21 (48.1%) cases squamous cell carcinoma was identified.

The material for cytological examination was collected not only endoscopically, but also with the help of puncture, trepanation, and also through the analysis of flush water during the irrigation of the cavity (3%).

A morphological study of the surgical material of all patients was carried out. Squamous cell carcinoma was detected in 21(48.1%) patients, osteogenic sarcoma –5(12.1%), cylindroma –14(33.1%), tumors of various origins –2(4.8%).

Radioisotopic examination was carried out on 4(9.8%) patients.

Computed Tomography provides an accurate imaging of cartilaginous, muscular, fatty, and other tissues, enabling to determine the tumor growth tendency and the degree of bony structures destruction. This method also makes it possible to clarify the boundaries of the tumorous tissue, as well as interdependence of the tumor with soft and bony structures.

42(100%) patients received computed tomography and magnetic resonance examination. Based on the examination results tumor spread to the orbital area was observed

in 7 (14.6%), pterygopalatine fossa – 4 (9.2%), infratemporal and temporal fossa – 2 (5%), hard and soft palate – 24 (5.9%), lacrimal duct – 5 (14.8%) cases. In all the cases tumor spread to the alveolar process was observed. This, based on the TNM Classification we revealed and established the following: Stage 1–9 (21.4%), Stage 2–15 (37.7%), Stage 3–12 (28%), Stage 4–6 (15%) For the detection of regional metastases the patients received ultrasound examination of cervical lymph nodes; hematogenic metastases were identified using computed tomography of the lungs. Based on the above, regional metastases were revealed in 10 (23.7%) cases, hematogenic metastases – 2 (5%), in 30 (72%) cases no regional metastases were observed. According to the clinical and Computed Tomography findings as well as the results of cytological study, an individual method of treatment was scheduled for each patient.



The slide shows the postoperative defect after 6 months and the defect and teeth alignment restored by complex prosthetic surgery with the purpose to significantly reduce postoperative deformation of the face, restore the integrity of the teeth alignment, and to detach the oral cavity from the upper respiratory organs, so that the patients could eat and resume their chewing, swallowing and respiratory functions.

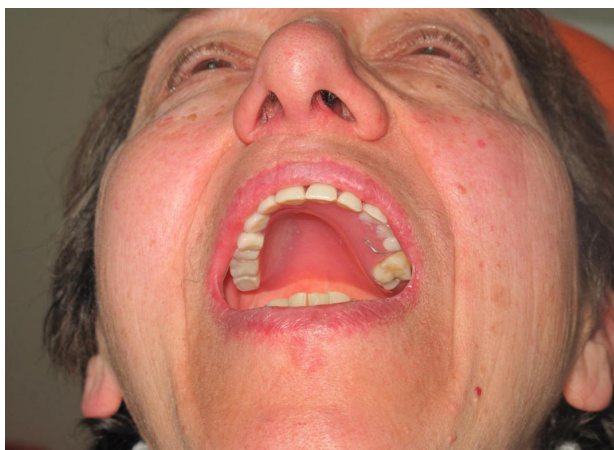


Consequently, combined treatment method was planned for 38 (90%) patients, radiation therapy as a monotherapy method for 4 (9.8%) patients; recurrence after radiation therapy was revealed in 4 (9.8%), postoperative recurrence – in 6 (11.8%) patients

Surgical treatment: Resection of the right half of the maxilla – 28 (69.7%) cases, Resection of the left half of the maxilla – 14 (30.3%) cases, Resection of the maxilla, orbitotomy – 7 (14.6%) cases,

Resection of the maxilla, exenteration – 3 (6.7%) cases, Resection of both halves of the maxilla – 2 (5%) cases, Resection of the maxilla, lymphadenectomy – 17 (45.1%).

Before surgical treatment, all patients received orthopedic treatment using a separating plate for partitioning the oral cavity from the operated defect. 6 months after the surgical treatment, patients underwent complex prosthetic surgery.



For rehabilitation purposes, after the resection of the right and left halves of the maxilla, dental implants were placed in 3 patients, which enabled to perform a complex prosthetic surgery. The slide shows the photo of the patient after the resection of both (right and left) halves of the maxilla.

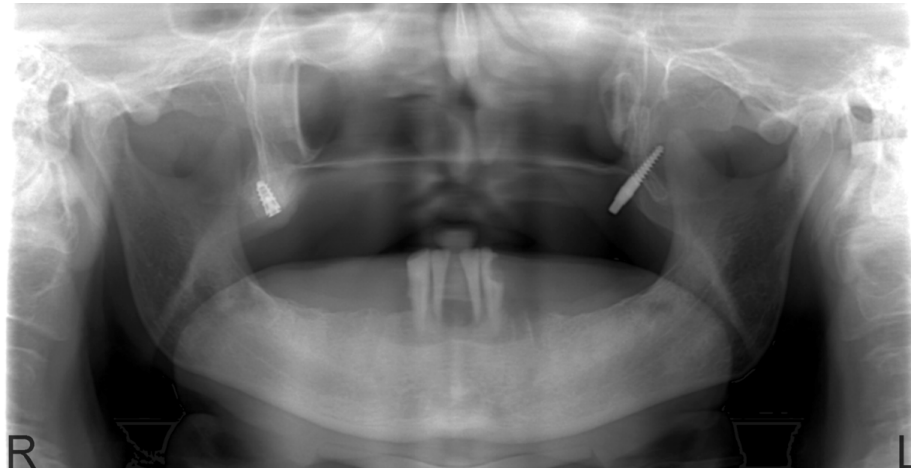




The slide shows the patient's oral cavity after the resection of both halves of the maxilla.

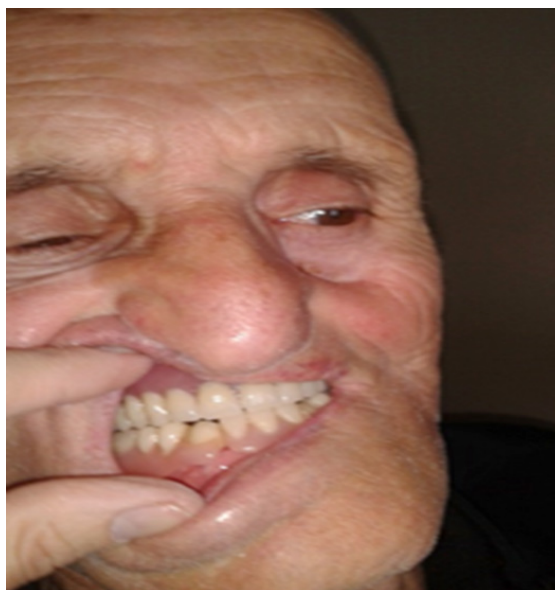


The orthopantomograph shows the two dental implants fixed into the rest of the jaw bone.



The slide shows metal ceramic crowns attached to the dental implants for the fixation of completely disposable prosthesis to achieve the orthognatic occlusion.





The following slide shows the patient before and after the complex orthopedic plastic surgery.



Out of 42 patients with squamous cell carcinoma, 31(73,9%) patients have survived, living for 3 years now. 3 (7,21%) patients died in a year and a half after being diagnosed, due to the rapid progression of the disease. 2 (5%) patients had a relapse of the disease and received relevant treatment; they have been alive for a year after the treatment. The fate of 3 (7.21) patients is unknown. 2 (5%) patients are currently undergoing chemotherapy due to the progression of the disease.

Summary:

Maxillary tumors make up 2–4% of all oncological diseases and 24% of head and neck tumors. This pathol-

In one case, there was self-rejection of the dental implant due to the progression of the tumor process.



ogy is equally common both in men and women patients, aged above 40 years. Maxillary cancer was first discovered in the human skull of stone age. Famous representatives of the medical field, such as Freud and Pirogov were suffering from maxillary cancer. Upper jaw cancers are characterized by numerous symptoms. This symptomocomplex can be neurological, ophthalmic, otorhinolaryngological and dental. To study the maxillary cancer it is important to consider (review) the relationship between the upper jaw and neighboring bones. For this purpose, we will briefly refer to the skull.

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TRANSTUBARISTIC ADMINISTRATION OF DEXAMETHASONE IN THE TREATMENT OF ACUTE SENSORINEURAL HEARING LOSS

Abstract. Sudden sensorineural hearing loss (SSNHL) is commonly encountered in audiologic and otolaryngologic practice. SSNHL is most commonly defined as sensorineural hearing loss of 30dB or greater over at least three contiguous audiometric frequencies occurring within a 72-hr period. Although the differential for SSNHL is vast, for the majority of patients an etiologic factor is not identified. Treatment for SSNHL of known etiology is directed toward that agent, with poor hearing outcomes characteristic for discoverable etiologies that cause inner ear hair cell loss. Steroid therapy is the current mainstay of treatment of SSNHL in the Uzbekistan. The prognosis for hearing recovery for SSNHL is dependent on a number of factors including the severity of hearing loss, age, presence of vertigo, and shape of the audiogram.

Keywords: hearing loss, sudden sensorineural hearing loss, evaluation, treatment, transtubaristic administration.

Introduction: There is a huge amount of research on the etiology and pathogenesis of the disease, as well as on the treatment of acute (sudden) sensorineural hearing loss (SSNHL).

For the treatment of SNHL, a huge number of different drugs, methods and treatment regimens have been proposed. These include: various vasoactive and hemodilution drugs, hyperbaric oxygenation, sedatives, diuretics, prostaglandin E1, vitamins B, E and C, extracorporeal methods, steroid drugs, etc.

Abroad for the treatment of SNHL treatment with steroid drugs is adopted as the “gold standard”.

There are a huge number of studies on the treatment of SNHL, among them only a few are randomized controlled studies (RCS).

In the CIS, vascular therapy, aimed at improving the blood circulation of the inner ear, is still the main treatment method.

Many authors evaluated the effect of different vasoactive and hemodilution drugs, such as pentoxifylline, dextran, ginkgo biloba, nifedipine, and their different combinations [3; 6; 8; 11]. There was no significant difference between the main and control groups.

Interesting facts is provided by A. Conlin, L. Parnes, who analyzed 20 RCTs devoted to the study of different types of treatment in patients with SNHL. The following results were obtained: there was no difference between patients receiving steroids systemically and placebo, between antiviral therapy in combination with steroids and placebo in combination with steroids, and there was no difference between steroids and other different types of treatment [4].

With systemic use of steroids, the optimal dose and duration of treatment are unknown and therefore often chosen empirically and are inaccurate. In addition, the therapeutic effect of steroids upon systemic administration may not be ideal in low doses, since they have a limited ability to penetrate the hematoperilymphatic barrier. So, in the work of M. Bühner et al. It has been demonstrated that after intravenous administration of prednisolone, its concentration in the cerebrospinal fluid is about 1/3 of its concentration in plasma [2]. L. Parnes et al. measured the concentration of methylprednisolone in perilymph guinea pigs an hour after intravenous administration. The authors indicate that this indicator is only 1/6 of the entered concentration [7].

Previously, patients who did not respond to systemic steroid therapy or who had not fully recovered hearing after systemic therapy, did not have an alternative to further treatment.

With the recent appearance of numerous publications on the effectiveness of intra-ear steroid therapy after systemic therapy, the situation has changed. Intratympanic therapy can also be used as the main and primary method of treatment in patients who cannot receive systemic steroid therapy for medical reasons (in patients with gastric ulcer and duodenal ulcer, osteoporosis, Itsenko – Cushing syndrome, renal failure, severe arterial disease). hypertension, glaucoma, tuberculosis, etc.).

Intratympanic administration of drugs into the inner ear was first applied by R. Barany in 1936; he used lidocaine to treat tinnitus [1].

Intratympanic administration has two theoretical advantages. Firstly, it becomes possible for steroids to directly pen-

erate the round window membrane (MCO), which leads to a high concentration of the drug in the perilymph. Secondly, with intra-implantation administration, in contrast to the systemic administration, it is possible to avoid the toxic effects and absorption of steroids.

L. Parnes et al. concentrations of methylprednisolone, dexamethasone, and hydrocortisone were determined in plasma, endolymph, perilymph after oral, intravenous, and intratympanic administration. The highest concentrations of steroids in the fluids of the inner ear were detected by intratympanic administration of drugs. At the same time, the highest concentration that lasted longer than that of hydrocortisone and dexamethasone was found in methylprednisolone [7].

Recently, a large number of clinical and review studies have been conducted to assess the effectiveness of intratympanic steroid administration in SNHL. However, most of them are only descriptive, there are no control groups or a sample of patients is too small, therefore, the results of these studies cannot be evaluated unambiguously, additional double-blind, randomized, placebo-controlled studies are needed.

In 2011, a systematic review of studies on the effectiveness of intratympanic steroid therapy in SNHL from 1970 to 2010 was published. The review included 176 studies, of which 32 were representative studies of the effectiveness of intratympanic steroid therapy, primary or post-systemic therapy, which included 6 randomized studies and only 2 RCTs. The authors concluded that, despite the small number of well-performed studies, the vast majority of studies of intratympanic therapy after systemic therapy showed the advantage of intratympanic therapy. Steroids can potentially improve hearing to a certain degree after systemic therapy, but it is still not clear how clinically significant this difference is. Therapy as a primary treatment is equivalent to standard therapy with high doses of oral prednisolone [10].

Side effects with intratympanic administration of steroids are minimal. So, L. Parnes et al. treated 37 patients by intra-implantation steroids. The authors indicate that 3 patients developed acute otitis media, which resolved after antibiotic therapy. No cases of hearing impairment or the formation of perforation were recorded [7]. B. Herr, S. Marzo indicate the following side effects: perforation of the eardrum, the formation of chronic suppurative otitis media, balance disorder and taste disturbances [5]. W. Slattery et al. observed several cases of perforation of the eardrum and nausea after intratympanic administration [9].

The goal of our study is to determine the effectiveness of transtubar steroids in the treatment of SNHL.

Material and methods: 49 patients with SNHL (patients aged 22 to 65 years; observation periods ranged from 1 to 6 months) were observed on the basis of Clinic III TMA, who

underwent transtubar steroids for the treatment of this pathology. Studies of the efficacy of transtubar steroids in the treatment of SNHL and comparison with the intravenous administration of steroids and the traditional treatment regimen of SNHL have been carried out.

From the moment of the onset of the disease before the start of treatment, 3 days passed in 8 patients, 5 days in 4, over 5 days in 11, and 8 patients diagnosed with sensorineural hearing loss after previous ineffective traditional therapy. The comparison group included 18 patients, all patients of this group received intravenous steroids and traditional treatment. The duration of treatment of patients in the hospital was 20 days. The examination of patients included general clinical studies, audiometry (tonal and speech), and impedancemetry.

A transtubar injection is performed using a catheter through an Eustachian tube. Dexamethasone is administered in a dose of 4 mg / ml depending on the degree of hearing loss every day, every other day. With the introduction of the drug into the tympanic cavity, the patient's head must be oriented so that the solution covers the niche of the round window for 30 minutes. The patient should not swallow, if possible, to reduce the loss of the drug through the auditory tube.

Transtubar therapy should be carried out until there is a positive trend, for example, until 2 identical audiograms are obtained with an interval of 2 weeks.

In the study of hearing after 1 month, 7 out of 8 patients who started treatment 3 days after the onset of the disease (group 1a) showed an improvement in hearing by 23.6 dB, in 1 patient by 19.5 dB; and in 4 patients who started treatment after 5 days (group 1b), hearing improved by 14 dB; over 5 days (group 1) – in 9 patients by 9.1 dB, of which in 2 patients – by 5 dB.

After 3 months – in the 1a group, 8 patients had a partial restoration of hearing by 37.3 dB; in 1b group, in 3 patients the hearing improved by 34 dB, in 1 patient – by 21.5 dB; in patients of group 1, in 9 patients by 17.5 dB, of which in 2 patients by 12.4 dB; and after 6 months, all patients of the group and 3 patients of the 1b group showed a complete restoration of hearing, in 1 patient of the 1b group and in 11 patients of the 1st group a partial restoration of hearing.

Patients with a diagnosis of “sensorineural hearing loss” after the previously ineffective traditional therapy, which were included in the main group, underwent a continuous course of transtubar therapy with dexamethasone during the entire period of treatment. The treatment lasted until a positive trend was observed and was discontinued in the absence of dynamics in the next audiogram. In 3 of 8 patients, improvement in hearing was noted.

According to the research, the following **conclusions** were made:

– The effectiveness of the administration of steroids for 1 month does not differ from traditional therapy and therapy only with steroids.

– In the study of the effect of therapy on different frequency ranges after 1 month, a higher effect of steroid administration on the high frequency range was detected compared to traditional therapy and systemic steroid monotherapy.

– With long-term therapy for 6 months by the route of administration of steroids, the effectiveness of this type of treatment is higher than that of conventional therapy and therapy with steroids only. It was revealed that after 6 months the greatest differences between the groups are in the frequency of complete restorations of hearing.

– The timing of local therapy by the administration of steroids is individual for each patient.

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PREDICTION OF OCCURRENCE AND THE RELATIONSHIP OF AUTOIMMUNE DISEASES IN CHILDREN WITH TYPE 1 DIABETES

Abstract. Autoimmune diseases of the thyroid gland (AIT) are the most common autoimmune diseases associated with type 1 diabetes. The development of hypothyroidism in patients with type 1 diabetes is associated with worsening of metabolic control and an increase in hypoglycemic states. Slowing down the process of insulin degradation in hypothyroidism reduces the need for patients with type 1 diabetes in exogenously administered insulin, which leads to the development of hypoglycemia

Keywords: diabetes mellitus; autoimmune diseases; diffuse goiter; diabetic cardiomyopathy.

Introduction. Autoimmune diseases of the thyroid gland (AIT) are the most common autoimmune diseases associated with type 1 diabetes [1]. AIT is diagnosed when three “large” signs are detected: primary hypothyroidism (manifest or subclinical), the presence of antibodies to the thyroid gland in the blood, and ultrasound signs of autoimmune thyroid damage [3]. In some patients, despite the presence of antibodies to the components of the thyroid gland, its function is not impaired. In a prospective study, it was found that in patients with elevated levels of AT to TPO, hypothyroidism develops annually in 4.3% of them. The rates of disease progression were directly dependent on the initial level of AT to TPO [4]. According to epidemiological data, in case of T1DM, the frequency of occurrence of thyroid disease increases 2 times [5].

The development of hypothyroidism in patients with type 1 diabetes is associated with worsening of metabolic control and an increase in hypoglycemic states. Slowing down the process of insulin degradation in hypothyroidism reduces the need for patients with type 1 diabetes in exogenously ad-

ministered insulin, which leads to the development of hypoglycemia [2]. Celiac disease manifestation is often associated with T1DM and in most cases is presented in the form of sub-clinical forms. The frequency of occurrence of celiac disease among patients with type 1 diabetes is much higher than that in the general population and, according to various sources [1; 2], ranges from 1 to 8% (compared with 0.5% in the general European population). In the debut of type 1 diabetes, celiac disease is diagnosed in 2.5% to 3% of cases.

Objective: to establish the frequency of occurrence of concomitant diseases in children with type 1 diabetes.

Material and methods. 46 children aged from 8 to 17 years with diabetes mellitus lasting from several months to 15 years were examined. The average age of children was 13.3 years. For the period of the survey, none of the patients had ketoacidotic and hypoglycemic conditions. All children were divided into 2 groups depending on the duration of the disease. Group 1 comprised 20 children with diabetes mellitus up to 5 years, Group 2–26 children with a disease duration of more than 5 years.

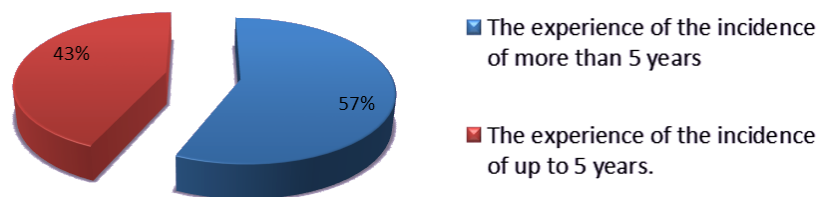


Figure 1. Distribution of children according to the experience of morbidity

The general characteristics of the examined patients provided for the collection of anamnestic data, including the time and nature of the onset of the disease, the course and duration of the disease, the hereditary predisposition to diabetes, a history of the child's life, past diseases, and an assessment of the patient's general condition. The diagnosis was made on the basis of complaints, anamnesis, physical examination, laboratory and instrumental data. Statistical data processing was performed using descriptive statistics in the form of arithmetic mean and its standard

error, Spearman correlation analysis. Statistical processing was performed using the application package "Biostat" and "Excell 2013".

Results. The basis of the development of late complications of diabetes in children, including the cardiovascular system, are metabolic disorders associated with poor compensation of the disease, which, according to our data, goes out of control when the duration of diabetes is more than 5 years. This is confirmed by the close direct correlation of the glycated hemoglobin level with the duration of the disease.

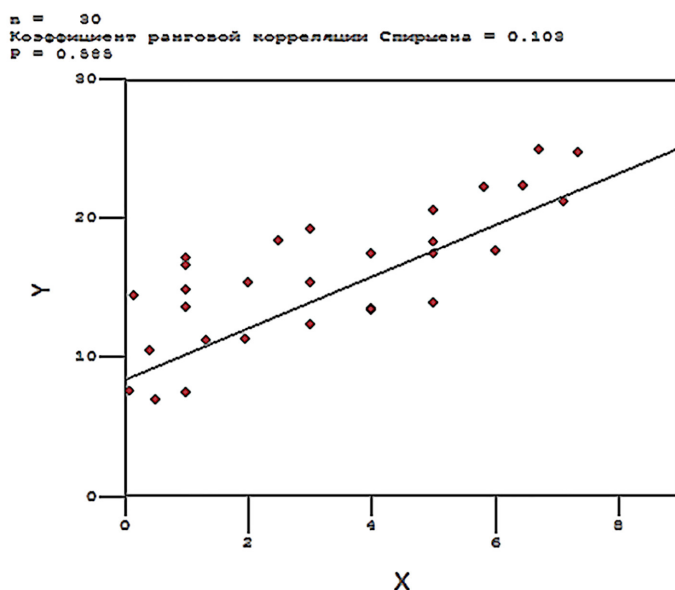


Figure 2. Correlation between experience of the disease and glycated hemoglobin
 Notes: X axis – the values of the experience; Y – the values of glycated hemoglobin

When comparing data from the experience of the disease and glycated hemoglobin, the direct reliable relationship was established, i.e. with an increase in experience, glycated hemoglobin increases. Given the above data, the duration of the disease and the level of HbA1c, as an indicator of metabolic

imbalance, reliably correlates with organ and systemic complications. It can be assumed that the leading value in the development of organ pathology is not the maximum peaks of the rise in glucose concentration in the blood, but long-lasting hyperglycemia.

Concomitant pathology of patients with type 1 diabetes mellitus (%)

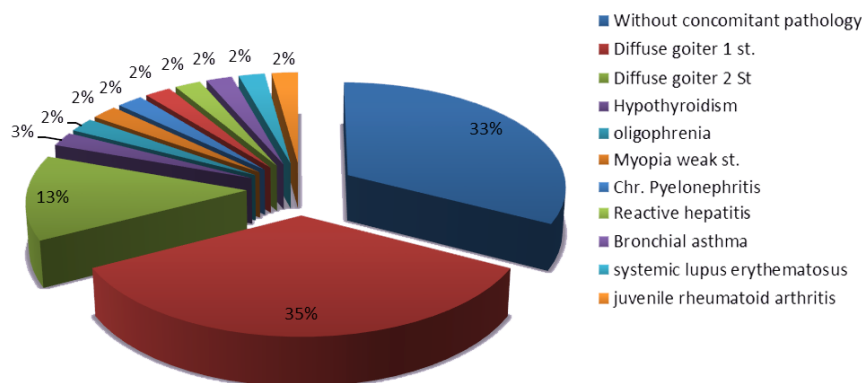


Figure 3. Concomitant pathology of patients with type 1 diabetes

Consequently, in children with diabetes mellitus over 5 years, the risk of developing late complications of the disease increases, which requires close attention of physicians with the aim of their early detection and timely prevention of further.

Type 1 diabetes mellitus is an autoimmune disease associated with the destruction of insulin-producing β -cells of the pancreas, the genesis of which involves many genetic and immunological factors. When T1DM, antibodies to β -cells are present.

The result of the study shows that type 1 diabetes is more common with diffuse goiter (48%), and with other autoim-

mune pathologies such as celiac disease, bronchial asthma, systemic lupus erythematosus, juvenile rheumatoid arthritis, reactive hepatitis occur in equal amounts (2%).

Conclusions. Thus, based on the above, children with type 1 diabetes have an increased risk of developing other autoimmune diseases. Early detection in autoimmune diseases of latent dysfunction of target organs that will prevent the development of severe and in some cases life-threatening complicated clinical signs of the disease that can worsen the course of diabetes.

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PECULIARITIES OF LIPID EXCHANGE IN PREGNANT WOMEN WITH OBESITY

Abstract. Obesity often causes aggravated pregnancy, childbirth and the postpartum period. At the same time, serious changes are noted in lipid metabolism. With the progression of pregnancy, abdominal obesity in women is a risk factor for the development of pathological dyslipidemia.

Keywords: pregnancy, obesity, lipids, fat metabolism.

Physiological pregnancy is accompanied by significant changes in the metabolism in the woman's body, which is associated with the characteristics of the hormonal background and is aimed at maintaining the normal growth and development of the fetus [3; 9]. At the same time, lipid metabolism undergoes the main changes [2]. During this period, there is a slight increase in the concentration of neutral fat, cholesterol and lipids in the blood of the woman, which reflects the adaptation processes taking place during pregnancy and is aimed at creating optimal conditions for the development of the fetus [5; 6; 7].

Currently, the important role of lipids in maintaining homeostasis during pregnancy is known. Violations of their exchange determine the changes that occur in the "mother – placenta – fetus" system. The content of lipids in the blood increases in a wavy manner as pregnancy progresses due to the inhibition of lipase activity under the influence of estrogens and hyperinsulinemia. By the end of pregnancy, there is an increase in total cholesterol, high and low density lipoproteins and triglycerides compared with pre-pregnancy levels [1; 4].

Obesity, as extragenital pathology, often causes aggravated pregnancy, childbirth and the postpartum period [8].

The high frequency of obstetric pathology is explained by the violation of adaptive and compensatory-protective mechanisms, the breakdown of the activity of regulatory systems that occur during obesity. Determining the levels and dynamics of changes in lipid metabolism during the gestation period in pregnant women with obesity is of particular interest.

The purpose of this study was to evaluate the dynamics of lipid metabolism changes in pregnant women with obesity.

Materials and methods

A total of 265 pregnant women with abdominal obesity and lipid metabolism disorders before pregnancy (main group) were under observation. The gestational age was determined by anamnestic data (the date of the last menstruation, the first appearance at the antenatal clinic) and the results of ultrasound fetometry. The work is based on clinical and anthropometric results of studies of 213 and clinical and laboratory results of studies of 52 pregnant women with obesity.

When registered for dispensary registration of pregnancy, all women were subjected to traditional anthropometric research with height (cm) and weight (kg) measurements, followed by calculation of body mass index (BMI). Obesity was diagnosed based on the calculation of the BMI index using the formula:

$$BMI = \text{body weight (kg)} / \text{height (m}^2\text{)}$$

The criteria for inclusion of patients in the main group were BMI values above 25 kg/m². We also measured waist circumference (WC) and hips circumference (HC) and then calculated the ratio WC/HC. Obesity was regarded as abdominal with a waist circumference of more than 80 cm and WC/HC ratio ≥ 0.85 . The control group consisted of 80 healthy pregnant women with a BMI before pregnancy of 18.5–25 kg/m². The values of the studied parameters obtained in this group were used as a starting point of comparison as physiologically normal values.

The state of fat metabolism was assessed according to lipid profile. In accordance with the goal, 52 pregnant women carried out the determination of the concentration of total cholesterol (TC), triglycerides (TG), low density lipoproteins (LDL) and high density lipoproteins (HDL). The study was performed three times during pregnancy – at 8–12, 18–20 and 34–36 weeks of gestation. Blood samples were taken from the ulnar vein in the morning on an empty stomach 12–14 hours after a meal. High and low density lipoproteins were determined by a homogeneous method, total cholesterol and triglycerides – by an enzymatic colorimetric method. The atherogenic index was calculated using the formula:

$$AI = (TC - HDL) / HDL$$

The ratio of HDL/LDL was also determined and the concentration of very low density lipoproteins (VLDL) was calculated by the formula:

$$VLDL = TG / 2.18$$

Statistical data analysis was performed using the MedCalc statistical software package for biomedical research. The evaluation of the obtained results was carried out by methods of

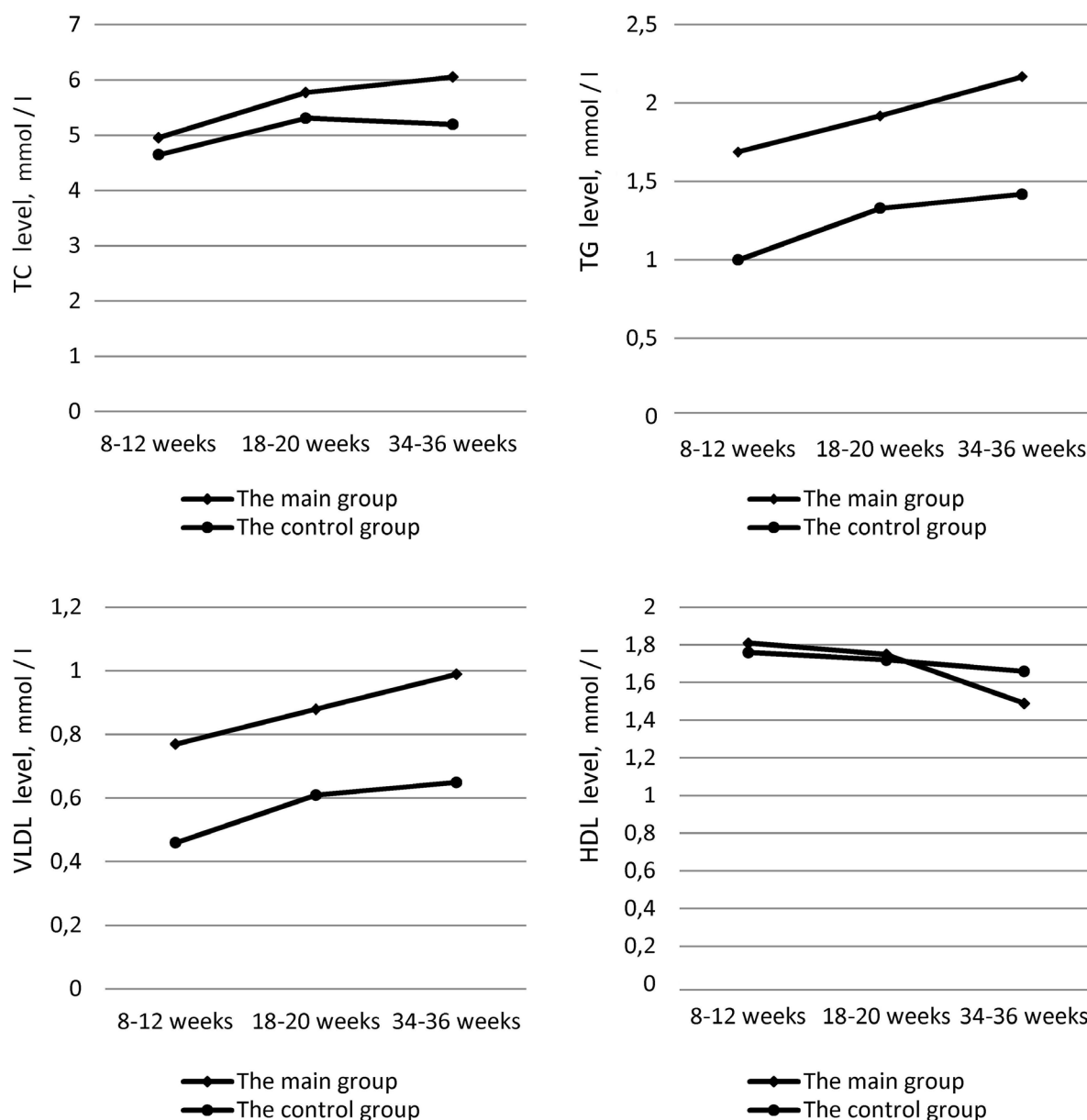
statistical description and testing of statistical hypotheses. For comparison of normally distributed values, the Student's t-test was used; if the distribution differs from the normal, the non-parametric Mann-Whitney test (U-test) was used. The data for the parametric distribution are presented as mean values of the measured value and standard error ($M \pm m$). Evaluation of the strength and relationship between phenomena or signs was carried out using the Pearson pair-correlation coefficient (r). The critical value of the level of statistical significance (p) in testing null hypotheses was taken to be 0.05.

Results and discussion

A normal pregnancy is accompanied by profound metabolic changes in the body of a woman, which for a number of

reasons turn into pathological conditions. However, serious changes are often observed in lipid metabolism.

In pregnant women with obesity, significantly higher levels of TC, TG and VLDL in serum were detected at all periods of gestation, which is a result of their increased production. During the analysis of the dynamics of lipid profile indicators of the examined women, it was found that the average lipid levels increase in all pregnant women with an increase in the gestation period, while the concentration of atherogenic lipids represented by TC, TG, VLDL was significantly higher in women with obesity ($p < 0.05$). Along with this, HDL levels have a tendency to decrease (picture 1).



Picture 1. Dynamics of lipid profile in pregnant women with normal body weight and pregnant women with obesity

Table 1. – Blood lipid parameters in pregnant women at different periods (M ± m, min–max)

Lipid spectrum	Observation groups					
	The main group (n = 52)	The control group (n = 80)	The main group (n = 52)	The control group (n = 80)	The main group (n = 52)	The control group (n = 80)
	8 – 12 weeks		18 – 20 weeks		34 – 36 weeks	
TC mmol/l	4.96 ± 0.071* (4.51 – 5.58)	4.65 ± 0.039 (4.11 – 5.26)	5.78 ± 0.076* (5.11 – 6.43)	5.31 ± 0.055 (4.51 – 6.13)	6.06 ± 0.11** (5.28 – 6.97)	5.20 ± 0.052 (4.41 – 5.94)
LDL mmol/l	2.71 ± 0.027* (2.47 – 2.93)	2.56 ± 0.020 (2.26 – 2.84)	2.88 ± 0.034* (2.65 – 3.41)	2.79 ± 0.022 (2.48 – 3.15)	3.06 ± 0.034 (2.81 – 3.34)	3.07 ± 0.033 (2.57 – 3.48)
HDL mmol/l	1.81 ± 0.028 (1.63 – 2.07)	1.76 ± 0.022 (1.47 – 2.12)	1.75 ± 0.017 (1.60 – 1.90)	1.72 ± 0.012 (1.56 – 1.94)	1.49 ± 0.02 (1.32 – 1.63)**	1.66 ± 0.012 (1.52 – 1.86)
TG mmol/l	1.69 ± 0.036** (1.41 – 1.95)	1.00 ± 0.013 (0.82 – 1.22)	1.92 ± 0.027** (1.71 – 2.13)	1.33 ± 0.013 (1.17 – 1.55)	2.17 ± 0.026** (1.97 – 2.39)	1.42 ± 0.013 (1.24 – 1.64)
VLDL mmol/l	0.77 ± 0.04** (0.21 – 1.24)	0.46 ± 0.07 (0.35 – 1.21)	0.88 ± 0.09** (0.34 – 1.45)	0.61 ± 0.05 (0.42 – 1.33)	0.99 ± 0.08** (0.51 – 1.45)	0.65 ± 0.04 (0.49 – 1.37)
AI standard unit	1.74 ± 0.025 (0.27 – 2.69)	1.64 ± 0.077 (0.39 – 2.23)	2.30 ± 0.023** (1.76 – 2.65)	2.09 ± 0.045 (1.04 – 2.58)	3.07 ± 0.061** (1.12 – 3.38)	2.13 ± 0.038 (1.09 – 2.61)
HDL/LDL unit	0.66 ± 0.01 (0.37 – 0.89)	0.68 ± 0.05 (0.33 – 0.75)	0.61 ± 0.03 (0.35 – 0.77)	0.62 ± 0.05 (0.37 – 0.80)	0.48 ± 0.07 (0.31 – 0.62)	0.54 ± 0.06 (0.39 – 0.83)

Note: The differences are significant in relation to the control group: * – $p < 0.05$, ** – $p < 0.001$

The results of the analysis of the dynamics of lipid profile in terms of pregnancy in patients of the main and control groups are presented in (table 1).

TC content at 8–12 weeks of gestation was 4.96 ± 0.071 mmol/l in patients with obesity (in the control group – 4.65 ± 0.039 mmol/l, $p < 0.05$), the TG level was 1.69 ± 0.036 mmol/l (in the control group – 1.00 ± 0.013 mmol/l, $p < 0.001$). The content of VLDL in the early stages of gestation was 0.77 ± 0.04 mmol/l (in the control group – 0.46 ± 0.07 mmol/l, $p < 0.001$). The LDL values were 2.71 ± 0.027 mmol/l (in the control group – 2.56 ± 0.020 mmol/l, $p < 0.05$), HDL – 1.81 ± 0.028 mmol/l (in the control group – 1.76 ± 0.022 mmol/l, $p > 0.05$), the value of the atherogenic index is 1.74 ± 0.025 standard units (in the control group – 1.64 ± 0.077 sr. units, $p > 0.05$), the HDL/LDL ratio is 0.66 ± 0.01 units. (in the control group – 0.68 ± 0.05 units, $p > 0.05$).

With the progression of pregnancy, dyslipidemic changes intensified, including in the control group of women. Such an increase in lipid concentration in healthy women can be considered as a physiological phenomenon that promotes the growth and development of the fetus, enhanced steroidogenesis, as well as providing high energy demands of the pregnant woman.

Thus, with a gestation period of 18–20 weeks, the TC level in the serum of healthy pregnant women was 5.31 ± 0.055 mmol/l, TG – 1.33 ± 0.013 mmol/l, VLDL – 0.6 ± 0.05 mmol/l. These lipid profile in obese patients with gestational period changed as follows: TC – 5.78 ± 0.076

mmol/l ($p < 0.05$), TG – 1.92 ± 0.02 mmol/l ($p < 0.001$), VLDL – 0.88 ± 0.09 mmol/l ($p < 0.001$). The level of LDL in the serum of pregnant women in the control group was 2.79 ± 0.022 mmol/l (in the main group – 2.88 ± 0.034 mmol/l, $p < 0.05$), HDL – 1.72 ± 0.012 mmol/l (in the main group – 1.75 ± 0.017 mmol/l, $p > 0.05$), the value of the atherogenic index is 2.09 ± 0.045 sr. units (in the main group – 2.30 ± 0.023 standard units, $p < 0.001$), the HDL/LDL ratio is 0.62 ± 0.05 units (in the main group – 0.61 ± 0.03 units, $p > 0.05$).

When comparing lipid metabolism in women of the main and control groups at gestational age 34–36 weeks, statistically significant differences were found. The values of TC, TG, VLDL and atherogenic index increase with obesity compared with the control group. Analysis of the lipid profile showed a significant increase in the level of TC in the serum of patients in the main group – 6.06 ± 0.11 mmol/l (in the control group – 5.20 ± 0.052 mmol/l, $p < 0.001$), TG – 2.17 ± 0.026 mmol/l (in the control group – 1.42 ± 0.013 mmol/l, $p < 0.001$), VLDL – 0.99 ± 0.08 mmol/l (in the control group – 0.65 ± 0.04 mmol/l, $p < 0.001$). At the same time, the level of LDL in the serum of pregnant women of the main group was 3.06 ± 0.034 mmol/l (in the control group – 3.07 ± 0.033 mmol/l, $p > 0.05$), HDL – 1.49 ± 0.02 mmol/l (in the control group – 1.66 ± 0.012 mmol/l, $p < 0.001$), the value of the atherogenic coefficient – 3.07 ± 0.061 sr. units (in the control group – 2.13 ± 0.038 conv. units, $p < 0.001$), the HDL/LDL ratio is 0.48 ± 0.07 units. (in the control group – 0.54 ± 0.06 units, $p > 0.05$).

In order to assess the association of the studied clinical and metabolic parameters in pregnant women, a correlation analysis was conducted, during which there was a close relationship between the lipid profile and BMI. It was established that the growing imbalance of lipidogram indices was accompanied by an increase in BMI: TC ($r = 0.251$; $p = 0.001$), TG ($r = 0.401$; $p = 0.002$), VLDL ($r = 0.365$; $p = 0.033$), HDL ($r = -0.318$; $p = 0.002$).

Analysis of the obtained results showed that lipid metabolism disorders have a close direct and inverse relationship with BMI and an increase in the duration of pregnancy. The development of pregnancy was accompanied by an increase in fat metabolism in the main group at 18–20 and 34–36 weeks of gestation, respectively: TC – by 16.5% and 22.1%, LDL – by 6.3% and 13.0%, TG – by 13.6% and 28.4%, VLDL – by 14.3% and 28.5%. We have revealed an inverse relationship between HDL levels and gestational age. So, if the level of HDL at the gestational age of 8–12 and 18–20 weeks did not have a significant difference ($p > 0.05$) with the level of the control group, then by the end of the gestation a significant decrease was observed. The decrease

in HDL values – by 3.3% and 17.6% during gestation led to a strongly marked increase in the atherogenic index by 32.1% and 76.4% in gestational age 18–20 weeks and 34–36 weeks, respectively. This index indicates the distribution of TC between HDL and atherogenic lipoprotein fractions. The antiatherogenic HDL/LDL ratio slightly decreased in the dynamics of pregnancy in obese women – by 7.5% and 27.2%, respectively.

Thus, the results of the study indicate a significant increase in total cholesterol, triglycerides, VLDL with a maximum level by the end of the gestation period in the group of pregnant women with obesity compared with patients with normal body weight. Along with this, there is a decrease in HDL levels, which is accompanied by an increase in the atherogenic potential of blood serum. Despite the fact that the metabolic changes occurring in the body of a pregnant woman are adaptive, they can play a role in the pathophysiological process of the development of pregnancy complications and impaired labor. With the progression of pregnancy, abdominal obesity in women is a risk factor for the development of pathological dyslipidemia.

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SPONTANEOUS DETACHMENT OF THE DESCMET'S MEMBRANE (CASE STUDY)

Abstract.

Keywords:

Introduction

Descemet's membrane (DM) detachment means disconnection of the Descemet's membrane from the overlying corneal stroma. It is a rare intraoperative complication following a surgeries performed on the anterior cavity of the eye. According to the literature, Descemet's membrane detachment occurs at the average in 2.5% and 0.044–0.5% extracapsular cataract extractions and phacoemulsifications, respectively, as well as during keratoplasty, with burn and post-inflammatory opacities. In addition, there are reports of chemical eye injuries that caused DM detachment, but they are uncommon [1].

Detached DM can be considered as a transparent or translucent membrane in the anterior eye chamber, separated from the posterior corneal stroma. Extensive DM detachment can create a double anterior chamber effect. Over time, the detached Descemet's membrane becomes hidden by developing cornela oedema [2].

Moreover, a detached Descemet's membrane may be one of retrocorneal membranes in inflammatory diseases of the anterior eye cavity [3].

The Descemet's membrane tear and detachment can occur in patients with alkali corneal burns [4–6], chronic anterior uveitis and deep corneal vascularization, due to corneal hemorrhage [7], less frequently to keratoconus [8].

The study by Schlötzer-Schrehardt et al. has shown a 0.5–1 thick layer of interlaced collagen fibers at the boundary of Descemet's membrane and the stroma 0.5–1 μm , known as Dua's layer. Similar to the Bowman's membrane, although found in both the central and peripheral corneas, this layer may be less pronounced in the peripheral part of the Descemet's membrane. It was assumed that possible alterations in the Dua's layer at the very periphery of the cornea are the cause of the Descemet's membrane detachment [9].

It is known fact that human cornea collagen fibers are positioned mainly horizontally and vertically (90° and 180°), parallel to each other and the surface of the cornea, determining its curvature and transparency. A similar pattern occurs in most of the cornea, with the exception of a strip 2 mm wide along the limbus. Collagen fibers extending from the limbus to the limbus are interconnected in the anterior-posterior direction by matrix proteins (proteoglycans, etc.), as well as collagen VI that binds collagen I fibrils. Collagen makes up about 80% of the organic content of the cornea. Nonfibrillar collagen IV is the main component of the anterior and posterior boundary membranes of the cornea. Collagen VII is necessary for fixation of connection between the basal cells of the epithelium, the basement membrane and the anterior stroma. Therefore, another cause of the Descemet's membrane detachment may possible be an alteration in the structure of stromal collagen fibers of hazed cornea. For

this reason, the connection between the Descemet's membrane and the stroma is broken and the latter is detached [10; 11; 12].

Case report

Patient N. was admitted to the Trauma and Reconstructive Surgery Unit in October 2016 with a diagnosis of OD-post-inflammatory corneal leukoma (keratouveitis sequelae), complicated cataract, paralytic mydriasis.

Following surgical procedures was performed on OD: penetrating reconstructive keratoplasty, extracapsular cataract extraction, posterior chamber IOL implantation with suturing and pupilloplasty (8.0/8.5 mm, surgeon: S. V. Flora). Visual acuity at discharge was 0.2 (Vcc). Transparency of the transplant was maintained for 8 months after the surgery, over time the transplant gradually hazed. The patient was admitted to the unit at the end of 2018 for reconstructive operation on OD.

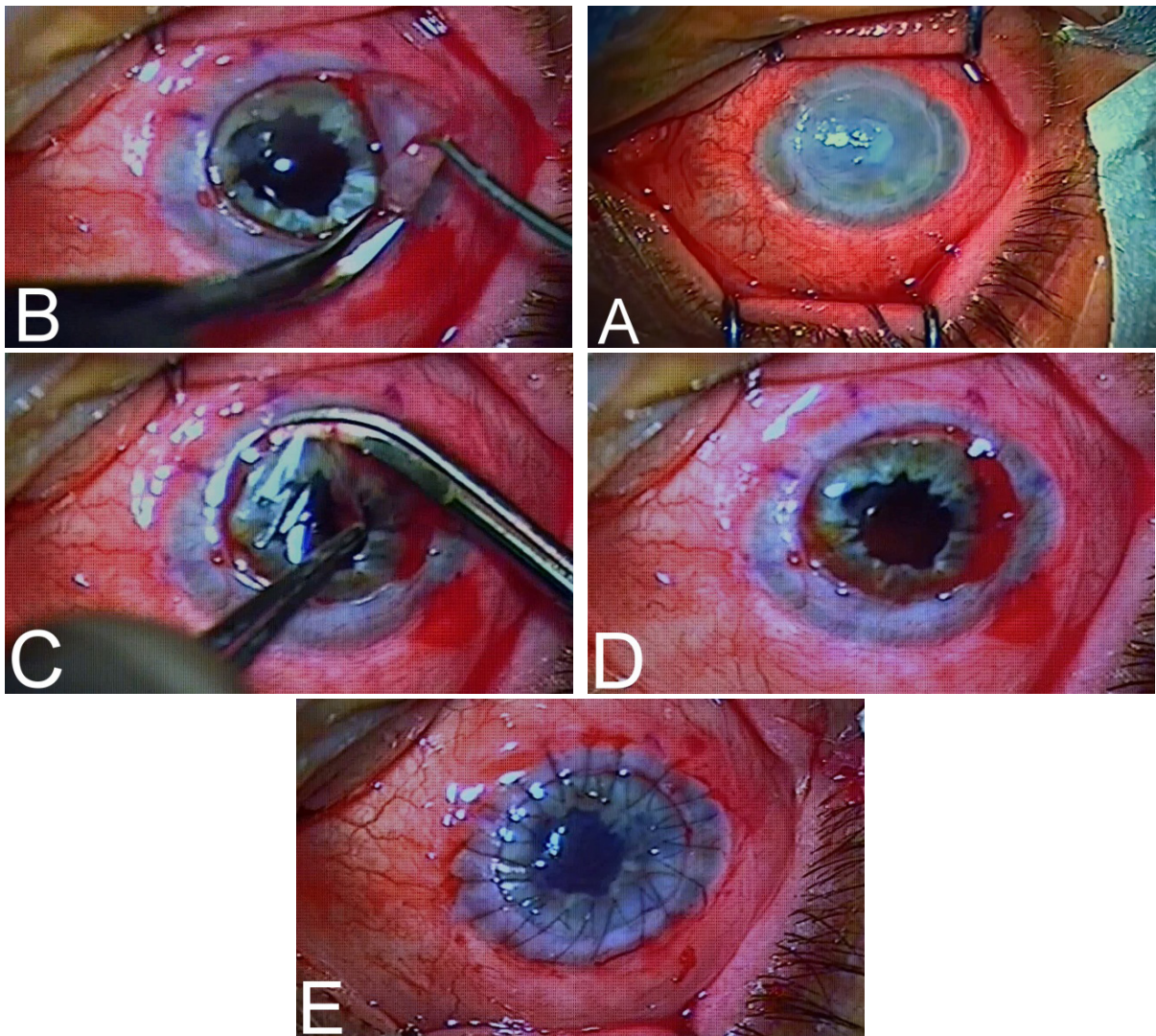


Figure 1. A – eye pre-operation. B – the opaque keratoplasty corneal transplant is cut out. C – detached Descemet's membrane is dissected D – foundation is formed. E – donor disk is fixed on the foundation with 4 nodal and one continuous stitches. Nodal stitches removed at the end of the operation

The patient underwent a standard clinical examination, including visual acuity testing, slit lamp biomicroscopy. On admission: the maximum visual acuity of OD was???, OS = 1.0. When conducting biomicroscopy on the right eye, diffusely hazed, thickened through keratoplasty corneal transplant with peripheral neovascularization was found. The anterior chamber was visible behind of medium depth haze (Fig. 1A).

During the operation, the boundaries of the incision were outlined with 8.0 mm of trepan, and during the excision of the hazed transplant disc an intact thick transparent Descemet's membrane was found (Fig. 1B). After the analysis of situation the decision to remove the Descemet's membrane of transplant was made due to the link of the opaque keratoplasty corneal transplant opacity to endothelial cell dysfunction of the altered Descemet's membrane. The Descemet's membrane was dissected with scissors (Fig. 1 C, D). The corneal donor

disk is fixed on the foundation with 4 nodal and one 10–0 continuous nylon sutures (Fig. 1E).

In the postoperative period, the patient was given anti-inflammatory, antibacterial, reparative therapy. Visual acuity of OS was 1.0.

The patient was discharged with a visual acuity of 0.1 (VCC), the transplant was transparent and epithelialized.

Discussion

In this medical case, despite the spontaneous detachment of DM from the stromal transplant, it was removed due to the lack of endothelial cells and the altered structure of the DM. Our unit had witnessed another 2 cases of nondeliberate preservation of the DM during penetrating keratoplasty. In these cases, one day after the surgery, an own transparent, not removed DM was visualized in the anterior chamber, in contact with the iris and through the cornea transplant at the periphery (Fig. 2).

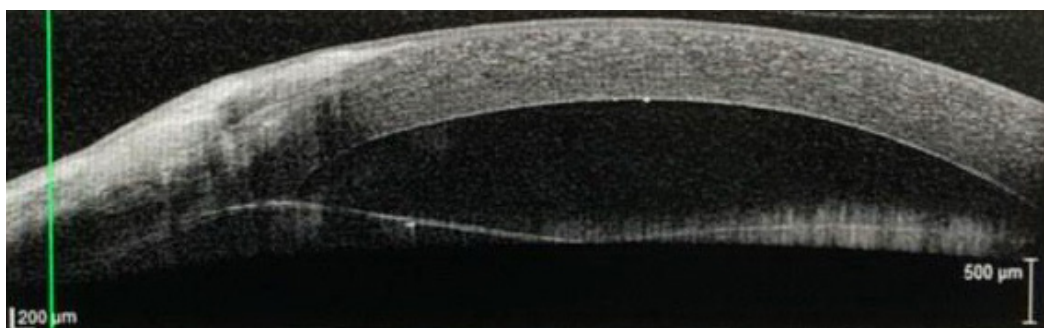


Figure 2. Descemet's membrane detachment

Over time, in the postoperative period (after 4–6 months), the disease of the perforated transplant started in both cases and, despite the therapy, in both patients the transplant became hazed. In our opinion, it may be due to traumatization of the endothelial cells of the perforated

keratoplasty transplant due to contact with the detached DM.

In summary, spontaneous detachment of DM, according to our data, requires surgical intervention and its removal in cases of complete detachment.

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Section 7. Pedagogy

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DIGITAL SKILLS CRISIS AND REVISION OF EDUCATIONAL STANDARDS

Abstract: the article analyzes the issue of compliance of educational standards currently in effect with the standards of the 5th and 6th waves of innovation. Practical conclusions and proposals are made based on the analysis of the educational standard for the training of international lawyers.

Keywords: wave of innovation, educational standard, competencies, digital skills crisis.

Currently, the CIS countries are reforming their state educational systems. One of the crucial factors of this process is the decision of transition to new-generation educational standards (three plus) [1].

The educational standards developed and approved by the Ministry of Education of the Republic of Belarus in 2013 (ed. 2018) are presently used.

It is known fact that all education systems strive to reach standards of the 5th and 6th waves of innovation. To make further presentation convenient, it is necessary to isolate from their general description those provisions that may be applicable to the system of legal education and training of highly qualified personnel.

Experts make emphasis on the widespread use and application of the following, when describing the 5th wave of innovation:

- computing equipment;
- fiber-optic technology;
- software;
- telecommunications;
- robotics.

These technologies should be used for the provision of educational services.

At the same time, one of the tasks that have become apparent in 2016–2018 is: overcoming the crisis of digital skills of both the teacher and the student. According to the term “digital skills crisis”, based on the point of view of the British Parliament, which discussed in the House of Lords the problem of low technological literacy of English school teachers and the poor development of the students’ skills of using digital devices [2].

There were little application of software, computing equipment, and telecommunications in the education of law

students. There are no attempts of creating virtual training worlds, virtual training grounds, and applications with augmented and virtual reality for the training of law students.

The educational standards currently in force have not yet reached the level of the first of the two listed waves of innovations. Therefore, the current edition cannot be considered optimal.

Another factor that dictates the need for further revision of educational standards is the need to prepare the scientific and pedagogical personnel needed to rotate/replace the personnel of the 20th century, which is poorly included in the digital transformation.

An example of the reform that is currently needed is given on the basis of recommendations for revision of the existing educational standard OSVO (educational standards for higher education) 1–24 01 02–2013 “International Law” used in training specialists with the qualifications of an international lawyer with knowledge of foreign languages [3]. At the same time, we propose possible changes that answer to the need to achieve standards of the 5th wave of innovation.

Clause 5.2 of the standard specifies the areas of professional activity of a specialist, which can be brought in line with the theory of waves of innovation [3].

First of all, a set of specialist competencies requires some revision (academic competencies, hereinafter referred to as “AC”, social and personal – hereafter “SPC”, professional – hereafter “PC”). We believe that from the point of view of the forthcoming work of lawyers in the conditions of new technological structures, deciphering the competence of AC-7 as “To have skills related to the use of digital devices, information management and computer usage” can now be considered unsatisfactory and requiring mandatory changes. It should mention not only digital skills, but

also the active creation of the necessary software. First of all, it will be necessary when strengthening the social and personal approach. For example, with the development and expansion of the use of augmented reality in the work of the investigator, graduates will have to have a good understanding of the technical side and the technology of augmented and virtual reality [3].

AC-8 describes skills in the field of oral and written communication of a lawyer, does not take into account the trend for Industry 4.0, Smart Internet, etc., which requires special skills and abilities in work organization using modern telecommunications, fiber-optic technology. For example, the creation of educational mobile applications [3].

We propose to add new competencies to the AC group of competencies with competencies not covered by the current edition of the standard:

- To have sufficient training for the application and use of virtual and mechanical robots in the professional field;
- To be able to apply technologies, equipment, and technological methods developed for law enforcement officers;
- To have skills of working with large databases, artificial intelligence, global information networks,
- To be able to create mobile applications necessary for the implementation of the professional activities of a lawyer.

Professional competence in the field of educational activities in the field of law (PC-73 and PC-74) also cannot be considered sufficient. First, they do not take into account the inevitable need for mass retraining of personnel, caused by the transition to a new economic system. Therefore, it is likely that competence should be added, reflecting the fact that a specialist in law education should be fluent in the set of knowledge, skills and abilities necessary for retraining lawyers in the face of digital transformation [3].

PC-73, which determines the need for the student to develop skills in teaching academic disciplines at a high scientific and methodological level, must be supplemented with words about a “high technical level”, as well as a reference to the targets for achieving standards of the new wave of innovation. A modern teacher should also have a high level of proficiency in modern educational technologies, and new teaching aids, consistent with the concepts of the theory of the 5th and 6th waves of innovation [3].

Article 7.4 “Requirements for the structure of the standard curriculum in the specialty” requires a serious review. First of all, attention is drawn to the distribution of the developed competencies by academic disciplines [3].

Let us give only one example: the legal article “Protection of the population and objects from emergency situations. Radiation safety” absolutely does not count the development of SC-7 (even in its current edition) and the already described competences in the field of educational activities (PC-73, 74). Meanwhile, the state program “High-tech technologies and technology” classifies nuclear power engineering as a promising high-tech industry, suggesting that their development will necessitate a broad retraining of specialists.

Article 7.6 “Requirements for the content and organization of internships”, in our opinion, needs to be supplemented. At the end of the requirements for each internship type, at the end of each phrase “... the acquisition and development of practical work skills” add the words “and the use of modern electronic, digital, etc. devices, instruments and equipment”. This will enhance the practical orientation of specialist training from simple documentation work during internship, to the use of new electronic devices, programs, etc.

Article 8.1 “Requirements for the staffing of the educational process,” currently requires replacing the verb “to master modern educational, including information, technologies ...”, including, among other things, a passive general acquaintance with the specified object (information technology) with a more active “use in the educational process”. To reach standards of the 6th wave of innovation, the reference to information technologies will obviously not be enough. Since, for example, nanotechnology, cellular technologies that can be used in the work of the courts, investigators, forensic scientists cannot always be attributed to educational, or information [3].

In addition, the requirement imposed by the edition of the standard currently in force to the teacher “mastering ...” does not yet establish the need to use these skills. The standard requires a mandatory obligation to apply new technologies in education.

Article 8.6 “General requirements for the forms and means of diagnostics of competencies” requires some addition to the list relating to the technical form of testing [3].

For example, the following specify the form of testing:

- preparation of materials using augmented reality;
- adjustment and application of technical means and equipment (for example, when passing the forensic exam);
- passing tasks on virtual simulators and virtual test sites.

Therefore, further revision of educational standards currently in force should be aimed at overcoming the current crisis of digital skills in education.

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COMMUNICATIVE COMPETENCE AS THE BASIS OF PROFESSIONAL ACTIVITY OF FUTURE PHARMACISTS

Abstract. Communicative competence is an essential part of professional education of future pharmacists. It plays the main role in a successful development of future specialists in their professional field.

Keywords: pharmacists, communicative competence, professional education, foreign languages, communication skills.

A professional communicative competence has become one of the basic components of qualitative teaching of specialists in every sphere of human activity that demonstrates the level of formed key knowledge and skills in the field of individual co-operation on social and professional levels. However, as theoretical and sociological researches have shown, efficiency of formation of the professional communicative competence in students of higher educational establishments substantially restrains temper because of insufficient scientifically-methodical process of communicative teaching of future professionals [3].

The general meaning of the term “competence” includes semantic basis: knowledge that a person must have; wide range of questions in that a person must be well-informed; experience, necessary for successful implementation of work in accordance with the established rights, laws, status. In this interpretations the cognitive (knowledge) and regulative (powers, law, status) aspects of this concept are represented. One of the key senses of the concept of competence represents description of personal qualities, possession a competence.

Thus, the competence is a certain norm of the achievement that can testify the possibility of correct implementation of a particular task; moreover, the competence is an estimation of achievement (or unachievement) of this norm [3]. The term “competence” comes into the Ukrainian and Russian languages as a quality, description of a person, that allows him or her (or even gives a right) to solve established tasks, award judgement, judge in a certain industry. Basis of this quality is knowledge, awareness, experience of social-professional activity of a person. Integrative character of the concept “competence” underlines the same meaning.

The term competence comes as a condition of development and acquisition of mature form of ideas, reasons, values, orientation of personality, that aims to assert oneself in his or her own activity, realize creative potential, show the capabilities, purchase authority among colleagues and the person himself. It testifies the motivational-incentive function of the competence. The competence activates cognitive and intel-

lectual activity of a person. The competence shows also the capacity of a person to confront volitional tensions, mobilization of the forces during overcoming difficulties in the process of cognitive or professional activity, persistence, endurance, that testifies the emotionally-volitional function of the competence in the structure of a personality.

Functions of the competence provide the conscious, motivated behavior and self-realization of a personality, support an emotional background, force, orientation, and development of the ability to work out vital and productive problems.

It is traditionally considered that the concept of communicative competence entered into scientific world in 1972 by Noam Chomsky, who contrasted the achievements of theory of language competence to the American linguist Dell Hymes. He marked that formation of the language competence was possible in a homogeneous language environment, among those, who knows a language at the highest level and on whom psychological factors (features of memory and attention, application of knowledge are common) do not have influence. The researcher concentrated his attention on possibilities of “ideal” speakers to form the grammatically correct sentences [6].

In scientific literature a communicative competence is interpreted in such way: ability to communicate in specific situations (Valett); ability to consider in speech communication a contextual appropriateness and use of language units for realization of cognitive and communicative functions (N. Gez [1]); ability of a person to understand and reproduce a foreign language not only correctly but also in accordance with the social-linguistic situation of the real life (M. Finokkiaro); ability to use a language functionally and ability to speak, interpret and discuss values that embrace a communication between two people and more or between one person and written or oral text (S. Savignon [7]).

According to the European Recommendations of language teaching, a communicative language competences are such that provide possibility to a person to apply specific linguistic facilities. A communicative speech competence consists of such components, as linguistic competences,

sociolinguistic competences and pragmatic competences, that are realized in the different types of speech activity (perception, production, interaction or mediation) [2].

Such components of the communicative competence are distinguished: orientation in the various situations of communication, that is based on knowledge and life experience of the individual; possibility to co-operate effectively with surrounding world and people in it due to understanding a person or other people during permanent modifications of mental conditions, interpersonal relations and terms of the social environment; an adequate orientation of a person in his or her own psychological potential, potential of a partner or situation; readiness and ability to build up contacts with people; internal abilities to adjust communicative actions; knowledge, ability and skills of structural communication; internal resources necessary for the construction of effective communicative action in the particular situations of interpersonal co-operation.

The professional communicative competence of future pharmacists is an integrative formation, theoretical knowledge, practical abilities and skills, professional communicative skills that predetermine conscious attitude of a future pharmacist toward the dialogic co-operation with the subjects of professional communication. Such components constitute the main characteristics of the professional communicative competence. On the other hand, it provides ability of a specialist to perform effectively professional communicative activity in particular, and also the professional activity on the whole. Development of the professional communicative competence of future pharmacists is the system of internal resources, that includes the development of personal potential of future specialists, as the basic function of it.

The main feature of health care worker's activity is the ability to conduct a dialogue, organize the process of communication, perform a number of professional skills and duties. A professional health care worker must be able to hear and understand, to ask and answer questions clearly and correctly, to convince and persuade, to create the atmosphere of confidentiality and comfort, to find the psychological approaches to a client, to settle a conflict and take off the tension.

Consequently, it is possible under communicative competence of health care specialist to understand a basis of knowledge, principles and techniques of communication intellectually and professionally; difficult organized system that allows him to carry out effective communicative actions in the certain field of situations of interpersonal co-operation in professional activity independently and responsibly. The features of the communicative competence of a health care professional can be the following: 1) ability to conduct a business communication; 2) ability to be quickly oriented in the

conditions of exteriority of communication; 3) ability to plan the speech correctly; 4) ability to find adequate facilities for an information transfer; 5) ability to provide a feed-back with a client in the situation of communication [4].

Formation of communicative competence in higher educational establishments can be described as formation of the system of knowledge, abilities, skills of a personality in gaining or achieving the positive result in the process of educational-productive activity, i.e. as readiness of a specialist to professional activity. Pharmaceutical workers belong to the sphere of professional activity with an increased communicative responsibility. First of all, the main visitors of pharmacies are aged people, patients and other categories, whom it is necessary to make contact with, to be able to conduct a conversation, to give advices and recommendations about the choice and application of medical preparations, drugs and others. The choice of methods of study and teaching with the aim of formation of communicative competence in future specialists depends highly on: maintenance of preparation, requirements of educational standards, general and professional aims of education, features, maintenance, methods and forms of work; content and methodology of teaching of a particular educational discipline and specify its requirements with the methods of teaching; spending time on the study of the particular topic, module; level of material and technical base; professional competence and pedagogical mastery of teachers etc.

In a pharmaceutical labour collective it is possible to distinguish a few levels of communication: 1-st level – communication between pharmacists and visitors; 2-nd level – communication between pharmaceutical specialists and medical workers; 3-d level – communication between pharmaceutical workers. In the last level it is possible to distinguish a communication on a horizontal (pharmaceutical workers) and on a vertical line (communication with the leaders of departments, administration of pharmaceutical organizations, communication with packers and junior nurses) [5].

Communication on the second and third levels must be official and less emotional, especially when it takes place in front of the visitors of pharmacies. Communication “colleague – colleague” is characterized by professional ethics, attention, goodwill, trust and reasonable demand. Communication with packers, junior nurses must be characterized by politeness, correctness, absence of superiority etc.

We should investigate more precisely the specific features of communication on the first level: communication between pharmacists and visitors. It is always needed to remember that pharmaceutical service can be provided by a person with the necessary qualification. Safety of providing the pharmaceutical service is totality of requirements to the quality of professional actions of a pharmaceutical worker. A pharmaceutical worker

must possess knowledge about efficiency and safety of medications, know the wide assortment of medical preparations, render informatively-consultative service to the population, but also a pharmacist must be ready to protect the actions or justify

them, if it was necessary to choose another method of treatment in patient's interests. A pharmacist must also remember that by overloading patients with superfluous information, he can provoke them to purchase inadequate quantity of medicines.

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METHOD OF IMPROVEMENT MEMORY AND PERCEPTION BY THE MODEL BASED ON LEONARDO DA VINCI'S COGNITIVE STRATEGIES

Abstract. The subject of research is the method of implementation a cognitive model for active perception and memory development, and its effectiveness.

The model based on Leonardo da Vinci's cognitive strategies was previously constructed, and the method has been worked out for its application.

The relevance of the method was confirmed: the participants increased the speed and depth of their perception, improved short-term, operational and long-term memory. The final measurements showed high dynamic of general intellectual processes and soft skills development, most important for the concept of education in the 21st century.

The study detected the main parameters that increase the perception accuracy and durability of durability of memorization. The methodology, based on model of Leonardo's strategies, helps to develop cognitive and sensory mechanisms, the general dynamics of psychological processes, critical and creative thinking skills, and systematization of information. The application of the method engages the neurophysiological mechanisms of perception.

Keywords: cognitive psychology, cognitive strategies, memory, perception, creativity, neuropsychology, soft skills, Leonardo da Vinci.

Introduction

The relevance of the research stems from the strengthening of information pressure and the development of the instrumental base of artificial intelligence, as opposed to rote of traditional educational programs. In the beginning of the Fourth Industrial Revolution, the World Economic Forum in Davos in 2016 defined social needs for universal skills of the 21st century (Soft Skills) and the development of higher-order competencies [1]. UNESCO research defined creativity, critical thinking, problem-solving, adaptability, collaboration and communications, curiosity and imagination as 21st-century skills [2]. A prominent bearer of the universal skills set was Leonardo da Vinci, who is honored by the whole world this year, 500 years after his death. Today, the interest to the system of individual strategies of Leonardo da Vinci is caused by their relevance in modern conditions. Skills and features of the genius are naturally become the virtues that are strived for. The basis of the study was the Leonardo da Vinci's model of cognitive strategies for the development of active perception, memory strengthening and systematization of information. This model has established itself as an effective method for the practical acquisition of these skills based on individual neurophysiological characteristics and social needs of the individual. The method develops individual cognitive and sensory mechanisms, qualitatively enhances the overall

dynamics of psychological processes. The active process of self-analysis develops the criteria for self-assessment of the quality of information perception, individual perception filters and strategies of durable memorization based on neurophysiological characteristics.

The purpose of this article is the analysis of effectiveness of the method based on cognitive strategies of Leonardo da Vinci for developing a personal system of competencies. The most important goal of the education using the developed method is the development of universal competencies related to the increasing informatization of the society, the ability for continuous learning and developed skills of systemic cognitive performance. In the European Definition and Selection of Competencies project (DeSeCo), key competencies are defined as important "in many areas of life and serving as a guarantee of life success and effective functioning of society" [3]. The results of independent use of the method and the possibility of applying personal skills in various life spheres based on the development of individual cognitive neurophysiological strategies were studied.

Subject and methods of research. The subject of research is the effectiveness of the methodology in enhancing the perception and expansion of the parameters of the working memory according to the model of Leonardo da Vinci's cognitive strategies.

The following techniques and methods were used in the research:

1. Theoretical methods:

1.1. Analysis of the sources that reveal the system of cognitive strategies of Leonardo da Vinci and his works.

1.2. Analysis of psychological and pedagogical literature on the development of memory and perception.

1.3. Modeling. The system of Leonardo da Vinci's competences in the field of cognitive strategies is modeled.

1.4. Abstraction. On the basis of observations, collection of statistical data of measurements, the key parameters of the training methodological process on the strategy of Leonardo da Vinci in various contexts and information arrays (visual, auditory, semantic perception of objects and texts) were formulated.

2. Empirical methods:

1.1. Experiment. In the course of practical training for 12 years, the author used the Leonardo da Vinci model of cognitive strategies for the development of active perception and memory. The total number of trained participants in the courses is more than 1200 people.

1.2. Measurement and testing. Changes in perception speed and memorization speed of different object before and after application of method in different time intervals. The number of memorized objects was compared (see Fig.2).

1.3. Observation and survey. To study the personal assessment of changes in perception and quality of memorization, automatic use of the method, surveys were conducted and personal reflection material was collected.

As a part of the research, the testing was performed based on the following methods: "Study of visual arbitrary memory", assessment of a sequence of an increasing number of elements by the method of A. R. Luria. Methods of indirect memorization, developed by L. S. Vygotsky, A. N. Leontiev and L. V. Zankov were used to understand the depth of available semantic organization of memory. Wilcoxon T-test was used for statistical processing of the results.

Research basis: the data obtained in the training 100 students of the data processing course using Leonardo da Vinci's cognitive strategy to enhance perception and memory.

Description of a pre-selected model of Leonardo da Vinci's cognitive strategies for improvement of perception and memory.

Leonardo da Vinci left a great number of sources for studying his own models of learning and working with information. The original texts of Leonardo da Vinci and the works of other researchers of his work were studied. In this article, citations are given by sources [5; 6].

Key parameters are given:

1. Reliance on visual perception, continues nature of which allows unlimited use of memory reserves. This situa-

tion was proved by the experiments of Ralph Haber in the 70s of 20th century [4].

Leonardo da Vinci considered vision as the main channel for receiving information. "We clearly know that vision is one of the fastest actions that exist; and at one point it sees infinitely many forms, and yet understands only one. Let's imagine that you, the reader, cast a single glance over this entire written page, and you will immediately express the opinion that it is full of different letters, but you will not know during this time what particular letters they are or what they express; therefore, you need to trace word by word, line by line, if you want to gain knowledge about these letters" [5].

2. Active perception of a natural object. "A piece by a painter will not be perfect enough if he finds inspiration in the paintings of others, if he studies in the objects of nature, he will reap the fruits of labor" [5].

3. Recalling when the object is not in sight. Leonardo da Vinci draws from memory. Leonardo da Vinci developed his observation to such a high degree that he could sketch moving turbulent flows of water and air (Fig. 2). "All our knowledge has its origins in our perception" [5].

4. Clarification of the information omitted when the object is re-perceived before the formation of a "common feeling" based on feedback loops forming the cognitive map of the perceived object. "The general feeling makes judgments about perceptions received from other senses. And these sense organs are controlled by objects, and objects send their images to our five senses, with the help of which they are transmitted to the organ of perception (imprensiva) and from there – to the general feeling; and there they are judged, after which they are passed on to memory, where they are more or less clearly preserved depending on their strength" [6].

5. Compulsive comprehension, the formation of a "judgment" about the perceived and memorized object. Records of own observations, as did Leonardo da Vinci in his notebooks. "Good judgment comes from a good understanding".

Elena Shugalei created her own method of applying Leonardo da Vinci's model of cognitive strategies in practice.

The main points of Elena Shugalei's method:

1. Leonardo da Vinci's model of cognitive strategies for the development of active perception and memory.

2. The system of complex speed exercises using the Leonardo strategy, multiplicative perception strategies and high dynamics of the analysis of information arrays called "Leonardo memory skills" method.

3. The complex of dynamic exercises based on the collections of visual cards of various types ("Leonardo memory skills").

4. Usage of the "Black dot" – method developed by author to activate mechanisms of neuroregulation through activation

of the frontal lobes of the cerebral cortex (using the results of research by A. R. Luria and E. D. Chomsky [11]).

5. The system of self-analysis and consolidation of conscious cognitive strategies based on individual neurophysiological patterns.

“Leonardo memory skills” method. Method has been developed and tested by author for more than 10 years of training in groups for development of active perception and memory, dynamic reading, intelligence and creativity. More than 1.200 people underwent this training and achieved steady results.

1. Preparation and materials. Getting to know the facts of life, illustrations and original sources for creating a model of cognitive strategies of Leonardo da Vinci.

2. Methodological rationale. The following should be prepared for training: natural materials (stone, shell, plants, etc.), slides with natural objects (Fig. 1) and a set of cards with art by Leonardo da Vinci, attributes are shown on the reverse side for memorization (Fig. 2).



Figure 1. Example slide with objects of nature

7. Active recollection of new parameters – 2–5 seconds.
8. Holistic perception of the object and active recollection, consolidation. A holistic impression is made freely and the accuracy of memorization is checked.

9. Analysis of individual features and perception filters. Understanding of personal sequence, memorization strategies, which are recorded in the notebook for results and conclusions.

10. Recollection after 20 minutes and after 1.5 hours with the appropriate analysis. Evaluation of filters and strategies for operational (working) memory.

3. Instruction-request of relaxation with simultaneous maximum concentration of attention. The “single glance” skill. The perception of the object is limited to 1–2 seconds. In the case of slides – 2–5 seconds. When using a set of cards, training is first carried out on 1 card, and then a matrix alignment of 16 or more cards is used (a total of 64 cards).

4. Active recollection (2–10 seconds) without looking on the object. Eyes of participants are retracted.

5. The second glance on a object with a focus on the omitted information. Retrieving information. Focusing only on what was not perceived – 1–2 seconds.

6. The third glance with a focus on omitted information. Retrieving information. The focus is only on what has not been perceived, details and new information – 1–3 seconds. At the same time, using the example slide (Fig. 1), features of own perception filters are noted: which parameters characterize poorly perceived objects: expressiveness of color, associative component, color preferences, size and position on the slide.

11. Checking the quality of memorization and evaluation of own filters of long-term memory after 3 days.

Conscious analysis and the formation of structural relationships help to capture information more holistically. In accordance with the research and conclusions of Hermann Ebbinghaus, the necessity of interval repetitions, the unproductiveness of rote training was confirmed [7]. The speed and number of memorized objects increase significantly due to the use of this method.

For training to provide continuous results, an increase in the number of objects used, their diversity and complexity is recommended. For self-training, you can use art and view albums.

When using card the task is complicated not only quantitatively but also qualitatively: memorization of names, creation time and location of sources (attributes) on the back of the card is added.



Figure 2. “Studies of Water passing”. Leonardo da Vinci, 1508 by Private Collection

The effectiveness of the method is derived from the results of measurements of the number of memorized objects (100 course participants, 2 groups of 47 and 53 people).

All participants of the course showed a high growth of memorization parameters for a short time of presentation of about 20 seconds for the number of objects up to 25 and

about 2–3 minutes for 36–64 objects. When using “Leonardo memory skills” cards and setting an additional goal of memorizing names, piece data, the time for physical location of cards on the surface increased to 10–15 minutes, including the process of memorization. Measurements were taken within 3 weeks.

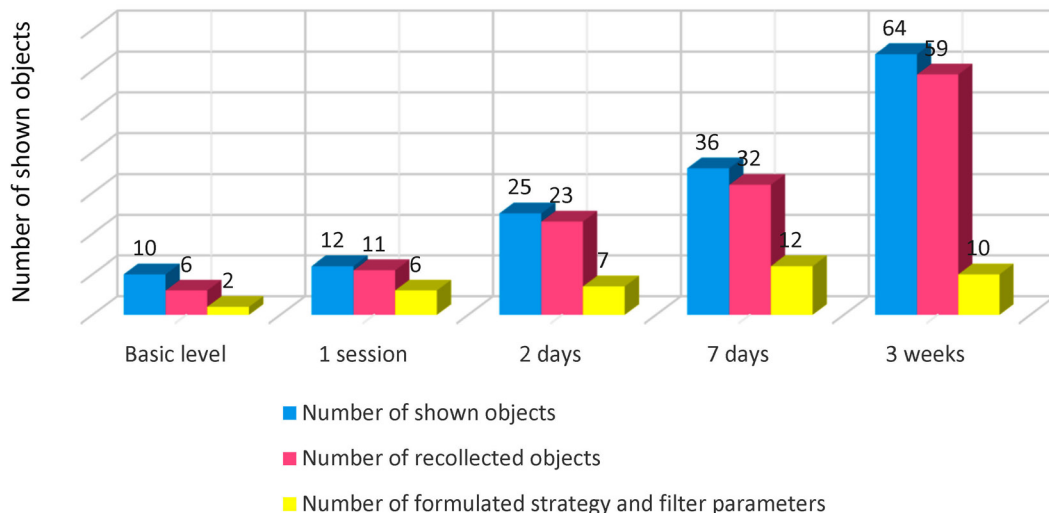


Diagram 1. Results of diagnostics of memory development by the number of recollected objects

Mandatory analysis of neurophysiologically determined personal characteristics of perceptual filters and memory

strategies contributed to the effectiveness. The mechanisms of involuntary memorization intensified due to the conscious

formulation of tasks. As confirmed by experimental studies A. A. Smirnova and P. I. Zinchenko, goal-setting in cognitive activity increases its effectiveness [8].

The listeners have noted an increase in the speed of perception, its fullness and rapid learning. Subjectively, all participants noted an increased level of vigor at high speed exercises, an increased level of concentration. At the same time, manifestations of the neurophysiological mechanism of error detection and auto-correction of memory strategies with an emphasis on insufficiently developed personal positions were noted.

In the process of training, cognitive abilities are automatically activated: perceptual speed, ability to operate with spatial relationships, the induction process, i.e. the ability to derive rules that govern a particular set of incentives. Catego-

rization and systematization of memorization objects form a conscious part of a personal memorization strategy.

The reduction in the number of formulations is explained by the generalization and compression of the conclusions in the formulations themselves. Semantic memory based on dynamic perception becomes the dominant form of cognitive behavior.

The effectiveness of the method, derived from a survey of 250 participants after completion of the course. Respondents in an arbitrary manner answered the questions of the questionnaire “Personal changes in the quality of perception and memory after training”. The survey participants participated in courses that completed the training more than 3 months ago.

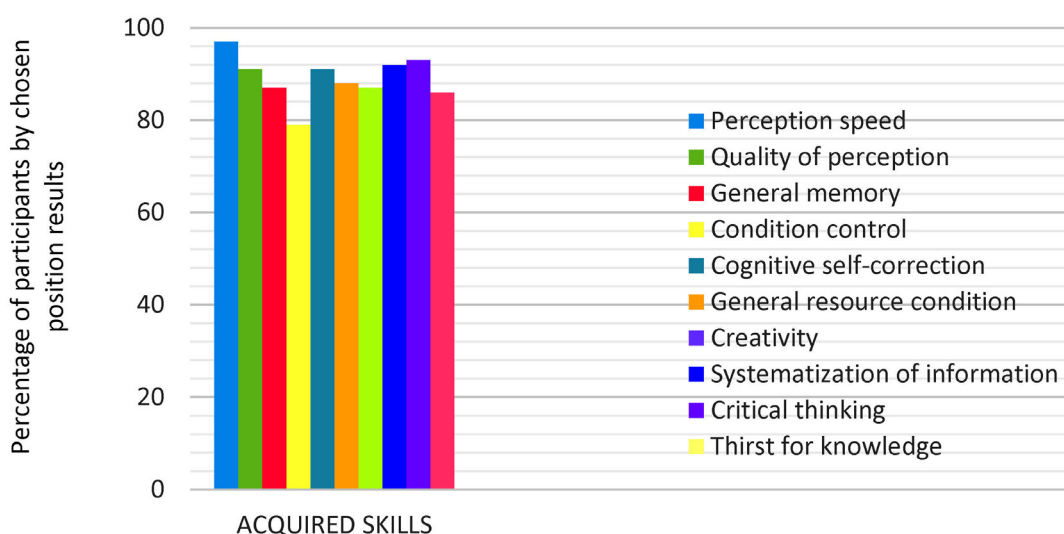


Diagram 2. Results of survey on personal results after training by “Leonardo memory skills” method

All formulations were proposed by the respondents themselves, 10 of them were chosen as general by the overwhelming majority of respondents. The diagram shows the percentage of the results formulations chosen by the participants. Subjectively, all participants note a rise in mood, vigor, pleasure from the achievement of the results and from changes in the perception of the world as a whole. Conscious management of personal cognitive processes provides a powerful incentive for continuous learning and development. “The noblest pleasure is the joy of understanding” [6].

Conclusion. The research found main parameters that increase the perception speed and information memorization. The method based on strategy model of Leonardo da Vinci develops individual cognitive and sensory mechanisms, the overall dynamics of psychological processes. It actively involves neurophysiological resources of perception are actively involved, the speed and strength of memorization increases, skills of systematization of information, critical and creative thinking develop. Concurrently, conscious criteria for

self-assessment of the quality of information perception are obtained, individual perceptual filters and durable memorization strategies based on neurophysiological features.

Personal cognitive strategies are used and consolidated in various informational situations. The method develops individual cognitive and sensory mechanisms, natural skills and consolidates them using cognitive strategies acquired in the learning process.

The effectiveness of the method is confirmed by the obtained data: an increase in the speed and quality of perception, increase in short-term, operational, long-term memory, higher dynamics of intellectual processes in general. A skill is formed in the regulation of cognitive activity and the analysis of own strategies for perceiving and memorizing various types of information in different contexts (meta-memory or knowledge of the very process of thinking and memorization). These results contribute to the development of flexible skills, higher-order competencies (Soft Skills), demanded in the education of the 21st century.

The methods allows you to form sustainable skills (4 C-s): the main universal (key) competencies necessary for learning in the modern world. They include: creativity, critical thinking, communication, cooperation. Flexible cognitive skills are considered components of the 21st century skills model developed by Partnership for 21st Century Learning, (or P21) in 2002 [9].

The social significance of the method stems from the influence of active perception and conscious use of individual memory strategies on the development of communicative competences [10]. The method is relevant in modern flexible forms of continuing education.

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Section 8. Political science

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GEOPOLITICAL PROCESSES OF CENTRAL ASIAN STATES

Abstract.

Keywords:

After getting the independence the young Central Asian states have found themselves in the center of the geopolitical and geo-economic interests of many modern powers of the developed countries of the world. This was due to rich natural resource endowments and a favorable location in the middle of the Eurasian continent. Such advantages haven't remained outside the interests of current main geopolitical player – the United States of America. In the 90s, American intelligence officer and analyst Graham E. Fuller – a former vice-chair of the National Intelligence Council, who also used to be a head resident of the CIA unit in Kabul, formulated the concept of main goals of USA in Central Asian region as follows: to prevent a return of Russia to the region; to stop the escalation of Islamic radicalism and fundamentalism; to complete the nuclear disarmament of Kazakhstan and establish strict control over the proliferation of weapons of mass destruction; to lay the foundations to control Caspian oil; to stabilize the region by influencing the governments [1].

The main feature of the situation in this region is that the interests of the United States, Russia and China collide there. The latter player implementing so called “silkworm” strategy seeks to integrate as much as possible into the economies of the Central Asian states and strengthen Chinese diasporas there, considering them as a “fifth column” in the future.

In turn Russia is interested in providing stability and security on its southern borders. Protection of national interests manifests itself particularly in the joint utilization of natural resources and in developing a joint defense potential. How-

ever, the Russian position is not always consistent and carefully selected, which is confirmed by the attempt to displace the US military base from Kyrgyzstan through providing a loan, as well as by an alternate support of the positions of Uzbekistan and Tajikistan in matters of water use. All this does not enhance the authority of Russia and forces the Central Asian countries to seek a solution to their problems without Russia. Other political players in the region are the European Union, Iran and Turkey. It should be noted that European interests increasingly diverge from American ones. First of all, in terms of Caspian oil, which could become the “energy rear” of the European Union, but there is no unified approach among the European states to the strategy of economic and military policy.

Iran, striving to the role of a regional leader, is trying to extend its influence in opposition to the United States, using primarily on religious motives. Iran uses Tajikistan as its outpost as the most ethnically close country in Central Asia. However, a weak economy does not allow it to seriously influence the political situation in the region. Therefore, Iran is building the political axis Iran-Afghanistan-Tajikistan, which basis is Iran, not as a sponsor state, but as a fraternal country with a similar ideology, language and mentality. This approach allows Tajikistan and Afghanistan to hope for a more significant role in the region in the future. In addition, Iran is trying to influence an energy policy between the East and the West.

Turkey intensively revives the ideas of Pan-Turkism, but the lack of economic capabilities significantly reduces its po-

tential to spread its influence. Under these conditions, Turkey is striving to become a transit country for fuel and energy resources. At the same time the Arab Spring has had a significant impact on the development of the regional situation. It resulted in the islamization of the states, the growth of identity and political activity of Shia, internal political instability, the economic crisis.

Most of the key political players have a strong military potential and usually can use it to achieve their goals. Russia and China are two countries that able to defend their national interests at all levels and have the biggest influence and efficiency in the Central Asian region.

In the process of getting independency by the Central Asian countries and Kazakhstan in particular, four main periods can be distinguished. Each country has its own characteristics, but generally they can be united by common world events and processes. The Republic of Kazakhstan, which is on the 9th place in the world in terms of the territory, with rich natural resources endowment and a fairly small population has built its statehood practically from scratch. In general, the period of independent development was not easy, and in some years even extremely difficult. However, the results achieved by 2019 prove the accuracy of the course chosen by Kazakhstan people (Table 1).

Table 1.– The periods and results of the formation of the Kazakh statehood

	Timing	General features of world political process	The results for Kazakhstan
1 period	2 nd half of 80 th – 1991	Seeking of new forms in international relations in the conditions of the collapse of the USSR and the bipolar world.	Proclamation of independence, the deepest economic and political crisis.
2 period	1991 – march of 1999	The undisputed world leadership of the United States, redraw the political map of the world; a series of interethnic armed conflicts in the post-Soviet states, a massive manifestation of political and religious extremism; war in Yugoslavia.	The construction of statehood, the reform of all spheres of livelihood; the choosing of a development path, the formation of a national security system, a non-nuclear status; border demarcation, settlement of disputes with neighboring countries; avoidance of internal conflicts; adoption of the Constitution (1995).
3 period	March of 1999 – February of 2009	The approval of the «law of force» of the United States in international relations; the weakening of international security control institutions; the growth of world military spending; the formation of new centers of power, the economic expansion of leading states; world economic crisis of 2008.	Formation of an effective state apparatus, development of national state cadre; the dynamic development of the economy, the development of hydrocarbon deposits; the growth of role in the international scene; building of the Armed Forces and the military-industrial complex.
4 period	February of 2009 – current time	The new US administration, the final formation of alternative centers of power; the resumption of the arms race; increasing the number of wars and conflicts; the crisis of the international security system, the growth of terrorist activity; uncompromising struggle for resources.	Stable development; extension of international activity; rebuilding of economy of the principles of intensification; development of the science, education and technology; development of conceptual directions of statehood on long term.

Kazakhstan, despite the complex international situation, has managed to find its own way of development, avoiding internal unrest and building an independent distinctive state, defending its right for self-determination. At the same time, current threats to the national security of the country are: terrorism, export of religious extremism, drug addiction and drug trafficking, problems associated with oil and gas deposits in the Caspian Sea [2]. All these act as factors of possible destabilization of the situation in Kazakhstan [3; 4].

After the Soviet Union collapse and acquiring its sovereignty Kazakhstan found itself in a completely new situation forcing it to pursue a rigid position in the global policy, eco-

nomical and financial markets, and independently establish external economic relations. All this put national security issues at the forefront, demanding guaranteed protection of its people's interests.

Western states have always closely monitored over the development of the situation in Central Asia and the Caspian Sea region. Immediately after Kazakhstan gained its independence, there were attempts of foreign investors to privatize the largest oil-gas and mining enterprises, as well as direct lobbying of interests of international corporations at the state level. The territory of Kazakhstan, referred to as the one of the “world treasure”, attracted the attention of the leading states

of the world. According to the experts estimate, the proved oil reserves of Kazakhstan, Azerbaijan and Turkmenistan are more than 16.5 billion barrels, and the proven gas reserves, including Uzbekistan, are 202 billion m³, which puts the region on a par with the Persian Gulf. At the same time, the President of Kazakhstan had a firm position, clearly set the priorities, declaring “first – the economy, then – politics. Our state and people are becoming stronger thanks to the growth of the economy and the welfare of the population than through hasty democratic transformations” [5]. This position allowed stabilizing the situation in the country. The state welcomed the attraction of investments in the development of industrial enterprises, but did not sell them completely, leaving substantial stakes under control. This approach resulted to direct the profits from oil production to the development of the national economy, improving people’s livelihood.

The global financial crisis and the attempts of world leading countries to get out of it at the expense of other countries exacerbate the possibility of escalation of tension in any part of the world. In a special “risk group” there are states with have rich hydrocarbon deposits, which forces them to develop institutions in order to ensure their military security.

According to the views of some foreign experts, today’s priorities in the armed conflict are shifting towards the minimum involvement of military units to solve combat tasks. Modern military thoughts of the leading world powers are

concentrated on solving global problems without wars by preventing conflicts and resolving crises and conducting indirect actions [6; 7; 8].

Indirect actions are commonly understood as an art of complex effects aimed at destabilizing society internally, creating externally controlled local conflicts, legitimate use of multinational forces contingency in order to bring the country into a state consistent with Western geopolitical interests [9].

American political scientist J. Sharp and politician Z. Brzezinski in their works presented the above mentioned theory in a simpler and more appropriate form of perception [10; 11]. For the last 20 years this theory has been successfully tested in the forms of so called “color revolutions” in many regions of the world.

In recent decades, there has been a progressive development of military security and views on its provision, which is reflected in the military doctrines of states. Kazakhstan clarified its conceptual positions in this area in 2017.[12]. In conclusion, it should be noted that the existing security structure in general allows neutralizing most of the threats to national security for the state in the military sphere. However, the development of military thought does not stand still, the ways to achieve military-political goals are constantly transforming and improving, which requires a prompt response to changing the views of the leading states on the use of military force in interstate confrontation.

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Section 9. Psychology

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PSYCHO-EMOTIONAL STATE OF WOMEN OF ADVANCED REPRODUCTIVE AGE IN THE IN VITRO FERTILIZATION PROGRAM

Abstract. The article presents the results of a study of the emotional state of women of advanced reproductive age. The obtained data revealed that women of advanced reproductive age participating in vitro fertilization program (with and without a donor egg) are more likely to be depressed, anxious, and to have alexithymia, than healthy women.

Keywords: women, infertility, in vitro fertilization, advanced reproductive age, psycho-emotional state, anxiety, depression, alexithymia.

Introduction

At present, the demographic crisis in the Russian Federation has begun again as the population of the Russian Federation started to decline. This gives relevance to the treatment of infertility as a part of measures aimed at increasing the birth rate [4, 49–51]. One of the promising methods of infertility treatment is in vitro fertilization (IVF). It also should be noted that modern specialists have discovered that number of women, who resort to this treatment, increases with age [7, 307]. It should be noted that this category of women has a great number of insecurities and complexes about their own infertility, coupled with disappointments, disbelief, despair while having a less flexible personality structure [1, 52–54].

The aforementioned conditions have so far not been fully studied in women of older fertile age. Therefore, it is extremely important to assess the personal response of women to their own infertility [2, 21–26].

It will make introduction of personality-oriented tactics into therapy, in addition to the general careful and delicate ap-

proach to the experiences of the patients, allowing increasing its effectiveness [3, 13–17].

Study objective: to identify and determine the level of anxiety disorders in women of advanced reproductive age in the IVF program.

Experimental and control groups description and research methods: A total of 75 women of advanced reproductive age (44.5 ± 7.5 years) who were treated at the National Medical Research Center of Obstetrics and Gynecology of the Ministry of Health of the Russian Federation took part in the study:

- 25 women with infertility have been selected for the experimental group;
- 25 women with infertility and a donor egg have been selected another experimental group;
- 25 women with a favorable pregnancy have been selected for the control.

The following inventories and questionnaires were used: Beck Depression Inventory; Spielberger – Khanin's State-Trait

Anxiety Inventory; Personality accentuation questionnaire by Shmishek; SF-36; Toronto alexithymia scale.

Results and discussion

We studied various aspects of psycho-emotional state in groups of women of advanced reproductive age in the IVF program.

The Shmishek's questionnaire revealed personality traits of women in all groups. It showed that most women with infertility tend to have a short temper, women with infertility and a donor egg are characterized by anxiety, and women in the control group are hyperthymic.

According to the Toronto alexithymia scale, it was found that women with infertility are more likely to be at risk of alexithymia, unlike women in the control group ($U_{emp} = 23.5$; $p \leq 0.01$), and women with infertility and a donor egg are much more likely to be at risk ($U_{emp} = 31.5$; $p \leq 0.01$). This is probably connected to the fact that women in the IVF program are under severe stress, as they are in conditions that they are not used to: dependence on drugs, procedures, under the constant surveillance and supervision of doctors [5, 16–17]. It can be stated that on the basis of the above, they are at higher risk of alexithymia.

The results of Beck Depression Inventory have shown that women with infertility without a donor egg in the IVF program have mild and moderate depressive reactions, in contrast to women in the control group ($U_{emp} = 129.5$; $p \leq 0.01$). In women with infertility and a donor egg, in the IVF program, average and severe depressive reactions are more common, with few cases of depression ($U_{emp} = 40$; $p \leq 0.01$). The difference between the experimental groups of women with infertility is also statistically significant ($U_{emp} = 166.5$; $p \leq 0.01$).

The study of health status of the pregnant women on the SF-36 survey showed no statistically significant differences. Meanwhile, health criteria such as physical functioning, role-physical functioning, bodily pain, general health, vitality, social functioning, role-emotional and mental health in women in the control group are higher than in women with infertility in the IVF program with and without a donor egg. The results obtained are close to those from a 2011 study conducted by

J. W. Aarts et al. [6, 1116–1118]. It is possible that the absence of statistically significant differences is connected with high career achievements, since most of the tested women have achieved success in their own professional field.

Spielberger – Khanin's State-Trait Anxiety Inventory shown a significant increase in the level of situational anxiety was found in women with infertility ($U_{emp} = 188$; $p \leq 0.01$) and in women with infertility and a donor egg ($U_{emp} = 172$; $p \leq 0.01$), compared to a control group of women. This can be explained by the anxiety reaction to the current situation of infertility before the procedure, fear for the fetus and their own health [2, 387–388].

When studying the level of personal anxiety with the help of the Spielberger – Khanin's State-Trait Anxiety Inventory there were no statistically significant differences. In a few cases in women of advanced reproductive age with a donor egg, a high personal anxiety was noted, which is confirmed by previously obtained data from studies conducted by Zh. R. Gardanova [3, 81].

Conclusion. Summarizing the article, we can make conclude about the prevailing psycho-emotional disorders in women of the older reproductive group in the in vitro fertilization program.

It was found that the majority of women in the IVF program (with and without a donor egg) are at risk of alexithymia and women of both group suffer from high situational anxiety.

In addition, women with infertility and without a donor egg in the IVF program have mild and moderate depressive reactions. Most of them have a short temper and are prone to maladaptive self-control.

In women of advanced reproductive age with infertility and a donor egg, in the IVF program, moderate and severe depressive reactions are more common, most women are anxious, being at risk of maladaptation, use coping strategies manifesting in search for social support.

The level of health in all groups has no statistical differences.

Proper diagnostic of psycho-emotional state allows the use of a differentiated approach to the inclusion of patients in the IVF program and facilitate the timely psychological support or adequate psychotherapeutic effects [8, 138].

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REFLECTION AND SELF-IDENTITY PERSONALITY

Abstract. In this article, we reveal the influence of the development of reflection on a change in the self-identity of a person. Because of a change in the reflection, beliefs and attitudes toward social and personal relationships also change. We have shown that psychodiagnostic methods that most fully diagnose the main characteristics of reflection can be used as methods for developing reflection.

Keywords: reflection, self-identity, psychodiagnostics of reflection, persuasion, attitude.

1. Introduction

Currently, the identity in research is treated as a self-evident phenomenon, but there are a huge number of diverse views and theories of identity. Due to this, concepts of identity, self-identity are not clear. When using these concepts, it is often understood different and even competing with each other. We hold the approach of V. A. Emelina, E. I. Rasskazova, A. Sh. Tkhostov, who consider, as generally as possible, identity means a phenomenological sense of oneself as a certain unity, identity with oneself in a cultural-historical chronotope, stemming from a particular source – belonging to a certain community, ethnic group, culture, nature, sex, or generation, experiences the needs of the organism, from the structure of vital drives, rational goal setting and cognitive abilities, beliefs, etc. [3, p. 27]. The theoretical analysis of problems of reflection and identity showed that so far in psychology there are few scientific works that are at the crossroads of the problems of reflection and identity. E. Yu. Mazur investigated the influence of reflection on professional identity and proved that the higher the level of reflexivity, the more intense is the type of moratorium (identity crisis) of professional identity, which leads to complication and inconsistency of the structure of professional identity [4]. N. Dmitrieva, S. Drozdova, adding the word reflection to the title of their article, actually considered the philosophical views on identity, apparently a priori believing that reflection is already represented in identity [1]. SA Drozdova conducted an experimental study of the influence of reflection on the identity of a person. She discovered the interrelations of the subsystem elements of the emotional-evaluative component of identity with the motivational-objective function of reflection. The following relationships are highlighted: life performance indicators are associated with an emotionally polar positive type of identity assessment, effectiveness in combination with retrospective reflection is characteristic of a balanced type of identity assess-

ment. These qualities are minimally expressed in respondents with a negative type of identity assessment. Social needs for recognition and understanding are associated with life goals and introspective reflection. The need for recognition is associated with the Life locus of control, and the group orientation is inversely proportional to the Locus of control. The professional component of identity is more related to the motivational-objective function – a high degree of development of prospective reflection has been revealed [2]. These empirical studies are of interest in the aspect of the relationship between types of reflection and its components with the development of various aspects of identity, mainly evaluations. Evaluation comes down to self-esteem. Our study posed the following task: to determine how the development of reflection affects the change in personal identity. Identity consisted of the beliefs of the individual and her relationship. Having highlighted the developing character of the “Questionnaire Focus of reflection” technique by T. E. Sizikova, we applied it as a means of developing reflection [5; 6].

2. Materials and Methods

In the experimental work, we applied psychodiagnostic methods as diagnostic and developmental. As a means of developing self-identity, we applied the “Unfinished sentences” methodology by Saks Levy, “The Method of Reflection of Relationships and Beliefs” by T. E. Sizikova, “Questionnaire Focus of reflection” by T. E. Sizikova, questioning. The sample size was 35 people (20 women, 15 men.) Aged 18 to 36 years.

3. Organization of empirical research

Stage 1. The subjects performed the “Unfinished sentences” technique by S. Levy and “The Method of Reflection of Relationships and Beliefs” by T. E. Sizikova, in which the subjects write three convictions for each of the 23 types of relationships. Processing of the results is the same for the two methods – assignment from 2 to minus 2 points according to the criterion of the positivity of the end of the sentence

and each conviction. The subjects independently processed their results and scored the positiveness of their beliefs and relationships on a scale.

Stage 2. The subjects performed the “Questionnaire Focus of reflection” by T. E. Sizikova without obtaining quantitative data and interpreting the results.

Stage 3. After 2 weeks, the subjects performed the tasks in the reverse order: first they worked with the methodology “Questionnaire Focus of reflection” by T. E. Sizikova, and then with the methods “Unfinished sentences” by S. Levy. The subjects independently processed the results of these two methods based on the criterion of positivity. The key to processing the results is the same for these two methods.

Stage 4. The quantitative results of the “Questionnaire Focus of reflection” by T. E. Sizikova were processed by the experimenter and presented to the subjects for self-interpretation. In two other methods, the subjects also interpreted the results themselves. As a result of self-analysis, the subjects formed a generalized view of their reflection, reflection of attitudes and beliefs, as well as their view of positivity.

Stage 5. Subjects were asked to answer “yes” or “no” to 5 questions of the questionnaire: 1. Do you learn anything new about yourself as you completed the tasks of the methods? 2. Were the tasks of the techniques developing you? 3. Did you have to think long to understand the tasks of the techniques? 4. Have you ever wondered when answering questions? 5. Has the work with the techniques influenced the development of your ideas about yourself and those around you?

4. Results

4.1. The results of the survey:

When answering the first question, 77% of respondents answered positively, 63% of respondents answered positively to the second question, 60% of respondents answered positively to the third question, 54% answered positively to the fourth question; subjects and 71% of the subject’s negative answer to the fifth question. In the questionnaire, the first, second and fifth questions are coordinated among themselves and from the different angles are considered the same. The questionnaires of the subjects who gave a negative answer to the fifth question were analyzed to determine if the answers to the first, second, and fifth questions were mismatched. In 84% of the subjects, discrepancies were revealed, which indicates the contradictory nature of reflection caused by emotional coloration and possibly frustration at the discovery of blocked, unconscious, unpleasant and unacceptable information about a person, relationships, beliefs, awareness, positivity. 14% of all subjects test all questions with positive answers and 6% of all subjects test all questions with negative answers.

4.2. The results of work with psychodiagnostic methods:

We have identified three types of changes:

1. Changing the self-esteem of positivity with the same beliefs of the first and second series of testing.

2. Changing the self-esteem of positivity and changing beliefs while maintaining the semantic commonality between beliefs (similarity principle) in two test series.

3. Changing the self-esteem of positivity and changing beliefs on the opposite of semantics in the two test series.

Counting changes was carried out in cases. The case is one subject in two test series with three beliefs in each type of relationship in two test series. Three convictions were compared with the positivity self-assessment scores in the first testing series and three convictions with the positivity scores of the second testing series. If the three beliefs of the first series of testing are identical to those of the second series of testing, and the self-assessment of positivity is different, then this change was related to the changes of the first type and was considered as one case. In a similar way, cases of the second and third type of change were distinguished. The peculiarity of counting on the third type of change was that if at least one pair of opposing beliefs stood out, and the other two pairs belonged to the second type of change, then this case was generally related to the third type of change. This approach is explained by the fact that three beliefs identified by the subject are in their personality structure a system that are interconnected and a change in any element of the system leads to a change in the whole system, therefore we considered the change in one pair of beliefs as a change in the whole system while maintaining similarity or the appearance of opposites, as well as a change in the element of the system – self-esteem of positivity. A change in the self-esteem of positivity was considered a change in points in the same beliefs for the two test series and an expert assessment of the change in positivity with the second and third type of change in beliefs. A qualitative change in the self-esteem of positivity was considered with reference to the following criteria, which are recognized in the cultural and historical stratum of our society as a “Russian idea” broadcast in mass communication and formulated by N. A. Stunzha. Based on the analysis of the history of the “Russian idea”, its cross-cultural peculiarities, psychological content and determinants, the author singled out that the “Russian idea” is the content basis, the semantic and motivating force of cultural identity and national identity [7].

This is the measure from which each person takes a countdown and builds his own identity – “the image of himself” on the cultural foundations of the society in which he lives. The Russian idea initially recognizes the priority of the unity of the world in all spheres of life and the spiritual life of man. The Russian idea expresses the idea of a person as self-developing on the values of being – freedom, justice, solidarity, tolerance, beauty, love and others, a person self-fulfilling in

the professional – industrial, social and cultural – spiritual life of society. According to a study by N. A. Stunzha, 32% of the sample of subjects believe that in Russia there are opportunities for self-realization of everyone who does not trample and does not violate human values, does not act against man and humanity, 20% of subjects add to this peacefulness and unity, and 16% indicate mercy, tolerance and patience. Consequently, the positivity of the personality and the awareness of the personality of the positivity of themselves and the surrounding reality, settled in the system of values, beliefs and attitudes of the personality are the basis for self-realization of the self-developing personality and are supported by universal norms that have become “Russian idea”, i.e. the highest layer where ideas live that control the other strata to which reflection belongs. Accordingly, the criteria for change were: a basis for self-assessment of positivity on general cultural values, on self-development and self-realization of the personality and their opposite.

If self-assessment scores of a positivity of a belief changed and approached greater compliance with expert criteria, this was regarded as a change in a self-assessment of a positivity of belief positive, and in the opposite direction, a negative one.

A quantitative calculation showed that for all 23 types of relationships, changes of the first type occurred in all cases of the same beliefs of the two series; self-esteem of positivity was closer to adequate. Cases of “mirror reflection” of beliefs and the sameness of self-esteem of positivity were not identified in the two test series. Changes of the second type in 36%, changes in the third type 41%. The subjects (4 people – 6%) who answered all the questions of the questionnaire negatively observed changes in beliefs and an assessment of positivity, it is more close to adequate, but at the current moment in time this new knowledge may not have been accepted and caused frustration.

The analysis of the degree of differences in the data of subjects by two methods in two test series gave the following results (Table 1):

Table 1. – T – criterion for sampling the first and second test series

Variable	T-criteria for dependent series (significant changes $p < 0.05000$)							
	Average	Standard deviation	Difference	Standard deviation of difference	t	p	Confidence interval –95%	Confidence interval +95%
Unfinished sentences 1 series	40.10	24.34						
Unfinished sentences 2 series	43.43	25.14	–3.33	14.34	–1.45	0.15	–7.98	1.31
The Method of Reflection of Relationships and Beliefs 1 series	47.56	24.69						
The Method of Reflection of Relationships and Beliefs 2 series	53.23	30.01	–5.66	17.46	–2.02	0.05	–11.32	–0.00

As follows from the data in the table, significant changes were identified by the “Method of Reflection of Relationships and Beliefs” by T. E. Sizikova, which confirms the conclusion that changes in the content of beliefs and self-assessment of their positivity occurred as a result of the implementation of the “Questionnaire Focus of reflection” by T. E. Sizikova, thereby confirming the developmental nature of the questionnaire. The average value of self-esteem of positivity increased in the second test series, the difference between the data from the two test series is significant at the significance level of $p < 0.05$, t -test = -2.026 . Standard deviation, i.e. the spread of data also increased in the second series of testing. The expert assessment did not show any destructive changes in beliefs and their self-esteem, therefore, it is logical to assume that the changes in the second series of testing approached the subjects

more adequately, to the real idea of themselves. The scatter of data is due in some cases, the psychological overcoming of guilt feelings that was inherent in the beliefs in the first test series, which increased the positivity in the beliefs both quantitatively and qualitatively in the second test series.

Persuasion is a stable component of the personality and the effect of beliefs in relationships can be observed using the data of the “Unfinished sentences” by S. Levy. Significant differences in the self-assessment of ideas about the positivity of relations diagnosed using this technique have been identified. Contrary to quantitative results, qualitative results show a different picture. For the same three types of changes, we conducted an analysis of the completion by the subjects of the sentences given in the stimulus material of the method. Qualitative analysis showed that changes in the second type

of changes make up 28% of cases and in the third type of changes – 34% of cases.

As a result, such data were obtained that show that beliefs, or more precisely, the ideas about their beliefs and their positivity, are more variable under the influence of the “Questionnaire Focus of reflection” by T. E. Sizikova compared to ideas about relationships. Relationships are more stable and ideas about them, like themselves, in reality, change more slowly, but these changes follow changes in beliefs, which corresponds to the provisions of the generalized theory of personality, prevailing in psychology and psychological counseling.

The conducted correlation analysis confirms this conclusion: the correlation relationship at the significance level $p < 0.05$ in the first test series between the data of the two methods “Unfinished sentences” and “Methods of Reflection of Relationships and Beliefs” $r = 0.494$ ($p < 0.05$) and in the second test series $r = 0.687$ ($p < 0.05$). The strength of the correlation connection between the completion of sentences and convictions has increased, has come to a more adequate form, and the connection between attitudes, beliefs, their aware-

ness and the notion of their positivity has been restored in the subjects’ awareness.

5. Conclusions

In our study, we showed that the development of reflection affects the adequacy of self-identity. Under the influence of reflection, such stable components of self-identity as beliefs and attitudes towards social and personal relations are intensively changing. In our study, changes occurred in the direction of positivity. The guiding lines for self-identification were the ideas of tolerance, peacefulness, self-development and self-sufficiency, which were set in the reflection using the criteria for self-assessment of the results of projective psychological methods of psychological diagnostics the “Unfinished sentences” methodology by Saks Levy, “The Method of Reflection of Relationships and Beliefs” by T. E. Sizikova and the norms that underlie the methodology “Questionnaire Focus of reflection” by T. E. Sizikova. We have shown in our study that psychodiagnostic methods can be used not only as a means of psychological diagnosis, but also to a greater degree as a means of development.

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PSYCHOLOGICAL FEATURES OF CHANGES IN FAMILY LIFESTYLE DURING THE PERIOD OF OLD AGES AND SENILITY

Abstract. The article is being investigated psychological features occurring in family lifestyle during the period of senility and old ages which are important and last stages of human ontogenesis. In the context of population aging tendencies in the Republic of Azerbaijan, the author analyzed specific aspects of family life, change motives in family roles, the peculiarities of divorce cases and repeated marriages and psychological changes arising in lonely people.

Keywords: senility, old age, family lifestyle, retirement age, family roles, divorce, repeated marriages, marriage of widows.

The increasing of the psychological factor's role in modern social life, as well as in family, gives higher demands to the mental development characteristics of old people. During the old age, the nature of family relationships stabilizes, becomes more substantial and interesting by its essence, relationships between genders begin to have a quieter character. According to the classification of age periods, 56–74 ages in women and 61–74 ages in men are called a period of old ages, but age period covering 75–90 ages of age are called a period of senility both in men and women [1, p. 45].

Aging is a special stage in age evolution of human life. Due to the long term of its duration (nearly 40 years-from youth to old age), this period of age is longer than the period covering all other age stages of human life and from this point of view it attracts attention due to its social importance.

According to physiologists, the energetic aging of the organism begins after 30 age, more specifically, immediately after the end of height growth and development period. There are a lot of thought differences in the issue of determining of old age's boundaries. Many experts attach importance to the determining of lower and upper boundaries of old age in its metric characteristic, so from this point of view, they emphasize the necessity of referring to the international classification of age periods.

The most active defender of old age period, the author of the dialogue about "Cato the Elder on Old Age", an ancient Roman philosopher Marcus Tullius Cicero (BC106–43) defended the old age and praised this period as the most valuable period for human and society. He opposed the following listed 4 main arguments against old age: 1) old age prevents the human from actively participating in public life; 2) old age brings various diseases and helplessness to human; 3) it causes sexual deprivation; 4) it frightens people by the approach of death. According to Cicero, old age period is the

most precious period of life for a wise man. That is, during this period youth passion fuming the humans' brain calms down, he owns a big treasure gained from the experience accumulated throughout his life.

Carol Rorschach, who conducted the investigations in the field of studying the psychological characteristics of elderly people, notes that a complex of needs that is specific for the elderly people does not differ with any specificity. It contains the identity with the runaway from pain of people who are in different age periods, and their needs of help, protection, care, love, creative work and etc. [2, p. 11].

Aging process is a genetically programmed process and causes psychological and psychological changeability in organism due to age variability. Gradual weakening of the body, decrease in physical activity and ability to work, reduction of total energy potential, difficulty of breathing, wrinkles in the skin cover, replacing teeth with dentures, increasing the sensitivity of the nervous system to irritants are main symptoms observed during old age.

As noted by a well-known Azerbaijani psychologist A. A. Gadirov, "As human beings grow old, first of all, many changes occurred in his organism and psychology, he faces new challenges and problems in life, spine twists, back becomes crooked, physical strength weakens, the body cannot withstand any effect, hair and beard whiten, teeth are being lost, vision and hearing members cannot fully perform their functions, the man cannot keep himself briskly, life days gradually decline, the world approaches the finish, of which beginning was sweet and the end was poison" [3, p. 381].

Azerbaijani scientist N. N. İsmayılov characterizes the changes occurring during this period by noting that the aging process is related to development towards lag: "Aging of the organism is accompanied by the appearance of character changes almostly in all organs and systems. Earlier noticeable

changes of mental changes is a decline in attention and speed of thought, a weakening of brightness and undertones of psychological processes. After a while, these processes cover the sphere of memory and impression too" [2, p. 200]. During the old age period, a leap occurs towards negative in the activity of organism's endocrine, heart, blood-vessel and nervous system. Aging of the organism in old people, almostly leads to certain changes in organs and systems. Along with somatic and endocrine systems, also a number of changes in the nervous systems causes to mental changes too. According to the information of some scholars, among the people of older than 65 age, the occurrence of these or other types of mental disorders is 30–35%, but severe mental diseases are 3–5%. Old people suffer mostly affective disorders like similar neurosis and psychopaths symptoms of mild mental disorders. In the course of mental disorders, it is encountered some symptoms in old people, like similar neurosis emotional lability, more sensitivity to irritability, anxiety for the health of himself and his loved ones, unreasonable panic, sleep disorder. One of the psychosis disorders encountered in old people is a pre-aging disorder from which women suffer more. In old people some symptoms of personality changes are also observed: mindless suspiciousness, stinginess, jealousy, querulousness, starting irrelevant argument. Their mood changes several times throughout the day: to get angry quickly, to be regretted very soon, intolerance to the action of others are ones of such symptoms.

During the old age period of ontogenic development it is occurred fundamental changes in the family situation of human and also his position in the system of public relations: professional labor activity ends. The objective patterns of this process show themselves in the increase of leisure time, in the change of communication area and financial situation. Old parents who continue their labor activity, despite being retired, get new opportunities to provide financial support for their children, to participate as an active subject in the implementation of economic, housekeeping and educational functions of family.

Throughout the whole life of a person, the family is the most important micro-social environment that forms the basis of the individuals' social life and activities. But depending on the stages of human life and his age periods, a number of specific changes occurs in the character of each individual's interaction with the family, in his social status and role in the family. The factors that contribute to change position and state of person in the family are different according to their social and biological characteristics and also closely related with social age of a person, values, norms and traditions of the concrete society in which family exists. On comparison with early stages of family life, during the old age period, the events

and processes occurred in family life begin to have a different content according to their meaning, social and psychological characteristics and scale.

During the old age period, a new age crisis is observed in human life. The man asks himself: What could I achieve in my life? It is encountered a particular weakening of human power during the period of adolescence: he compares his previous achievements with present moment, feels that there is a stagnation, moral emptiness in his life, children left father's home, they got married and live independently: professional activity is going to approach to an end, how much time is left to retire on a pension?

In modern times, aging tendency of the population in Azerbaijan has a strong impact on economic structure of the family and its function, reproduction of labor force, organization of health and healthcare measures and their implementation. "As a whole, in accordance with appropriate criteria, 65 and older aged people from general population are accounted as eligible for the evaluation of demographic aging in international practice. According to demographic aging scale of UNO, if 65 and older than this aged people are less than 4%, the population is considered a young, but if this portion is less than 7%, the population is considered in the old age. In accordance with this criterion and above indicators, currently, the population of Azerbaijan is considered in the old age" [1, p. 251].

In our republic there is a correlation between the aging of population and total demographic load ratio. So that, demographic load ratio of children was 31.0 in 2010 year, but it is expected that this indicator will reach 33.7 in 2020 year, demographic load ratio of old people will reach from 8.1 to 10.2 [1, p. 255]. According to report of State Statistical Committee, it is observed a rise in the number of population over the age of 65 per 100 people in Azerbaijan. So that, this indicator reached 5.8% in 2012 rising from 4,8% in 1990 [2, p. 250].

In modern Azerbaijan society, the most of old and elderly people who are on the eve of retirement age, face with the dilemma posed by this age: going on labor activity after retiring on a pension or only going to retire? In recent years our Republic made a decision about gradually increasing of the retirement age limit to 65 years for both genders, and due to this decision most elderly people had to face a difficult situation. And this, in turn, leads to a delay in retirement age of people from that category and a decrease in their capacity to benefit from this privilege, that is a significant decrement of financial and social security. In this respect, a delay in retirement age has a significant psychological impact on old and elderly people and it should not be overlooked. During the pre-retirement age period, old people's social expectations, their life plans, desires and interests contradict with their health-related real

opportunities and gradually this contradiction further deepens. This factor affects the changes in the nature of intra-family relations too.

Sociologist M. E. Yelyutina indicated following types of elderly couples: 1) disbalance of authority (most of the decisions are made by both couples, mutual relations are elastic, there is no expressive sympathy and antipathy, there is a tolerance to conflicts); 2) Symbiotic relationship: It is observed the generality in not only life strategy but also in the attitude and habits to the events, traditions in elderly married couples. 3) Boundless attachment to each other performs a defense function for elderly couples. 4) Limitation of social roles' spectrum in the family [1, p. 86]

In family life one of the turning points for old and elderly people is related to their adult children, marriage and establishing an independent family of them. This event and in connection with this, birth of grandchildren, gaining a new social status as a grandfather and grandmother create a condition for the transition from middle-aged generation to older generation. Remaining a widow, divorce cases occurring at a later age, repeated marriages in the period of old and elderly ages can be included in the list of significant events that conditioned the transformations of most elderly people in family relations.

Characteristic features of old people's life are characterized by psychological symptoms like ending of life cycle and labor activity, retiring on a pension, reduction of opportunities' range, increase of necessity for a sense of reputation and respect (especially by the children). During this period, feeling the sense of his own necessity and importance, having a desire to be esteemed by others are perceived such factors that have an important effect as a moral stimulus in their life.

Children grow up and leave the family, close people die and all of these events make deep vestiges in spiritual world of old people, start of independent life limits his family frame and communication environment. Within about 2 decades a child who was a central figure in the family, becomes a parent and it opens a new way for mother and father to perform new social roles as grandfather and grandmother. This case is especially hard for mothers who devoted their lives to their children: how to adapt to the family? Only grandchildren can fill this emptiness.

In modern families there are some discrepancies between education model of elderly generation and young parents-mother and father. Grandfather and grandmother or older parents have more conservative views on education work, they are more careful than young parents. In attitude to children when old parents prefer to boundless care without limiting their independence, activity and initiative, young parents prefer unlimited emotional attachment, showing their love constantly. New roles as "grandfather" and "grandmother" re-

quires a great power especially in the early years of the grandchildren's life. The researches of L. A. Gordon and E. V. Kopov related to this problem, allow us to come such a conclusion that during this period, a part of elderly people's cares becomes conditional with solution of the problems which faced by their children in personal family life [1, p. 47].

In medical-biological characteristics of old age and senility period, the weakening of total activity and work ability, to be in low mood generally, some changes in interests, in characteristics of interpersonal (as well as with close relatives) relations, also repeated marriages attract attention. Main reason of this is related to the determination of new biological features with lifestyle of certain way, social attitude of old people in the family and in society. General problems of old and elderly people that enumerated connecting with the family have different characteristic for every human and is concretely associated with life conditions of human.

The majority of contradictions that frequently encountered in the daily life of a family is relating with psychological features of old parents. Because of exhaustion of their physical strength, requirement for recreation increases, having rest assumes more importance. Due to the getting worse of health in old married couples, the problems came from this issue (doctor's examination, to get treatment, to keep a diet and etc.) go to the first plan and all interests and efforts are directed towards it.

B. G. Ananiev who was a well-known Russian psychologist in the field of herontopsychology, while talking about the paradox in human life, noted that in many people the event of "death" happens earlier than their physical collapse. These type of cases are encountered in such people, who begin to isolate themselves from society with their own personal will. In its turn, this concludes with loss of personality qualities and deformation of personality structure, arising a feeling of social uselessness, entering the "dramatic death stage".

After the children leave father's home, old husband and wife start to live lonely face to face, the family hearth turns into an empty hut. Russian sociologist M. E. Yelyutina who was talking about structural and functional changes occurring in the family of old and elderly people, noted: "Some functions are gradually lost with the start of "empty hut" phase: loss of the functions relating with socialization, cultural experiences and knowledge transfer. While one function is going to weaken, another one is going to strengthen. Supportive function strengthens in the family of elderly and old people. Husband and wife helps each other in housekeeping affairs, provide psychological compensation in division of any load". [1, p. 83]. There have been encountered repeated marriage cases among old and elderly people, mostly who lost husband or wife by death, and who are divorced.

The woman or man who divorced because of dissatisfaction with first marriage or who lost husband or wife by the death do repeated marriage by hoping that everything will be better than before. Both of them already have family practice. But there is no sufficient warranty that negative things causing the end of marriage will not be repeated in the second marriage. As well as, the presence of children from the previous marriage is characterized by the character complexity of "parent-child", "child-child" relations in half-structure of new family. In the attitude of the parties towards children, and in the attitude of the children to the parents, there is a high probability of step-native relations. So, psychologists consider this type of marriages more problematic. Adoption of children from previous marriages, their education issues and attitude to them significantly affect the character of family relations and intra-family psychological atmosphere that formed on this ground. Such type of reunion in the family makes necessity for couples to adapt new kind of family roles unlike the roles in the first marriage. Fatherhood and motherhood roles appear as "step-father" and "step-mother" roles for couples and it creates other new social roles for children too.

The peculiarities of child mentality also have an impact in the formation of complicated mutual relations between step-father and step-mother and non-native children. Jealousy, infinite naughtiness, insolence, rudeness, spoiling of child, their failure to follow the requirements and etc. are the factors aggravating the situation. Children with unlimited love for their native father and mother stand in the rebellious position against those who replace them, because their place is taken by another stranger.

In modern Azerbaijani society a widow who has many children from previous marriages has much lower chance to marry again. The presence of step and native children in new family of widower who enters the re-marriage with mother of orphan children, in many cases causes tension and complexity of relationships. Replacement of native father by step-father, and native mother by step-mother turns into psychological barrier. Such children do not have chance to meet with native father and mother once more because they are not alive and this makes them desperate, hopeless. They are forced to accept the authority of "step-parents".

The repeated marriages that called "marriages of widows" are encountered less than divorced couples' marriage. One of the barrier factors for new family life in repeated marriages of divorced couples is connected with alive separated parties but this case is not characteristic in repeated marriages of widows.

The majority of Azerbaijani women who loves unlimitedly their first husband do not have a desire to marriage again even though their husband died untimely. They grow their children independently without assistance. But majority of

men become forced to marry again because of inability to live alone and difficulties relating to care for children.

By referring to the results of socio-psychological surveys we can say that 28% of divorced couples in Azerbaijan consider that they have taken the wrong step with breaking the marriage and afterwards feel regretful from this. 56% of men want to restore their previous marriages after divorce, they live with desire to marry again with their ex-wife. But on the contrary, the women don't attach much importance to "returning marriages". So, "returning marriages" can be accepted as "confession of mistakes" and an attempt to correct them. But however, the motives of "returning marriages" can be quite extensive and multifaceted. As main and leading motives in such type of marriages we can ascribe understanding by couples their wrong position during the first marriage, expected difficulties in growing up of fatherless (motherless) child, the restoration of previous economical and housing comfort, fear of loneliness and strong emotional attachment with ex-partner. Main difference of "returning marriages" from first and repeated marriages is that such type of marriages is bounded between the couples who know well each other's mental outlook, habits, delight and fun, necessities, dignity and deficiencies.

It was noted in the 1980's report of World Health Organization relating with family lifestyle of elderly people that most of the elderly people (especially men) who live with their spouse want to live close with their old and married children. This allow them to show mutual support to each other, to provide the needs for live emotional spiritual communication. There are some motives that stipulates living together with old parents. In our opinion, here we can ascribe firstly, the character of communal life, gender and age of children, marital and social status of parents. Married children who live separated from their old parents mostly contact his family in connection with holidays, birthdays, care during illness, care for grandchildren in the absence of parents, cleaning works at parents' home and etc.

Family status, family roles of elderly people in Azerbaijan differ from the relations of most other peoples because they are closely linked to the mental national-moral values, especially with traditions. "To provide their own needs after retiring on a pension is a main task for able-bodied population who are in old age groups. So that, this contingent has no assurance that they will be guaranteed by the family or state and they have a strong stimulus for collection of financial assets" [3, p. 243]. In our country old people are provided with social cares of the state and when they reach retirement age, get pension depending on payments to social fund and use some concessions and privileges. Some of them can continue their labor activity at previous workplace even after retirement, at

the expense of trade unions they are sent to sanatorium-spa treatment on suitable terms, and exempted from compulsory medical examination payment.

The tendency of nucleation is gradually getting stronger in demographic structure of modern Azerbaijan society. Many old parents place their children in a separate apartment after the wedding or at their request, they prefer to buy a separate apartment from discounted housing resources. From demographic point of view, giving priority to such a reproductive lifestyle by new young families is relating with globalization, material and technical progress coming from this, also urbanization processes. During our survey with 18–21 aged young people relating to the research, most of young couples who are on the eve of marriage have preferred to live separately from their parents.

44 were boys and 36 were girls of 70 young people involved in the survey. 68% of boys said that they would live separately after marriage. 54% of them said that it was their own wish, but 56% noted that they had younger brother and his parents would live with that son according to the customs and traditions. 11 out of 36 girls (approximately 30%) whose opinion were asked, preferred to live at their own parents' home together with husband because of being only child of the family. 9 girls (27%) noted that, in fact they would like to live with their future spouse, but it depended on the opinion of spouses. 16 girls (37%) have clearly indicated that they want to live separately. Most of them have preferred free life because parents and relatives of the husband may irrelevantly interfere young family.

The results of our research showed that there is a correlation between behavioral motives, life plans and social status in the family of elderly and old people who decided to retire. So that, most of elderly people on the eve of retirement age, and absolute majority of widowers, indicated their desire to work after retirement too. They coordinated this decision with their economic situation, wish to help children, grandchildren, also help for homework. It is related with bore of unemployment too. Most of elderly people told that they would leave their previous job once and for all and showed the basis for that some reasons, as weariness, weakening of labor force, and other health problems. Absolute majority (66%) of people living alone, said that they wanted to continue their labor activity.

Retired elderly and old grandparents participate in distributing preoccupations about care for grandchildren and

upbringing of them and this situation directly stipulates living together or in their neighborhood. On the basis of expressive surveys' results about the theme of research, we can say that old and elderly retirees care for grandchildren and participate in distributing their preoccupations voluntarily and consider it a debt to grandparents.

Though it may seem strange, we have encountered such facts that, elderly and old retired grandparents refuse to serve and look after their grandchildren. The grandmothers deviate from the responsibility to look after infant babies of daughter-in-laws and show as a cause for this, unpleasant attitude toward them of their son and daughter-in-law. 74% of inquired grandmothers said that, they looked after their grandchildren heartily, but 26% of them indicated that they had already been tired of this affair and long before they had overcome this debt without the help of anyone. They insistently pointed out that, a mother is obliged to look after her children. Until they reach 2 years of age mothers should care for them and shouldn't send them to kindergartens. It turned out that 62% of retired elderly and old people have no any serious health problems, they work in housekeeping affairs and they are not in need of anyone to care for themselves. They said that most of their pension is spent for grandchildren, communal expenses and food, they provide financial support to their children. 32% of surveyed pensioners indicated that children living together with them often suffered from scarcity of money due to the lack of permanent work.

The results of our research are the basis for such a statement that, in the present reality of Azerbaijan, communicative coverage of 56% of retired elderly and old people is limited with family and close neighbors. 44% of elderly and old men who live in the city or village spend leisure time talking about their past memories at resting corners located in the courtyard of the building houses, in the parks, tea-houses, or gathering places established in rural areas which called as "gimge". Only 14% of pensioners told that they went to sanatorium-spa treatment once a year to strengthen their health.

As a result of the research, it is determined that, retired widows who lost their husband can provide financial needs with own pensions. But widowers have to face many problems due to living alone: they have difficulties with cooking, washing and ironing of clothes, care while being ill and etc. So 54% of old widowers prefer to marry again.

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Section 10. Sociology

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INFLUENCING INCLUSIVE EDUCATION IN UZBEKISTAN AND DEVELOPMENT OF UNIQUE TENDENCIES

Abstract. The article discusses reforms in Uzbekistan aimed at educating and educating mentally retarded, widely-respected individuals, and particularly the education of children in need of social protection, as well as the issues envisaged by the Law of the Republic of Uzbekistan “On Education” the problems of socio-psychological adaptation in the process of education of children with disabilities and ways to overcome them, There are some conclusions and recommendations on the inclusion of inclusive education for children with disabilities, its advantages, key stages and further improvement of inclusive education.

Keywords: children’s rights, social protection, capacity limitation, integration, inclusive education, individual education, socialization, rehabilitation of children with disabilities, social and psychological adaptation, psychological training.

Introduction

From the very beginning of the declaration of Uzbekistan as a sovereign state, the protection of the rights and legitimate interests of citizens, in particular the rights of the child rights as an integral part of human rights, has been identified as one of the priorities of state policy. Particularly at the moment when the education of children with special needs becomes one of the most pressing issues, it is important for Uzbekistan to provide social support to people with special needs, to improve their health, to effectively educate and educate people with disabilities, to integrate them into general education and inclusive education. a number of measures are being taken. In order to implement a continuing education system in the concept of inclusive education, ministries of education, higher and secondary education and other administrative bodies are supporting inclusive education.

Reforms in Uzbekistan for the education of children in need of social protection.

Consistent reforms are being carried out in Uzbekistan to educate children with disabilities who are in need of social protection, in order to bring up harmoniously developed and well-educated people. Based on the universally recognized principles of international law, the national human rights

framework has been radically updated. On December 9, 1992, Uzbekistan joined the Convention on the Rights of the Child, recognizing the international community’s recognition of the rights of the child as a supreme value [1]. After joining an important international document on the rights of the child, the implementation process in our country, that is, reforming legislation has been started in line with the Convention.

The main document determining the legal basis of education in our Republic is the Law of the Republic of Uzbekistan “On Education” [2]. The law specifically mentions the issue of education and upbringing of persons with disabilities. Paragraph 23 of this Law regulates the training, education and rehabilitation of children and adolescents with physical or mental disabilities in specialized institutions.

Issues related to the education and training of persons with disabilities are discussed further in the Law of the Republic of Uzbekistan “On social protection of persons with disabilities in the Republic of Uzbekistan” [3]. Particularly, article 22 of the law deals with education and upbringing of children with disabilities in home-based settings. As noted here, education and upbringing of disabled children can be undertaken at home or at home and in the absence of special pre-school and school facilities, as well as with the con-

sent of parents. Relevant educational institutions are obliged to assist parents in educating children with disabilities. Great attention is being paid to the issue of social protection of children with disabilities in Uzbekistan, the dramatic change in their education and upbringing is acknowledged as one of the urgent tasks of the state and requires special support – the level of development, disability, to be trained in a special or general education system according to their abilities an inclusive education policy is being implemented to improve the quality of education. In implementing this policy, a large-scale reforms are being carried out in the country, a range of benefits, privileges and conditions for the disabled.

The policy on the development of integrated (inclusive) education in Uzbekistan is based on the following principles:

- Recognition of integrated (inclusive) education as an important element of sustainable development, rehabilitation, adaptation and integration of children with disabilities;
- Integrity of inclusive education for all, the adaptation of the education system to the pupils' developmental abilities, peculiarities and learning needs;
- Establishing mechanisms for coordinating and coordinating the activities of educational institutions, parents, public organizations to integrate children with disabilities into general education;
- Development of educational curricula, educational-methodological complexes for integrated (inclusive) educational institutions;
- Establishing positive relationships with peers, peers, developing communication and tolerance for surrounding people;
- State support for quality education for children with disabilities in their needs and capacities.

Creation of necessary conditions for the education of children with disabilities and teenagers, their emotional and social status, as well as the level of their knowledge. Therefore, in the system of inclusive education in Uzbekistan special attention is paid to the following goals and objectives:

- Psychological development and social adaptation through the creation of necessary psychological and pedagogical, correctional facilities for the education of children with limited capacities in the educational institution, and implementation of capacitive general education programs and correctional work;
- Ensuring that students have equal access to education;
- Active involvement of society and family is disabled and healthy satisfy the needs of children, early social life adaptation;
- Realizing the right to live without parental care for children and teenagers with disabilities;

- Building a friendly and respectful attitude towards children and teenagers with disabilities.

Children with disabilities are only vulnerable to physical or psychological development, and in the public life their abilities are wide. However, it is important to bear in mind the importance of education, first of all, emphasizing that the child should be socialized, ie joining society.

It is not an easy process for children with disabilities to join society. Disabled children with physical disabilities often abandon social life. They tend to quit often, preferring not to leave the house. Especially important is the socio-psychological adaptation of children with disabilities in the learning process.

Whether children with special needs, whether it's special schools, pre-school facilities or classrooms or groups at general educational institutions, all forms of education and involvement in the education sector are in some ways the integration process, these children communicate with other children, including children at secondary schools, to ensure their social adaptation and harmony with society. However, choosing suitable conditions for study is the right of every child and parent. Therefore, specialists of the psychological and medical-pedagogical commission are responsible for studying the psychological state of the child and diagnostics, and a comprehensive child-focused examination of the child requires the development of recommendations for the education of children and the appropriate learning environment.

Hundreds of children with disabilities receive education in specialized boarding schools operating in our country. Although there are adequate conditions for children in special schools, there are still few deficiencies. For example, there may be problems with getting out of touch with the outside world, and the lack of confidence in the child can always be a problem, especially when it comes to the concept of «I'm disabled, unhealthy.» In fact, even if the child is really unhealthy, he can provide it with a healthy lifestyle, with the ability to study in a heterogeneous environment. It is important to say that the society is not a «detention» of the individual, but rather how society responds to it. To overcome the difficulties, it is important that the parents' personal abilities, experiences, support of their loved ones and social workers are important. Parents should be concentrated on the content rather than on the nature of the work that needs to be carried out [4.53–54].

Inclusive education is an educational system that can be adapted and adapted to individualized and adaptable circumstances for children and young people in need of special care. These findings are correlated with the help of specialized children and adolescents who are educated in healthy children and general education institutions. Inclusive education enables children with physical or mental disabilities to be educated with healthy peers.

Based on these ideas, in our country since 2007, the project «General Education for Children with Special Needs» has been introduced in inclusive education process [5]. The purpose of this project is to provide full-fledged education in general education institutions, as well as the opportunities for children with special needs, to create the necessary conditions for every child in educational institutions, and to achieve these objectives:

- Organization of the special commission on pedagogical and psychological study of children with special needs;
- Organization of joint educational, medical, social and correctional services;
- Conducting trainings, seminars and trainings for parents on prophylactic and rehabilitation activities in families and mahallas;
- Provide parents with methodological assistance in educating and mentoring children with disabilities;
- Development of correctional-pedagogical methods for teachers of inclusive education and development of methodological recommendations on their application [6, 76–77].

In the process of inclusive education, great demands are placed on general school teachers. Because, unlike usual, there are differences in the mental and physical state of the students in this process. In this process, the teacher should be able to explain the lesson to a vulnerable child, and the skills to apply to the hearing-impaired reader. Thus, general secondary school teachers are required to update their knowledge of science in each subject category (weak, blind, deaf, weak, limited mobility).

The main stages of transition to inclusive education.

The transition to inclusive education is done in several stages:

- The first step is to adapt the school. That is, school conditions should be in line with the physical and psychological state of each child. For example, children with traumatic stress disorders should have access to the outlet and their respective parts. Classrooms, kitchens and other places need special needs for children with special needs. Also, for hearing impaired students need hearing aids, magnifying glass for children who can not see, and school supplies. In short, the school needs to be enriched so as to cover children's disadvantages;
- The second step is training teachers. The method of individual training in inclusive education is crucial. That is, the teacher should be aware of the needs, abilities and shortcomings of each student. Thus, during the course each child is separately engaged. She should have a good conversation with children

who are incapable of hearing, learning techniques that are used to teach children who do not see them. In an individual approach, a teacher should engage more with children with disabilities and to support them. For this purpose, teachers need to be admitted to advanced training courses;

- The third stage is that it is important for them to be friendly towards children with disabilities and to help them. There should not be any contradictions or discrimination among them. Students need to be trained to make sure that they help their friend, who is unheard, blind, or mentally weak;
- The fourth phase – after the school has been completed, special boarding schools can move children to ordinary schools. If children are sent to ordinary schools after such preparations and adaptations, they will have no difficulty.

Children who are educated on inclusive education learn to play self-help by playing side-by-side with healthy friends, participating in activities, participating in various activities. The most important thing is that their desire to be healthy as their peers will help them to build confidence in the future and develop social adaptation.

Summary

It is our great achievement that the educational process in the whole world is developing in our country today. In this way, we will discover many talented young people. Limitability is not an impossibility. Therefore, it is possible for all children studying in special boarding schools to be able to reach many people by creating many opportunities. Therefore, it is advisable to take into consideration that there are some problems with the development of inclusive education for children with disabilities:

- Increasing the legal and medical knowledge of inclusive education for families with disabilities;
- Establishment of partnerships between mahalla activists, community, educational institutions and healthcare workers in creating adequate conditions for the development and rehabilitation of children with disabilities;
- Further improving the work on adaptation and improvement of education, medical and cultural-enlightenment institutions and services to ensure accessibility of children with disabilities;
- Improvement of favorable and favorable conditions for physical, intellectual and spiritual development of children with disabilities;
- Frequent open doors, roundtables, psychological trainings with parents, community activists, psychologists and other specialists to further stimulate

educational and training activities in inclusive educational institutions.

A wholesome society will not abandon any or even small factor for the sake of progress. On the contrary, it

tries to use all the facts wisely. As disabled children constitute a part of our society, the talent and capacity to use them inevitably have a significant impact on the development of our country.

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YOUTH UNEMPLOYMENT IN NIGERIA: LESSONS FROM TECHNICAL AND VOCATIONAL MANPOWER DIVIDE IN THE PETROLEUM INDUSTRY

Abstract. Youth unemployment is a socio-economic problem that every government strives to give maximum attention due to the adverse impacts it can have on the development of a nation. For instance, it increases the levels of poverty, crime and other social vices, which can impede development. As a way of addressing this problem, it became necessary to carry out an investigation into expatriate employment pattern in the Nigerian petroleum industry, with a view to providing some level of insight into the rationale for the high youth unemployment situation in the volatile Niger Delta region of Nigeria and in the country in general, where there are many educated youths whose education should have afforded some form of employment. Specifically, this study seeks to examine why many foreign nationals occupy the low and middle level employment positions in the Nigerian oil and gas sector, while youths in the country's oil rich region of Niger Delta and other parts of the country are almost shut out. A qualitative, comparative study of 148 nationals and 112 foreigners working in the petroleum sector was carried out using guided in-depth and key informant interviews. Also, Focus Group Discussion was carried out with unemployed youths and key stake holders in a major oil and gas industry in the Niger Delta region. Results from major themes reveal that while there is a very high aspiration among the young Nigerians to acquire higher academic qualifications, they generally lack required competencies, skills, experiences and certifications required to gain employment in the industry. On the hand, while their foreign counterpart may not have so much of higher academic degrees, they pass through skill development training/educational institutions, which certify them on the industry-required competencies. The findings implicate the Nigerian educational and technical manpower development strategies, amongst other issues. Thus, it is recommended that policies and strategies that will strengthen Technical and Vocational Education (TVE), and specialized institutional training in the country be put in place. This will make it possible for some of the sustainable development goals including, poverty eradication, quality education, decent work and economic growth, to be achieved.

Keywords: Unemployment, Youth, Foreign Nationals, Technical and Vocational Education (TVE), Certification, Competencies.

Introduction

In 2007, the World Bank brought to fore the world's historic "youth bulge" of 1.3 billion young people, and stressed the urgent need for governments and other development stakeholders to invest in this future generation. Since then, efforts have been geared towards helping youths navigate and transit through this stage of life successfully. However, the challenge is that the global youth unemployment rate has been on the increase since 2007, reaching its peak in 2009 (ILO, 2012). Furthermore, since then, the rate has remained close to the 2009 peak and was estimated at 12.6% (which translates to about 74.6million youths) in 2011. In 2012, it was projected at 12.7%, with only little improvement expected by 2016.

Youth unemployment rates everywhere are considerably higher than adults' rates and constitute a major concern to countries across the globe and the reason is not far-fetched. Youth unemployment leaves lasting negative effects on the welfare of young people and goes further to adversely affect the economic performance and social stability of a nation.

In Nigerian, the population is currently estimated at about 200 million. Of this, the youth constitute about 51% (NBS, 2012). This high population of youth and the attendant high unemployment rate present a great threat to the stability and growth of the political and socio-economic fabrics of the nation. It is therefore not surprising that most of the boiling

conflicts in the country including the Niger Delta militancy and Boko Haran insurgency have been linked to youth unemployment (Adebayo, [1]).

Despite the current unemployment challenges, especially as it affects the youths, Nigeria still seems to have appreciable opportunities to absorb a good number of its youths in to the labour market. A careful look at national dailies reveals the advertisement of job vacancies across different Nigerian industries. So the question is: why is the unemployment situation still persisting so hard especially among young Nigerians? Even more disturbing is the fact that in the face of the biting youth unemployment situation in Nigeria, as Ezea [18] pointed out, there is still a notable presence of foreigners in the country taking up different cadres of employment, including the ones deemed low and middle levels, in the hospitality, construction as well as the oil and gas industries spread across the country. Thus, one wonders if there is something these foreigners have or do that young people in Nigeria do not have or do; and if so, again, one cannot but ponder on what implication this could have on the Nigerian employment and manpower planning policy.

To understand the concerns outlined so far, the petroleum industry is chosen for the purpose of this analysis, to explore the unemployment dynamics in Nigeria. The choice of the petroleum industry is not farfetched. First, this sector has a vital role to play in the Nigerian economy both as a major source of Gross Domestic Product (GDP) and as a major stakeholder in the development and employment of labour in the country. The industry is said to generate over 95 per cent of the nation's foreign exchange worth over US\$8 billion annually (representing about 85% of revenue generated by the Nigerian government). However, up to 70% of the generated earnings is often channelled abroad through outsourcing of intermediate input, while indigenous companies only manage to lay their hands on a token of about 8.3%, (Olorunsogo [16]). With regards to employment, the industry has witnessed the influx of expatriates, making it one of the sectors with the single highest population of foreign nationals. This is so serious that in order to bring the issue of influx of foreign nationals into the sector under check, the Nigerian government recognizes the need for higher local content in the oil and gas industry and came up with the Nigerian Oil and Gas Industry Content Development Act (NOGICD), which was signed into law in 2010. The Act aimed at ensuring the creation of employment through the award of contracts to domestic intermediates, as well as the generation of foreign earnings, known to be channelled abroad as a result of the importation of intermediate inputs used in production and service delivery in the industry. Furthermore, the Nigerian Content Development Monitoring Board was established to increase and build local capacity of

individuals and firms, establish linkages to channel positive externalities appropriately to other sectors of the economy and boost the industry's contribution to the nation's GDP (www.ncdmb.com).

Secondly, and very importantly, most of the Petroleum installations are located in the Niger Delta Region. This region is known for youth restiveness which manifests in form of vices like kidnapping and militancy, all of which unemployment is believed to be their leading causal factor. Moreover, some parts of the region are among the least developed in the southern part of Nigeria. As such, understanding the youth unemployment dynamics of the region will set the stage for gaining insights into the youth unemployment dynamics in Nigeria.

Gaining insights into the concerns so far raised will have a significant implication for addressing to a significant extent the Nigerian youth unemployment situation and this paper seeks to provide some of the needed insights. To achieve this, it is important to address the following crucial questions:

- Why are many low/middle level jobs being taken up by foreign nationals in some Nigerian economic sectors, like the oil and gas sector, while there are many Nigerian youths with high enough academic qualifications?
- Is something these foreigners have or do that young people in Nigeria do not have, or do?
- What implication could this have on the Nigerian employment and manpower planning policy?

Methodology

To provide answers to the questions raised above, and gain the much needed insights into the dynamics of youth unemployment in Nigeria, a comparative study of foreign and Nigerian nationals working in an oil and gas industry was undertaken. The study was basically exploratory by design. However, qualitative techniques were employed to obtain primary data. Subjects studied were majorly contractor staff of ExxonMobil Nigeria, a major oil and gas industry operating in the Niger Delta Region.

Data for the study were obtained via:

- Guided in-depth interviews with purposively sampled foreign and Nigerian nationals altogether 112 and 148 respectively.
- Focus group discussion with 5 representatives of unemployed youth who aspire to become employees of the industry, to determine their knowledge level and perception of employment dynamics in the sector, as well as to gain reflection into the outcome of the in-depth interviews above;
- Key informant interview of 3 nationals and 2 expatriates who are in managerial positions in their different

contracting companies of Exxon Mobil, to verify and strengthened interview findings by providing a broader view of the concerns raised.

Findings and Discussion of Major Themes:

The findings in this investigation centred on three major themes namely: educational qualification and competency certification; age at the time of employment as well as work attitude and possession of soft skills. They are presented follows:

Educational Qualification and Competency Certification

Of the 148 Nigerian nationals who participated in this study, 16(10.8%) had a post graduate qualification; 59 (39.9%) had a graduate level qualification of either a degree or higher national diploma; 48(32.4%) reported having ordinary diploma or equivalents; while only 21(14.2%) were still with secondary school qualification. In the case of

foreign nationals, they were found to be more concentrated in intermediate level education in that as much as of them had just 54.5% secondary school qualification, while 35.7% reported having ordinary diploma or equivalents. Unlike Nigerian nationals, only 7.1% and 2.7% had graduate level and post graduate level qualifications respectively. However, of this 148 Nigerian subjects as table 3b shows, those who indicated having obtained Tradesmen/vocational certification and professional qualification were merely 41.2% and 29.1% respectively as against 48.2% and 51.8% respectively observed among foreign nationals. A finding of this nature shows that whereas Nigerian youths spend time pursuing higher level academic qualifications, foreign nationals concentrate on acquiring professional qualification and competency certifications, which are often the major bases for their employment in many industries as is the case with the oil and gas sector.

Table 1. – Distribution of Respondents by Highest Academic Qualification

Academic Qualifications	Nigerians		Foreigners	
	Frequency	Percent	Frequency	Percent
Primary Education	4	2.7	0	0.0
High/secondary sch.	21	14.2	61	54.5
National Diploma	48	32.4	40	35.7
Graduate Level(First Degree/HND)	59	39.9	8	7.1
Post graduate qualifications	16	10.8	3	2.7
Total	148	100	112	100

Source: Field Survey, 2017

In summary, while there is very popular aspiration among the Nigerian youth towards higher academic qualifications as bases for employment, most of them seem to be unaware of the competencies, skills, experiences and professional training required in many industries and when they discover, they do so

too late most of the times. This explains why Aladekomo [4], refer to Nigeria as a 'qualification economy' and raised concern over the increasing attractiveness of qualification in the face of massive retrenchment in the formal sector of the nation's economy and massive unemployment of the 'qualified'.

Table 2. – Distribution of Respondents by Highest Qualification

Academic Qualifications	Nigerians		Foreigners	
	Frequency	Percent	Frequency	Percent
Tradesmen/Vocational certificate	61	41.2	54	48.2
Professional certification	43	29.1	48	51.8
Academic Qualification	44	29.7	0	0.0
TOTAL	148	100	112	100

Source: Field Survey, 2017

What this boils down to is that the youth unemployment situation in Nigeria is compounded by the fact that a large proportion of youths in the country merely possess academic qualifications, but lack competencies and professional skills that would better their chances of securing a place in some of the industrial outfits in the country, many of which require specialized skills and competencies as criteria for employment much

more than just Honours and Bachelors, which countless Nigerian youths possess. Thus, one may well adduce that some of the employment slots occupied by foreign nationals would rather have been taken up by youths of Nigerian nationality if they were readily available with the needed specialized skills and competencies. And perhaps, this would have made the current youth unemployment challenge in country less dire.

Age at the Time of Employment

In terms of age, as shown in Table 4 below, it was found that a total of 33 (29.5%) of the foreign workers had already acquired skills that gave them the basis to be employed as expatriates at relatively very young ages of thirty and below compared to 28(18.9%) of Nigerian nationals. What made the difference? Most of the foreign nationals who participated in this study reported starting work early, right after high school, through various craft/apprenticeship programmes. As a consequence, their higher educational and professional trainings fused with their career path. On the other hand, most Nigerian youths as this study revealed do not settle into employment early enough. A good number of them rather spend time trying to acquire higher academic qualifications before they realize the need for a professional training that will certify them for a job. Unfortunately, for many of them, this does not materialize soon enough owing to delays caused by failure of some of them to secure placement in higher institutions early enough. For some it might take them up two to four years or even more before they secure admission into higher institutions.

Secondly, there is also delay generated by the educational system itself. While in these institutions of higher learning, a good number of them, especially the ones in public institutions, do not get to graduate on time due to frequent strike actions by staff of these institutions. These coupled with additional one year compulsory national service, elongates the time many Nigerian youths finally become ready for employment. Sometimes, before some of them are finally ready

for employment, they would have become older than the maximum age required in order to be offered employment in some industries. For reason, there is massive age fraud by many Nigerian youths, in which case many of them swear age affidavits downsizing their ages. Sometimes an individual can cut off as much as 5 to 10 years from his/her actual age, just so as to qualify for certain jobs. The implication of this is that sometimes the individual taking up an employment position is not even a youth any longer, but then has spent all his/her time as youth rather unemployed, trying to ‘meet up with the requirements’ for employment. And by downsizing ones age to get an employment, those who by age (youths) are actually qualified for the job, are shut out and left unemployed. All these worsen the youth unemployment situation in the country. The inability to get employed early is not without it costs. Early unemployment is reported to be stressful and can leave some scars on the livelihood of the young ones. This is because the unemployed youth will not have the opportunity to build career skills on time (IEG, [10]). Consequently, they face the risk for higher adult unemployment. Thus, it is not surprising to find that only 2(1.4%) of Nigerian Nationals were still working at relatively advanced ages of 61 years and above, compared to 6(5.4%) of foreign nationals. Early unemployment is reported to be linked with career downgrades and lower wages later in life, with a resultant loss in life time earnings (Kahn [11]). Gregg and Tominey (2005) found that individuals in UK can pay as high as 13 to 21% penalty for up to 26 years, as a result of early unemployment.

Table 3. – Distribution of Respondents by Age

Age Range (Years)	Nigerians		Foreigners	
	Frequency	Percentage	Frequency	Percentage
20 and below	1	0.7	5	4.5
21–30	27	18.2	28	25.0
31–40	46	31.1	31	27.7
41–50	49	33.1	27	24.1
51–60	23	15.5	15	13.4
61 and above	2	1.4	6	5.4
TOTAL	148	100	112	100

Source: Field Survey, 2017

General Attitude and Employability Skills

The Key informants in this study generally agreed that foreign nationals have very good working attitude and culture. One of these key informants reported as follows: “apart from having the expertise, foreign nationals are reliable; they can work for longer hours and for affordable cost; they are also resourceful, with some having excellent computing as well as other complementary and soft skills that an employer can rely on. To corroborate this, a study by Ezea [5], on why building

engineers and contractors prefer foreign artisans found that lack of commitment, poor work attitude, high cost of labour and other similar negative trends which were identified as prevalent among Nigerian artisans were the major reasons. Similarly, Arrey [3], maintained that the work culture and behaviour of Nigerians largely present the perception of a people who generally have poor work attitude with low accountability level. Furthermore, Kongvong, in his June 4, [13]. Info Guide Nigeria’s article listed among other issues: lack of training in key

relevant areas, absence of further training, lack of soft skills like communication and other social skills, as well as possession of out-dated knowledge, lack of direction and mentorship, as some of the reasons Nigerian graduates are not employable. All this point to the fact that, much still has to be done beyond academics to improve the employability of Nigerian youths. Therefore, until progress is made in this regard, there would still be widespread youth unemployment in the country. This has become even more necessary because as Goleman [7] stated, *“the rules of work are changing. We are being judged by a new yardstick: not just by how smart we are or by our training and expertise, but also by how well we handle ourselves and each other”*. There is therefore more to what needs to be done to resolve the problem of youth unemployment in the country than mere acquisition of academic qualifications, which is not even a major hurdle to many Nigerian youths.

Policy Implications for Manpower and Educational Development in Nigeria

Ezea [5], reported that on November 6, 2015, the Nigeria's President, Muhammadu Buhari, directed his ministers to come up with a plan of action for the speedy revitalization and expansion of the nation's vocational training centres. This was necessitated when the president was told, at a meeting with the board of directors of Julius Berger Construction Company, that many construction companies were being forced to bring in skilled workers from abroad because of a shortage of competent construction workers and artisans in the country. The question is; why would a scenario like this play out in a country where there is a teeming population of youths who need jobs? Kravetz [14, 211] stated that *“... in many developing countries, educated school leavers are without work and jobs that need doing are without hands”*. The above statement, made over four decades ago still remains true to a large extent in many African countries today, including Nigeria, and might explain why some vacancies have been and continue to be filled by foreign nationals while Nigerian youths who should have taken up such jobs remain unemployed.

Often, qualifications required to fit into some of these technical or vocational jobs are generally not acquired from schools directly, except where such schools or institutions were established for such specialized training (like the Nigerian Maritime Academy and the Petroleum Training Institute). As such, for individuals to acquire the technical or vocational skills that would qualify them for jobs that require these specialized skills, they need to go beyond acquiring academic qualifications to training in specialized institutions in order to obtain the needed technical or vocational skills. Thus, Nigeria needs to re-visit its policy on technical and vocational education (TVE) with practical actions and not just mere policies and documentations.

The place of TVE in innovations, industrialisation and employment creation cannot be over emphasised. For instance, in order to foster industrial development in Africa, African leaders have been encouraged right from the early days of their independence to embark on technical and vocational education, as well as specialized training, as one of their development priorities (ECA/UNESCO, 1961; Audience Africa, 1975). Unfortunately, there is the tendency to look down on TVE in Nigeria. The technical colleges and polytechnics are seen as being inferior to secondary schools and the universities, respectively. This is evidenced in the poor and discriminatory salary pattern and limited career growth path set for technical and vocational personnel in both private and public sectors. Even the educational system has limited opportunity for further studies for those with TVE (Kerre [12]; Aladekomo, [2]). As such, the demand for TVE has remained generally low. And the cost for the nation is that the training of lower and middle manpower as well as personnel with specialized technical and vocational is neglected in principle.

This neglect shows up in many ways. There is a resultant reduced number of trained lower and middle level manpower (who are equipped with the much needed specialized skills) for industries and private organizations, and this in turn gives rise to continuous unemployment and lack of entrepreneurship among youths.

Having a youth population that is equipped with specialized skills can be of tremendous advantage to a country. Countries in Asia for instance, which incidentally have about the highest number foreign nationals serving as expatriates in the country, have had their economies benefit hugely from export of lower and middle level manpower/labours. For some Asian countries, the remittances from labour export have begun to significantly exceed foreign direct investment (FDI), capital market flow, and official development assistance (ODA) and most importantly, support balance of payments and fiscal positions (Pernia [17]). Many developing countries, across the world with excess labour, high level of unemployment and underemployment have therefore positioned themselves to maximise these benefits from labour export. For instance, the Filipinos are reputed as being the third highest recipient of remittances from labour export, after India and Mexico (11.7 billion USD in 2005, making up 10% GDP) thereafter, 14 and 17 billion USD in 2006 and 2007, respectively. Other countries like the East Europe, Latin America, South East Asia, the Middle East and some North African countries have benefited from labour export remittances also (Bakunda and Mpanga, [4]). Thus, the acquisition of skills and expertise in demand will be of benefit to Nigerian youths who dare to do so. It could be of immense benefit to the country as a whole via labour export, which contributes to lifting households out

of poverty, while its multiplier effects can increase spending, with the corresponding remittances to Nigeria as the exporting country. Therefore, Nigeria can adopt a systematic approach to facilitate the acquisition specialized technical and vocational (TVE) skills by youths. Such a move will increase the employability of these youths and subsequently facilitate their chances of securing jobs in industries. This will in turn go a long way in reducing the severity of youth unemployment in the country. Above all, some of the trained manpower could be exported for the benefits outlined as accruing from labour export.

Conclusion and Recommendations

This study has shown that in the oil and gas sector and by extension other sectors and industries, Nigeria is losing countless employment opportunities to expatriates; the very opportunities Nigerian youths would have taken up and by so doing reduce the acute youth unemployment currently facing the country. Unfortunately, these expatriates are qualified for the jobs they take up, due to specialized technical and vocational (TVE) skills which they possess. For Nigerian youths, whereas there is very high aspirations among them to acquire higher academic qualifications, many of them do not seem to be aware of the technical and vocational competencies/certifications and even soft skills required in order to gain employment in some of Nigeria's industries. But for their foreign counterparts, whereas they may not have higher academic degrees, however, they undergo series of skill development in specialized training/educational institutions which certify them on the industry required competencies, thereby giving them the edge when it comes to securing jobs even in a country where they are non-nationals.

As a way forward to promote employability and reduce unemployment among youths in Nigeria, the following recommendations are therefore made:

- There is a strong need to determine the skill gaps in different industries in Nigeria in order to direct youths and training institutions to areas of manpower needs in the country. Thus, targeted skills development program can be initiated to address the required skill needs in specific sectors.

- The Nigerian government must make concerted efforts to invest more in the Basic level of education and also strongly pursue the revitalization of TVE in the country, paying particular attention to content, current societal changes and technological adaptability. And of course, teachers/trainers development will also be a great factor in supporting this move.
- There is need for strong institutional development for many professional training. The Nigerian Society of Engineers, National Association of Engineering Technicians and Craftsmen, National Association of Technologist in Engineering etc., all have a part to play in evolving specialized institutions and subsequent certification of the lower and middle level technical practice so as to compete globally with their foreign counterparts. Where it is not immediately tenable to stand alone, these professional institutions can seek affiliation with relevant global training bodies.
- Individuals and private corporate bodies can explore this novel business opportunity in partnering with training institutions abroad who have the technical expertise and license to empower Nigerian youths in different specializes skills and vocations.
- Training and manpower development stakeholders can take advantage of recent technological development to package global training content through e-learning platforms, where it is not possible to deliver such trainings physically.
- There is also need for the orientation of youths to get them to be more aware of the economic realities of placing value on technical and vocational skills, so that they can appreciate the need to integrate their academic power with skills that will enhance their employability early in life.
- Lastly, career guidance and counselling structure for youths in Nigerian schools needs to be modified to reflect modern work realities, so as to have them properly guided with regards to available job opportunities and what it takes to secure them.

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ALGORITHMS FOR THE SYNTHESIS OF PARAMETERS OF REGULATORS BASED ON THE ESTIMATION OF THE STATE VECTOR IN ADAPTIVE CONTROL SYSTEMS AND REFERENCE MODELS

Abstract. The article presents an approach to the development of algorithms for the synthesis of regulators with the current estimation of the intensity of additive noise, allowing to adapt the dynamic filter to varying statistical characteristics of the perturbation at the input of the system. Algorithms for the synthesis of regulators based on estimating the a posteriori probability density of unknown characteristics of the useful signal are proposed, allowing the two-step task of adaptive estimation of controller parameters to be realized based on separation methods and adaptive filtering.

Keywords: control object, controller, adaptive system with reference models, dynamic filtering, regularization, adaptive filtering.

I. Introduction

To estimate the vector of controller parameters, the Kalman filter algorithm is usually used [1]. A significant disadvantage of the Kalman filter, which has received widespread implementation of control systems in practice, is the phenomenon of divergence. One of the significant reasons for the divergence of the Kalman filter is that, in the course of the operation of a system, its parameters may differ significantly from those of its mathematical model [2]. Therefore, there is a problem of synthesizing adaptive variants of the Kalman filter, in which discrepancies between the parameters of the real system and the parameters of its mathematical model will be taken into account and, thus, the discrepancy of the filter will be eliminated. In other words, this problem lies in the

synthesis of reliable filters that are resistant to previously unpredictable changes in system parameters [3–5].

II. Formulation of the problem

Let us highlight two approaches to solving this problem. The first is based on the synthesis of a filter, in which unknown or changing parameters are estimated, and using this estimate to adjust the parameters of the adaptive Kalman filter [6]. The second is based on the properties of the “renewing” process.

Suppose that the sets $\{w(k)\}$ and $\{v(k)\}$ are mutually independent and define stationary processes $\theta(k)$, $x(k)$.

If there are a priori data about the values σ_1 , σ you can build a Kalman filter that performs a one-step forecast. It is defined by recurrent formulas.

$$\widehat{\theta}(k+1/k) = \widehat{\theta}(k/k-1) + K(k)(z(k) - H\widehat{\theta}(k/k-1)), \quad (1)$$

$$\widehat{x}(k/k-1) = H\widehat{\theta}(k/k-1), \quad \widehat{\theta}_{i,0} = 0, \quad k = 1, 2, \dots,$$

where $x(k/k-1), \theta(k/k-1)$ – estimates of values = on a set of observations $z(l), l = \overline{1, n-1}$.

The matrix $K(k)$ is also defined by recurrence relations. For further, it is only important that under the assumptions made, the sequence $K(k)$ has a limit

$$\lim_{k \rightarrow \infty} K(k) = K.$$

From here, along with the filter (1), one can consider a stationary filter of the form

$$\theta^*(k+1) = \theta^*(k) + d(z(k) - H\theta^*(k)), \quad (2)$$

$$x^*(k) = H\theta^*(k),$$

where $d = K$. This filter, as follows from the results of [3; 4], should be asymptotically stable. It gives a one-step prediction optimal in the average quadratic sense with an infinite observation time on the class of linear filters. In the case when $\theta(k), \nu(k)$ – are Gaussian processes, then estimate (2) is optimal on an arbitrary class of filters and satisfies conditions [2–4]

$$M[\theta(k)/z(k-1), z(k-2), \dots] = \theta^*(k), \quad (3)$$

$$M[x(k)/z(k-1), z(k-2), \dots] = x^*(k).$$

Equations (3) can be collapsed into a single scalar equation of the form

$$x^*(k) + a_1 x^*(k-1) + \dots + a_l x^*(k-l) =$$

$$= d_1(z(k-1) - x^*(k-1)) + \dots + d_l(z(k-l) - x^*(k-l)).$$

The expression (4) will present in equivalent form

$$x^*(k) = \Psi^T(k-1)\mu, \quad (5)$$

where

$$\Psi(k-1) = (-x^*(k-1), \dots, -x^*(k-l), z(k-1), \dots, z(k-l))^T,$$

$$\mu = (\rho(1), \dots, \rho(l), d(1), \dots, d(l))^T, \quad \rho(i) = a(i) + d(i).$$

Observations $z(k)$ can be given the form

$$z(k) = \Psi^T(k-1)\mu + \eta(k), \quad (6)$$

$$\eta(k) = x(k) - x^*(k) + \nu(k).$$

Next, we will assume that σ_1, σ are not set a priori, and we will synthesize an adaptive analogue of the filter (2), which simultaneously performs both state evaluation and parameter setting.

Adaptive assessment $\widehat{x}(k)$ signal $x(k)$ when $k \geq l+1$ we find by the formula

$$\widehat{x}(k) = -\rho(1,k)\widehat{x}(k-1) - \dots - \rho(l,k)\widehat{x}(k-l) +$$

$$+d(1,k)z(k-1) + \dots + d(l,k)z(k-l), \quad (7)$$

where $\rho(i,k), d(i,k), i = \overline{1, l}$ – parameter settings $\rho(i), d(i)$ values $\widehat{x}(1), \dots, \widehat{x}(l)$ – arbitrary. Based on equality (6) settings $\mu(k)$ parameters μ ($\mu = (\rho(1), \dots, \rho(l), d(1), \dots, d(l))^T$), we find using vector relations of the form

$$\mu(k) = \mu(k-1) + \gamma(k)\Phi(k-1)(z(k) - \Phi^T(k-1)\mu(k-1)), \quad (8)$$

$$\gamma^{-1}(k) = \gamma^{-1}(k-1) + \|\Phi(k-1)\|^2, \quad \gamma(l) > 0, \quad k = l+1, \dots,$$

where

$\Phi(k-1) = (-\widehat{x}(k-1), \dots, -\widehat{x}(k-l), z(k-1), \dots, z(k-l))^T$; $\mu(l), \gamma(l)$ are arbitrary. One-step forecast $\theta(k+1)$ state vector $\theta(k)$ computed by the formula

$$\widehat{\theta}(k+1) = \widehat{\theta}(k) + d(k)(z(k) - \widehat{x}(k)), \quad (9)$$

where $d(k)$ is the setting d , which is a simple recount according to $\mu(k), \theta(k)$ is set arbitrarily or consistently with $\widehat{x}(l)$ [3; 5].

The set of interrelated relations (7), (8), (9) forms an adaptive filter (closed system, determining $\mu(k), \widehat{x}(k), \widehat{\theta}(k+1)$).

Based on the results of [4; 7], we present the conditions indicating that the constructed adaptive filter under certain conditions can be extremely optimal in the sense indicated below.

Let the conditions be fulfilled:

$$1) \quad M[x(k)/z(k-1), z(k-2), \dots] = x^*(k),$$

$$M[\eta^2(k)/z(k-1), z(k-2), \dots] \leq L < \infty;$$

2) filter (4) satisfies the condition of complete controllability with respect to observations $z(k)$.

Then for any finite $\mu(i), \gamma(l), \widehat{\theta}(l), \widehat{x}(1), \dots, \widehat{x}(l)$ with probability one we have

$$\begin{aligned} \lim_{k \rightarrow \infty} \mu(k) &= \mu, \\ \lim_{k \rightarrow \infty} \frac{1}{k} \sum_{l=1}^k (\widehat{x}(l) - x^*(l))^2 &= 0, \\ \lim_{k \rightarrow \infty} \frac{1}{k} \sum_{l=1}^k \|\widehat{\theta}(l) - \theta^*(l)\|^2 &= 0. \end{aligned} \quad (10)$$

It follows that with probability one, the parameters of the adaptive filter converge to the values of the parameters of the optimal filter (4), and the empirical mean square of the deviation of the adaptive estimates from the optimal ones converges to zero.

The above algorithms of adaptive filtering (2), (7), (8), (9) allow you to implement the adaptation procedure of the Kalman filter, without the limitations inherent in the identification methods and allow you to find the optimal values of the settings of the regulators in the systems of adaptive control of dynamic objects in real noise environment with almost complete a priori uncertainty.

III. Solution of the task

Consider the task of synthesizing a control device in adaptive control systems with reference models [7; 8]. We assume that the equations necessary for estimating the optimal parameters of the controller are given as

$$\theta(k+1) = \theta(k) + w(k), \quad (11)$$

$$z(k) = H(k)\theta(k) + \nu(k), \quad (12)$$

where is $\theta(k)$ the n – dimensional vector of controller parameters with discrete time $k = 0, N$; $z(k)$ – size measurement vector m ; $H(k)$ – size measurement matrix $1 \times m$; $w(k)$ – vector of perturbations; $\nu(k)$ is a sequence of random vectors characterizing the errors of observations; $\theta(0)$ – some random vector.

To solve the problem of synthesis of the optimal controller, it is necessary to set the joint density of the vector distributions $\theta(0)$ and sequences $\{w(k)\}$, $\{v(k)\}$. We will, however, assume that only the following statistical characteristics are known:

$$E\{w(k)\} = 0, \quad E\{w(k)w^T(j)\} = Q(kj), \quad (k, j = \overline{0, N-1}),$$

$$E\{v(k)\} = 0, \quad E\{v(k)v^T(j)\} = R(kj), \quad (k, j = \overline{0, N}).$$

Building optimal filters based on relations (11), (12) requires knowledge of the statistical characteristics of the state vector and the level of interference. For system (11) and (12), knowledge of the statistical characteristics of the non-information parameters of the state vector is also necessary. In practice, as a rule, there is a significant uncertainty of these characteristics [1; 6]. Often, the uncertainty of the statistical characteristics of the state vector, the output signal and interference is parametric in nature and reduces to the uncertainty of some of their parameters: spectral width, dispersion, spectral density, etc [9; 10]. Under these conditions, in order to take into account the a priori uncertainty of the statistical characteristics of the useful signal and interference, the linear equations (11), (12) of the formation of the state vector and the observed process can be represented as

$$\theta(k) = F(\lambda)\theta(k-1) + \Gamma(\lambda)w(k, \lambda), \quad (13)$$

$$z(t) = H(\lambda)\theta(k) + v(k, \lambda), \quad (14)$$

where λ is the vector of unknown parameters describing a priori indefinite statistical characteristics of the observed process and interference.

If a priori indefinite characteristics of the state and interference vector are constant during the filter operation, then the description of its working conditions is complemented by the relation

$$\theta(k) = \theta(k-1). \quad (15)$$

If these characteristics change in time, then it is convenient to use the description of the vector λ such a Markov process as such a model.

$$\theta(k) = F_1\lambda(k) + w_1(k), \quad (16)$$

where F_1 is the matrix that determines the rate of change of parameters λ ; $w_1(t)$ – white noise with the correlation matrix $R_{w_1}\delta(\tau)$, which determines together with the matrix F_1 the range of parameters λ .

If the state and the observed process are described by equations (13) and (14), in which the matrices F, Γ, H, Q depend on the vector of unknown parameters λ [11], then the optimal filter equations, calculated on the selection of the state vector with known characteristics corresponding to value $\lambda = \lambda_i$, will be:

$$\begin{aligned} \theta_o(k, \lambda_i) &= F(\lambda_i)\theta_o(k-1, \lambda_i) + \\ &+ K(k, \lambda_i)[z(k) - H(\lambda_i)F(\lambda_i)\theta_o(k-1, \lambda_i)] \end{aligned}$$

$$K(k, \lambda_i) = P_3(k, \lambda_i)H^T(\lambda_i)[D(k, \lambda_i)]^{-1},$$

$$D(k, \lambda_i) = H(\lambda_i)P_3(k, \lambda_i)H^T(\lambda_i) + R,$$

$$P_3(k, \lambda_i) = F(\lambda_i)P(k-1, \lambda_i)F^T(\lambda_i) + Q(\lambda_i),$$

$$P(k, \lambda_i) = [I - K(k, \lambda_i)H(\lambda_i)]P_3(k, \lambda_i). \quad (17)$$

We initially assume that the parameter λ takes a continuous set of values and consider the equation for the a posteriori probability density $\rho(\lambda | z_0^k)$ vector λ provided that there is a sequence of discrete values of the input process $z(iT)$ on the interval $0 \dots k$. Consider for this conditional distribution density $\rho(\lambda, z(k) | z_0^{k-1})$. Following [10, 88], you can write

$$\rho(\lambda | z_0^k) = H_1 \rho(\lambda | z_0^{k-1}) \rho(z(k) | z_0^{k-1}, \lambda), \quad (18)$$

where $\rho(z(k) | z_0^{k-1}, \lambda)$ is the probability density of formation at the time $t = kT$ reference of the input process $z(k)$, found under the condition that a sample of the input process was observed z_0^{k-1} and the vector of unknown message parameters is λ ; H_1 – constant independent of λ , which is determined from the condition of density normalization $\rho(\lambda | r_0^k)$:

$$H_1 = 1 / \int \rho(\lambda | z_0^{k-1}) \rho(z(k) | z_0^{k-1}, \lambda) d\lambda. \quad (19)$$

Conditional probability density $\rho(z(k) | z_0^{k-1}, \lambda)$ when observing a vector process (3.12) and measuring (3.13) is Gaussian [96, 98]

$$\rho(z(k) | z_0^{k-1}, \lambda) = \frac{1}{\sqrt{(2\pi)^m \det B}} \exp\left\{-\frac{1}{2}[z(k) - A]^T B^{-1}[z(k) - A]\right\} \quad (20)$$

where m is the dimension of the input process;

$$A = M[z(k) | z_0^{k-1}, \lambda] = H(\lambda)\theta_3(k) = H(\lambda)F(\lambda)\theta_o(k-1);$$

$$B = M\{[z(k) - A][z(k) - A]^T\} = R + H(\lambda)P_3(k, \lambda)H^T(\lambda);$$

$\theta_3(k)$ – extrapolated estimate of the state vector at the k -th moment; $\theta_o(k-1)$ is the optimal estimate of the state vector at the time instant $t = (k-1)T$, equal to the expectation of the posterior distribution of the message at that moment.

Expressions (18) – (20) allow us to sequentially calculate the distribution $\rho(\lambda | z_0^k)$ at each step of the time sampling [1]. In the transition to a discrete set of possible values of the vector λ relations (18), (19) are replaced by the expression for their a posteriori probabilities $P(\lambda_i)$

$$P(\lambda_i) = \rho(\lambda_i | z_0^k) = \frac{\rho(\lambda_i | z_0^{k-1}) \rho(z(k) | z_0^{k-1}, \lambda_i)}{\sum_{i=1}^M \rho(\lambda_i | z_0^{k-1}) \rho(z(k) | z_0^{k-1}, \lambda_i)}, \quad (21)$$

where probability density $\rho(z(k) | z_0^{k-1}, \lambda)$ is determined by expression (20) when $\lambda = \lambda_i$.

IV. Conclusion

The considered approach to the construction of adaptive filters is based on the separation method. The adaptive filtering procedure in the synthesized filter is divided into two

stages. In this case, at the first stage, state estimates are determined for fixed values λ_i and posterior probabilities $P(\lambda_i)$, and at the second stage, these estimates are averaged with a weight equal to probabilities $P(\lambda_i)$.

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IMPROVEMENT MEASUREMENTS OF ELECTROMAGNETIC FLOW METERS

Abstract. An article devoted to the concept of building electromagnetic microprocessor flow meters; takes into account the further development of electromagnetic parameters of flow measurement and increase the accuracy of such devices; the transition to a low-frequency pulsed power magnetic systems; studies of magnetic induction flow meters and the results of their operation; improvement of the automated calculation of the electromagnetic flow signal in the development of a unified device for calibrating instruments.

Keywords: electromagnetic flow meter, increase accuracy, sensor sensitivity, measuring unit, measuring electrodes, measuring signals, operational amplifiers, flow rates, A/D conversion, measured data filtering.

I. Introduction

Growing requirements for modern technologies and for resource saving, for environmentally friendly industries, and rising energy prices lead to the need for ever wider use of instruments with the best metrological parameters for measuring the flow of liquids and gaseous streams. These measuring devices are increasingly used to monitor technological parameters, the use of natural resources, internal production processes, and commercial purposes.

II. The problem

The complexity of the task of measuring the flow rate of gas-liquid flows is in the ambiguity of the aggregate state of the measured substance. If to take into account single-phase expenses it is enough to know only one quantity as the quantity of a substance flowing through a certain section per unit time [1], then in gas-liquid mixtures, such information does not give a complete quantitative picture of the flow. It is necessary to know the amount of consumption of each of the components, the ratio between them, etc. The ultimate goal of measuring any technological parameter is determined primarily by the tasks of a specific production, which, in turn, determines the requirements for measuring instruments.

Electromagnetic flow meters are becoming increasingly deserved distribution. A distinctive feature of electromagnetic flow meters is that they can be installed on pipelines of any diameter, ranging from 10 mm to 3000 mm. The given er-

ror of applied electromagnetic flow meters ranges from 0.1 to 2.0% [1]. The design of electromagnetic sensors has no moving parts. [2].

The flow meter does not contain parts that create resistance to flow. They are chemically resistant to almost any kind of liquid and are independent of the readings on viscosity, pressure, temperature, density or conductivity. A linear graded characteristic with an increase in the size of the device, its value does not grow as quickly as with other types of flow meters.

III. Solution

The proposed electromagnetic flow meter task of improving the accuracy is achieved by measuring the flow rate of the medium of a magnetic induction flow meter, containing a measuring tube installed in the line through which the flow flows, equipped with a grounding electrode for potential equalization. In the flow meter, the power is supplied by bipolar pulses with a pause frequency of 5 Hz. Powering the sensor with a bipolar flow, under other equal conditions, doubles the sensitivity of the sensor. Moreover, when using pulsed power, it becomes possible to significantly simplify both the electromagnetic sensor and the measuring circuit. This is due to the following reasons: [3]

- at steady state current in the inductor there is no transformer EMF;
- there is no phase shift caused by losses in steel, therefore, the inductor supply current is strictly proportional to the flow or induction in the air gap;

– significantly decreases the power consumed by the electromagnetic sensor, since the resistance of the windings with a pulsed power supply is significantly lower than with a sinusoidal voltage supply.

In addition, this sensor power allows for recovery mode, i.e. use the current in the inductor to form the opposite power pulse, which gives a significant reduction in electrical energy consumption.

The next feature of the inductor supply circuit is that it has a separate zero bus relative to the measuring electrodes. This feature allows you to get rid of two types of parasitic capacitances at once: parasitic capacitances between the electrodes and a grounded sensor housing and parasitic capacitances between the inductor and the corresponding electrodes, thus ensuring the possibility of obtaining the most accurate measurement signals without the inherent noise of the converter [4].

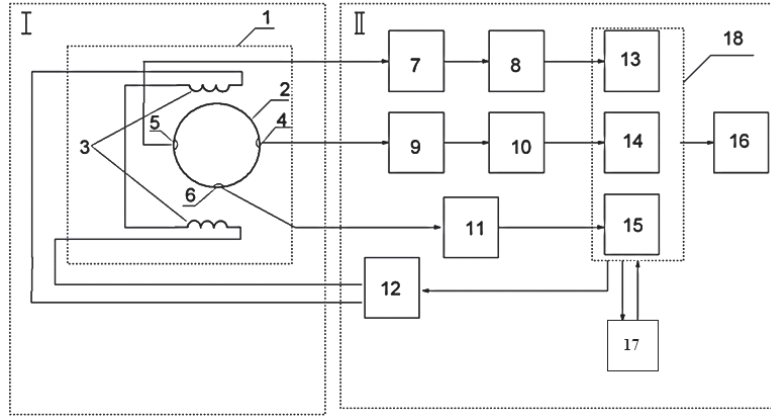


Figure 1 Block diagram of the electromagnetic flow meter

The proposed electromagnetic flow meter consists of a primary flow transducer (1) installed in the main pipe (2), with magnetization coils (3), measuring electrodes (4, 5, 6) [measuring unit, I], pre-amplifiers (7, 9), integrated amplifier (8, 10, 11), microcontroller (18), analog-digital converter modules (13, 14, 15), current driver (12), electronic display (16), computer (17) [electronic unit, II].

In the electronic unit II (Fig. 1), preamplifiers 7.9 convert the level of the electrode signal to a predetermined voltage level and provide a ready signal to the microcontroller 18 via amplifiers 8.10 to the medium flow rate measurement cycle. The microcontroller 18 starts the measurement cycle, consisting of the inclusion of a controlled current source 12 for a specified period of time [7]. Through the magnetizing coils, 3 of the block I, a rectangular current pulse is generated, creating a magnetic field in the measuring tube. The magnetic field interacts with the electrically conductive fluid flowing through the measuring tube and, in accordance with the Faraday law, induces an electric field in the liquid, which creates an emf. on the measuring electrodes 4, 5. Induced EMF between the electrodes 4, 5 together with the electrochemical and polarization potentials of these electrodes, relative to the electrode ground 6 potential equalization, is fed to the measuring inputs of operational amplifiers 7.9 of the electronic unit II. From the output of the operational amplifiers 7.9, the total signal of the amplified EMF and the differences of the electrochemical and polarization potentials of the electrodes is fed to the input of the integrating amplifiers 8.10 with a large integra-

tion time constant [6]. Operational amplifiers 7 and 8, form a high-pass filter (HPF), which compensates for the increased difference of the electrochemical and polarization potentials of the electrodes 4, 5 with respect to the ground electrode of the potential equalization 6 at infra-low frequencies. Integrating amplifier 8 amplifies the emf induced by electrodes 4 and 5, as well as the difference of electrochemical and polarized potentials between electrodes k_1 ($e_1 - e_2$) times (Fig 3d). The process of change in time of the electrochemical and polarization potentials of electrodes 4 and 5 is in the region of infra-low frequencies (tenths, hundredths of a Hertz) contains a high-frequency noise component and is shown in (Fig. 3). At the beginning of the measurement, the microcontroller 18 generates a sequence of control signals for the measurement unit, I (Fig. 1). The excitation coils 3 lie on the first diameter of the measuring tube 2. The excitation system serves, during operation, to create a magnetic field B penetrating the pipe wall and flowing medium. It occurs when the current I generated by the electronic unit 12 passes through the excitation coils 3 connected in this case in series excitation. From the controlled current source 12, rectangular current pulses of alternating polarity equal to the amplitude I_{max} and duration t_1 with intermediate off states are fed to the magnetization coils 3 (Fig. 3a). The time duration t_1 of the current pulses can be from 40 to 120 milliseconds. The off time must be more than 1 minute and is necessary for the relaxation of partial polarization arising on electrodes 4 and 5 in the measuring tube with a moving medium with a unidirectional low-frequency

pulsed magnetic field (only for liquids with ionic conductivity). Due to the presence of free charge carriers in the liquid, the polarization of the electrodes has a finite relaxation time. With the passage of a current pulse through the magnetization

coils 3, the amplitude of the induced electromotive force (e_1 , e_2) on the electrodes 4, 5 increases or decreases in proportion to the average flow velocity in the measuring channel of the flow meter (Fig. 3c).

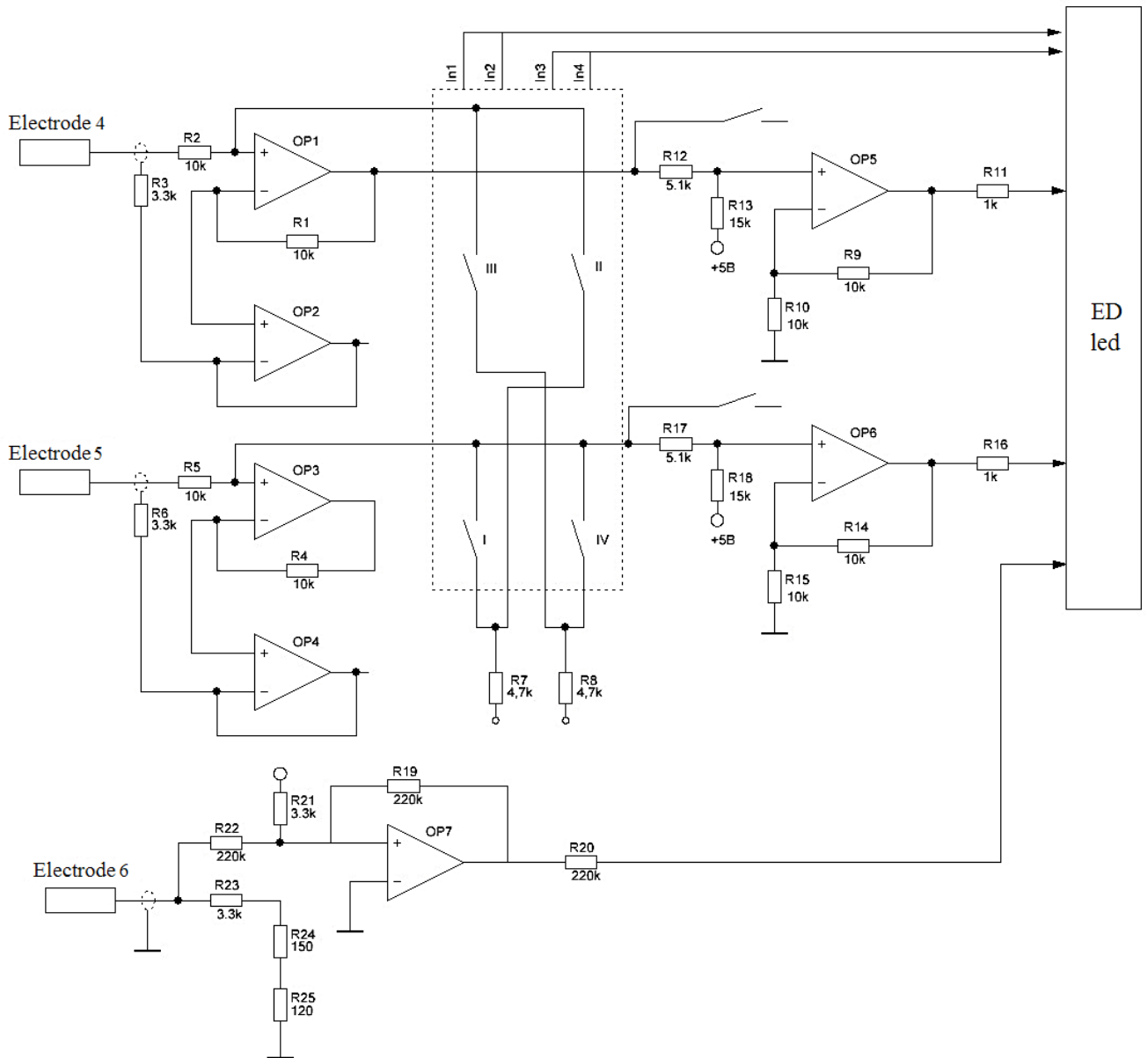


Figure 2. Functional diagram of the electronic unit of the flow meter

The front and rear edges of the magnetizing rectangular current pulse cause inductive-capacitive and noise high-frequency components of the EMF signal induced on the electrodes, and the process of establishing the magnetic field in the measuring tube (Fig. 3, time interval t_2) is accompanied by significant noise in a wide range of high frequencies. Depending on the average flow rate, the magnitude of the induced emf can be three orders of magnitude less than the electrochemical and polarization potentials of the electrodes [6].

From the output of the measuring unit I from the electrode 4, the signal enters the low-pass filter 10 (LPF) through the operational amplifier 9, which amplifies the measuring emf that is k_2 times the difference of the electrochemical and polarization potentials of the electrodes 4 and 5 at low frequencies and eliminates high-frequency noise. The signals filtered by high frequencies (Fig. 3e) are fed to the inputs of analog-digital converters 13, 14, 15 from the outputs of which the proportional signals are read by digital codes by the

microcontroller 18. The digital code of each ADC measurement (13, 14, 15) of the corresponding channels is recorded in the memory controller 18. The controller 18 summarizes the data by N measurements for step t1, and then step t2, determining the average data values obtained in each of the stages, respectively, thereby filtering the measured data from low-frequency and high-frequency noise [4].

Analog-to-digital conversion is performed by the method of double integration, i.e. by charging the integrator with voltages U_{in} and U_{op} (charging time is a multiple of the period of the mains voltage) and discharging it with the reference

voltage U_{ref} of the corresponding sign. The end of the discharge is fixed by the comparator, the control system generates a pulse, the duration of which is equal to the discharge time of the integrator and is proportional to the measured voltage. In the microcontroller, this duration is converted into a digital form, a fourfold calculation of the time interval corresponding to the input voltage, a single calculation of the time interval corresponding to the reference voltage and the division of the average value are performed. Such an algorithm allows reducing the influence of noise and external influence, as well as the instability of the inductor current [5].

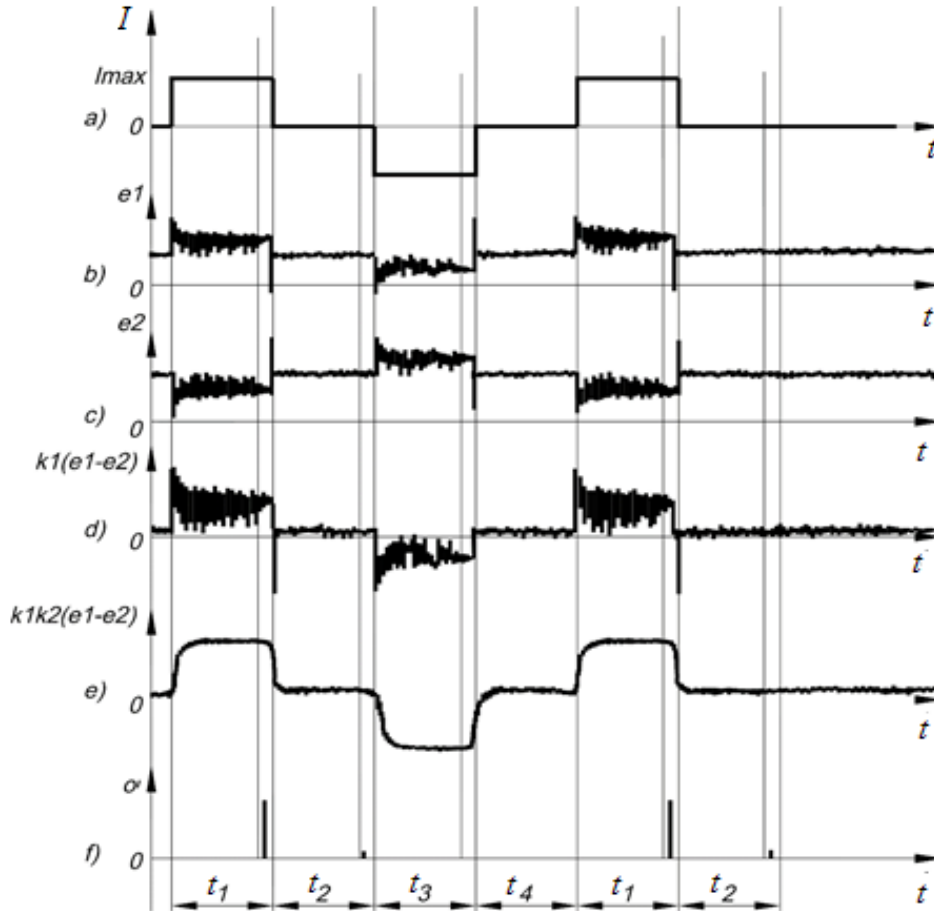


Figure 3. Timing diagrams of measuring signal changes

During direct integration, the integrator output voltage reaches

$$U_{out} = \frac{1}{\tau} \int_0^{int} U_{in}^+ dt \text{ or } U_{out} = \frac{1}{\tau} \int_0^{int} U_{op}^+ dt \quad (1)$$

The integrator discharge occurs when a reference voltage of opposite polarity is applied to its input. The time interval of the discharge lasts until the processing of the comparator. Wherein

$$U_{out} = \frac{1}{\tau} \int_0^{ms} U_{in}^- dt \text{ or } U_{out} = \frac{1}{\tau} \int_0^{op} U_{ms}^- dt \quad (2)$$

The value of the time interval of the discharge is proportional to the measured signal (U_{in} or U_{op}) and for the input signal can be written in the following form [7]

$$T_{ms}^+ = T_{int}' \frac{U_{in}^+}{U_{ref}^-} \quad (4)$$

$$T_{ms}^- = T_{int}' \frac{U_{in}^-}{U_{ref}^+} \quad (5)$$

U_{in} – the measured voltage at the input of the integrator (corresponding to positive and negative current supply pulses)

$$|U_{in}^+| = |U_{in}^-| = |e_{in}| K_{pa} \cdot E_{na}$$

e_{in} – voltage on the electrodes of the electromagnetic sensor; [5]

K_{pa}, E_{na} – respectively, the transfer coefficients of the preliminary and normalizing amplifiers;

T_{int} is the integration time of the input voltage. The total measurement time for one period of the input signal is

$$T_{ms} = T_{ms}^- + T_{ms}^+ = T_{int}' \left(\frac{U_{in}^+}{U_{ref}^-} + \frac{U_{in}^-}{U_{ref}^+} \right) \quad (6)$$

The measurement time of the voltage support signal has a similar appearance:

$$T_{sup} = T_{int}'' \frac{2e_{in} \cdot K_{pa} \cdot E_{na}}{U_{ref}} \quad (7)$$

where

$$|U^{+sup}| = |\bar{U}^{sup}| = |e_{sup}| K_{sup}$$

e_{sup} is the support voltage at the input of the SA;

K_{sup} is the gain of the support voltage amplifier; T_{int} is the time of direct integration of the reference voltage.

Taking into account the fact that $|U^{+ref}| = |\bar{U}^{ref}| = U_{ref}$, we can write:

$$\begin{aligned} T_{int}' &= T_{int}' \frac{2e_{in} \cdot K_{pa} \cdot E_{na}}{U_{ref}} \\ T_{sup} &= T_{int}'' \frac{2e_{in} \cdot K_{sup}}{U_{ref}} \end{aligned} \quad (8)$$

The result of the division is proportional to the ratio of the input signal to the reference signal, obtained in ED(led), has the form:

$$N = \frac{e_{in}}{e_{sup}} \cdot \frac{T_{int}'}{T_{int}''} \cdot \frac{K_{pa} \cdot K_{na}}{K_{sup}} \quad (9)$$

Thus, from the last expression, it follows that the accuracy conversion is determined by the accuracy and stability of the gain in the paths of the separate passage of the measured and reference voltages [3].

IV. Conclusion

In conclusion, we can draw the following conclusions that the advantage of this flow meter over other known analogs is as follows:

- the ability to filter from various kinds of interference;
- the ability to view the spectrum as the source data for processing, and not just the result;
- the ability to diagnose and obtain information through a computer;
- control over the position of the signal on the frequency scale to determine the output beyond the metrological range;
- devices with digital electronics and its connection to a computer make it possible to carry out remote diagnostics of the measurement process during operation without stopping the flow.

An additional advantage is the availability of feedback. It allows the device to monitor the integrity of its output circuits.

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SYNTHESIS OF NEW ANTICORROSION COATINGS BASED ON GOSSYPOL RESIN

Abstract. The article discusses the results of the study of the competitive anticorrosive coatings synthesis based on gossypol resin and phosphoric acid. The resistant modified anticorrosive coatings are presented as a result of the gossypol resin, 3-chloroxypropane, monoethanolamine and diethanolamine interaction. Synthesized anticorrosive compositions based on gossypol resin and 3-chloroxypropane, which mechanism is characterized not only by the barrier type of protection, but also by the acquisition of rust modifying properties with improved physical mechanical and technological indicators of high adhesive properties and aging resistance, as well as a wide temperature range of plasticity, increased heat and frost resistance have been obtained.

Keywords: gossypol resin, anticorrosion coatings, 3-chlor 1,2-oxypropane (ChOP), monoethanolamine (MEA), diethanolamine (DEA), urotropin, adhesion, range of plasticity, type of protection.

In connection with the need to improve production efficiency, there is a necessity to develop new technologies that ensure the integrated use of raw materials and the disposal of industrial waste, which, in turn, leads to preservation of raw materials and improvement of the ecological situation.

At present, the need of the Republic of Uzbekistan for anticorrosion materials is provided by import. Creating a technological basis for waste chemical processing in order to obtain import-substituting, anticorrosive commodity products for the needs of the country is relevant.

This paper proposes development of physicochemical and technological bases for the production of anticorrosive materials from waste oil industry.

On the basis of the experimental studies carried out using modern chemical and physicochemical methods, the corrosion rate was determined by the polarization resistance method on the corrosion rate meter P-5035.

It is established that as a result of the interaction of gossypol resin and 3-chloroxypropane (ChOP), monoethanolamine (MEA) and diethanolamine (DEA) stable modified anti-corrosion coatings are formed.

Synthesized anticorrosive compositions based on gossypol resin and 3-chloroxypropane (ChOP), which mechanism is characterized not only by the barrier type of protection, but also by acquiring the properties of corrosion modifiers, also have several advantages from the previous analogs:

- improved physical-mechanical and technological indicators;
- high adhesive properties and resistance to aging;
- wide temperature range of plasticity, high heat and cold resistance.

In the production of cottonseed oil and fatty acids, lots of secondary products and wastes such as gossypol resin and soapstock are generated. It is known that gossypol resin is an

aromatic compound with phenolic, hydroxyl groups and a carbonyl group in ortho position to a hydroxyl group.

In the gossypol resin, 12% of nitrogen-containing compounds, 36% of gossypol conversion products, which retained naphthol hydroxyls and 52% of fatty and oxyfatty acids in the form of lactones, have been found [1].

The above mentioned resin exhibits acidic properties as well as properties of phenolic and aldehyde compounds. The presence of phenolic, carboxyl, carbonyl functional groups allows modification of gossypol resin and converts it to a water-soluble state [2; 3; 4].

It is known that polyphenols, fatty acids, hydrocarbons, nitrogen- and phosphorus-containing compounds, as well as gossypol transformation products are present in the gossypol resin. The presence of naphthalene core compounds in its composition also makes the products of gossypol resin thermal, chemo- and radiation-resistant, and makes the presence of phenolic hydroxyls and aldehyde groups reactive with high complexing properties.

In many respects, it can successfully replace expensive anti-corrosion coatings, which deficit is felt every year. The preparation of anticorrosive materials on the basis of gossypol resin is associated with specific features and requires the search for certain conditions, as well as the use of non-traditional additives – modifiers [3].

In order to reduce costs and improve operational properties, an anticorrosion coating technology based on gossypol resin has been developed and introduced into production. Based on the use of cheap and affordable raw materials, the production of anticorrosion coatings has a high level of organi-

zation of technological processes and relatively high economic efficiency.

One of the advantages of the obtained bitumen anticorrosive composite materials is their versatility. In particular, by selection of appropriate modifiers and solvents improved anticorrosion coatings and paints can be obtained from them [4].

Today in domestic practice, there are over 100 different compositions for inhibiting the corrosion of steel. The disadvantages of the existing anticorrosion materials are their high cost and low accessibility, as well as the impossibility of their use to combat multi component salt and acid corrosion.

The use of readily-available gossypol resin and its modifications as the basis of the anticorrosion coating is due to the fact that it contains phenol, hydroxyl and carboxyl groups that interact with corrosion products and bind iron ions into complex compounds of chelate structure [3].

In connection with the foregoing, gossypol resin is an effective material against corrosion, provided that the appropriate solvents are selected, and another synergistic enhancing inhibitor. To solve this problem, we have used hexamethylenetetramine ($(\text{CH}_2)_6\text{N}_4$), monoethanolamine (MEA) and diethanolamine (DEA), which is one of the most well known representatives of acid corrosion inhibitors [4].

The fractionation study of gossypol resin, the identification of physical-chemical and mechanical characteristics have formed the basis for the development of sustainable anticorrosion compositions of a complex nature. Table 1 shows the main parameters of the influence of the molar ratio of reagents on the composition of the product upon receipt of a polymeric anticorrosion inhibitor.

Table 1. – The influence of the molar ratio of reagents on the inhibitor composition of the oligomer antioxidant ChOP ($T = 338^\circ\text{K}$, $t = 2 \text{ h}$)

Molar ratio: Gossypol: ChOP.	Output, %	Average mol.mass. (cryoscopic)	Element analysis, %			
			Carbon		Hydrogen	
			Calculated	Found	Calculated	Found
3:1	72.3	2380		68.1		4.8
2:1	87.7	3450		67.9		5.2
1:1	98.8	4860	69.1	68.8	5.7	5.1
1:2	85.6	3820		69.3		4.9
1:3	79.2	3340		69.2		4.5

The inhibitory corrosion composition preparation method based on gossypol resin, 3-chloroxypropane (ChOP) and HMTA, monoethanolamine (MEA) and diethanolamine (DEA) (compositions Mir K-1, Mir K-2, Mir K-3 and Mir K-4), which solves the problem of eliminating the disadvantages. A distinctive feature is that the gossypol resin components are available, the preparation technology and its use is simple. An intermediate complex the components can change

the nature of the interaction of the metal surface with the surrounding corrosive medium individually or together and thereby, enhance the protective effect of the inhibitors. This technique is of particular relevance for the corrosion protection of metal structures in contact with multi component media and acid solutions.

The optimal ratio of the composition components is defined. The corrosion behavior of the metal has been evalu-

ated by an electrochemical method in accordance with the standard CЭB 4421–83 on samples made of carbon steel (St. 3) 40 × 40 × 160 mm in size, without corrosive lesions (standard), with corrosive lesions (thickness of corrosion products from 150 to 300 microns). The corrosion behavior

of the samples has been evaluated by the nature of the anodic polarization curves. The obtained data have also been confirmed by the results of chemical analyzes. The rate of general corrosion has been estimated by weight loss per unit area per unit of time ($\text{g}/\text{m}^2 \times \text{h}10^{-3}$) (Table 2).

Table 2. – Test samples for corrosion resistance in the presence of anticorrosion coating based on gossypol resin

Inhibitor GS, ChOP, MEA	The difference in the sample mass, g (day)			Corrosion rate, $\text{g}/\text{m}^2 \times \text{h} 10^{-3}$ (day)			Protective effect, % (day)			The appearance of the sample after 90 days
	7	28	90	7	28	90	7	28	90	
Without processing	0.0105	0.0567	0.0696	44.4	56.16	22.08	–	–	–	High corrosion
91:2:0:2,0:4,5:0,5	0.0014	0.0067	0.0742	5.91	7.13	4.48	86.4	88.2	89.6	Medium corrosion
90:2:2,0:5,5:0,5	0.0010	0.0089	0.0013	4.03	9.22	4.35	90.6	94.3	90.1	Traces of corrosion
89:2:2,0:6,0:1,0	0.0001	0.0005	0.0009	0.41	0.46	0.29	99.0	99.2	98.2	Clean
88:2:2,0:6,5:1,5	0.0007	0.0008	0.0014	3.47	5.27	1.64	98.2	98.1	97.2	Traces of Corrosion
87:2:2,0:5,5:1,5	0.0014	0.0019	0.0025	5.1	7.35	3.19	97.2	96.5	95.5	Low Corrosion

The test results show that the composition of the Mir K system has the properties of reliable protection at concentrations of components, mass.%. Property evaluation of the composition as a rust converter modifier has been carried out based on GOST 6992–68 (Method for determination of weather-resistance of coatings) visually, according to an eight-

point scale. Coatings has been applied on unalloyed (a) and rusted (b) steel surfaces, about 1.0mm thick, resistance to the effects of distilled water and 3% solution № S.1 has been determined (Table 3). Weathering resistance has been measured in the atmosphere of the Aral Sea region, which has been considered to be a medium aggressive environment for two years.

Table 3. – The stability of the protective properties of coatings in time in points

№	The name of the test	Time, day	Coatings									
			1		2		3		4		5	
			a	б	a	б	a	б	a	б	a	б
1.	Resistance of coatings to static exposure to water at $T=20 \pm 2^\circ\text{C}$	3	1	2	2	1	2	1	1	2	3	2
		5	2	1	2	1	2	1	2	1	2	3
		7	2	1	2	1	2	1	2	1	3	2
		10	1	2	2	1	2	1	2	2	3	3
		14	1	1	1	1	1	1	2	1	3	3
2.	The resistance of coatings to the static effects of a № S1 solution $T=20 \pm 2^\circ\text{C}$	3	1	2	2	2	1	2	2	2	3	4
		5	1	1	2	2	1	2	1	2	3	4
		7	1	2	2	2	2	2	3	2	4	4
		10	2	2	2	2	2	2	2	2	3	4
3.	Resistance of coatings to atmospheric influences in the city	182	1	1	2	2	1	2	1	2	3	4
		365	1	1	2	2	1	2	1	2	4	4
		547	2	2	2	2	2	1	3	2	3	4
		730	2	1	2	2	3	2	3	3	4	4

The rate of general corrosion has been estimated on a ten-point scale: the first type corrosion rate < 0.001 mm/year (perfectly resistant), 2 – from 0.001 to 0.003 mm/year, 3 – from 0.003 to 0.01 mm/year (very resistant), 4 – from 0.01 to 0.03 mm/year, 5 – from 0.03 to 0.1 mm/year (resistant), etc.(with each point, the corrosion rate increases by about 3 times).The 10th mark corresponds to a corrosion rate greater than 10 mm/year (non-resistant).

All obtained coatings are characterized by 1–2 points with water resistance up to 14 days, resistance to 3% solution No. S1 to 10 days, and weather resistance up to two years. For coating No. 5, salt resistance is characterized by at least 120 hours, but water resistance up to 14 days and salt resistance up to 7 days have been practically observed.

In all cases, the coating durability was studied when applied to a rusty surface. At the same time, it should be noted that on

samples of coatings deposited on rusty surfaces and tested in atmospheric conditions in accordance with the allotted time of the experiments, no partial rust clearing has been observed.

Probably, there was a modification of rust, due to the formation of carbon compounds, due to which, on a rusty surface, pre-treated with developed coatings, it is possible to

apply paintwork material, which is the main positive feature of the coating as a rust modifier.

The physical-mechanical indicators of anticorrosion coatings based on gossypol resin, calcium oxide, zinc oxide, phosphoric acid and hexamethylenetetramine are shown in (table 4).

Table 4. – Physical and mechanical properties of anticorrosion coatings based gossypol resin

№	The name of indicators	Norm of indicators
1.	Colour	From light brown to brown
2.	Appearance	Tar-like
3.	Smell	Specific
4.	Flashpoint, °C	315, without solvent
		On with “Nefras” solvent
5.	The adhesion strength metal shear (adhesion), МПа, not less	4.0
6.	Impact resistance, N·m, not less	1.9
7.	Bend, mm, not more	7.0
8.	The interval of ambient temperature during application, °C	4–45
9.	Hydrogen ion index(pH)	5.6–6.1
10.	Crystallization temperature, °C	Minus 40
11.	Hiding power, g/m ² , not more	100,0
12.	Water absorption,%, not more	0.1
13.	Drying time, h, not more	24
14.	Expected protection period, days, in atmospheric conditions, not less	1000,0
15.	Time of complete formation of the protective layer, days, not more	4–5

Based on the analysis of data (table 4) it can be stated that the obtained coatings meet the requirements for anticorrosion coatings by their basic indicators. For example, fast drying time, impact strength, bending elasticity, high adhesion, and the possibility of applying a paint and varnish material on these coatings.

Resumed on the foregoing, it can be considered that, due to its specific property, the interaction products of gossypol's

resin with other inhibitors can form a thin, stable anticorrosive coating with the carbon steel surface.

Thus, on the basis of the multi-tonnage waste of the fat-and-oil industry – gossypol resin can be easily used as new raw material for the production of anticorrosive polymer composite materials. Coatings have been tested with a positive result in conditions of high salinity at “Mubarekneftegaz” LLC.

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ASSESSMENT OF LEAD (Pb) CONCENTRATION IN COASTAL WATERS OF VLORA, ALBANIA, USING FLAME ATOMIC ABSORPTION SPECTROMETRY

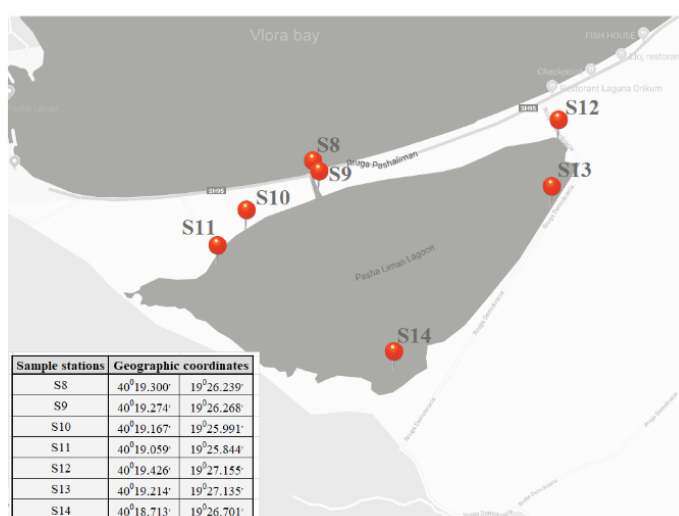
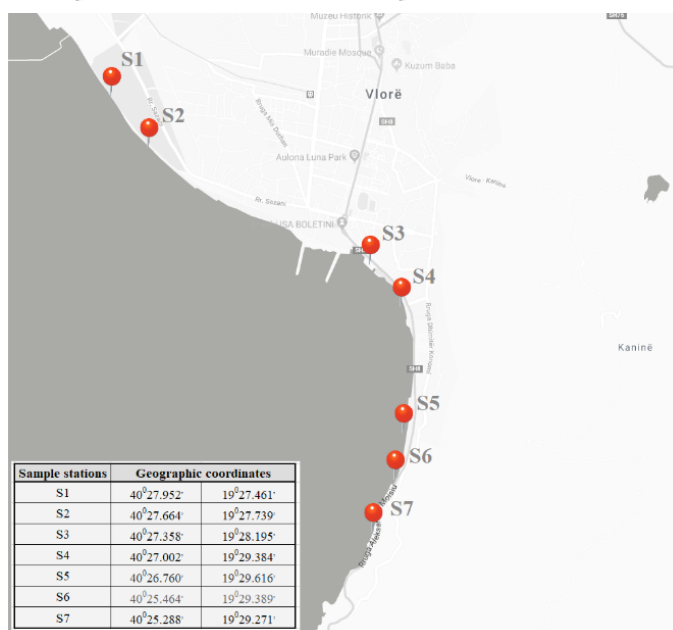
Abstract. The research has been focused in assessment of the Pb concentration levels in coastal area of Vlora by using Flame Atomic Absorption Spectrometry. Water samples were collected in seven stations on three different depth levels, –10cm, –60cm and –120 cm of water column where the values of Pb concentrations were up to $0.17\mu\text{g/L}$. All these results reflect the increase in human and industrial activities in the area, and the concentration and distribution of the metal in this study, is influenced by the direction of coastal winds and currents that carry them from the coastal industries of the area.

Keywords: Pb concentration, pollution, FAAS, seawater samples.

1. Introduction

Coastal areas of Vlora are heavily affected by urbanization, industrialization, and maritime activities [1, 2–6]. One consequence of this environmental pressure is the contami-

nants accumulation, as heavy metals, into the marine ecosystem. In this paper, the coastal areas were assessed for lead (Pb) contamination, one of the most toxic metals found in the environment.



a) b)
Figure 1. Sampling stations: a) in sea water, b) in lagoon water

Lead and its compounds, if are present in aquatic environments over the permitted levels, can cause acute or chronic toxicity to organisms [2, 1–2]. However, the concentration levels are determined by bioavailability factors such as water chemistry, solubility, salinity and organic matter content. Lead enters the aquatic environment through precipitation, lead dust fallout, erosion and leaching of soil, municipal and industrial waste discharges and the runoff of fallout deposits from streets and surfaces [3, 117–118], [4, 473–483]. Due to the poor solubility of most lead compounds in water, much of the lead entering marine systems via precipitation and runoff will be removed by sedimentation [5, 855–858].

The fate of lead in the water column is determined by the chemical and physical properties of the water, such as acidity or alkalinity (pH), salinity, oxidation status, flow rate, suspended sediment and inorganic and organic matter [6, 6–7]. The pH of water is of primary importance in determining the likely chemical fate of lead in terms of solubility, precipitation or organic complexation. The influence of water chemistry is very important as it not only affects the chemical form (speciation) of lead, but also its availability and toxicity to aquatic organisms [7, 1310–1315].

Measurements of Pb concentrations in Albanian coastal area are relatively limited only in few parts of the coast. In this study we represent a pattern of Pb concentrations in the main part of coastal region of Vlora.

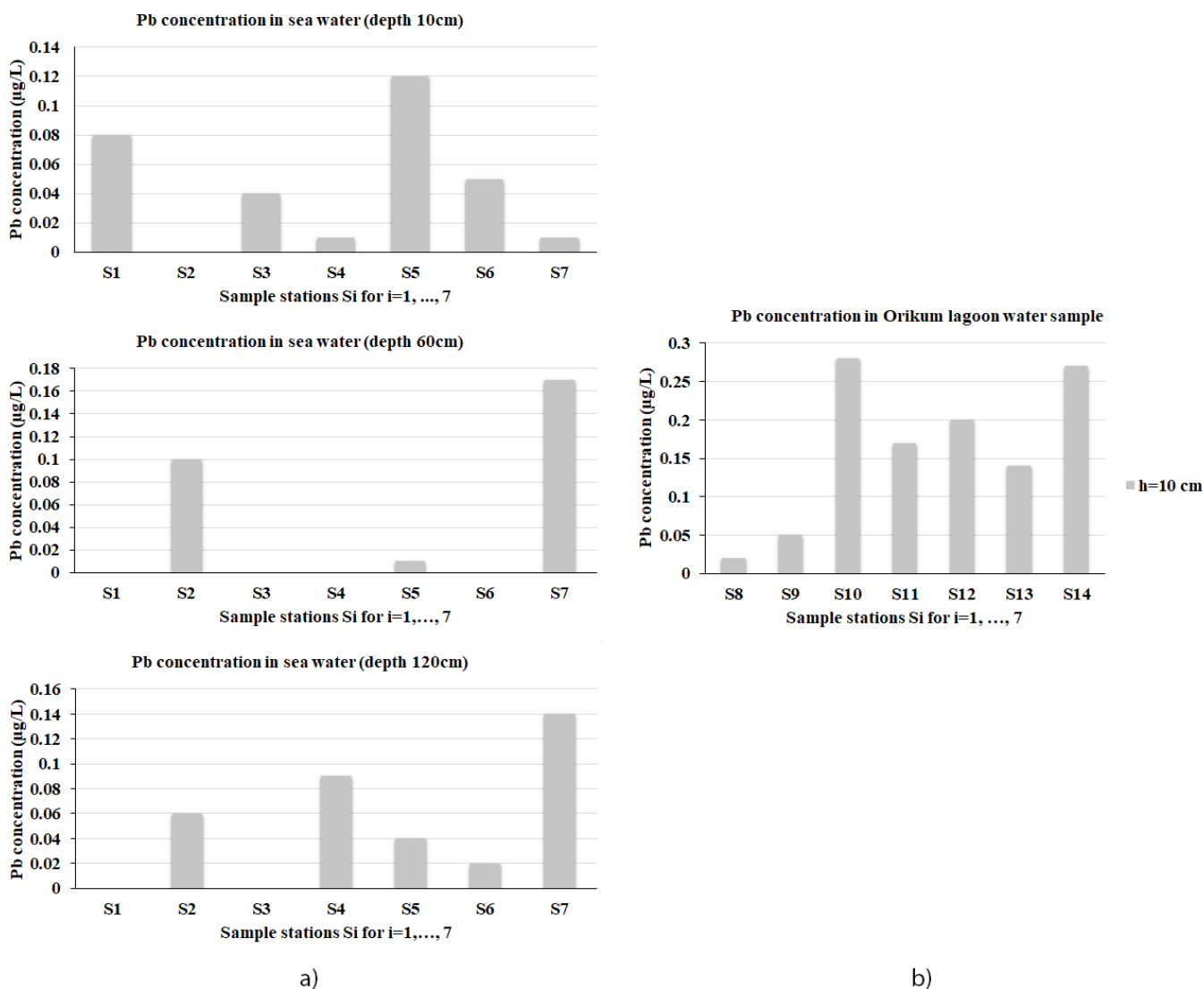


Figure 2. Pb concentration (µg/L): a) in sea water sampling stations and b) in lagoon water sampling stations

2. Method and data analysis

Generalized method of sampler preparation and treatment are considered especially in the guide of the field of re-

search [8, 4–7]. From geographic point of view, we schematized the stations corresponds to that part of Vlora bay most affected by human activity. Along the coast line we chose seven

sampling stations positioned on the most populated areas (see Figure 1a). We realized another set of measurement in Orikum Laguna situated close to a military base (see figure 1b).

The measurements were realized in calm water during the springtime. The stations were located at distance 50 m from the coastline and samplers are taken in three vertical levels of water column: -10cm, -60 cm and -120cm respectively. The idea behind this measurement was to get known about direct surface situation where atmospheric or low discharges would be dominant factor and how this affects the waters along the column. Practically a good level of homogenization was reached by taking samplers with a horizontal Van Dorn Water Sample. After

that, the samples were treated according to EPA3015A procedure (Microwave Assisted Acid Digestion of Aqueous Samples and Extracts) [9, 10–15]. The assessments of Pb concentration in all samples were conducted by ContrAA300 instrument by using Flame Atomic Absorption Spectrometry technique. The accuracy was of the ppm range [10, 4–5].

3. Results and discussions

Figures 2a and 2b shows the results of the concentrations of Pb ($\mu\text{g/L}$), for sea and lagoon's waters samples.

In table 1 and 2 are presented a descriptive statistical analysis of the obtained data respectively for sea and lagoons water samples.

Table 1. – Descriptive statistical analysis of data in sea water

Depths	Statistical parameters					
	Mean	Stand. Dev.	Kurtosis	Skewness	Min.	Max.
10 cm	0.044	0.044	-0.06	0.883	0	0.12
60 cm	0.04	0.068	1.331	1.576	0	0.17
90 cm	0.05	0.051	0.085	0.891	0	0.14

Table 2. – Descriptive statistical analysis of data in lagoons water

Depths	Statistical parameters					
	Mean	Stand. Dev.	Kurtosis	Skewness	Min.	Max.
10 cm	0.16	0.1	-1.27	0.28	0.02	0.28

The levels of concentration of Pb are resulting with heterogeneous distribution. According to all the data of the sea water, (see table1) it is noticed an increasing trend toward S7 station, which in our classification is in the south area. Are presented five fringes of concentrations of average width of $0.05\mu\text{g/L}$, where the most probable concentrations are in $0.05\mu\text{g/L}$ and $0.155\mu\text{g/L}$. According to all the data of the lagoons water (see table 2), it is noticed a higher concentration in S10 and S14 sampling stations. These values a supposed to be influenced by a high anthropogenic activity at these stations.

4. Conclusions

In obtained data it isn't noticed any kind of derivation from a quasi or normal distribution. We can state the same for the entire water column studied.

By grouping all the sampling stations in two major groups from 1–7 and 8–14, we can identify some traces of a regular pattern, so it is better to practice the group analyses.

Since the data do not have any representative in the statistical meaning, we refer to the arithmetical values. In the case of stations S8-S14 the deviation coefficient is around 62.5%, a very high value, even though these stations has contributed more than others in the mean value due to the high value of magnitude at these stations.

Regarding the sea water sampling stations, the calculations of arithmetical coefficient of deviance show again a high heterogeneity so the mean values cannot be representative because the deviance coefficient is around 100%.

If the contamination derives from the superficial layers and goes down than the upper layers can be considered as uniform sources.

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QUADRUPLE MAGNETOPOLARONS IN MAGNETOOPTICS OF A QUANTUM-DIMENSIONAL NANOSTRUCTURES

Abstract. A theory of interband magneto-optical light absorption in a nano-dimensional quantum well in a strong magnetic field conditioned by interaction of electrons with optical phonons was developed. We investigated a behavior of magneto-optical peaks corresponded to transitions of electrons from Landau levels with quantum numbers $n \geq 3$ in the region of magnetic fields that satisfy the condition of equality of the electron cyclotron frequency in the conduction band to the frequency of longitudinal optical phonon. For $n = 3$ in a point of resonance there is an intersection of four terms of the electron-phonon system (electron on Landau level $n = 3$, electron on the level $n = 2$ and one optical phonon, electron on the level $n = 1$ and two phonons, and electron on the level $n = 0$ and three phonons), which are considered to be a function of the cyclotron frequency of electron. Interaction with phonons removes a degeneracy of the terms, and leads to appearance of four non-intersected branches of electron-phonon spectrum. Accordingly, a magneto-optical peak splits into four peaks. Equations to describe a frequency dependence of a position and intensity of peaks on the magnetic field are presented.

Keywords: interband, magneto-optical, absorption, quantum well, magnetic field, electrons, Landau levels, cyclotron frequency, optical phonons, the electron-phonon system, peak splits, equations, magnetopolaron effect, semiconductor materials.

After pioneer works by Johnson and Larsen [1] a magnetopolaron effect (Johnson-Larsen effect) attracts significant attention of both theoretical [2] and experimental [3] studies.

Polaron states can be formed both in three-dimensional (3D) [1], and quasi-two-dimensional (2D) systems [4–7]. A difference between the systems is in spectra of an electron in the presence of a quantizing magnetic field: in 3D-system these are single-dimensional Landau zones, in 2D-system these are discrete Landau levels. This difference leads to different magnitude of a repulsion of levels of the electron-phonon system.

In [3] Korovin and Pavlov showed that in a case of a bulk semiconductor (3D) a magneto-polaronic split is proportional to $\eta^{2/3} \hbar \omega_0$, where ω_0 – is cutoff frequency of longitudinal optical phonons.

In 2D-systems this effect is stronger, and a distance between the peak split components becomes proportional to $\eta^{1/2} \hbar \omega_0$ [4–7].

In 3D and 2D –systems the magnetopolaron states play important role in formation of a frequency dependence of magneto-optical effects, such as interband light absorption,

[1; 7], cyclotron resonance [3; 4; 8], and Raman scattering [9].

As it was shown in [10], when the following condition is valid

$$\omega_0 = j\omega_{e(h)H}, \quad (1)$$

where

$$\omega_{e(h)H} = \frac{|e|H}{c \cdot m_{e(h)}} \quad (2)$$

where $\omega_{e(h)H}$ – is a cyclotron frequency, c – light speed in a vacuum, $|e|$ – is charge of the electron, H – isa magnetic field strength, $m_{e(h)}$ – is an effective mass of electron (hole), j – is a number. The value $j = 1$ is corresponding to a double polaron noted in [10] by A letter. The value $j = 2$, i.e. $\omega_H / \omega_0 = 1/2$ is corresponded by two double polarons. The value $j = 3$, i.e. $\omega_H / \omega_0 = 1/3$, is corresponded by three double polarons, etc.

Above double polarons there are triple polarons that correspond to intersection of three terms. Quadruple polarons are located above the triple ones, etc. Number of polarons of each type at a given j is equal to j .

Quadruple and higher polarons has not been considered yet.

This work is devoted to theoretical study of the energy spectrum of the quadruple magnetopolaron, and an influence of the spectrum on formation of the frequency dependence of magneto-optical effects in a rectangular quantum well in a strong magnetic field directed perpendicularly to the well's plane.

As a 2D-system below we consider a single quantum well. In the magnetic field directed normally to its interface the energy levels in the well become discrete ones (with infinite multiple degeneracy), and their classification depends on the ratio of the energy in the well and the cyclotron energy. Below we assume that the energy of quantization in the well is high with respect to cyclotron one and we take into account only lowest level with adjacent Landau levels.

We assume that the valence band (\mathbf{v}) and the conduction band (\mathbf{c}) are situated in the center of Brillouin zone, and a direct dipole transition is between them. Interaction with LO-phonons, which determines in our case the split of peaks, we assume to be weak. In many semiconductors the condition $m_e/m_h \ll 1$ is valid. We consider an interband optical transition, as a result of which there appears an electron in the quantum well of the conduction band and a hole in the valence band on Landau level (we neglect a possibility of formation of

exciton states). If temperature is low, and the magnetic field is close to the resonant one (see Eq.1), then the hole states will be standard in frames of the chosen mechanism of interaction, since the hole cannot really emit LO-phonon due to energy insufficiency. The hole cannot absorb phonons due to their absence. The electron in such conditions can really emit LO-phonon and to go from the level with quantum number n to the level with quantum number $n-1$.

The absorption will be characterized by a rate of absorbed energy [11]

$$W = W_0 \omega_{eH} \sum_{\alpha} \text{Re} i G_r(\alpha, \omega - \omega_{h\alpha}) \quad (3)$$

Where $G_r(\alpha, \varepsilon) = [\varepsilon - \omega_{\alpha\alpha} - \Sigma(\alpha, \varepsilon) + i\delta]^{-1}$; $\delta \rightarrow +0$ (4) is a one-particle retarded Green function of electron,

$$\omega_{\alpha\alpha} = \omega_{eH} \left(n_{\alpha} + \frac{1}{2} \right) + (\varepsilon_{e0} / \hbar),$$

$$\omega_{h\alpha} = (E_g / \hbar) + \omega_{hH} \left(n_{\alpha} + \frac{1}{2} \right) + (\varepsilon_{h0} / \hbar), \quad (5)$$

$$W_0 = \left[8\sqrt{\varepsilon_p} / (\sqrt{\varepsilon_p} + \sqrt{\varepsilon_l})^2 \right] (e^2 / c\hbar) \left(|P_{cv}^y|^2 / m_0 E_g \right) (m_e / m_0) \quad (6)$$

Here P_{cv}^y – is an interband matrix momentum element calculated from Bloch modulating factors, E_g – is a value of band gap, $\varepsilon_{p(l)}$ – is statistical dielectric permittivity of semiconductor (dielectric), $\varepsilon_{e(h)0} = \pi^2 \hbar^2 / 2m_{e(h)} d^2$ – is the energy of $l = 1$ dimensionally-quantized level in the quantum well.

Functions $\Sigma(\alpha, \varepsilon)$ in (4) can be easily calculated by using the Feynman diagram technique. The rules are standard ones.

We'll start from the energy part of $\Sigma(\alpha, \varepsilon)$ equal to

$$\Sigma(\alpha, \varepsilon) = \sum_{\tilde{q}} \sum_{\alpha_1} \hbar^{-2} |C_{\tilde{q}}|^2 |J_{\alpha\alpha_1}(\tilde{q})|^2 (\varepsilon - \omega_0 - \omega_{\alpha\alpha_1} + i\delta)^{-1} \quad (7)$$

In case of electron transition to Landau level with $n = 3$, in the sum by n_{α_1} a resonant will a summand with $n_{\alpha_1} = 2$ since it corresponds to a real resonant transition between neighboring Landau levels. Assuming $n_{\alpha} = 3$, $n_{\alpha_1} = 2$ we will have for the resonant summand

$$\Sigma(3, \varepsilon) = \omega_0 C (\gamma + \lambda + i\delta)^{-1}, \quad \eta = \frac{\alpha_0}{2} \left(\frac{\dot{E}_{eH}}{\dot{E}_0} \right)^{1/2} \quad (8)$$

$$\gamma = (\varepsilon - \omega_{eH3}) / \omega_0,$$

$$C = \frac{1}{3} \int_0^{\infty} du \sqrt{u} e^{-u} \left(3 - 3u + \frac{1}{2} u^2 \right)^2, \quad \lambda = (\omega_{eH} - \omega_0) / \omega_0. \quad (9)$$

To find out a picture qualitatively we neglect firstly the graphs containing apical parts. In this case it's enough to take into account a series of graphs presented in (Fig. 1).

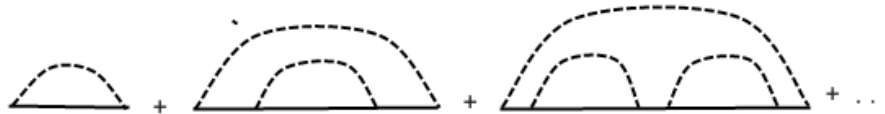


Figure 1. A series of graphs that leads to equation (10)

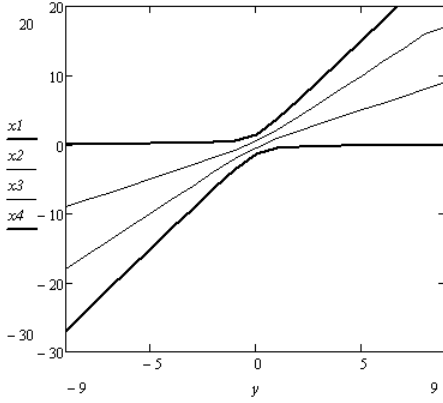


Figure 2. The spectrum of electron with taking into account its interaction with optical phonons versus external magnetic field

Non-resonant members in all graphs are neglected since they are small in comparison with resonant ones. In this case a summation the series in (Fig. 3) leads to equation

$$\gamma - \frac{C\eta}{\gamma + \lambda - \frac{B\eta}{\gamma + 2\lambda - \frac{A\eta}{\gamma + 3\lambda}}} = 0, \quad (10)$$

$$\text{where } A = \sqrt{\pi}/2, B = (7\sqrt{\pi}/16), C = (51\sqrt{\pi}/128). \quad (11)$$

The equation can be written in the form

$$x^4 + 6yx^3 + [11y^2 - (A+B+C)]x^2 + [6y^2 - (A+3B+5C)]yx - 6Cy^2 + A \cdot C = 0 \quad (12)$$

$$\frac{W}{W_0 \pi \left(\frac{w_{eH}}{w_{LO}} \right)} = \frac{\sum_{i=1}^4 \left\{ \Gamma_i^3 + 6\lambda \Gamma_i^2 + [\lambda^2 - (A+B)\eta] \Gamma_i + \lambda [6\lambda^2 - (A+3B)\eta] \right\}}{\left\{ 4\Gamma_i^3 + 18\lambda \Gamma_i^2 + 2[\lambda^2 - (A+B+C)\eta] \Gamma_i + \lambda [6\lambda^2 - (A+3B+5C)\eta] \right\}} \times \delta \left\{ \Gamma^4 + 6\Gamma^3 + [\lambda^2 - (A+B+C)\eta] \Gamma^2 + \lambda [6\lambda^2 - (A+3B+5C)\eta] \Gamma - 6C\Gamma^2\eta + AC\eta^2 \right\} \quad (15)$$

By substitution of A, B and C from (11) into (15) we have that peaks are situated at $\Gamma_1 = -1.44\sqrt{\eta}$, $\Gamma_2 = -0.55\sqrt{\eta}$, $\Gamma_3 = 0.55\sqrt{\eta}$, $\Gamma_4 = 1.44\sqrt{\eta}$, the magnitudes of peak intensity are $I_1^o = I_4^o = 0.068$ and $I_2^c = I_3^c = 1.18$ and middle peaks are 17 times more intensive than lateral peaks. A distance between lateral peaks is $2.88\sqrt{\eta}$, between middle peaks it is $1.1\sqrt{\eta}$, and the distance between lateral and middle peaks is $0.89\sqrt{\eta}$.

At $\lambda = \sqrt{\eta}$, intensities of peaks are, consequently, $I_1 = 0.002$, $I_2 = 0.0079$, $I_3 = 0.2799$ and $I_4 = 0.6534$. Their positions are: $\Gamma_1 = -3.66\sqrt{\eta}$, $\Gamma_2 = -2.083\sqrt{\eta}$, $\Gamma_3 = -0.83\sqrt{\eta}$ and $\Gamma_4 = 0.57\sqrt{\eta}$.

At $\lambda = 2\sqrt{\eta}$ integral intensities of peaks are, consequently, $I_1 = 0.002$, $I_2 = 0.0058$, $I_3 = 0.0769$ and $I_4 = 0.9292$. Positions of peaks: $\Gamma_1 = -9.3\sqrt{\eta}$, $\Gamma_2 = -6\sqrt{\eta}$, $\Gamma_3 = -3\sqrt{\eta}$ and $\Gamma_4 = 0.23\sqrt{\eta}$.

$$\text{where } x = (\gamma / \sqrt{\eta}), \gamma = (\lambda / \sqrt{\eta}) \quad (12a)$$

When $\lambda = 0$ (resonant case, $\omega_{eH} = \omega_0$) roots of (12) will be:

$$\gamma_1 = 1.44\sqrt{\eta}, \gamma_2 = 0.55\sqrt{\eta}, \gamma_3 = -0.55\sqrt{\eta}, \gamma_4 = -1.44\sqrt{\eta} \quad (13)$$

The spectrum of electron-phonon system versus magnetic field is presented in (Fig. 2).

Four terms of electron-phonon system, which in the absence of interaction are intersected in the point $\omega_{eH} = \omega_0$, after account of electron-phonon interaction is split, according to results of Section 2, into four branches of electron-phonon spectrum. A peak of magneto-optical absorption, corresponding to a throw of electron by light to Landau level with quantum number $n = 3$, is also split at $\omega_{eH} = \omega_0$ into four δ -like peaks. The absorption at $\omega_{eH} = \omega_0$ will be determined by four branches of electron-phonon spectrum in conduction band, since holes do not contribute to nonstationarity of levels when condition $(m_e / m_h) \ll 1$ is valid. We calculate the absorption as a function of light frequency in the region of the studied peak by neglecting small contribution from apical parts. Be taking into account (3), (4) and (10), as well as inequality of effective masses, we have

$$W = W_0 \pi \left(\frac{\omega_{eH}}{\omega_{LO}} \right) \delta \left[\frac{\Gamma - \frac{C\eta}{\Gamma + \lambda - \frac{B\eta}{\Gamma + 2\lambda - \frac{A\eta}{\Gamma + 3\lambda}}}}{\Gamma + \lambda - \frac{B\eta}{\Gamma + 2\lambda - \frac{A\eta}{\Gamma + 3\lambda}}} \right], \quad (14)$$

$$\Gamma = \left(\omega - \omega_g - \omega_{oc} - \frac{7}{2} \omega_{eH} \right) / \omega_0.$$

By using properties of δ -function from (14) we have

When $\lambda = 6\sqrt{\eta}$ the peaks are shifted towards smaller frequencies of the exciting light. Intensity of the very right peak is $I_1 = 0.98$, and, further to the left, the magnitudes of peak intensity are $I_2 = 0.02$, $I_3 = 0.0016$, $I_4 = 0.424 \cdot 10^{-3}$. Positions of peaks are $\Gamma_1 = -18\sqrt{\eta}$, $\Gamma_2 = -12\sqrt{\eta}$, $\Gamma_3 = -6\sqrt{\eta}$, $\Gamma_4 = 0.01\sqrt{\eta}$.

At $\lambda = -6\sqrt{\eta}$ the picture becomes inverse.

Thus, at $\lambda > 0$ with rising λ the peaks shift towards low-frequency region and the intensities of left peaks is decreased, while the intensity of very right peak increases. At $\lambda \gg 1$ there is only one last peak. At $\lambda < 0$ the picture is inverse, i.e. peaks are shifted towards high-frequency region, the intensity of the first peak increases and the intensity of other peaks decreases. Only one peak remains at $|\lambda| \gg 1$.

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Section 13. Philosophy

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DEMOCRACY AND YOUTH: FORMATION OF DEMOCRATIC VALUES

Abstract. For the sake of prosperity and prosperity of the country in the first years of independence, first of all, the upbringing of comprehensively developed, comprehensively developed, comprehensively advanced generation, not only physical and spiritual wellbeing of our children, but also their most contemporary intellectual knowledge and a comprehensively advanced generation that meets the requirements of the 21st century it is not accidental that it is one of the most pressing issues to date.

Keywords: Unorganized youth, youth, youth, organized youth, youth problem, life strategy.

The modern requirements for the modernization and reform of our country, modernization and renewal of our country, and the need to find and implement effective ways and methods of consistent implementation of the state youth policy are growing. President of the Republic of Uzbekistan Shavkat Mirziyoev “It is well known that the upbringing of the younger generation has always been important and important. But in the twenty-first century of our existence, this issue is really a matter of life and death” [1]. Expresses the essence and meaning of this process.

In this sense, for the sake of prosperity and prosperity of the country in the first years of independence, first of all, the upbringing of harmoniously developed, intellectually developed comprehensively advanced generation, not only physical and spiritual wellbeing of our children, but also their most contemporary intellectual knowledge and a comprehensively advanced generation that meets the requirements of the 21st century it is not accidental that maternal mortality is one of the most pressing issues.

In this period, the further activation of the youth factor and the broadening of its potential are the guarantees of achievement of the desired goals in achievement of the efficiency of the creative work initiated on consistent implementation of the state youth policy. The following opinion of the head of state, Shavkat Mirziyoev, undoubtedly plays a crucial role in determining the main criteria for addressing this pressing problem: “Today, the age-old process of improving the effectiveness of our efforts to promote legal culture, healthy lifestyle, physical education and sport among our young people is in demand. Implementation of the measures outlined in

these programs will be continued on the basis of the recently adopted norms of the newly adopted Law “On Youth Policy.”

A natural question arises at this point. We accept many programs, but are they sufficient, initiative and patriot, highly qualified personnel? Are higher education specialists capable of performing such vast tasks? Is the knowledge and skills of teachers and professors trained to meet these requirements? Unfortunately, it is difficult to answer these questions [2].

This conclusion, reflecting the fact of extreme and real-life, is once again reflecting on the main criteria, common aspects and peculiarities of the current state youth policy, identifying ways to use it effectively, and inextricably linked with the development of the younger generation and the effectiveness of democratic reforms and emphasize the urgent need to pay more attention to the issues being addressed.

It is also important to study the world experience and master the achievements of the advanced countries of the world. As you know, the emergence of special youth policy and youth policy throughout the world began in the middle of the last century after the Second World War. It was during that time that the two world wars of the terrible World War began to more clearly perceive their future, the future of civilization, the future of civilizations with young people, and many intellectuals, scientists and specialists were focused on this issue.

In the last quarter of the twentieth century, in many developed countries, youth policy has become the focus of independent action, and international documents have been adopted that define universal trends and priorities. In particular, the resolution “On the Basic Principles of Effective Youth Policy Formulation” adopted by the UN General Assembly

in 1985 is a clear example of this process. The adoption of this document, which is essential for the implementation of the youth policy in line with the national interests and development principles of the countries of the world, and the adoption of the most common international norms, laid the basis for its application at the national level, and secondly, this process is of utmost importance for the development of universal civilization. it can be said.

At the same time, Uzbekistan has become an integral part of the government's policy, with the emergence of a new attitude towards the young people all over the world, with independence and achievement of all spheres of life. Taking into account the requirements of the time, a special attention was paid to the youth problem in our country and the creation of wide opportunities to meet their interests and needs. From the first days of our country's independence, on November 20, 1991, it was the first among the former Soviet republics to adopt the Law "On the Fundamentals of Youth Policy in the Republic of Uzbekistan".

In this regard, it should be noted that the Constitution of the Republic of Uzbekistan adopted in 1992 is an important step in this direction. In addition to the Basic Law, the Family Code, the National Program for Personnel Training, the Law on Guarantees of the Rights of the Child, on Education, on Employment, on Physical Training and Sports, "On guardianship and prevention", "On guardianship and sponsorship", in turn, create a solid foundation for the formation and realization of state policy in this field in the independent Uzbekistan in the first years of independence has proven again.

This, in turn, has become one of the pressing issues today, to thoroughly study the process of becoming a solid foundation for the emergence of a new generation of young people with a new world of thought and democratic thinking, summarizing their findings and summarizing their experiences.

It is also crucial to thoroughly and thoroughly analyze the issues related to the successful implementation of the Law of the Republic of Uzbekistan "On Education" and the National Program of Personnel Training in implementing effective ways and methods of consistent implementation of the state youth policy in the country. It plays a crucial role.

State policy on youth has always been based on the urgent issues of the time and the essence of the problems of social development. The head of the Republic of Uzbekistan, speaking on the issues of youth, emphasized the importance of raising a healthy generation for the development of the state, the need to create favorable socio-economic opportunities for social development and development of young people, the criteria of upbringing of universal and national values in the youth, preservation of the independence of the country, mobilization of youth power and potential for further advancement of

the state, the sacred duty on the way, the organization of the necessary infrastructure to engage in sports, the glorification of the country's potential and power all around the world. focused on the training. They have identified the main criteria, theoretical and practical aspects of youth policy in Uzbekistan.

Efforts to address the problems of youth at any given time are in harmony with the various complex processes of society life. The country's new legislation recognizes youth as the basis of social development, creates opportunities for the development of youth organizations, creates a new generation of young people, ensures access to the intellectual potential of young people in the world community, and creates a new layer of ownership among young people. A strong civil society being established in Uzbekistan strengthens the social demand for unorganized youth [3]. Because civil society is a conscious, educated, educated society. Civil society can not be built without educating citizens. Therefore, various state and non-governmental organizations are widely involved in the decision-making and practice of unorganized youth in the country. Youth organizations are among the institutional structures of society in building a democratic state of law and human rights. As a result, the most promising topic for the future has been the identification of the future of youth organizations and movements.

State and non-governmental organizations are widely involved in the implementation of unorganized youth in Uzbekistan. Its structures carry out targeted and targeted actions by legislative bodies, supreme executive power, ministries, regional government, their special subdivisions, local executive institutions and non-governmental organizations.

In civil society, the state relies on the activities of non-governmental organizations in the socio-political, spiritual and educational development of the state, which considers its structure as supportive. In the process of political reforms being implemented in Uzbekistan, the tasks of the state with regard to the daily life of citizens gradually go to this institute. The development of the non-state sector is a modern stockpile of new jobs, and this reserve is not fully reflected. Nonprofit organizations are one of the major organizations supporting charity, needy families, orphan children, the disabled, and the elderly in promoting social protection of citizens on the basis of national and universal values.

One of the key elements of civil society is the non-government organization. The main task of non-governmental organizations is to coordinate different interests in the state and society, to support them, to provide communication between the state and the population, to represent the interests of the parties in this dialogue.

Particular attention was paid to the activities of non-governmental organizations in civil society development processes.

Despite the fact that the system of non-governmental organizations in Uzbekistan is one of the newly formed social infrastructures, dozens of youth organizations created during the years of independence have developed in harmony with the requirements of the time.

State and nongovernmental organizations are widely involved in the social activities and employment of unorganized youth in Uzbekistan, with its targeted and targeted efforts in the structure of lawmakers, supreme executive power, ministries, regional government, their special subdivisions, local executive bodies, non-governmental organizations will go. One of the main objectives of state policy in the country is to attract young people to the state and society, and to increase their interest in the process of democratic reform. In this context, young people are encouraged to work with non-governmental organizations to strengthen young people's political and legal literacy, build up their moral and ethical outlook, social activity, prepare families for their family life, and protect young people from harmful threats such as drug abuse, toxic-mania, alcoholism, and AIDS. helping the state system.

In addition, negative emotions among young people include depression, depression, self-renewal, inclining contradictions, egoistic look at life, material incentives, difficulties, difficulties in ignorance, dissatisfaction, crime, as well as non-governmental organizations.

As a result, young people are becoming increasingly demanding for non-governmental organizations to pursue specific goals. At the same time, young people are in the center of the country, and the weakness of youth movements in rural areas is one of the challenges posed by the problem.

The development of youth non-governmental organizations, their incentives for the development of a great opportunity and benefits system, as well as strengthening the focus on youth initiatives within local governments are among the most important tasks. In short, the creation of broader opportunities for young people in the process of building a civil society is a key requirement for the fourth phase of building a state-of-the-nation basis, on the basis of new principles. Establishing the foundations of civil society will serve as a major political concept in the country, ie the foundation of a new statehood.

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Section 14. Chemistry

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TESTING BASALT FILTER IN LABORATORY AND INDUSTRIAL CONDITIONS

Abstract. In recent years, requirements for cheap and demanded products from basalt raw materials have been growing. It is directly related to basalt processing industry development, activity and problem solution. In such circumstances, to solve the problem of production, especially those related to the study of the influence of various forces on basalt materials, is very important. This creates conditions for increasing the number of industrial enterprises producing environmentally friendly, high-quality products that will last longer than the existing ones.

Keywords: filter, material, hardness, aerosols, solid residues, basalt materials, filter partition, measures, surface bending, rigidity, separation, weight, residue, basalt filter, raw minerals, container, filtration rate, wet residue, quality ecology.

Water permeability is one of the main properties of basalt fiber material used for the manufacture of filter materials. The coefficient of water permeability ($\text{dm}^3/(\text{m}^2\text{s})$), shows how much water passes through a unit of material area per unit of time with a constant pressure drop on both sides of the basalt fiber filter [1].

Practical permeability is determined experimentally using basalt wool ambassadors stuffing. Pressed basalt crystal-line fibers are commonly called “Basalt wool”. We developed a technique (МБИ ГТМК Қ-34.20–39:2010 (Measurement procedures of Navoi Mining and Metallurgy Combinat

Ts-34.20–39: 2010) to determine the filtration rate of pulp (non-homogeneous media) using a filter made of basalt fibers. The features of the filter object are [2–5]:

– comparative high bending stiffness of basalt fiber in comparison with other mineral fibers. Its crystal structure contributes to the creation of mechanical strength, as well as a high coefficient of resilience, the absence of a coefficient of stretching, which favors the formation of an artificial lattice – a type of light mesh that prevents the filter from deflection and thus accelerates the filtering process while trapping large particles;

– in the manufacture of a filtering material from basalt, indiscriminate deposition of fibers is formed on each other,

as a result of which free space is formed between them for the flow of fluid;

Table 1. – Experimental calculated indicators of basalt fiber bending during liquid filtration

Parameters	Theoretical results				Experimental results			
	I	II	III	IV	I	II	III	IV
Fluid pressure, kg/mm ²	30	60	90	120	30	60	90	120
Average diameter of the filter, mm	120	120	120	120	120	120	120	120
Average filter thickness, mm	10	10	10	10	10	10	10	10
Average bend, mm	1.43	3.4	5.76	10	1.51	3.8	6.1	10.5
Average pressing force of basalt fibers for filters, kN	18	18	18	18	18	18	18	18

– lack of hygroscopicity and swelling, as well as maintaining a constant porosity of basalt fibers, counteracts the formation of precipitates in the path of flow of the liquid mass through the filter, at any filtration rate, thereby ensuring high performance;

– the pulp precipitates (inhomogeneous media) remaining on the filter surface are easily removed by washing from the filter surface, which creates conditions for filter reuse in subsequent filtration. In fig. 1 and in table. 1 shows laboratory experimental installations for filtering slurries using single and multiple filter materials.

Depending on the purpose, various types of filtering materials can be produced that best suit the needs of the mining and metallurgical industry in the best way. When pressing in and making filtering materials, various pressing forces can be used. They vary depending on specific technical needs: hardening, stabilization, etc. Good chemical resistance of filter materials expands the scope of this material.

Filtration is carried out under vacuum on a Buchner funnel, where an arbitrarily selected volume of the non-homogeneous

medium is equal to 5·l. The pulp is passed in one case through the “Traditional filter”, in the other case through the “Traditional filter” with the “Basalt Wool” filter placed on top (with the layers of planes slightly shifted, h = 5 mm).

Measurements are performed in accordance with the instructions for the technical operation of filtration materials and under normal climatic conditions (GOST15150–69): ambient temperature $t = 25(\pm 10)$ °C, relative humidity 45 ÷ 80% and atmospheric pressure 630 ÷ 740 mmHg and regulatory documents [6–7].

The results are presented in (Table 2). Filtration is carried out at a constant vacuum, using the “Basalt wool” filter, while the filtration rate is accelerated by 1.8 times. Processing the measurement results consists in registering the time on the stopwatch and comparing the result with filtering results and through a paper filter with an estimate of measurement uncertainty, as shown in the (table 3).

In developing this methodology, we followed the Regulatory Documents [7–8].

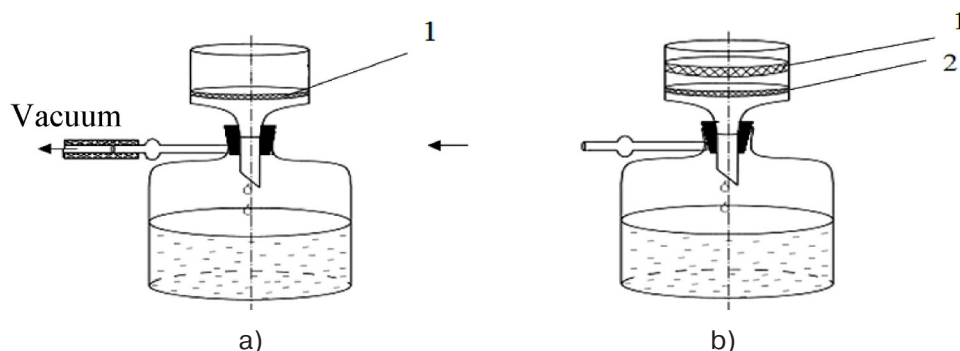


Figure 1. Experimental plant for the combined filtration: a) filtration using a paper filter – “traditional filtering material”; b) combined filtration using “Basalt wool + traditional filtering material” filters; 1 – Basalt wool filter; 2 – “traditional filtering material” filter

Table 2. – Experiment results

Filter name	Filtration time, τ , min			Mean time, min
“Traditional filter”	47	45	43	45
“Basalt wool” + “traditional filter”	25	27	23	25

One of the important areas for solving problems of filtering gold-bearing pulp in the mining and metallurgical industry and solving environmental problems is the use of filters to improve labor productivity, reduce process costs, and also to eliminate harmful emissions to the atmosphere and the aquatic environment as much as possible.

This direction is of great interest for the manufacture of filters from natural basalt fiber (NBF), obtained from raw materials of domestic basalt deposits. This choice is explained by the fact that basalt is an environmentally friendly product of nature, it has a high natural chemical and thermal resistance.

As one of the most important functions of a basalt filter, one can note the high thermal resistance of its material, i.e. basalt fibers that open up unlimited possibilities of this breed.

Thus, the fundamental proof of the filtering ability of basalt materials are the results of a preliminary check of the basalt filter when filtering the gold-containing pulp of the metal-mining plant Mining and Metallurgy Factory-1 of the State Enterprise Navoi Mining and Metallurgy Combinat.

A preliminary study of the filtering capabilities of basalt materials made of basalt fibers showed their relatively high stability when filtering gold-bearing pulp for a long time (stability during repeated alternate freezing and thawing, wetting and drying, as well as resistance to long-term atmospheric effects were not tested). Filtration of gold-containing pulp was checked on the existing filters “traditional filter material” and on the filter material “Basalt wool”.

The study was conducted according to the following scheme:

- preparations;
- conducting an experiment to test the performance of each type of filter;
- conducting an experiment to test the performance of the combined filter;
- accounting of the results of the experiment;

At the first stage of the study, three samples of each filter were prepared: three filters – “traditional filtering material” and three filters from the material “Basalt wool”.

Three vessels of volume 1, 3 and 5 l. Gold-bearing pulp was also prepared in the appropriate volume, which contained crushed ore mixed with water, acid and cyanides. Checked the operation of the stopwatch. In this case, the density $\rho = 2.65 \text{ g/sm}^3$ and solid to liquid ratio –1:2.83. During the experiment, the allowable temperature, pressure, humidity of the room air and illumination were provided.

The performed experiment was conducted in accordance with GOST 7076–79. At the second stage of the experiment, one filter was installed in the throat of vessels with a capacity of 1 l, as shown in fig. 1 a and b. The duration of the whole filtration process for pulp of 1 l. was recorded. At the end of the filtration, the data were recorded in the log. Similarly, the experiment was carried out on 3 and 5 liter vessels.

All indicators of the experimental study on the filtration of gold-bearing pulp on the existing filters “Traditional filter material” and on the filter material “Basalt wool” were recorded in a journal.

As a result of an experimental study on the filtration of gold-containing pulp using the filters “Traditional filter material” and “Basalt wool” it has been established:

- in contrast to the filter made from the material “Basalt wool” in the filtering process of gold-bearing pulp on the filter “Traditional filter material” external intervention is required, which is due to the fact that when the accumulation of pulp particles on the surface of the filter material is necessary to mix them, in order to accelerate the passage liquid medium;
- found a very low mechanical strength “Traditional filter material” compared to basalt material, the strength of which is created as a result of pressing basalt fibers and the formation of wool due to indiscriminate occurrence of crystalline fibers on each other in the process of forming an artificial lattice;
- the technology of using the filter “Traditional filter material” includes the treatment consisting of soaking and processing the filter material with distilled water, which is not necessary when using the material “Basalt wool”.

Table 3. – The results of the experiment on filtration of the pulp using filter materials “traditional filter materials” and “basalt wool”

Parameters of sample filters	Filter material name								
	Traditional filter material			Basalt wool			Combined		
	I	II	III	I	II	III	I	II	III
Diameter and thickness of filter, D × B, sm	12.5–0.4	12.5–0.4	12.5–0.4	13–1.5	13–1.5	13–1.5	13–1.5 12.5–0.4	13–1.5 12.5–0.4	13–1.5 12.5–0.4
Volume of gold-bearing pulp, l	1	3	5	1	3	5	1	3	5
Filtration time, min	10	35.4	55	5,3	25.8	39.7	9	18	27
Price of 1 filter (at the price of 2014)	60	60	60	40	40	40	100	100	100

At the third stage, the operability of the combined filter was studied, including filters from the materials “Basalt wool” and “Traditional filtering materials”. The installation of the combined filter in the vessel was illustrated.

1, b. Recorded filtration time on each vessel volumes of 1, 3 and 5 l. As in the previous stages of the experiment, all significant indicators of the study were recorded in a journal. All data obtained as a result of studying the process of filtering inhomogeneous media in laboratory and industrial conditions were merged and listed in (Table 3). In the experiment, the used filter materials “Basalt wool” were pre-dried with the preservation of the corresponding geometric parameters.

Under laboratory conditions, it was established experimentally that the use of a basalt filter when filtering inhomogeneous media with a volume of 1 l, compared with the “traditional filtering material”, reduced the filtration time by 1.1 times, the volume of 3 l – by 1.9 times and the volume of 5 l – by 2 times. Curves of changes in filtration time when using different types of filter materials are shown in (Fig. 2)

Throughout the experimental investigation of filtration through the samples under study, the vacuum remained constant. The use of a filter consisting of the following was effective: “Traditional filter media” + “Basalt wool” while maintaining the existing degree of purification of the liquid medium, where the filtration rate of non-homogeneous media is accelerated by about 1.8 times. The use of the “Basalt wool” filtering mate-

rial up to the “Traditional filtering material” filter layer made it possible to eliminate accumulations of large particles of impurities on the surface of the current filter, which previously delayed cleaning the liquid phase from precipitation. From the data table. 1 shows that the filter made of natural basalt fiber is cheaper. High efficiency of application as a filtering material “Basalt wool” and in the combined method “Traditional filtering material” + “Basalt wool” proved that basalt fiber material has good prospects. Particularly noteworthy are the positive filtering indicators of such materials, which are far superior to the materials of existing filters used to filter gold-bearing pulp. The latest indicators give good recommendations for using the Basalt wool filter material for filtering inhomogeneous media.

In the process of researching the performance of basalt filter material, the priority application of the Basalt wool filter has been proved, which has the following properties:

- well retains solid particles of the suspension;
- has sufficient hydraulic resistance to filtrate flow;
- easily separated from the sediment suspension;
- resistant to chemical effects of the substances to be separated;
- does not swell in contact with the liquid phase of the suspension and leaching fluid;
- has sufficient mechanical strength;
- heat resistant at filtration temperature.

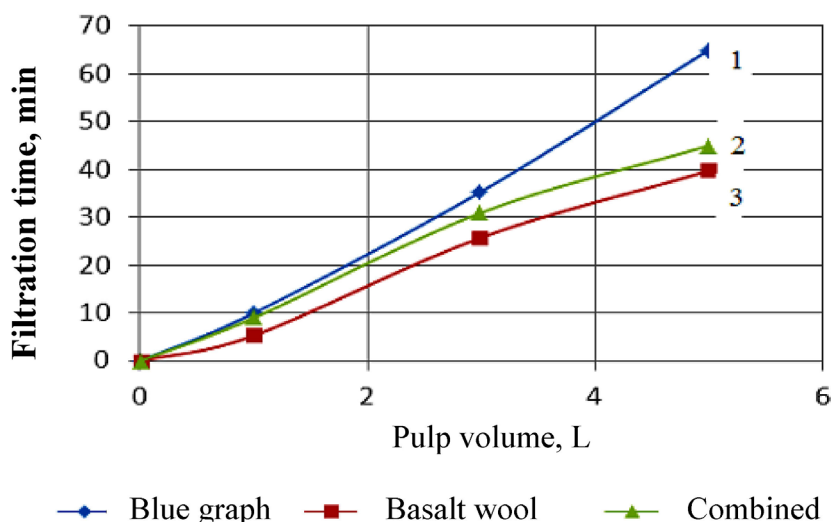


Figure 2. Diagram of filtering time when using different types of filter materials

Thus, as a result of analyzing the filtering ability of gold-bearing pulp on the existing “Traditional filtering material” filter and using it in combination with the Basalt wool filter, the expediency of using the latter for filtering inhomogeneous media was revealed. When using “Basalt wool” as a filtering material for filtering inhomogeneous media, the use of local raw materials is expanded and the cost of filtering is reduced.

Based on the results of the study of the technical feasibility of the Basalt Cotton filters, their use in hydro-metallurgy for pulp dehydration can be recommended, as well as the possibility of using recycled water (filtrate) in a closed cycle of the technological process.

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A SHORT REVIEW ON METAL OXIDE THIN FILMS

Abstract. Preparation and characterization of metal oxide thin films were extensively discussed by many researchers. In this work, nickel oxide, tin oxide, cuprous oxide and cupric oxide films were characterized by using various tools. The obtained band gap values are in the range of 1.75 to 4.4 eV.

Keywords: band gap, copper oxide, nickel oxide, thin films, tin oxide.

Introduction

Over the last decade, thin films were successfully deposited onto substrate by using various deposition techniques [1; 2]. These films have been considered attractive for utilizing in solar cell [3; 4], laser device, sensor device, switching device, Schottky barrier and IR detectors. Generally, deposition technique could be broadly divided into two groups, namely physical and chemical method [5; 6]. Selection of deposition technique is highly dependent on many factors such as easiest setup [7; 8], cheap equipment [9, 10], convenient for large area deposition [11; 12], controllable growth rate [13] and film thickness.

In this work, several metal oxides were prepared by using different techniques and obtained films were characterized by using various tools.

Literature survey

Nickel oxide thin films:

Spray pyrolysis technique has been used to produce nickel oxide (NiO) films [14]. X-ray diffraction (XRD) data indicated that amorphous structure at 280 °C, while cubic structure at 320–400 °C. Broad peak and polycrystalline structure could be observed in as-deposited NiO films and annealed films, prepared using sol gel technique [15]. Furthermore, XRD data showed intensity was increased with annealing temperature (300–600 °C). The band gap value (2.1 to 3.9 eV) was increased with increasing annealing temperature (300–473 K) for the chemical bath deposited NiO films [16]. The D. C. reactive magnetron sputtering method was used to prepare NiO films [17]. Irregular shape grains, uniform grain size distribution, worm like structure, and smooth structure could be seen when the thickness is 150, 250, 350, and 550 nm, respectively.

Tin oxide thin films:

The tin oxide films deposited onto glass substrate using atmospheric pressure chemical vapour deposition method [18] indicated major orientation along (110) plane. The films deposited onto fluorine doped tin oxide glass via electro deposition method [19] at different concentrations of butyl rhodamine B (BRhB) were studied. There are different morphologies could be observed including irregularly connected

nanoparticles (absence of BRhB), loose surface structure (100 μ M BRhB) and porous structure (150 μ M BRhB). The films prepared using pulsed laser deposition indicated pure polycrystalline phase, and almost stoichiometric [20]. Magnetron sputtering technique was used to prepare films [21] and, resistivity increases with reduce of oxygen pressure from 10 to 1%. The crystallite size (29.8 to 6.5 nm) reduced as the substrate temperature was reduced from 800 to 400 °C for the films prepared using spray pyrolysis [22]. Higher band gap value could be observed under higher anneal temperature for the films produced using thermal evaporation [23]. The annealed chemical bath deposited SnO₂ films are highly transparent, highly stoichiometric [24] with a band gap of 4.4 eV.

Cuprous oxide and cupric oxide thin films:

The cupric oxide (CuO) with monoclinic structure was produced using reactive radio frequency magnetron sputtering method [25]. Spray pyrolysis technique was used to synthesis CuO film. Its thickness (660–1250 nm) increased as the deposition time was increased from 30 to 80 minutes [26]. Sol-gel spin coating was used to prepare Cu₂O films [27] in the presence of ethylene glycol. These films showed irregular morphology, band gap of 1.75 eV, film thickness of 59 nm and lower absorption value. XRD data supported the existence of Cu₂O at 250 °C, while formation of CuO at 350, 450 °C for the films prepared using thermal evaporation [28]. The obtained electro deposited Cu₂O films [29] show cubic structure, crystal size about 210 nm and band gap is 1.98 eV. There are three peaks (627, 503 and 540 nm) could be observed in photoluminescence spectra for the chemical bath deposited Cu₂O films [30]. The higher growth rate is achieved when using higher pressure during the preparation of Cu₂O via magnetron sputtering [31].

Conclusion

Metal oxide thin films have been successfully prepared using various deposition techniques. The properties of nickel oxide, tin oxide, cuprous oxide and cupric oxide have been reported. Scanning electron microscopy studies indicate that a strong dependence of the surface texture, film thickness and grain size on the various experimental conditions.

Acknowledgement:

INTI INTERNATIONAL UNIVERSITY is gratefully acknowledged for the financial support of this work.

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HYDROCHEMICAL ANALYSIS OF SOME MINERAL WATERS

Abstract. Hydrochemical analysis of some mineral waters of Georgia was carried out. Lentekhi Municipality of the Svaneti region (lower Svaneti), in particular the mineral waters of the Bavaria rock, the Bavaria yard and Babili. For the first time, chemical methods were used for determined of ions Ca^{2+} , Mg^{2+} , HCO_3^- , Cl^- , I^- , oxygen dissolved in water, oxygen, carbon dioxide, total iron, while ions of Na^+ , K^+ , Li^+ , NO_2^- , S^{2-} and ammonia by photometric methods, mainly for the determination were selected relatively simple, and good repeatability methods of titration and photometry. By experimentation it was established that the investigated waters are mineralized with weak acidity (pH 5.32–5.61). In the analyzed mineral springs, the above ions are within the norm and their use as drinking water is reasonable.

Introduction Since ancient times, humanity has been interested in the nature of mineral waters. In antiquity, the origin of mineral water was explained by rather primitive idea, and in its application certain superstitions prevailed about water as the lifeblood. Facts reveal that in ancient Georgia, mineral water was in wide use. At present time, as an answer to increased consumption of mineral water, springs are also developed. It should be noted that mineral waters are a type of natural waters, the study of the chemical composition of which was started more than 150 years ago and is still continuing to understand their healing properties.

Mineral water has a noteworthy healing and therapeutic effect and for this reason it should be studied deeply. The chemical hydrologists are given plenty of research freedom to obtain results. Mineral water – is groundwater, which is characterized by the chemical composition and physicochemical properties. Mineral content is not considered a significant criterion for the therapeutic properties, since there are mineral waters with very low mineral content, on the other hand for therapeutic properties, as well as its underlying mechanism and effect on health requires studying chemical composition of water.

For proper understanding of mineral water, it is first necessary to know its ionic, salt and gas composition of water, temperature and radioactivity. It is also necessary to determine the specific trace elements of water, which will make it possible to establish the functional dependence of these trace elements, and with other constituent elements of water. On the surface of the Earth, mineral waters appear due to hydrostatic or gas pressure, as enriched water sources.

Under the influence of natural processes, the chemical composition of mineral waters can be changed. The chemical composition of mineral water formed in the earth's crust and deeper, can be enriched with specific trace elements. The physicochemical processes occurring in the earth's crust markedly change the composition of mineral waters.

One of the characteristic features of the chemical composition of mineral water is the presence of an ionic composition. The study of the gas composition, together with other physicochemical properties, is a necessary condition for the general understanding of water. Gases at a certain depth under the influence of high hydrostatic pressure are in a soluble state. Mineral waters are often saturated with gases. With a change in temperature and pressure in water, gases that are soluble in water begin to surface as small bubbles.

In the studied mineral waters, oxygen and carbon dioxide are gases found. CO_2 has good water solubility and earth is rich with carbon dioxide-containing minerals. In the earth's crust, heavy metals undergo migration of hydrocarbons in the form of hydrocarbonates, since groundwater is saturated with CO_2 [1].

Goal of research. The object of the study is the three mineral springs of Lentekhi Municipality: spring of Bavaria yard and spring of Bavaria rock, 500 m apart from each other and the mineral spring of the village of Babili, which is 3 km away from them.

Lentekhi Municipality is located in Western Georgia, in the Svaneti Range in the southern part of the upper basin of the Tskheniskali river. Lentekhi has a humid climate. There is a cold winter and a short summer. Its territory is mountainous,

shaped by branching border ridges. Lowland areas are mainly composed of river gorges, and subtropical and glacial relief characteristic of mountain gorges. In the area because of the hilly terrain, there is a zonal climate distribution by height. In the highest places, the climate is humid due to constant heavy snow and frost. The main river of Lentekhi Municipality is Tskhenistskali, which rises from the main drainage range of the Caucasus. Babili village is located in the southern branch of the Svaneti Range in the upper right corner on the bank of the Tskhenistskali river, three kilometers from the center of Lentekhi [3].

Water consumption with a specific purpose requires a deep chemical examination of its physical – mechanical, organoleptic quality and determination of the chemical composition. After which, on this basis, quality assessment is carried out [4].

Experimental part. Methods for determination of chemical elements in water.

The main analysis was carried out at Akaky Tsereteli State University in the laboratory of analytical chemistry, and in the laboratory of the Gamma company and in the Ferdinand Tavazde Institute of Metallurgy and Materials Science. The hydrochemical, proven methods in practice, were used for the analysis [5].

Indicator of acidity is pH 673-M. The specific gravity of the electrical conductivity of the water sampled is measured by the method of conductometry in pre-temperature-controlled samples.

The dry residue remaining after evaporation of water at 110 °C was determined by the gravimetric method. Hydrocarbons were determined by acidomytractive method. 0.01 mol/eq. of hydrochloric acid was used as the titrant. Methyl-red was used as an indicator.

Chlorides were often determined by the mercurimetric method. 0.01 mol/eq. of $\text{Hg}(\text{NO}_3)_2$ was used as the titrant, diphenyl carbonate as the indicator.

Highly mineralized water is sulfate ions, determined by the classical gravimetric method, sedimentary form of BaSO_4 .

The content of calcium and magnesium, as well as the total hardness of water are determined by the complexometric titration. Exposure to heavy metals was limited by the addition of Na_2S – in parallel determinations.

Biogenic substances were identified by photometric methods: NH_3 – by Nessler's reagent; NaNO_2 – by Griess reagent; NO_3^- – by salicylate sodium, and PO_4^{3-} by ammonium phosphomolybdate (blue).

To determine the concentration of potassium sodium and lithium, we used the bolometric method and FPF-58 (ФПФ-58) flame photometer.

Dissolved oxygen was determined by the iodometric method. 0.02 mol/eq. of the concentration of $\text{Na}_2\text{S}_2\text{O}_3$ solution, starch was used as an indicator.

The total iron content was determined by photometric method content. photometer

To determine the total concentration of organic matter used oxygen, permanganometric and bichromatic methods

In the studied water, this content is determined by the alkalimetric method. 0.01 mol/eq. concentration of sodium alkali solution was used, phenomophaleine was used as an indicator.

Iodide ions are determined by the Reznikov method. Sodium thiosulfate was used as the titrant, and starch was used as an indicator [6].

The data of electrical conductivity, deposits of Ca^{2+} , Mg^{2+} , HCO_3^- , Cl^- , SO_4^{2-} , dissolved oxygen, Na^+ , K^+ , Li^+ , total iron content of CO_2 , NO_3^- , NO_2^- , PO_4^{3-} , NH_3 , S^{2-} , I^- , ions of some mineral waters of the village of Babili, Lentekhi Municipality, are presented in (Table 1).

Experiment discussion. The mineral waters of Lentekhi Municipality are, on average, mineralized, therefore their reaction is slightly acid (5.3–5.6).

Ions of Mg^{2+} , Ca^{2+} , HCO_3^- , Cl^- , SO_4^{2-} , Li^+ , Na^+ , K^+ , CO_2 , I^- and the total iron content of studied mineral waters of the Lentekhi Municipality vary widely.

The electrical conductivity of the mineral waters we studied is the highest in the acidic (mineral) water of the village of Babili, 0.2171, the smallest in the mineral water of the Bavaria yard – 0.1470 s/m.

The dry residue is the highest in the mineral water of Bavaria, 1.3 mg/l, relatively small in the mineral water of the Bavaria yard – 0.95 mg/l. A large amount of HCO_3^- ions are contained the mineral water of the Bavaria rock – 26.35 mg/l, and less than its content in the mineral water of the Bavaria yard – **18.84 mg/l**.

The content of Cl^- ions is variable. The largest amount of Cl^- ions is found in the mineral waters of the Bavaria rock – 2.01 mg/l, while its content is relatively small in the mineral water of Babili – 0.736 mg/l.

The large amount of SO_4^{2-} ions is found in mineral waters of Babili – 2.966 mg/l and its content is insignificant in the mineral waters of the Bavaria rock – 1.030 mg/l.

The largest amount of soluble oxygen is contained in the mineral waters of Babili – 0.98 mg/l, and in the mineral waters of the Bavaria rock – 0.30 mg/l, oxygen content is higher in mineral waters of Babili – 1.92 mg/l, while its content in mineral waters of the Bavaria yard is small – 0.91 mg/l.

– Na^+ content is higher in the mineral waters of Bavaria – 162.8 mg/l, while Na^+ content in mineral waters of Bavaria yard – 61.8 mg/l.

The content of K^+ ions in the mineral waters of Bavaria – 162.8 mg/l, while in the mineral waters of the Bavaria yard, its content is 61.8 mg/l.

Table 1. – Hydrochemical analysis of some mineral waters of the village of Babili, Lentekhi Municipality

#	Spring name	pH	Elec-trical conduc-tivity	Dry resi-due	Ca ²⁺	Mg ²⁺	HCO ₃	Cl	SO ₄ ²⁻	Soluble oxygen	Oxy-gen-ation	Na ⁺	K ⁺	Li ⁺	Total iron	CO ₂	NO ₃ ⁻	NO ₂ ⁻	PO ₄ ³⁻	NH ₃	S ²⁻	I ⁻	
																							mg/l
1.	Babili	5.101	0.2171	0.108	34.51	17.25	19.96	0.73	2.966	0.98	1.92	162.8	3.14	0.04	0.002	0.029	-	-	-	-	-	-	0.85
2.	Bavaria rock	5.44	0.1573	0.131	25.32	23.28	26.36	2.01	2.030	0.30	0.93	64.9	3.74	0.09	0.102	0.030	-	-	-	-	-	-	-0.81
3.	Bavaria yard	5.32	14.70	0.095	18.08	19.12	18.84	1.83	1.895	0.38	0.91	61.8	3.56	0.07	0.010	0.026	-	-	-	-	-	-	0.10

Table 2. – Results of quantitative spectral analysis of some alkaline mineral waters of Lentekhsy Municipality

Mineral waters name	Si	Al	Mg	Ca	Fe	Mn	Ni	Ti	Cu	Pb	Na	K	Ba
Babili	~10.0	0.2	~8.0	root	0.10	0.15	0.005	0.02	0.002	0.003	~12-15	-	0.01
Bavaria rock	~8.0	0,1	~	root	0.05	0.10	-	-	0.001	0.001	~5.0	-	0.01

The content of ions in the mineral waters studied by us is almost the same. A relatively large number of K⁺ ions contained in the mineral waters of the Bavaria rock – 3.74 mg/l, while the mineral waters of the Bavaria rock contain 3.14 mg/l of K⁺ ions.

A small amount of lithium alkali metal ions is contained in the mineral waters studied by us. A high content of Li⁺ ions was found in the mineral waters of the Bavaria rock – 0.09 mg/l, while it is low in mineral waters of Babili – 0.04 mg/l.

Total iron content is also unequal. A large amount of total iron is found in the mineral waters of Bavaria – 0.102 mg/l, and its content in mineral waters of Babili – 0.02 mg/l.

CO₂ content is approximately the same. In studied mineral water of the Bavaria rock – 0.030 mg/l hile its small amount is found in the mineral water of the Bavaria yard – 0.026 mg/l.

The content of biogenic substances studied by us in the mineral waters of Babili, the Bavaria yard and the Bavaria rock are far below the norm. We also failed to find a sensitive method for detecting sulfide ions.

The content of iodine ions is high in Bavaria mineral waters – 0.85 µg/l. And a relatively small amount is contained in the mineral water of the Bavaria yard – 0.10 µg/l

A quantitative spectral analysis of some dry alkaline mineral waters of Lentekhi Municipality was performed.

Analysis results are shown in (Table 2).

Conclusion. In summary, in some mineral waters of Lentekhsy Municipality for the first time physicochemical methods were used to determine Ca²⁺, Mg²⁺, HCO₃⁻, Cl⁻, SO₄²⁻, Na⁺, K⁺, Li⁺, CO₂, NO₃⁻, NO₂⁻, PO₄³⁻, NH₃, S²⁻, I⁻ ions. acidity, mineralization, oxygen content, electrical conductivity, and also dry residue during mineralization.

It has been established by electrical conductivity that the above concentration is directly proportional to of acidic waters.

Study of the Ca²⁺, Mg²⁺, HCO₃⁻, Cl⁻, SO₄²⁻, Na⁺, K⁺, Li⁺, CO₂, NO₃⁻, NO₂⁻, PO₄³⁻, NH₃, S²⁻, I⁻ content and the total amount of iron in the mineral waters under consideration does not exceed the norm and its use as drinking water from a therapeutic point of view is reasonable.

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Section 15. Economics

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ATTITUDE OF GEORGIAN CONSUMERS TOWARDS BRANDS

Abstract. Strong brand creates a base for creating positive and profitable relationships with customers. In order to study attitudes towards the brands of Georgian consumers, a survey was conducted involving more than 600 respondents. During the research process they following key questions were revealed: what the brands for the respondents meant, what characteristics of the brand they preferred, which brands they were familiar with, how they expressed preference, what they expected from the brand or what could make them change, did they pay attention to advertising, which Georgian product was the brand for them and etc. Taking into consideration all of this, we present the attitude of Georgian consumers to brands. We believe that introduction of users' attitudes to Georgian producers will help them reinforce the image and achieve loyalty to consumers.

Keywords: Brand, consumer, brand value, Georgian products.

Brands have become a major player in modern society. They invaded us in any sphere of our life: economic, social, cultural, sporting and even religion. Because of this, they have come into undergrowing criticism. Since the brands are major symbols of our economics and postmodern societies, they can and should be analysed through a number of perspectives: macroeconomics, microeconomics, sociology, psychology, anthropology, history, semiotics, philosophy and so on [1].

The big brand's equity gives the company a lot of advantages. Strong brand is based on high awareness and customer loyalty. The fact that customers are hoping to see their brand on shelves at the store, gives the company a great advantage in trading with resellers, because the name of brand has high durability, the company can easily expand the product series and brand [2].

Together with this, a strong brand creates a base for creating positive and profitable relationships with customers. Thus, the fundamental asset, that emphasizes the value of the brand is the user's equity – the value of customers relationship that forms the brand. Strong brand is important, but in fact, it is a combination of loyal customers. The main focus of marketing is the creation of user's equity, in which brand management is one of the main tools.

Establishment of Georgian production in the international market is associated with a lot of obstacles. First of all, this is related to the problems of intensification of competition and awareness on the world market. However, it should be noted that in many countries Georgia is well known for the Georgian brands, such as "Borjomi", "Sarajishvili", "AVTANDIL", "Khvanchkhara" and so on. We can't stop mentioning the fact, that Georgia is mainly associated with wine and wine tradition for the rest of the world. While "the ancient Georgian traditional Qvevri wine-making method" is in the UNESCO Intangible Cultural Heritage List [3; 4].

To find out what kind of attitude the Georgian consumers have towards brands, we have conducted a survey, which was meant to study public attitudes towards brands and in particular, Georgian brands.

We conducted a survey in electronic form, as well as face-to-face interview. In this survey over 600 respondents took part. Among them, 70.4% were female.

The questionnaire included both closed and open questions, where the respondents had the opportunity to express their own opinions or different views. questionnaire included such questions as: what do the brands for the respondents

mean, what characteristics of the brand do they prefer, which brands you are familiar with, how do they express preference, what do they expect from the brand or what can cause them to change, do they pay attention to advertising, which Georgian product is the brand for them and etc. Taking into consideration all of this, we present the attitude of Georgian consumers to brands.

The question on which characteristics of the brand is important for them, most of the respondents – 56.3% have noted that the high quality of the product is the most important, which isn't surprise, because the brand is perceived as a high quality product. Besides the quality, users pay much attention to the characteristics of the brand, such as adjusting the individual brand. 31.7% of respondents answered this question, and a small part of the respondents focus on social responsibility of the brand, the important application made by the brand, the recommendation of friends or relatives and etc. The following question was about how the user express preference to the desired brand, where the two answers were revealed that a large part – 42.1% says that they express their preference to the brand by buying it, while 34% says that they are talking about the desired brand with others, which is a clear example of difference between brand goods and other goods, and what is its advantage compared to other similar products, because a customer who can't buy it still thinks about the brand and will buy it immediately within the first opportunity. Also with a small percentage, but there are still some answers like this: we become loyal to the brand (12.2%), following on social media (10.7%) and buying online (1%).

The next question was to understand what the respondents are expecting from the brand they are using. Half of the respondents – 50%, expect to emphasize their individuality by the help of the desired brand, while 24% wants to know the brand that they are using. For 18% it is important to reach success by chosen brand, while remaining 8% says that different features, such as comfort, quality and so on are more important.

As research shows, the reason of changing the preferred brand can be the economic, psychological, innovative, mental and other circumstances. The survey shows that first of all, the rejection of the liked brand can be caused by the financial position (38%), it is followed by the appearance of the more pure brand (36%), also the appearance of a more prestigious brand in the market (25%), which is followed by breaking the brand image (20%) and increase price on products (19%), it should be noted that not a large number of respondents will change the brand because of the change in price, which indicates that if a person has an income, he will not lose money, even if it is a bit too expensive. Quite a small number of respondents think that beloved brands will be replaced by the recommendation of family members or friends (9%), while 8% will refuse a

favor brand for suggested promotions or advertising by the competitor brand.

Advertisements is a quite important in selecting products for 59.6% of consumers, that should be interesting and considerable for any product manufacturers, especially for branded goods, because good advertising is a half way to the success. This confirms that 22.7% of respondents give a definitive value to advertisements and buys some goods because of good advertising. Only 17.7% does not pay attention to advertisements and viewing or hearing advertising has no definitive influence on them.

Our interest was also to understand which sources were used by users when they wanted to buy a new product. Most of the respondents – 87 say that they are asking friends and acquaintances; following- 80 persons, who try to find information on different brands on websites; also people who are looking for information on different blogs and forums (53 votes). According to a small part (31 votes) they go to specialized stores and get consultations there about new production. TV advertisements have received the least number of votes (21), which means that the user no longer waits for an advertisement for a new product on television, but tries to find information about the goods needed for him/her, and for that s/he is using modern technologies such as the Internet, also advice from acquaintances and friends.

Finally, the most interesting question for us was: Do you use Georgian products and why? This question was interesting in terms of understanding how Georgian customers are concerned about national products.

From the answers it appeared that Georgian products are not only acceptable for 34.8%, but „made in Georgia” is one of the key factors in the selection of the product. 24.7% trust the goods produced inside the country, while 19.2% periodically consumes Georgian products, because it is available. Overall, we can say that nearly 80% of respondents positively evaluate Georgian products and are ready to buy it. Only 10.6% of respondents refuse to use it, in order to buy better, while 9.4% thinks that Georgian product has low quality and do not trust it.

The results of the survey once again convinced us that today there is a customer in the center of everything, so the direct interest of the company should be focused on better understanding its own customer. That's why companies should understand current and potential customers needs and wants, that will help the company in developing new products and planning marketing activities.

Depending on the above mentioned, we can conclude that consumers perceives the brands and branded products as high quality products, and at the same time they emphasize not only the quality but also the ability to satisfy their

needs and desires. The advantage of the brand is that it is tailored to the individual, it must satisfy the taste of the buyer and make him feel comfortable. The brand is characterized by always being in the center of attention and even if consumer can not buy a branded item, s/he shares his/her preference, likeness and emotions to others, because s/he is so fascinated by this product. The desired product is always in the buyer's subconscious, and as soon as he/she is able to buy it he/she will purchase it without thinking. It should

be noted that even increase of the price of the brand can not cause a catastrophic decline in sales, because people are willing to pay more for their needs and desires, than pay less in the same product, but with undesirable names.

From the survey it clearly appeared that Georgian consumers are ready to buy local products, and they trust the quality of Georgian products, so it is important to have more effort as it was possible for many Georgian brands, such as Barambo, Natakhtari, Nikora and so on.

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Contents

Section 1. Biology	3
<i>Babayana Bella</i>	
MULTIPLE ANTIBIOTIC RESISTANCE OF SOIL STRAINS OF <i>PSEUDOMONAS CHLORORAPHIS</i>	3
Section 2. Demography and ethnography	7
<i>Mohamad Arifin, Sri Suwitri, Endang Larasati, Ida Hayu Dwimawanti</i>	
ROAD HANDLING POLICY IN IMPROVING HUMAN DEVELOPMENT INDEX (HDI) IN PEMALANG DISTRICT	7
Section 3. Journalism	18
<i>Qulmurodova Odinaxon Abdug'afforovna</i>	
THE SKILL OF JOURNALIST DURING THE INTERVIEW	18
Section 4. Materials Science	21
<i>Agbanwu David Onu, Ihuaenyi Salvation Chijioko, Bepalova Maria Sergeevna</i>	
APPLICATION OF NANO-DIAMOND IN TISSUE ENGINEERING	21
Section 5. Machinery construction	27
<i>Dunyashin Nikolai Sergeevich, Galperin Leonid Vladimirovich, Ermatov Ziiadulla Dosmatovich</i>	
DEVELOPMENT OF THE GAS-FORMING COMPOSITION OF ELECTRODE COATING FOR A HIGH-QUALITY CAST WELD STRUCTURE	27
Section 6. Medical science	30
<i>Ashurmetov Azizbek Mirsagatovich</i>	
ERECTILE DYSFUNCTION AS A LOCAL MANIFESTATION OF SYSTEMIC HORMONAL AND METABOLIC DISORDERS.....	30
<i>Baramidze T., Mardaleishvili K.</i>	
RESULTS OF COMBINATION THERAPY FOR SQUAMOUS CELL CARCINOMA OF THE MAXILLA.....	33
<i>Chakkanova M. B., Makhkamova N. E.</i>	
TRANSTUBARISTIC ADMINISTRATION OF DEXAMETHASONE IN THE TREATMENT OF ACUTE SENSORINEURAL HEARING LOSS	38
<i>Sadirkhodjaeva Azizakhon Alavitdinovna, Ashurova Dilfuza Tashpulatovna</i>	
PREDICTION OF OCCURRENCE AND THE RELATIONSHIP OF AUTOIMMUNE DISEASES IN CHILDREN WITH TYPE 1 DIABETES	41
<i>Tagiyeva Fakhriya Alamdar</i>	
PECULIARITIES OF LIPID EXCHANGE IN PREGNANT WOMEN WITH OBESITY	44
<i>Chentsova Ekaterina Valerianovna, Fedoseeva Elena Viktorovna, Flora Sergey Vitalyevich, Vlasova Viktoria Alexandrovna, Petrova Alena Olegovna,</i>	
SPONTANEOUS DETACHMENT OF THE DESCENDING COLON'S MEMBRANE (CASE STUDY)	48
Section 7. Pedagogy	52
<i>Borbotko Pavel Valentinovich</i>	
DIGITAL SKILLS CRISIS AND REVISION OF EDUCATIONAL STANDARDS	52

<i>Kolomiets Tetyana Vyacheslavovna</i> COMMUNICATIVE COMPETENCE AS THE BASIS OF PROFESSIONAL ACTIVITY OF FUTURE PHARMACISTS.....	55
<i>Shugalei Elena Viktorovna</i> METHOD OF IMPROVEMENT MEMORY AND PERCEPTION BY THE MODEL BASED ON LEONARDO DA VINCI'S COGNITIVE STRATEGIES	58
Section 8. Political science	64
<i>Zhusupov Marat Muskenovich</i> GEOPOLITICAL PROCESSES OF CENTRAL ASIAN STATES	64
Section 9. Psychology	67
<i>Kalina Svetlana Andreevna, Gardanova Zhanna Robertovna, Esaulov Vladimir Igorevich</i> PSYCHO-EMOTIONAL STATE OF WOMEN OF ADVANCED REPRODUCTIVE AGE IN THE IN VITRO FERTILIZATION PROGRAM.....	67
<i>Sizikova Tatyana</i> REFLECTION AND SELF-IDENTITY PERSONALITY.....	70
<i>Chalabiyev Nurali Zarbali oghlu</i> PSYCHOLOGICAL FEATURES OF CHANGES IN FAMILY LIFESTYLE DURING THE PERIOD OF OLD AGES AND SENILITY.....	74
Section 10. Sociology	80
<i>Alimova Sh.X., Karimova G.A.</i> INFLUENCING INCOLOROUS EDUCATION IN UZBEKISTAN AND DEVELOPMENT OF UNIQUE TENDENCIES	80
<i>Etuk Reuben Ufot, Etuk Grace Reuben</i> YOUTH UNEMPLOYMENT IN NIGERIA: LESSONS FROM TECHNICAL AND VOCATIONAL MANPOWER DIVIDE IN THE PETROLEUM INDUSTRY.....	84
Section 11. Technical sciences	91
<i>Botirov Tulkin Vafokulovich, Latipov Shahriyor Bahtiyorovich, Boboev Aziz Azimjonovich</i> ALGORITHMS FOR THE SYNTHESIS OF PARAMETERS OF REGULATORS BASED ON THE ESTIMATION OF THE STATE VECTOR IN ADAPTIVE CONTROL SYSTEMS AND REFERENCE MODELS	91
<i>Yusupbekov Nodirbek Rustambekovich, Jumaev Odil Abdujalilovich, Ismoilov Muhridin To'lqin og'li</i> IMPROVEMENT MEASUREMENTS OF ELECTROMAGNETIC FLOW METERS	95
<i>Abdukarimov Mirzohid Muratovich, Yodgorov Normahmad, Jalilov Abdulahad Turobovich, Bozorov Jurabek Turanovich, Mukolyants Arsen Artemovich</i> SYNTHESIS OF NEW ANTICORROSION COATINGS BASED ON GOSSIPOL RESIN	100
<i>Tahiri Valbona, Denaj Astrit, Vullkaj Ilir</i> ASSESSMENT OF LEAD (PB) CONCENTRATION IN COASTAL WATERS OF VLORA, ALBANIA, USING FLAME ATOMIC ABSORPTION SPECTROMETRY.....	104

Section 12. Physics	108
<i>Eshpulatov Barat, Xujanova Dilafruz Shakarbekovna,</i>	
<i>Asrarov Shuxrat Abbasovich</i>	
QUADRUPLE MAGNETOPOLARONS IN MAGNETOOPTICS OF A QUANTUM-DIMENSIONAL NANOSTRUCTURES	108
Section 13. Philosophy	112
<i>Ismailov Temurbek Islamovich</i>	
DEMOCRACY AND YOUTH: FORMATION OF DEMOCRATIC VALUES.....	112
Section 14. Chemistry	115
<i>Sattorov Laziz Holmurodovich, Kurbanov Abdirahim Akhmedovich,</i>	
<i>Abdirazakov Akmal Ibragimovich, Aralov Gayrat Muhammadievich, Ibotov Oybek Kuili ugly</i>	
TESTING BASALT FILTER IN LABORATORY AND INDUSTRIAL CONDITIONS	115
<i>Ho Soonmin</i>	
A SHORT REVIEW ON METAL OXIDE THIN FILMS.....	120
<i>Chikovani Manuchar, Kupatashvili Natalia, Kurasbediani Mariam</i>	
HYDROCHEMICAL ANALYSIS OF SOME MINERAL WATERS	123
Section 15. Economics	127
<i>Valishvili Tea, Genelidze Lia</i>	
ATTITUDE OF GEORGIAN CONSUMERS TOWARDS BRANDS	127