Biological sciences

Geological and Mineralogical sciences

Medical sciences

Philological sciences

Pedagogical sciences

CONTENTS

Sociological sciences

Technical sciences

HISTOLOGICAL ESTIMATION OF THE STATE OF FISHING MATERIAL AND COMMODITY FOOD PRODUCTS BY APPLICATION OF PROBIOTIC ACTING PREPARATIONS

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The article presents pathomorphological studies of internal organs of trout. In particular, the histological state of various organs (intestines, muscles, gills, kidneys, liver, stomach) and trout systems was studied in the application of domestic fodders with the inclusion of probiotic agents. A positive effect of domestic fodders with the inclusion of probiotic agents has been established, characterized by weight gain, lengthening of the intestine, accumulation of fat and other positive signs. Artificial forage "Domestic" and "Foreign" without probiotics, regardless of the commercial fish species, do not have a significant influence on the development of pathological processes in the body; do not cause a profound pathology in the organs. Relatively noticeable changes are noted in the liver in the form of fatty dystrophy, which over time is subject to the reverse process.

Keywords: Trout, probiotic, food, pathomorphology, pathology, fish

Fish, like other animals, are prone to various diseases. Fish diseases that occur in both natural and artificial water bodies cause significant damage to the fishery [1].

Especially acute is the problem in modern aquaculture. According to experts, the damage from diseases in artificial cultivation by individual age groups of fish can be up to 100%. Constantly changing, due to economic activity of a person, the conditions of keeping fish in aquaculture and the ecological situation in natural reservoirs lead to the emergence of new diseases or already known to appear in new forms. All this makes us constantly monitor the health of fish, the number of pathogens and develop measures to prevent the occurrence of diseases and reduce the damage from them [2].

Therefore, during the cultivation of valuable fish species, it is necessary to carry out sanitary and preventive measures, measures to combat diseases of fish and other aquatic animals, which requires the carrying out of ichthyopathological, histological, microbiological, physiological and biochemical studies, control and updating of regulatory and methodological documentation for the prevention and control of diseases of fish in fish farms of Kazakhstan [3, 4].

The results of the histological studies on the influence of domestic feeds with the inclusion of probiotic action preparations to replenish previously conducted experiments and will allow to comprehensively assess the ichthyopathological state of fish grown on domestic mixed fodders in aquaculture, which will allow early detection of various changes in their organism taking into account the main environmental factors their environment.

Materials and methods of research

The material was studied in the laboratory of "Antiparasitic Biotechnology" of the department "Biological Safety" of the Kazakh National Agrarian University. The object of research was trout (Fig. 1).

Classical, pathoanatomical methods were used with the preparation of macro and micro preparations from the selected material, histological preparations. Pathohistological examination of organs and tissues was carried out to detect microscopic changes, as well as to study the correlation of internal organs in the application of food.

The material for histological examination was fixed in a 10% neutral formalin solution. Serial paraffin sections 5 and 6 μm thick were prepared. Ultrathin sections were made on a semi-automated microtome HEOTION ERM 3100 (Fig. 2, a) and on a microtome MC-2.

Celloid, paraffin and frozen sections were prepared. Sections stained with conventional and some special histological methods: hematoxylin-eosin on the apparatus, a processor for coloring the sections of Leica No. S4040 / №000000358 (Fig. 2, b). Histological micropreparations were studied using a binocular microscope MBI-6 under various magnifications (Fig. 2, c).

Results of macroscopic examination before the experiment

At macroscopic research of a trout: a liver – is increased, yellow color, a consistence flabby. The gallbladder is full of bile orange color. Gastrointestinal tract – pale yellow color. When washed in water, the mucous membrane

is swollen, in some places there are spotted hemorrhages. The stomach is empty, shortened, pale gray, spotted hemorrhages were observed in the cardinal part (Fig. 3, a, b).

Swimming bubble. red-yellow color, a testy consistency, a surface on a cut of dark red color, hemorrhages are present under the pleura.

Heart: enlarged in the size of a round-oval shape. Under the epicardium there are many point hemorrhages. Myocardium is red-brown, coronary vessels are slightly filled with blood.

a) b)

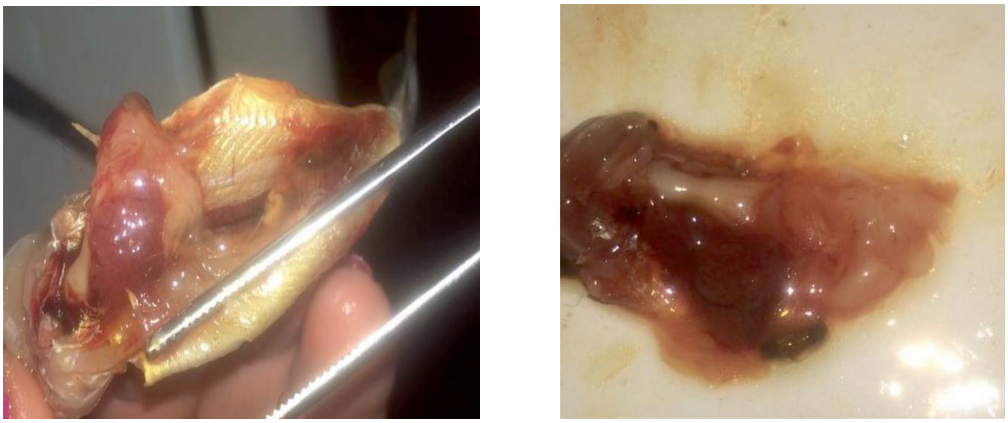
Fig. 1. Trout (a) – before the experiment; (b) – after the experiment

a) Semi-automatic microtome HEOTION ERM 3100 for the preparation of ultra-thin sections

b) Apparatus-processor for coloring of the Leica incisors No. S4040 / № 000000358

c) Equipment for microscopic research and fixation of results

Fig. 2



a) b)

Fig. 3. Gastrointestinal tract and liver of trout

The kidneys are enlarged, swollen, hyperemic, the capsule is easily removed, the cortical layer is dark red, the medulla is red.

Results of macroscopic examination after the experiment

During the experiment using domestic feeds with the inclusion of probiotic preparations, the trout mass increased accordingly, further differentiation occurred in the histological structure.

When examining the material 15 days after the start of the experiment, a noticeable lengthening of the intestine was established (Fig. 4).

Liver – the organ is enlarged, grayish-yellow in color, flabby consistency. The gallbladder is full of bile orange color. Spleen: not enlarged, pulp softened, dark cherry color. Swimming bubble. red color, a testish consistency, a surface on a red cut. Heart – myocardium on a section of uneven color, red-brown areas alternate with light gray dull areas, corresponding to the centers of cardiac muscle dystrophy. The kidneys are slightly enlarged, grayish-yellow in color.

Results of microscopic studies before the experiment

In the histological study of trout gills, the structure of the gill lobes has not been disturbed, the structure of the lamellae is preserved, the epithelial cells are hyperplastic (Fig. 5, a).

Kidneys – in the cortical layer of the kidney the epithelial cells of the tubules are saturated with eosin, their volume is increased, the walls of the tubules are thickened, the lumens narrowed. The boundaries of nephrocytes are indistinct, not expressed, the nucleus is in a state of pycnosis. Numerous small grains are located in the cytoplasm of cells (Fig. 5, b).

Intestines – the villi are thickened, the apex of many of them is devoid of epithelial lining and merges with the rosy-colored mass of catarrhal exudate that covers the mucous membrane. Crypts (Lieberkunovy glands) are preserved, the cytoplasm of cells is sharply vacuolized in a state of dystrophy mucosa.

At the core of the villi are numerous cell infiltrates: lymphocytes, histiocytes. On the mucosa in the rosy-colored mass of catarrhal exudate, it is possible to see the fallen, decaying cells of the epithelium (Fig. 5, c).

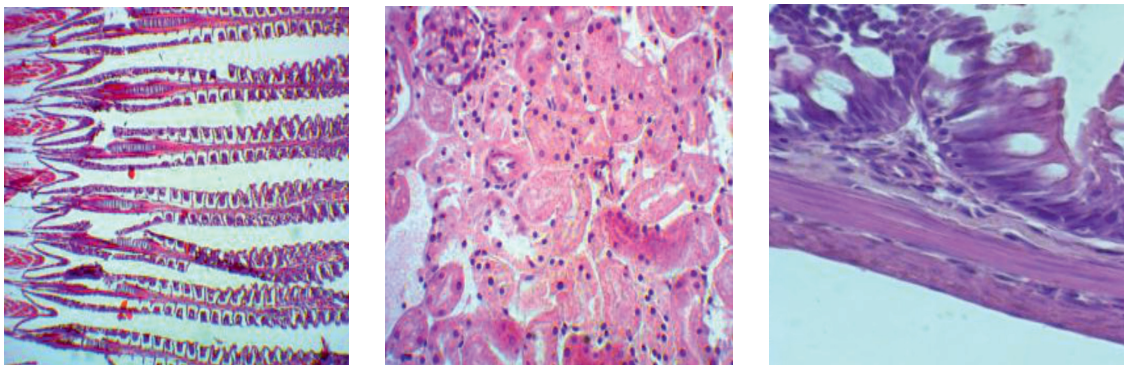
In muscles – the structure of muscle fibers is preserved, the sarcolemma is not broken, in some places the striated striation of the fiber is erased, the number of nuclei is reduced, the intermuscular connective tissue is edematous (Fig. 5, d).

In the liver, the changes were manifested by parenchymal dystrophy of hepatocytes, the vessels in most cases were full-blooded, the endotheliocytes swollen. Hepatocytes are enlarged in volume, the structure of the hepatocyte structure is broken, the number of nuclei is reduced, some nuclei are in the state of pycnosis, rex and lysis. Intermediate and interlobular blood vessels are blood-filled (Fig. 5, e).

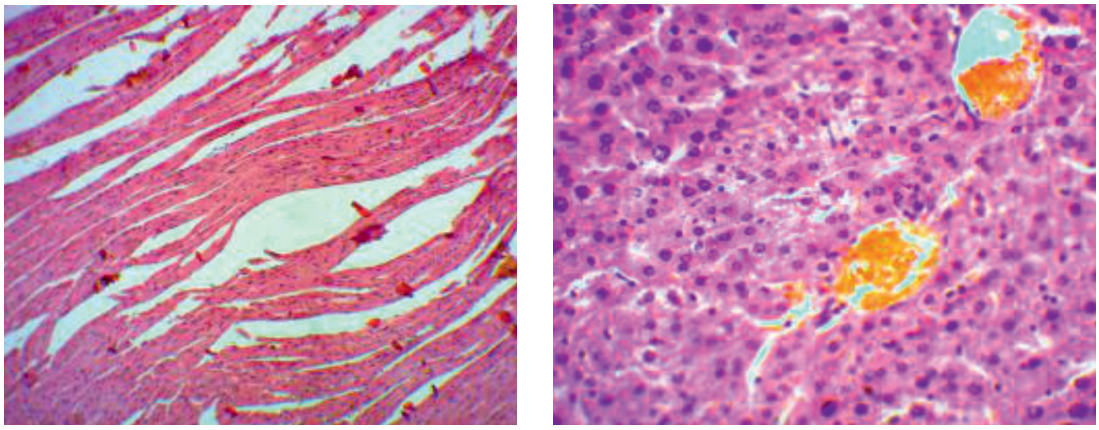
Results of microscopic studies after the experiment

Histological examination in gills in trout found that, basically, the structure of lamellae is not broken, the structure of gill lobes is preserved (Fig. 6, a).

Fig. 4. Gastrointestinal tract of trout at the end of the experiment



a) Gills b) Kidney c) Intestine



d) Muscle e) The liver

Fig. 5

Kidneys – one canaliculus in the state of granular dystrophy: they are intensively colored with eosin in pink, enlarged in size, their walls thickened, lumens narrowed. The boundaries between the cells are poorly visible. The cytoplasm of cells is fine-grained, the nuclei lie unevenly, some of them in a state of pycnosis and lysis. Other tubules are normal: their lumens are well marked, the nuclei are evenly distributed in each cell (Fig. 6, b).

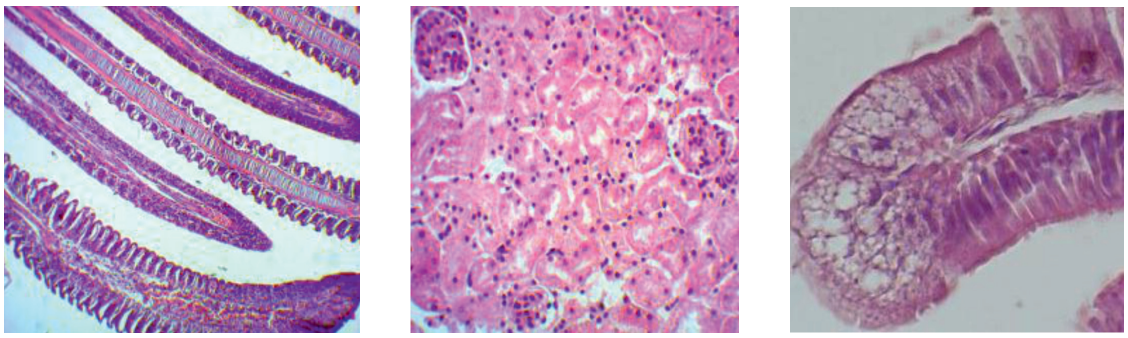
Histological analysis of the intestine showed that the epithelial cells in the apical part form vacuoles, leading to destruction and destruction of cells. The muscular membrane is thin, the connective tissue tissue is poorly developed, puffiness is observed in it. Outside, all pyloric processes are covered with adipose tissue (Fig. 6, c).

In muscles the structure of muscle fibers is preserved, the sarcolemma is not broken. The nuclei are located on the periphery of the fiber, in places the vacuolization of the intermuscular connective tissue is observed (Fig. 6, d).

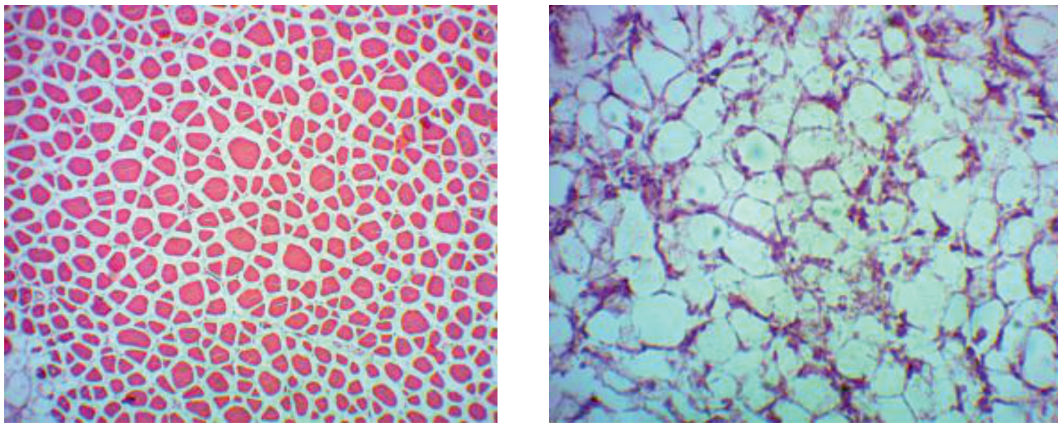
In the liver of trout is characterized by an increase in the size of hepatocytes due to the accumulation of lipid inclusions in the cytoplasm. Many hepatocytes were highly vacuolated and had nucleus cells pushed to the periphery. In some hepatocytes, pycnotic nuclei were observed. Histopathological examination of the liver showed that there were changes in many hepatocytes, circular vacuoles corresponding to the locations of the droplets of fat are seen in different sizes. Large vacuoles occupy the entire cytoplasm, so the nucleus is displaced to the periphery of the cell, the cells are filled with one large drop of fat and a nucleus mixed into the periphery. This phenomenon is called cricoid cells (Fig. 6, e).

Conclusion

Thus, on the basis of histological studies, using domestic feeds with the inclusion of probiotic agents, it was established that in the gastrointestinal tract, all experimental trout specimens showed no significant disturbances in the structure of the mucosa and muscle membranes.



a) Gills b) Kidney c) Intestine



d) Muscle e) The liver

Fig. 6

The revealed changes are compensatory-adaptive.

The histological structure of the liver is characterized by a well-defined tubular structure of the parenchyma with wide sinusoids. The cytoplasm of hepatocytes is homogeneous, but there are individual hepatocytes with small fat vacuoles. Some individuals have vasodilatation and local expansion of sinusoids. In general, the liver of fish has no noticeable pathological disorders.

Pathological changes in muscle tissue and the rest in the organs are considered as moderate.

On the basis of the obtained pathomorphological data, it can be concluded that the positive effects of domestic fodders with the inclusion of probiotic agents, which were characterized by an increase in the mass of individuals, lengthening of the intestine, accumulation of fat and other positive signs. The established minor changes do not tend to disrupt the structure of organs and tissues, do not hinder the growth of fish.

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FRACTAL CHARACTERISTICS OF NATURAL OBJECTS

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Fractal models are simple and are briefly described. Their potential is not fully used yet in geology and environment sciences. Our goal is to investigate the fractal characteristics of diverse geological objects and strive to find an application for them. Fractal dimensions of the suture lines of ammonite shells, granite textures and the Onega-Ladoga river network portions and multi-fractal sedimentation spectra for European postglacial lakes were calculated. It was shown that ammonite species can be identified from the fractal dimensions of the suture lines of shells and that the texture fractality of granites can be used to improve their aesthetic perception. The fractal dimensions of the river network and the multi-fractal sedimentation spectrum were shown to be related to tectonics. The study demonstrates the efficiency of mathematical methods in natural sciences and the use of fractal models for setting and solving geological problems in particular.

Keywords: Ammonite shell, fractals, lake sedimentation, lobar line, river network, rock texture

The constituents of fractal objects are similar to the object itself. The object typically displays a structure, which is complex on some scales, and a metric dimension different from topological. A fractal pattern is typical of many geological objects and processes. The entire environment is often assumed to have fractal properties.

Fractal models are popular because they are simple and are briefly described. With a small number of parameters such models can adequately consider the properties of objects, reflect the integrity and hierarchy of a structural level and reveal hidden laws. In the humanitarian sphere, they allow to see simplicity in complexity, regularity in chaos, similarity in diversity, to connect many facts with a small number of hypotheses. In technical applications fractal models are used for data clustering and classifying and image processing. The potential of fractal models in natural sciences is far from exhausted.

The goal of the paper is to analyze the fractal properties of some natural objects, such as the lobar lines of ammonites, rock textures, river networks and varved clays, and to use them for solving geological problems. We seek to identify the type of ammonite on the dimension of the lobar line of its shell, to show that rock textures are fractals and that river networks and lake sedimentation are correlated to tectonics.

Lobar lines of ammonite shells

Ammonites are relatives of quids and octopuses and represent an extinct subclass of cephalopods named after the Old Egyptian god Amona. Ammonites came to exist in the Paleozoic, evolved completely in the Mesozoic and died off in the late Cretaceous Period. During this time span they were repeatedly born, died, spread over the ocean and evolved rapidly. In stratigraphy, this group of sea relics is used to estimate the relative age of sedimentary rocks, to subdivide rock sequences and to correlate geological units. It is most commonly used for the subdivision of the Jurassic (201-145 Ma) and Cretaceous (145 – 66 Ma) systems [10].

The soft body of a mollusk in a structurally complex ammonite shell occupies the last (living) chamber of the shell, while other chambers are filled with air. The gas regime of the chambers controls a siphon, a muscular strand which extends from the posterior end of the body through all chambers. The line of its attachment to the shell is called a suture or lobar line. As the lobar lines evolved, they became more complex presumably because the shell was getting more durable to be able to resist external factors such as water column pressure, water movement in near-shore zones, and to maintain the stable position of the soft mollusk body and the strand within the shell. The suture line could act as a marker during lit-par-lit shell formation.

Sedimentary rocks often contain shell fragments that can hardly be used to determine ammonite species. A lobar line can help in this case. Classifying ammonite with the help of a lobar line is like trying to reconstruct an object by analyzing its constituent. Curves that differ in shape can be compared in a simpler manner by analyzing their fractal dimensions.

The metric dimension of lobar lines was calculated in MATLAB computer mathematics package as a known cell dimension. The image region was split up into δ-sized cells and calculated the number of the cells N(δ) that cover the line plot. The cell dimension was doubled and the number of cells was re-calculated, etc. The data in the coordinates ln(δ), ln (N) were approximated by a straight line using

the least-square method. The absolute value of the angular coefficient of the straight line was assumed to be the fractal dimension of the lobar line

$$D = -\lim_{\delta \to 0} \left(\frac{\ln(N(\delta))}{\ln(\delta)} \right). \quad (1)$$

Fig. 1 shows the lobar lines of some ammonite species [5] (a-c) and their dimensions estimated using the algorithm described (d). The fractal dimensions of the lobar lines were D = 1.29 ± 0.02 for *Spectoniceras elegantum*, D = 1.34 ± 0.02 for *Craspedodiscus borealis* and D = 1.45 ± 0.02 for *Deshayesites collevarus* (Fig. 1 (d)).

It can be see from this example that different values of the fractal dimensions of the lobar line allow one to determine the type of ammonite.

Fractal Dimension of Rock Texture

The term "dimension stone" is applied to rocks used for the production of ornamental and facing materials, architectural structures and technical articles. This group includes igneous rocks such as granite, granite-gneiss, granodiorite, diorite, gabbronorite, gabbro-diabase, pyroxenite, peridotite, nepheline syenite, porphyrite and volcanic breccia; metamorphic rocks such as quartzite, quartzitic sandstone, marble, amphibolite, shungite shale and talc-chlorite schist; sedimentary rocks such as limestone, dolomite, calcareous tuff, limestone and gypsum. The characteristic features of dimension stone are decorative value, durability, unchangeable colour, mosaicity, wear resistance, water absorption, frost resistance and physico-mechanical properties. The aesthetic perception of dimension stone is attributed to its colour and ornament. The colours of the constituent minerals are responsible for the colour of dimension stone. Its ornament depends on the structures, textures and colours of rock constituents. Rock texture looks like a fractal image.

The fractal texture of a rock as a combination of contrasting mineral grains was studied using granite samples (Fig. 2) from the collection exhibited in the Museum of Precambrian Geology at the Institute of Geology, Karelian Research Center, Russian Academy of Sciences.

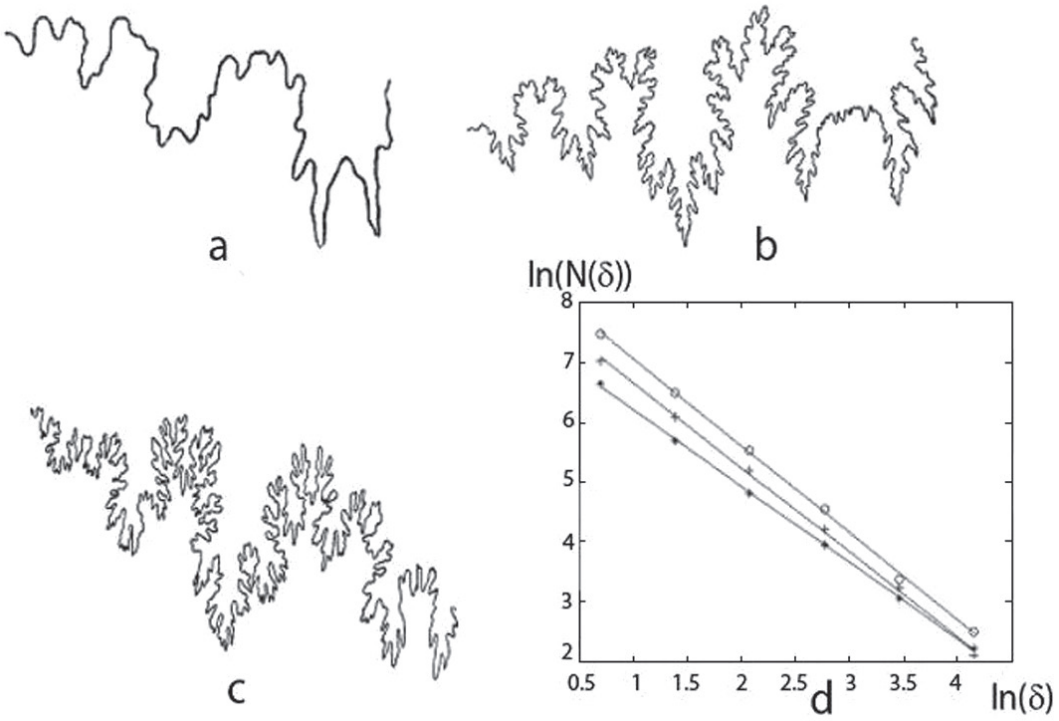

Fig. 1. Lobar lines of ammonites: a) *Spectoniceras elegantum* at a revolution height of 9 mm (*); b) *Craspedodiscus borealls* at a revolution height of 51 mm(o); c) *Deshayesites collevarus* at a revolution height of 60 mm (+); d) plots for estimation of cell dimensions

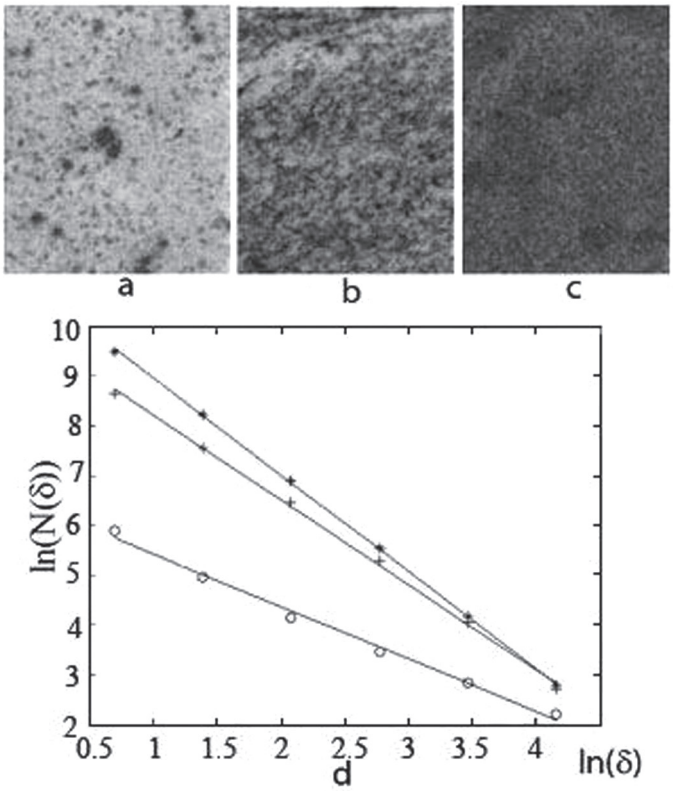

Fig. 2. Images of granites from Snezhny Bars (a), Shatkov Bor (b) and Lisya Guba (c) deposits, Karelia, and plots for calculation of their metric dimensions, “o”, “+” and “*” respectively

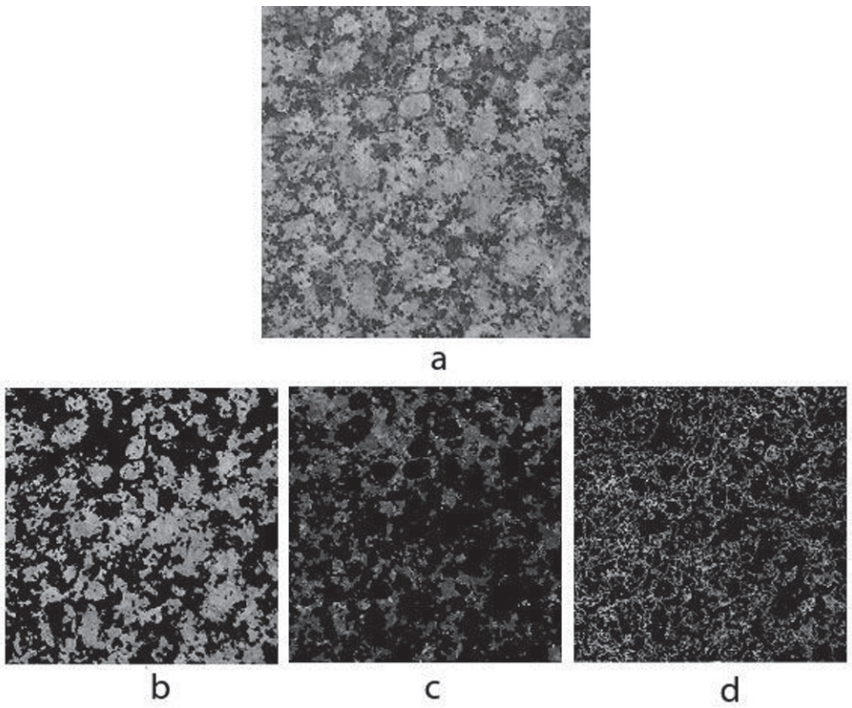

Fig. 3. Image of rapakivi granite (a) and the space distribution of the mineral grains of K-feldspar (b), quartz (c) and oligoclase (d)

Scanned images (a-c) were converted to a black-and-white format and inverted, assuming that the dark grains are the most intense. The fractal pattern of the textures of the images obtained was supported by the calculations shown in Figure 2d 1.07 ± 0.01 (a), 1.70 ± 0.01 (b), 1.94 ± 0.01 (c).

To estimate the fractal texture dimensions of polymict rocks, their images were subjected to pixel segmentation in colourspace by k-means clustering algorithm. The result of this procedure for rapakivi granite is shown in Fig. 3 [2].

The fractal dimensions of the K-feldspar, quartz and oligoclase distributions, respectively (r), estimated in this manner, were 1.71, 1.77 and 1.61.

The distributions obtained represent the real physical fractal components of rapakivi granite. It is known that fractal patterns affect the working capacity and cognitive abilities of a person [9]. By activating the brain stem structures and its regulatory mechanisms, they reduce fatigue, order

memory, increase resistance to stress. It is possible that the selection of rock textures with certain fractal properties can improve their aesthetic appeal.

Fractality of the Onega-Ladoga river network

River networks are traditional objects in fractal geometry. For a river network, as a system in which the energy of the ordered motion passes into other types, the fractal structure is advantageous and is realized due to the property of the system to choose a path with a minimum energy dissipation. The characteristics of the river network, calculated from the fractal model, are consistent with observations for the number of flows of a given order, their average length, catchment area and other parameters of river flow [1].

The rivers flow in topographic lows and are connected with crustal faults. Fractal dimension, reflecting the density and branching of the river network, may characterize the tectonics of the region. The verification of this assumption was carried out on the sections of the Onega-Ladoga hydrographic network (Fig.4a), selected by their proximity to the elements of the tectonic structure represented by the boundary of the Russian Plate of the East European Platform and the Fennoscandian Shield and the suture zone of the Svecofennian and Karelian blocks of the Fennoscandian Shield [8].

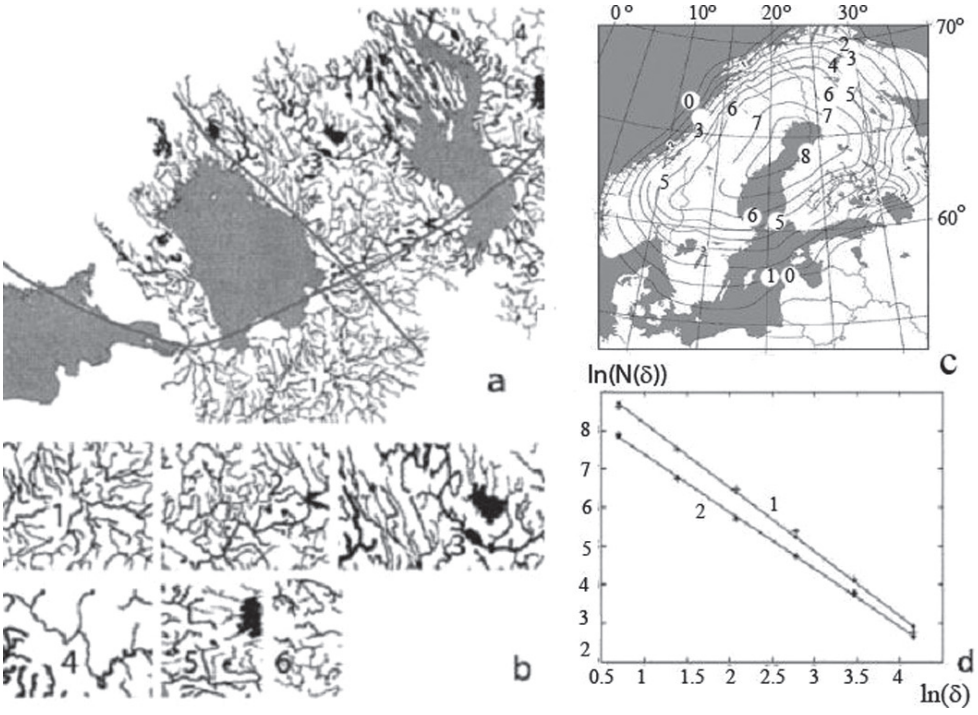

Fig. 4. The Onega-Ladoga river network with the elements of tectonic structure (a) and the sections of this network (b) chosen for analysis, the map of Fennoscandia [3] (c) and the plot (d) for the calculation fractal dimension of sections 1 and 4 (lines 1 and 2)

The boundary of the shield (Fig. 4, c), built by the hydrographic principle [6], is manifested by a stepwisw landform and the nature of the contact of Precambrian formations with a platform cover. Depressions, uplifts, tectonic zones, and horst-graben systems alternate along it. It generates seismic events, sets the starting level of the rise of Fennoscandia, causes the flooding of the coasts in Denmark and the Netherlands. The elevation of Fennoscandia and the deflection of the Russian Plate in the joint zone were responsible for the characteristics of the regional river network, forcing the rivers flow into this area from the north and south. The conjugation zone of the Karelian and Svecofenian geoblocks formed in the Late Archean as the boundary of the protocrust with the forming continental crust.

During geological time, there were manifestations of intrusive mantle magmatism here. Extensive evidence for neotectonics are found on Tulomozero Plain, stretching along the conjugation zone and on Valaam Island. Modern progress, as a rule, inherits ancient movements.

Fractal dimensions for the sections of the Onega-Ladoga river network (Fig.4b) were calculated (Table, Fig. 4, d).

Fractal dimension of the sections of the Onega-Ladoga river network

Number of section	Fractal dimension	Number of section	Fractal dimension
1	1,67	4	1,38
2	1,67	5	1,52
3	1,61	6	1,48

The values obtained for the fractal dimensions of the Onega-Ladoga river network sections confirm the characteristic pattern for the territory of Russia and the former USSR, the fractal dimensions of the river networks vary from 1,1 to 1,7 [7].

The river network sections, close to the elements of the tectonic framework, have increased fractal dimension values. With the removal from these elements, the fractal dimension of the network sections decreases. The proximity of the fractal dimensions of sections 1-3 and 4-6 is related to their position within the central and marginal parts of Fennoscandia's border. The difference in these group of fractal dimensions is due to the remoteness of fragments 4-6 from the suture zone of the contact of the Svecofennian and Karelian geoblocks.

It is difficult to unequivocally interpret the influence of tectonics on river systems. On the one hand, its impact is associated with the feeding of rivers, their erosion work, changes in current direction, the morphology of the valleys and the river network density. On the other hand, rivers can arise without any contribution of tectonics, flowing out of swamps and lakes.

Calculations show that appreciable channel wanderings, invoked by erosion of rocks and sediments, are not characteristic of rivers flowing in rock massifs. Tectonics remains one of the main factors in the formation of the regional hydrographic network described. The continuing rise of Fennoscandia, the deflection and fragmentation of the Russian Plate contribute to the renovation of the former, the formation of new faults in the earth crust and the density of the river network. formation of new faults in the earth's crust, the density of the river network.

Multifractal spectra of varved clay

Varved clay is a convenient material for the study of climatic changes and depositional environments. Varved clay deposits, formed annually in postglacial lakes, consist of light and dark laminae composed of sand supplied in summer and living organisms that died off in winter. The thickness of the laminae provides evidence for the velocity of sand supply and the freezing time of a water body. The multi-fractal parameters of varved clays were assumed to be sensitive to variations in sedimentation regime. This assumption was checked by analyzing varved clay samples from lakes Onega and Ladoga. Data on varved clay columns from lakes Onega (61°41', 35°35') and Ladoga (Heluli) are provided by S.A. Vyakhirev. The sedimentation process in them was described by numerical series represented by the ratio of a winter layer thickness to annual layer thickness (Fig. 5 a, b). The multifractal spectrum was calculated as a function of the Hausdorff dimensions f (α) from the singularities α [4]. The above calculations were carried out in the MATLAB computer mathematics system using the algorithm and program [4]. The multi-fractal varved clay spectra obtained are shown in Fig 5 c. These spectra display a typical bell shape with $f(\alpha) < 1$.

It can be seen from Fig.5 that clay from Lake Onega is more regular than that from Lake Ladoga. Its narrow spectrum (curve 2) is close to mono-fractal, which is characteristic of the Brownian process. The spectrum of the clay column from Lake Ladoga (curve 1) is shifted and broadened. Its structure is determined by the singularity indices α in the range 1,025-1,30. The width of the spectrum is estimated from the perturbations of the sedimentation process.

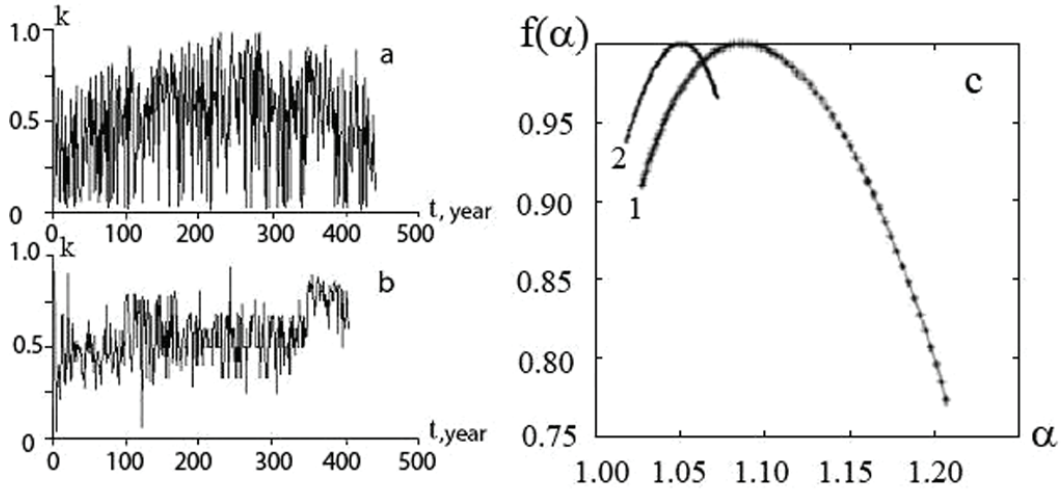

Fig. 5. Series of the ratio of the thickness of the summer puff to the thickness of the annual layer of sections of the varved clay of the Ladoga (a) and the Onega (b) lakes, their multifractal spectra (curves 1, 2), respectively (c)

In contrast to the Onega region, the Ladoga region shows a weak modern seismic activity.

Monitoring of seismic events on Lake Ladoga was conducted by monks of the Valaam Monastery in 1916-1927. In the epicentral zone weak earthquakes can cause hum, water boiling and luminous formations. These phenomena are often observed to the west and southwest from the Valaam island in a zone with underwater troughs, ridges of northwest stretch and the greatest water depths of 200-260 m. The effects observed seem to be associated with the ongoing discharge of fluids. Weak earthquakes could have been triggered by meteorological phenomena. Wind, waves and variations in the lake level invoke a seiche that generates micro-earthquakes. Such phenomena disturb the course of sedimentation and make this process irregular.

The influence of tectonics on sedimentation is demonstrated by changes in deep-sea formations triggered by shallow formations, and vice versa. The disturbance of stratification in banded clay sequences is especially noticeable in water reservoirs located near seismic dislocations. This disturbance makes it possible to estimate the years of an earthquake and the frequency of seismic events. The multi-fractal spectrum is capable of describing an irregular sedimentation pattern when the disturbance of stratification is poorly-defined.

Conclusion

The fractal nature of the objects discussed was proved by estimating their metric dimensions and multi-fractal characteristics. These characteristics of the objects are sensitive to the conditions of their formation and evolution.

The results obtained show that the lobar line of a shell is consistent with ammonite species, that dimension stone has a fractal texture and that the metric dimension of the river network and a multi-fractal sedimentation spectrum reflect the influence of the region's tectonics.

The study demonstrates the efficiency of mathematical methods in natural sciences and the use of fractal models for setting and solving geological problems in particular.

The author expresses gratitude to Sergey Vyakhirev for the provided materials on varved clay columns.

This work was performed within the framework of the theme "3D Karelia lithosphere model based on geological and geophysical data".

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EFFECTIVENESS OF THE APPLICATION OF CLINICAL CASES IN THE EDUCATIONAL PROCESS

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The aim of the research is to assess the effectiveness of training using clinical cases according to the program "Erasmus Plus". The tasks of the research are to identify differences in the performance of students who are trained with the use of clinical cases and those ones who are trained by traditional methods; as well as to identify advantages and disadvantages of the innovative method. The survey was conducted among 86 4-year students of the specialty "General Medicine" (Karaganda State Medical University). It has been established that the innovative method has more advantages in comparison with traditional teaching methods.

Keywords: Erasmus Plus, case study, clinical cases, teaching methods, innovations

"Erasmus Plus" is a new program of the European Union for the period from 2014 to 2020, aimed at supporting projects, cooperation, academic mobility in the field of education, training, sports and youth policy. The program is aimed at further promoting the modernization and sustainable development of education system, supporting the development of youth policy and sports as well as improving skills and, thus, improving the employment opportunities for people. The new program envisages a significant increase in investments in human development.

In the framework of this program, training of 4-year students of KSMU (Karaganda State Medical University) is provided on the base of adopted clinical cases.

Despite obvious advantages of classes given according to the new innovative method, among pedagogical literature, there are not scientific researches devoted to the analysis of advantages and disadvantages of application of the program in the educational process. It was key factor in conducting this research.

The aim of the research is to assess the effectiveness of training using clinical cases according to the program "Erasmus Plus".

The tasks of the research

1) to identify differences in the performance of students who are trained with the use of clinical cases and those ones who are trained by traditional methods;

2) to identify advantages and disadvantages of the innovative method.

Materials and methods of research

The survey was conducted among 4 groups of 4-year students (43 students) of the specialty "General Medicine" who were trained in the discipline "Children's diseases" according to the program "Erasmus Plus" on the basis of clinical cases – 6 separating and 6 linear cases; and the same number of students who studied this discipline by traditional methods.

The questionnaire included the following questions:

1. Do you think there were any advantages in the case study? If so, describe these features. And why do they seem to be strengths?

2. Do you think there were any disadvantages in the case study? If so, describe these features. And why do they seem to be weaknesses?

3. How would you rate your mental strain during the solving of a case (from 0 to 10 points)?

4. Choose your impression of working with a case with a virtual patient from the presented options, such as:

– I make decisions, which would be made by the doctor in real life;

– As the scenario developed and new information was received, I was actively involved in the process of revising the initial vision of the patient's problems;

– While working on this case, I was constantly thinking about what kind of new information would confirm or disprove the differentiated diagnoses formulated initially;

– After solving the case, I had the opportunity to prepare better for work with differential diagnostics and confirm the patient's exact diagnosis based on his problems – complaints.

5. Please, note how much you are sure you would have coped with the following tasks before and after the case.

Results of research and their discussion

The analysis of students' academic performance in the groups, in which a number of topics were studied in accordance with the cases, showed higher results (87% – grade average)

comparing with the performance in the groups where training was not conducted in accordance with adopted cases (84% – grade average). However, these differences were not significant.

According to the results of the questionnaire, the following advantages of the innovative method were identified: cases were as close as possible to actual clinical practice and allowed to develop the ability to concentrate on solving problems of a specific virtual patient, increased the skills of teamwork, with the adoption of a common solution. It was also noted that the complex approach to conducting classes in discipline using clinical cases increased the skills of clinical thinking and sense of responsibility. In the general complex, one of the most important elements of the analysis of the clinical cases by the student, apart from the correctness of the decision, was the high level of activity of each student, the completeness and originality of the solution, the ability to evaluate their work and the activity of each member of the group. The method gave the opportunity to the students to develop their clinical thinking on the topic with the use of knowledge of Anatomy, Physiology, Evidence-Based Medicine and other related sciences. Students could develop the ability to accept different points of view, the ability to cooperate and resolve conflicts in the process of teamwork. This approach gave the teacher an opportunity to assess several students in a short time.

The following disadvantages of this method were noted: the lack of the possibility of conversation and application of objective examination of a particular patient. Some students had difficulties in working in a team; the lack of individual assessment of each student.

When assessing the mental strain of students during solving the case, mainly an average degree (5-6 points) of mental strain was noted; this had no effect on the outcome of the work in the team. The activity of students was also revealed in the form of desire to participate in research work of the department and university as a whole, interest in the topic of the lesson.

Conclusions

Thus, the experience of teaching students using the innovative method, in our opinion, combined with problem lectures, can determine high efficiency in professional orientation, the formation of clinical thinking and creative approach to the learning process. The obtained subtle differences in students' academic performance may be determined by the fact that the introduction of new teaching methods in pedagogical practice is not a matter of one day. It would be very useful to create a system of exchange and transfer of experience of their use at the university level.

In conclusion, we would like to express gratitude to our scientific adviser – the Head of Foreign Languages Department, c.p.s., associate professor V.A. Burmistrova.

THE EFFECTIVENESS OF ENDOVASCULAR AND SURGICAL METHODS OF HEMOSTASIS IN PATIENTS WITH HIGH RISK OF POSTPARTUM HEMORRHAGE

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Obstetric postpartum hemorrhage is the leading cause of maternal mortality worldwide. Developing countries have a disproportionately high rate of fatal bleeding compared to industrialized countries. In most cases, early postpartum bleeding leads to death. In order to reduce mortality from postpartum bleeding, it is necessary to identify patients at high risk, accurately analyze blood loss and life indicators, correctly choose therapy and surgical methods of hemostasis. Temporary balloon occlusion of internal iliac arteries, embolization of uterine arteries, ligation of internal iliac arteries are modern organ-preserving methods of prevention and relief of postpartum bleeding. These techniques are also effective in cases of obstetric bleeding to create a complete hemostasis or reduction of blood flow at the time of the hysterectomy. Comparison of endovascular and surgical methods of hemostasis in two groups of patients with high risk for early postpartum hemorrhage, such as: cesarean section in anamnesis, placenta previa, anterior location of placenta, increment and rotation of the placenta, has shown high clinical efficacy of endovascular methods,such as temporary balloon occlusion of internal iliac arteries and uterine artery embolization.

Keywords: postpartum hemorrhage, a temporary balloon occlusion, uterine artery embolization, ligation of internal iliac arteries

Postpartum obstetric hemorrhage plays a key role in the structure of maternal mortality worldwide. The maternal mortality rate in 2015 is 303,000 women who died during and after pregnancy and childbirth, reflecting a 43.9% decline between 1990 and 2015 [4]. Almost all fatal cases of PPH were noted in countries with low income, and most of them are recognized as preventable. Developing countries have a disproportionately high rate of fatal haemorrhages, accounting 99% of the global structure, in comparison with industrialized countries, where rate is about 1% [5]. Improving the quality of health care for women in childbirth for the prevention and treatment of postpartum bleeding is a crucial step towards achieving the UN Millennium development goals [11].

In most cases, early postpartum bleeding leads to death. [10.3]. The risk factors for postpartum bleeding include: placenta previa, caesarean section, a history of postpartum bleeding, a history of multiple pregnancy, the elongation of the third stage of labour, retained placenta and its parts in the uterus, preeclampsia, mid-lateral episiotomy, weakness of patrimonial activity, a trauma of the birth canal, a large fetus, operative vaginal delivery, hypertension, chronic anemia, low socio-economic background, maternal age older than 35 years, uterine fibroids [3,6]. The causes of early postpartum bleeding are: violation of uterine contraction; delay of parts of the placenta or blood clots in the uterine cavity; trauma of the birth canal, uterus, vagina; pre-existing or acquired coagulopathy. The causes of late postpartum bleeding include: postpartum infection, hereditary hemostatic defects, the presence of placental tissue residues, subinvolution of the uterus [8].

Strategy in reducing mortality from postpartum hemorrhage include: identification of high-risk patients, analysis of the state of childbed a precise assessment of blood loss and vital signs, the correct choice of drugs, methods of treatment, transfusion therapy and if necessary surgery in the early stages of postpartum bleeding [7]. Knowledge of vascular anatomy of the pregnant uterus helps to evaluate the effectiveness of various methods of hemostasis in advance and choose the best one for each specific clinical case, due to the variety of collaterals of the vascular bed. Preference is given to organ-preserving methods of surgical treatment aimed at reducing blood loss, and providing the possibility of minimally invasive operations with preservation of reproductive function, such as balloon occlusion of the internal iliac arteries (BOIIA), uterine artery embolization (EUA), as well as the use of autohemotransfusion [2].

Balloon catheters installed in both internal iliac arteries are relatively safe and in most cases effective method for the prevention and treatment of bleeding in the postpartum period [1]. Favorable outcomes are also described in the application of bilateral ligation of the internal iliac arteries. This technique is effective in cases of obstetric bleeding to create a complete hemostasis or reduction of blood flow at the time of hysterectomy [9].

The purpose of this study was to evaluate the clinical efficacy of endovascular treatment

techniques such as temporary balloon occlusion of internal iliac arteries and uterine artery embolization combined with temporary balloon occlusion of internal iliac arteries, and surgical methods of hemostasis such as temporary ligation of the internal iliac arteries (IIA) , temporary ligation of the common iliac artery (CIA) permanent ligation of the common iliac arteries in patients with high risk of early postpartum hemorrhage.

Materials and methods of research

On the basis of the Perinatal center of State Pediatric Medical University, Saint-Petersburg from 2014 to 2017 was conducted a study of the clinical efficacy of surgical and endovascular hemostasis techniques among women with postpartum bleeding. The study was conducted in two groups. The first group consisted of women who, after the birth of a child through the natural birth canal or fetal extraction during cesarean section, for the purpose of temporary reduction of blood flow, a method of temporary balloon occlusion of internal iliac arteries was used in combination with subsequent embolization of uterine arteries (6 person) or exclusively a method of embolization of uterine arteries (8 person). The second group underwent temporary ligation of internal iliac arteries (1 person), permanent ligation of internal iliac arteries (3 people), temporary ligation of common iliac arteries (1 person). The choice of technique depended on the intensity of bleeding and effectiveness in achieving hemostatic effect.

The criterion for inclusion of women in the study was the presence of risk factors for the development of early postpartum bleeding, such as: caesarean section in the history, placenta previa, placenta anterior arrangement, placental increment and rotation, and the use of surgical or endovascular methods for hemostasis.

The average age of patients was 32 years. The scope of the study included a comparative analysis of such clinical indicators as: hemoglobin level, red blood cells, platelets, hematocrit at the time of transfer to the intensive care unit, the volume of hemotransfusion, type of anesthetic benefit, the duration of the surgical stage of the operation, hysterectomy, the presence of complications in the postoperative period, x-ray doses, the volume of hemotransfusion and blood reinfusion using the Cell-Saver-5, the number of intensive care days.

Results of research and their discussion

Table presents the studied parameters in two groups of patients. The analysis allows to correlate clinical parameters in the application of various methods of hemostasis in the early postpartum period.

Thus, average duration of hospitalization was 11.42 days in the first group of patients, while in the second group – 12.8 days. At the same time, length of stay in hospital after delivery in the first group was also less, compared with the comparison group, and amounted to 6.64 days, in the second group – 7.2 days.

The average volume of blood loss in two groups studied was also significantly different, in the main group it amounted to 1671.42 ml. in the comparison group 3100 ml, which is a significant indicator in the clinical effectiveness of the methods used in patients of the first group, as well as the volume of hemotransfusion and blood reinfusion using Cell-Saver-5. In the first study group, the average amount of blood transfusion amounted to 1097,4 ml. in the second – 1895,8 ml average volume of blood reinfusion in the first group was 399,7 ml in the comparison group 700,6 ml.

Comparison of the prevalence and frequency of postoperative complications confirmed low-trauma minimally invasive techniques. Postoperative complications were not revealed in 100% of examined cases in the group with the use of endovascular hemostasis methods, while in the group of patients with the use of surgical hemostasis methods the case of adhesive intestinal obstruction was recorded.

Also, an important role has the form of anesthetic benefits. Thus, in the first group of patients, in 57.15% of cases, epidural anesthesia was used, which is preferred due to the lack of risk of complications associated with tracheal intubation, in 42.8% of cases, combined endotracheal anesthesia was used. In the second group, endotracheal anesthesia was used in 100% of cases, due to the peculiarities of this type of surgical intervention and the volume of blood loss. At the same time, the total duration of the surgical stage was higher in the first group and amounted to 151.42 minutes, while in the second group – 138.8 minutes.

The duration of stay of patients in the intensive care unit also differed in two groups and amounted to 1.78 days in the first and 3.4 days in the second group.

One case of uterine extirpation was observed in both study groups, corresponding to 7.14% in the main group, and 20% in the comparison group. Also, the analysis revealed no significant differences in the degree of anemia in the postoperative period, due to the conduct of reinfusion and autohemotransfusion of blood in the early postpartum period. The average dose of x-ray radiation when performing interventional operations, made up 11.24 mSv.

Clinical indicators in groups of patients with early postpartum bleeding

№	Indicator	The main group (14 person)	The comparison group (5 person)
1	Average age (years)	32,85	32,2
2	The type of surgical treatment	endovascular treatment (EUA, EUA+BOIIA)	surgical treatment (temporary ligation IIA, permanent ligation IIA, temporary ligation CIA)
3	Average length of hospital stay (days)	11,42	12,8
4	Average number of bed days after surgery (days)	6,64	7,2
5	The average volume of blood loss (ml.)	1671,42	3100
6	The level of hemoglobin in the early postoperative period	anemia of I degree-71,4 % anemia of II degree-21,4 % anemia of III degree 7,4 %	anemia of I degree – 60 % anemia of II degree – 40 %
7	The average volume of blood transfusion (ml.)	1097,4	1895,8
8	The average amount of reinfusion with cell-Saver-5 (ml.)	399,7	700,6
9	The kind of anesthesia	endotracheal anesthesia-42,85 % epidural anesthesia- 57,15 %	endotracheal anesthesia – 100 %
10	The average number of intensive care days	1,78	3,4
11	The average duration of the surgical stage (min.)	151,42	138,8
12	A hysterectomy	1 case(extirpation of uterus without appendages)- 7,14 %	1 case (extirpation of the uterus with the right appendages) – 20 %
13	The presence of complications in the postoperative period	no-100 %	1 case (adhesive intestinal obstruction) – 20 %
14	The average x-ray exposure dose (mSv)	11,24	0

Conclusions

In a group of patients where endovascular hemostasis techniques were used, clinical efficacy was higher than in a group of patients who underwent surgical hemostasis techniques. Uterine artery embolization and temporary balloon occlusion of the internal iliac arteries are minimally invasive and effective organ-preserving operations that allow to preserve fertility and quality of life of women after postpartum bleeding.

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A NEW STEP IN THE TREATMENT OF CHRONIC INFECTIOUS PROSTATITIS

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The aim of our study was to compare the effectiveness of treatment of patients with chronic infectious prostatitis by gemifloxacin in combination with azithromycin + complex therapy in the main group (MG); and ofloxacin + similar therapy in the control group (CG). The object of observation were 104 patients with infectious prostatitis. They were randomized into two groups: 53 men in MG and 51 man in CG. Almost half of patients were detected with C. trachomatis in the form of monoinfection. The immediate and remote results of the developed regimen showed its high efficiency after the treatment. Adding azithromycin fluoroquinolones increased the effectiveness of therapy in both groups, but it was higher in MG. A new effective treatment regimen for patients with chronic infectious prostatitis was proposed to practical health care.

Keywords: chlamydial infection, chronic prostatitis, antibacterial therapy

Infections of the genital tract are considered common causes of male fertility disorders, with a prevalence of 6-10 % [1]. Most of the affected men are asymptomatic [2, 3].

Urogenital chlamydial infection of lower genitourinary tract is of great interest today [4].

Today, chronic prostatitis is the most common urological disease in men younger than 50 years.

Special attention these days should be given to infectious prostatitis, which occurs on the background of chronic urethritis, often caused by *C. trachomatis*.

The diversity of the etiology and pathogenesis of this disease causes difficulties in the choice of therapy.

The purpose of this research is to study the effectiveness of treatment of patients with infectious prostatitis combining azithromycin, gemifloxacin and integrated therapy.

Materials and methods of research

The study included 104 patients with infectious prostatitis randomized in the main group (MG) – 53 men and the comparison group (CG) – 51 men.

In both groups the contingent workers from 33 to 50 years prevailed. Most patients were married. The duration of prostatitis often accounted for terms from 3 to 6 years (MG – 83.1 %, CG – 84.4 %).

The patients' prostate glands were ultrasound tested, which confirmed the diagnoses and specified the nature of the changes in them. During the etiologic evaluation of patients the PCR (polymerase chain reaction) and the Real Time PCR were used. The cultural research was conducted to determine *Tr. vaginalis* and *N. gonorrhoeae*. The anaerobic flora in the content of the prostate gland was allocated. The level of testosterone, follicle-stimulating hormone and prolactin was determined by ELISA (enzyme-linked immunosorbent assay).

84.8 % of patients in the MG and 81.3 % in CG had serous secretions, often of abundant nature. 52.9 % in MG and 56.9 % in CG were diagnosed with anterior urethritis.

C. trachomatis were detected in almost half of patients in the form of monoinfection. In 20.8 % of patients in the MG and 21.6 % in CG had a combination of *C. trachomatis* and *U. urealyticum*. Peptostreptococcus and E. coli were most frequently found in opportunistic flora. In both groups' patients with significant increase in the quantity of leucocytes in the secretions from the urethra prevailed.

When assessing symptoms of chronic prostatitis on NIH-CPSI (National Institutes of Health – Chronic Prostatitis Symptom Index), severe symptoms (30 to 43 points) were found with more than half of the patients in the MG (52.8 %) and CG (51.1 %).

Almost 60 % of patients in both groups had decreased volume of ejaculate. Normal motility of the cells was indicated in 8.3 % (MG) and 9.1 % (CG). Normal viscosity, respectively, in 33.3 % (MG) and 27.3 % (CG). Alkaline pH – 54.2 % (MG) and 45.4 % (CG). Only 47.2 % of men in MG and 49 % in CG had normal level of testosterone. The follicle-stimulating hormone, respectively, in 64.2 % (MG) and 62.7 % (CG); prolactin – 66.1 and 64.7 %.

In the study of deviations from normal levels of sex hormones in both groups (104 men), the correlation dependence levels of testosterone and follicle-stimulating hormone ($r = + 0.66$), testosterone and prolactin ($r = + 0.56$) were found.

The following regimen was developed: patients MG ($n = 53$) received 1.0 g of azithromycin per day on the 1st, 7th, 14th days, along with gemifloxacin 1 tablet (320 mg) per day

for 14 days + complex therapy: suppository Vitaprost plus 1 per night for 10 days; prostate massage every other day 7 times; rectal laser therapy daily for 10 days. Treatment of patients in CG (n = 51) were distinguished by appointment of ofloxacin (1 tablet twice a day for 14 days) instead of gemifloxacin.

Mathematical processing of data was performed using Student's t-test. Differences were considered relevant when $t > 2$, $p < 0.05 - 0.01$. The nature of the relations (r) between the studied indicators were established on the basis of correlation and regression analysis. Statistical processing of data was performed on a personal computer using the StatSoft Statistica v6.0 package.

Results of research and their discussion

One month after the treatment all patients had the eradication of *C. trachomatis*.

When comparing the dynamics of the parameters between the groups was found that the decrease in the number of conditionally pathogenic flora was statistically significant in MG.

According to the results of urethroscopy patients in MG had normalization of the mucosa of the urethra along its entire length 11.9% more often than patients in CG ($p < 0.05$).

When examining the content of the prostate gland in men, the MG did not have a single patient with a significant increase in the number of leukocytes. However, there were 6 (11.8 percent) out of 51 of such patients in CG ($p < 0.05$).

The data ultrasound of the prostate gland was the objective indicator of the treatment effectiveness of chronic infectious prostatitis. One month after the treatment, the echostructure improvement of the prostate occurred in 44 out of 53 patients in MG and 33 out of 51 men in CG, which is 18.3% less than in MG ($p < 0.05$).

The positive dynamics of the overall assessment of symptoms of chronic prostatitis (on NIH-CPSI) was also noted in both groups one month after the above treatment. Reliable positive changes in overall assessment of symptoms of chronic prostatitis (on NIH-CPSI) were more prominent in the MG compared to the CG.

Dynamics of previously impaired sexual function and the indicators of the level of sex hormones in blood serum and coagulation were positive in both groups. Although the number of patients with increased viscosity was reduced to 12.5% in MG and 33.3% in CG. The number of men with a normal volume of ejaculate was 75% in MG and 68.2% in CG.

Comparative analysis of the immediate results of the therapy developed by the scheme showed a more pronounced treatment effectiveness in MG compared to CG.

All patients were re-examined after 6 months of treatment (fig. 1).

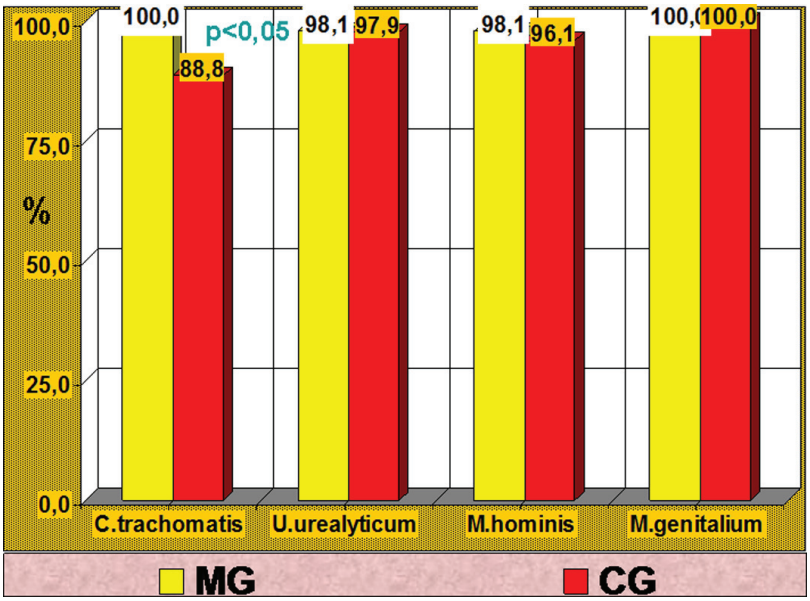

Fig. 1. The difference in the frequency of C. trachomatis detection between the groups after 6 months of treatment

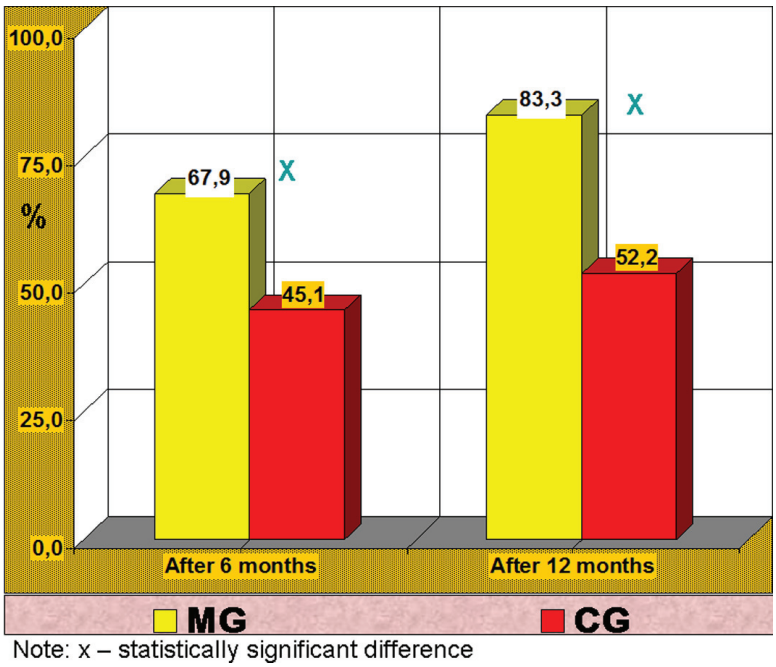

Fig. 2. The number of patients (in %) with low symptoms (on NIH-CPSI scale) of chronic prostatitis in 6 and 12 months after the treatment

C. trachomatis and *M. genitalium* were not detected in men of MG when examined on STI by PCR. *M. hominis* was detected in one patient and *U. urealyticum* in another. Among CG patients *C. trachomatis* was detected in 6 men (11.2 %), *M. hominis* in 1 (2.1 %). *C. trachomatis* was in association with *U. urealyticum* in one man of CG.

The difference in the frequency of *C. trachomatis* detection between the groups is statistically significant ($p < 0.05$).

In MG the number of patients with low symptoms of chronic prostatitis (0-14) on NIH-CPSI increased by 5 and reached 36 patients (67.9 %). In CG the number increased by 3 and amounted to 23 men (45.1 %).

In MG patients the normal number of leukocytes in the content of the prostate was found 22.2 % more often than in CG men ($p < 0.05$). There were 26.0 % more men in MG with normal echoes prostate ($p < 0.01$) and 22.8 % with low symptoms of chronic prostatitis compared to CG ($p < 0.05$).

Thus, in terms of up to 6 months 2 (3.8 %) of the 53 patients in the MG and 4 (7.8 %) of the 51 men in CG had the exacerbation of chronic prostatitis.

Statistically significant difference was found in the effectiveness of treatment after 1st and 6th month. It was 45.3 % higher in the MG ($p < 0.01$) and 35.2 % higher in CG ($p < 0.01$).

12 months after the treatment 48 men in MG and 46 in CG were examined. *C. trachomatis* and *M. genitalium* were not found when screening the MG patients for STI. *M. hominis* was detected in one (2.1 %) of the 48 people and *U. urealyticum* in another (2.1 %).

The CG patients were not detected with *M. genitalium*. *M. hominis* was found in 2 (4.3 %) of the 46 patients; *U. urealyticum* in one (2.2 %); *C. trachomatis* in one man (2.2 %). The analysis of the case of *C. trachomatis* detection showed that the infection was repeated.

12 months after the treatment patients (except the above mentioned) did not complain of anything. In this regard, the total score of chronic prostatitis symptoms (NIH-CPSI) was taken as the basis of therapy effectiveness. It turned out that the number of patients in MG with low symptoms of prostatitis increased by 4 and reached 40 (83.3 %) of 48 patients; in the CG the number increased by one and amounted to 24 (52.2 %) of the 46 men. The MG had 31.1 % more patients with a higher rate of therapy effectiveness ($p < 0.01$).

The comparative data of the treatment effectiveness of patients with chronic infectious prostatitis in both groups (on NIH-CPSI scale)

in 6 and 12 months after the treatment is reflected in the fig. 2.

Thus, there was increase in the number of men with low symptoms of chronic prostatitis in the MG. Therefore, the combination of gemifloxacin with azithromycin in association with similar complex (pathogenic) therapy in both groups was justified.

Conclusion

The study demonstrated the effectiveness of the developed treatment regimens for patients with chronic infectious prostatitis in short-and long-term.

One month after the treatment patients in MG had the eradication of opportunistic flora in the content of the prostate gland secretion and normalization of the urethra mucosa more often than men in CG. Also the normal number of leukocytes from the mucous membrane of the urethra was 18.0% more in MG ($p < 0.05$). There were more men with the improvement of the echostructure of the prostate and low symptoms of chronic prostatitis in men of MG compared to CG.

Positive dynamics of the above indicators had an impact on the level of sex hormones in blood serum, triglycerides, and the state of sexual function in favor of MG.

Long-term results of the treatment of patients were tracked. After 6 months of treatment *C. trachomatis* were not found in MG patients, while in CG 11.8% had it. *M. genitalium* was absent in both groups. In a few cases *U. urealyticum* and *M. hominis* were detected in both groups.

Men in MG had the normal number of leukocytes in the content of the prostate 22.2% more often than men in CG. The lecithin grains – 20.3% more. Number of patients in MG with normal echoes prostate was 26% greater and those with low symptoms of prostatitis 22.8% greater ($p < 0.05$-0.01).

12 months after the treatment in MG *C. trachomatis* and *M. genitalium* was not detected. *U. urealyticum* was detected in one man (2.1%) and *M. hominis* in another (2.1%).

In CG *M. genitalium* was not found; *M. hominis* was detected in 2 (4.3%), *U. urealyticum* in one (2.2%); *C. trachomatis* in one patient (the later was re-infection).

Also in MG the number of patients with low symptoms increased to 83.3%, while in the CG to 52.2%, which is 31.1% lower than that in MG.

These figures confirmed the validity of our combination of gemifloxacin and azithromycin for the effective treatment of patients with chronic infectious prostatitis.

This scheme can be used in practical health care.

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COMPARATIVE CHARACTERISTIC OF FACIAL PARAMETERS AMONG PATIENTS WITH VERTICAL-MESIAL FORM OF INCREASED TEETH WEAR

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The work presents special features of morphometric parameters among patients with vertical-mesial form of face and increased wear of teeth. Morphometric parameters of face with decompensated and compensated vertical-mesial form of increased teeth wear were compared to the norm. For patients with decompensated vertical-mesial form of increased teeth wear decrease in height of gnathic face part by an average of 10 mm with inter-occlusion gap of 4-10 mm is typical. For patients with compensated vertical-mesial form of increased teeth wear an insignificant decrease in height of gnathic face part is typical, especially height of lower jaw and inter-gnathic gap, with inter-occlusion gap within 0-3 mm. the received data can be used in defining tactics of orthodontic and orthopaedic treatment for patients with increased wear of teeth.

Keywords: orthodontia, orthopaedics, increased wear of teeth

Widespread of pathology in jaw-facial area, attended by decrease in height of gnathic face part is rather high and, according to the data of different authors, equals from 11% to 60% [1, 3]. Such variability is defined by imperfection of diagnostic methods, differences in terminology, lack of classification and definition of gnathic face part descent. At the same time specialists do not specify etiologic factors and dynamics of pathology development [2, 4, 5, 7].

An important part is occupied by patients with increased wear of teeth (IWT), and it is present in 11,8% to 42,6% of cases (2, 3, 4, 5, 8, 9, 10, 11).

IWT can be caused by morphological insufficiency of solid teeth tissue, teeth overload, chemical impact, professional hazards, functional condition of chewing muscles and temporal-lower-jaw joints, etc. (3, 4, 6, 7, 8).

Decompensated and compensated IWT are distinguished. Decompensated form is attended by decrease in gnathic face part height, and for compensated form decrease in gnathic face part does not happen or is insignificant. It takes place due to vacant (false, substitutive) hypertrophy of bone structures of alveolar crests (3, 4, 8, 9, 10, 11).

Decrease in gnathic face part height is influenced not only by degree of teeth wear, occlusion anomalies in different directions, but also changes in jaw-facial area that take place in terms of increased wear of solid teeth tissue, loss of antagonists, and other attending pathologic conditions [6, 8, 9]. At the same time there is no clear differentiation between forms of decrease in height of gnathic face part among patients with increased teeth wear. Basic morphometric parameters of face with decreased gnathic part are not displayed.

Research objective

Comparing morphometric parameters of face among patients with compensated and decompensated vertical-mesial form of increased teeth wear.

Materials and methods of research

We have undertaken morphometric research of cranio-facial complex among 30 patients (12 men and 18 women) with decompensated vertical-mesial form of increased teeth wear, and among 28 patients (13 men and 15 women) – with compensated.

Comparison of facial morphometric parameters in patients with compensated and decompensated vertical-mesial form of increased erosion of teeth.

Comparison group was formed of 64 people (27 men and 37 women) with physiological occlusion and intact teeth rows.

Kefalometric estimations were made with consideration of guidelines by Y.Y. Roginskiy (1968), F.E. Khoroshilkina (1991) and in accordance with requirements of anthropometry that imply defining distance between commonly-accepted points. Standard tool was used.

Research results and discussions

We have established a legislation in correlation between head form and different morphometric parameters of face in control group.

Morphologic features of head formation and its separate parts (face, gnathic face part, inter-gnathic gap, lower jaw) were determined. Morphometric parameters were studied with consideration of gender dimorphism. Sizes of head and face were studied. Interrelation between separate parameters of head among men and women was defined.

Results of studying morphometric parameters of head in comparison group are presented in table 1.

Thus, among men, most of morphometric parameters of head and face were larger than among women had a reliable difference.

On the whole, morphologic height of face and height of nasal part among men was larger than among women. At the same time, height of gnathic part had no reliable differences between men and women.

We should underline that height of teeth-alveolar part of upper jaw (sn –inc) corresponded to teeth-alveolar part of lower jaw (inc – spm) among men (21,82 + 1,17 and 21,96 + 1,89 correspondingly), as well as women (20,07 + 1,24 and 21,14 + 1,27 correspondingly). Height of lower jaw (inc– me), as a rule, exceeded size of teeth-alveolar part of upper as well as lower jaw. Combined height of teeth-alveolar parts in upper and lower jaw corresponded to size of lower jaw, and no gender dimorphism was registered according to these indicators.

The results of measuring facial skeleton among patients with decompensated vertical-mesial form of increased teeth wear are presented in table 2.

Table 1

Morphometric parameters of head and face

Morphometric parameters	Face size (mm)	
	men	women
n-me (face height)	125,64 ± 6,3	111,87 ± 2,26
gl – me	136,75 ± 3,29	122,34 ± 2,34
n-inc (height of naso-maxillary complex)	81,47 ± 3,52	73,45 ± 2,24
sn-inc (height of teeth-alveolar part in upper jaw)	21,82 ± 1,17	20,07 ± 1,24
n-sn	61,19 ± 2,7	58,57 ± 2,29
inc-me (height of lower jaw)	43,76 ± 3,32	41,52 ± 1,47
sn-spm (inter-gnathic gap)	55,84 ± 4,5	53,16 ± 1,54
gn – me	6,52 ± 1,29	6,02 ± 1,19
inc – spm (height of teeth-alveolar part in lower jaw)	21,96 ± 1,89	21,14 ± 1,27
zy – zy	143,57 ± 5,1	138,41 ± 3,72
sn – gn	65,46 ± 1,43	63,28 ± 2,16

Tabe 2

Morphometric parameters of head and face among patients with decompensated vertical-mesial form of increased teeth wear

Morphometric parameters	Face size (mm)	
	men	women
n-me (face height)	108,6 ± 3,11	105,26 ± 2,53
gl – me	118,3 ± 3,29	115,24 ± 2,33
n-inc (height of naso-maxillary complex)	71,53 ± 2,56	69,45 ± 2,34
sn-inc (height of teeth-alveolar part in upper jaw)	12,36 ± 2,37	11,6 ± 1,62
n-sn	52,18 ± 3,26	52,44 ± 3,54
inc-me (height of lower jaw)	36,68 ± 2,32	34,71 ± 1,47
sn-spm (inter-gnathic gap)	43,31 ± 3,65	42,51 ± 2,84
gn – me	14,96 ± 1,79	13,54 ± 1,37
inc – spm (height of teeth-alveolar part in lower jaw)	133,27 ± 6,35	131,471± 6,73
zy – zy	54,37 ± 2,16	52,56 ± 1,56

Table 3

Morphometric parameters of head and face among patients with compensated vertical-mesial form of increased teeth wear

Morphometric parameters	Face size (mm)	
	men	women
gl – me	123,31 ± 6,5	114,38 ± 2,4
n-inc (height of naso-maxillary complex)	134,15 ± 3,4	119,3 ± 2,2
sn-inc (height of teeth-alveolar part in upper jaw)	75,4 ± 3,2	72,4 ± 2,46
n-sn	17,5 ± 1,2	16,1 ± 1,4
inc-me (height of lower jaw)	59,6 ± 2,4	57,3 ± 2,7
sn-spm (inter-gnathic gap)	40,4 ± 3,2	38,2 ± 1,7
gn – me	52,5 ± 4,3	50,1 ± 1,3
inc – spm (height of teeth-alveolar part in lower jaw)	19,6 ± 1,4	18,2 ± 1,6
zy – zy	137,5 ± 6,3	133,1 ± 3,2
gl – me	56,7 ± 1,1	55,3 ± 2,8

The results of studying patients showed us that height of nasal face part (n – sn) corresponded to the lower part of face (sn – gn), and difference between these indexes formed around 1-2 mm. It is also worth mentioning that height of teeth-alveolar part of upper jaw (sn – inc) was approximately three times smaller than height of nasal face part, and did not correspond to teeth-alveolar part of lower jaw (inc – spm). Height of inter-gnathic part (sn – spm) was decreased by 8-11 mm. Thus, decrease in height of gnathic face part, especially height of lower jaw and intergnathic gap. The results of analyzing teleradiogragh in side projection have shown that among patients position of upper jaw was mesially shifted in sagittal direction. Inter-occlusion gap among patients of this group was placed in limits 4-10 mm.

The results of analyzing teleradiogragh in side projection have shown that among patients position of upper jaw usually corresponded to norm, while lower jaw was mesially shifted in sagittal direction.

The results of measuring facial skeleton among patients with compensated vertical-mesial form of increased teeth wear are presented in table 3.

The results of studying patients have shown that height of nasal face department (n – sn) corresponded to the lower face part (sn – gn), and difference between these indexes equaled about 1-3 mm. The height of teeth-alveolar part of upper jaw (sn – inc) was approximately equal to height of nasal face part and corresponded to teeth-alveolar part of lower jaw (inc – spm). The height of inter-gnathic part (sn – spm) was decreased by 3 mm. The results of analyzing teleradiograph in side projection have shown that among patients position of upper jaw was mesially shifted in sagittal direction. Inter-occlusion gap among patients of this group was within limits of 0-3 mm.

Thus, for patients with decompensated vertical-mesial form of increased teeth wear decrease in height of gnathic face part in average by 10 mm with inter-occlusion gap of 4-10 mm is typical. For patients with compensated vertical-mesial form of increased teeth wear an insignificant decreased in height of gnathic face part, especially height of lower jaw and intergnathic gap with inter-occlusion gap 0-3 mm is typical.

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IMMUNE SYSTEM

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The article touches upon the issue of Immune system. It provides role, types, components and problems of immune system. The immune system is the most incredible part of our body. It has the task of keeping the body healthy by destroying pathogens and disease-producing organisms, and by neutralizing their toxins. The immune system employs the services of the skin, mucous membranes, hair, cilia, saliva, urine and other natural means of waste disposal to keep the body free of illness and pathogens, For instance, should foreign bacteria enter the body, the immune system will employ cells in the body to fight the invading bacteria, and to prevent their spread. Immune activity has a benefit and a cost. The negative side of immunity is the production of distressing symptoms, acute and chronic diseases. The term hypersensitivity describes increased, damaging immune response.

Keywords: immune system, vocabulary, medical students

The main roles of the immune system

The main role of the immune system – a collection of structures and processes within the body – is to protect against disease or other potentially damaging foreign bodies. When functioning properly, the immune system identifies a variety of threats, including viruses, bacteria and parasites, and distinguishes them from the body's own healthy tissue.

The main tasks of the body's immune system are:

- Neutralizing pathogens like bacteria, viruses, parasites or fungi that have entered the body, and removing them from the body;
- Recognizing and neutralizing harmful substances from the environment;
- Fighting against the body's own cells that have changed due to an illness, for example cancerous cells.

The major components of the immune system include:

Lymph nodes: Small, bean-shaped structures that produce and store cells that fight infection and disease and are part of the lymphatic system – which consists of bone marrow, spleen, thymus and lymph nodes, according to "A Practical Guide To Clinical Medicine" from the University of California San Diego (UCSD).

Spleen: The largest lymphatic organ in the body, which is on your left side, under your ribs and above your stomach, contains white blood cells that fight infection or disease.

Bone marrow: The yellow tissue in the center of the bones produces white blood cells. This spongy tissue inside some bones, such as the hip and thigh bones, contains immature cells, called stem cells, according to the NIH.

Lymphocytes: These small white blood cells play a large role in defending the body against disease, according to the Mayo Clinic.

Thymus: This small organ is where T-cells mature. This often-overlooked part of the immune system, which is situated beneath the breastbone (and is shaped like a thyme leaf, hence the name).

Leukocytes: These disease-fighting white blood cells identify and eliminate pathogens and are the second arm of the innate immune system. A high white blood cell count is referred to as leukocytosis, according to the Mayo Clinic.

Types of immunity

Humans have three types of immunity – innate, adaptive, and passive:

Innate Immunity

Everyone is born with innate (or natural) immunity, a type of general protection. Many of the germs that affect other species don't harm us. For example, the viruses that cause leukemia in cats or distemper in dogs don't affect humans.

Adaptive Immunity

The second kind of protection is adaptive (or active) immunity, which develops throughout our lives. Adaptive immunity involves the lymphocytes and develops as people are exposed to diseases or immunized against diseases through vaccination.

Passive Immunity

Passive immunity is "borrowed" from another source and it lasts for a short time. For example, antibodies in a mother's breast milk give a baby temporary immunity to diseases the mother has been exposed to.

Problems of the Immune System

Disorders of the immune system fall into four main categories:

1. immunodeficiency disorders (primary or acquired)
2. autoimmune disorders (in which the body's own immune system attacks its own tissue as foreign matter)

3. allergic disorders (in which the immune system overreacts in response to an antigen)

4. cancers of the immune system

Immunodeficiency Disorders

Immunodeficiencies happen when a part of the immune system is missing or not working properly. Some people are born with an immunodeficiency (known as primary immunodeficiencies), although symptoms of the disorder might not appear until later in life.

Autoimmune Disorders

In autoimmune disorders, the immune system mistakenly attacks the body's healthy organs and tissues as though they were foreign invaders. Autoimmune diseases include:

● **Lupus:** a chronic disease marked by muscle and joint pain and inflammation

● **Juvenile idiopathic arthritis:** a disease in which the body's immune system acts as though certain body.

● **Scleroderma:** a chronic autoimmune disease that can lead to inflammation and damage of the skin, joints, and internal organs.

Allergic Disorders

Allergic disorders happen when the immune system overreacts to exposure to antigens in the environment. The substances that provoke such attacks are called **allergens**. The immune response can cause symptoms such as swelling, watery eyes, and sneezing, and even a life-threatening reaction called anaphylaxis.

Allergic disorders include:

● **Asthma**, a respiratory disorder that can cause breathing problems, often involves an allergic response by the lungs.

● **Eczema** is an itchy rash also known as atopic dermatitis. Although not necessarily caused by an allergic reaction, eczema most often happens in kids and teens who have allergies, hay fever, or asthma or who have a family history of these conditions.

● **Allergies** of several types can affect kids and teens. Environmental allergies (to dust mites, for example), seasonal allergies (such as hay fever), drug allergies (reactions to specific medications or drugs), food allergies (such as to nuts).

Cancer happens when cells grow out of control. This can include cells of the immune system. Leukemia, which involves abnormal overgrowth of leukocytes, is the most common childhood cancer. Lymphoma involves the lymphoid tissues and is also one of the more common childhood cancers.

Immunity works in a co-ordinated fashion to respond to numerous threats from the environment. It is essential to good health, from the moment of conception, when the mother's immune system starts protecting the growing baby, until old age. As medicine has progressed, physicians have slowly learned how to apply an understanding of the fundamentals of immunology to reinforce and repurpose the immune response, providing greater protection against infection or targeting cancers.

So, immune system should function properly in order to maintain an overall health. People should avoid stress, have a balanced diet, sleep enough, do sports, and drop smoking. Therefore, they will not weaken their immune system and live a longer and healthier life.

The authors want to thank the supervisor M.ZH. Baltabayeva for the help in investigation and preparation of the article.

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FEATURES OF THE COURSE OF PREGNANCY, CHILDBIRTH AND OUTCOMES FOR THE MOTHER AND FOETUS WITH PYELONEPHRITIS

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On the basis of the Kyrgyz Research Center for Human Reproduction was conducted a cohort prospective research between 2015-2017. The object of the research was 455 pregnant women: 1st group – 158 women with gestational pyelonephritis, 2nd group – 147 women with chronic pyelonephritis, 3rd control group – 150 healthy. There were calculated the relative values (P) and their errors (mp), t – Student's criteria, χ^2 and Spearman's rank correlation coefficient. As a result of the research, it was proved that the complicated course of pregnancy was more often detected in the group with gestational pyelonephritis (31.0%) than in the group with chronic pyelonephritis (23.1%). In the first group, there were 2.5 complications per pregnant woman, in the second group – 1.9 detected complications, $p < 0{,}001$. Pregnancy with gestational pyelonephritis was complicated: gestational anemia (31.0%), hydramnios (12.0%), oligohydramnios (9.5%), fetoplacental insufficiency (8.2%), threat of miscarriage (7.0%), intrauterine infection (3.8%), hydronephrotic transformation of the kidneys (3.2%), preeclampsia heavy (3.2%) and light (1.3%) degree. In the group with chronic pyelonephritis, pregnancy was complicated: gestational anemia (14.3%), threat of miscarriage (5.4%), hard preeclampsia (4.8%), hydronephrotic transformation of the kidneys (4.1%), intrauterine growth retardation (IUGR) (3.4%), partial premature detachment of the placenta (3.4%), fetoplacental insufficiency (2.7%), intrauterine infection (2.7%), oligohydramnios (2.0%), antenatal fetal death (0.7%), hydramnios (0.7%). When comparing in the first group, there were significantly more frequent: hydramnios ($t = 4.20$, $p < 0.001$), oligohydramnios ($t = 2.89$, $p = 0.004$) and fetoplacental insufficiency ($t = 2.15$, $p = 0.03$). Immediate childbirth was 96.2% of women in the first group and 94.6% in the second. Complications with childbirth were significantly more often detected of pregnant women with chronic pyelonephritis – 30.6% than in the first group – 14.6%, $p < 0.001$ and control group – 8.7%, $p < 0.001$. Women with complicated childbirths in the first group – 12.0%, in the second group – 21.8%, $p = 0.02$, in the control group – 8.0%, significantly less than in the second group, $p < 0.001$. In women with chronic pyelonephritis in the structure of complications: prenatal outflow of amniotic fluid (15.0%), injuries of soft tissues (5.4%), premature abruption of the normally located placenta (3.4%), pelvic presentation (2.7%), hypotonic bleeding (1.4%), weakness of birth activity (0.7%), puerperal endometritis (2.0%). In the first group (94.3%) and the second group (87.8%) significantly fewer healthy newborns in comparison with the control group ($p = 0.001$ and $p < 0.001$, respectively). When evaluating a newborn by Apgar children in the control group (100.0%) were born with a higher score (8-9 points) than in the first group, 88.6% of the children, $p < 0.001$ and in the second group 84.4%, $p < 0.001$. Children of the first group (3.8%) and the second group (2.7%) estimated less than 6 points. In the second group the congenital malformations of the fetus and stillbirthare 0.7%. Immature infants in the first group 3.8%, in the second 5.4%.

Keywords: pyelonephritis, pregnancy, childbirth, complications, outcomes, prospective research

The relevance of gestational pyelonephritis is due to an increase in the growth of infectious and inflammatory diseases of the urinary tract in women in recent years. There are cases of purulent-destructive forms of acute pyelonephritis of pregnant women, as well as complications in the form of gestosis, fetal hypotrophy, premature birth and chronic placental insufficiency. [1].

O.V. Lysenko with the co-author (2016) note that pregnant women with chronic pyelonephritis have a higher incidence of complications of gestation, and with exacerbation of chronic pyelonephritis, there significantly more children who are born with intrauterine infections, and so it is necessary to conduct a detailed examination of the pregnant woman in the course of clinical observation and timely sanation of urogenital infections [2].

It is proved that the most informative signs of the probability of intrauterine infection are hydramnios or oligohydramnios, persistent fetal tachycardia, a decrease in its mass-growth parameters, violation of the structure of the placenta, pathological changes in the organs of the fetus [3].

In the work of S.P. Seregin with the co-author (2018) revealed that changes in immunity indicators are more pronounced in patients with gestational pyelonephritis, in comparison with women suffering from chronic pyelonephritis, who had an exacerbation during pregnancy [4].

It was proved that the most pronounced changes in uteroplacental blood flow were found in patients with an active inflammatory process in the kidneys during pregnancy. But even in the absence of exacerbation of pyelonephritis there are significant changes in uteroplacental blood flow. The obtained results testify to the need to develop measures for pregravid preparation in patients with chronic pyelonephritis and to prevent exacerbations of the inflammatory process during pregnancy [5].

The purpose of the research was to determine the features of the clinical course of pregnancy, childbirth and outcomes for the mother and fetus with pyelonephritis.

Material and methods of research

A cohort prospective study was conducted between 2015-2017 on the basis of the Kyrgyz Research Center for Human Reproduction of the Ministry of Health of the Kyrgyz Republic (*KRCHR MH KR*).

The required sample size was calculated according to E.N. Shiganu (1987) (t = 3.2, P < 0.001, 99.9%) [6]. The subject of the research was 455 pregnant women, which were divided into 3 groups: the 1st group – 158 pregnant women with gestational pyelonephritis, the 2nd group – 147 women with chronic pyelonephritis, the 3rd control group – 150 healthy women. The unit of study was a pregnant woman.

Inclusion criteria: pregnant women aged 18 to 49 years. The average age of the pregnant women of the first group was 29.7 ± 0.2 years for 100 of the examined, of the second group – 28.1 ± 0.2 per 100 of the examined and control group – 29.5 ± 0.2 years for 100 of the examined, which confirms the representativeness of the compared groups, p > 0.05.

From the histories of childbirth form 096/u from Sep. 10th, 2002 No. 375 and individual cards of the pregnant woman and the puerpera form 111/u from March 25th, 2013 No. 134 on the observation cards the following results were introduced: comprehensive survey of pregnant women, data on the structure of complications of pregnancy, features of gestational process, the course of birth and the outcome of birth for the mother, fetus and newborn.

There are calculated relative values (P) and their errors (mp). To evaluate the reliability of the difference in the numerical values of relative indicators, there was calculated the reliability criterion (the confidence coefficient t-criterion of the Student and χ^2) recommended byN.E. Chernova (2006) for medico-social researches using the formula $t = \frac{P2 - P1}{m\,differ}$, at t = 3.2 the probability of difference is 99.9% or the reliability of the differences is < 0.001 [6]. As probability values of the error-free forecast, the criteria of the static significance of the error were chosen – less than 5% two-sided (p < 0.05), with 95% confidence interval, and statistical power – 80% power. The rank significance was calculated by the Spearman rank correlation coefficient using the formula: $p = 1 - \frac{\Sigma 6d^2 + A + B}{n^3 - n}$. For the statistical processing of the received data was used the online free software package OpenEpi 3.03 of the Center for US morbidity control.

Results of the research and their discussion

The information presented in Table 1 on the peculiarities of the course of the gestational process in women with pyelonephritis indicates that women with a complicated pregnancy were detected more in the group of pregnant women with gestational pyelonephritis (1st group) – 49 pregnant (31.0%), i.e. every third woman than in the second group (with chronic pyelonephritis) – 34 pregnant women (23.1%), every fourth woman, with the difference statistically not significant, t = 1.55, p = 0.12. In the control group, women with complicated pregnancies were also identified – 15 women (10.0%), i.e. every tenth woman, which is statistically significantly less likely than in the first group t = 4.70, p < 0.001 and in the second comparison group t = 3.05, p = 0.001.

It should be noted that complications were detected more often in the first group, 125 complications were revealed, i.e. for 1 pregnant woman there are 2.5 complications, and in the second group 65 complications, for 1.9 detected complications, t = 6.71, p < 0.001, while in the control group there are significantly less complications of pregnancy (15 complications), in comparison with the first group t = 17.02, p < 0.001 and with the second group – t = 7.12, p < 0.001.

Pregnancy in women with gestational pyelonephritis was complicated (group 1): gestational anemia, which accounts for the first ranked place, was found in 31.0% of women, the second – is hydramnios 12.0%, in third place is oligohydramnios (9.5%), the fourth ranked place – fetoplacental insufficiency (FPI – 8.2%). Further on, the decreasing threat of miscarriage (7.0%), intrauterine infection – 3.8%, the seventh ranked place belongs to the hydronephrosistransformation of the kidneys (3.2%) and hard preeclampsia (3.2%), and the next one is light preeclampsia (1.3%).

In a group of women with chronic pyelonephritis (2nd group), the first ranked place also falls on gestational anemia (14.3%), the second place is the threat of miscarriage (5.4%), the third – hard preeclampsia (4.8%), the fourth – hydronephrosis transformation of the kidneys (4.1%), the fifth ranking place is occupied by intrauterine growth retardation (3.4%) and partial premature placental abruption (3.4%). The seventh ranked place falls on fetoplacental insufficiency (2.7%) and intrauterine infection (2.7%), followings areoligohydramnios (2.0%), antenatal fetal death (0.7%) and hydramnios (0.7%).

In the control group, the pregnancy was complicated by gestational anemia in 15 women (10.0%), and no other pathology was observed during pregnancy.

When comparing the main groups among themselves in the first group, there were significantly more frequent occurrences: hydramnios ($t = 4.20$, $p < 0.001$), oligohydramnios ($t = 2.89$, $p = 0.004$) and fetoplacental insufficiency ($t = 2.15$, $p = 0.03$). In the first group, there were no cases of partial placental abruption, intrauterine growth retardation, and antenatal fetal death.

The features of the course of childbirth of pregnant women with pyelonephritis are presented in Table 2. Urgent births were found in 152 pregnant women of the first group (96.2%) and 139 women of the second group (94.6%), there was no significant difference in the groups, $p > 0.05$. At the same time, in the control group, pregnancy of all women ended with immediate childbirth (100%), which was statistically significant with the first group ($t = 2.53$, $p = 0.01$) and the second comparison group (= 2.84, $p = 0.004$). Independent childbirths were in 86.7% of women in the first group, 81.0% in the second group and 86.7% in the control group, $p > 0.05$.Childbirths by cesarean section were 1.9% in the first group, 6.1% in the second group, differences between the groups were not significant, $t = 1.84$, $p = 0.06$, in the control group, abdominal childbirths were 1.3% of women, the difference in comparison with the second group is statistically significant, $t = 2.19$, $p = 0.02$. Re-operative birth, the indication for which was a scar on the uterus, was 7.6% of the first group's women, 7.5% of the pregnant women in the second group and 12.0% of the women in the control group, no statistically significant differences between the groups were found, $p > 0.05$.

In the first group, the pregnancy ended in very early birth of 2 pregnant women, which was 1.3%. Early births in the first group occurred in 2.5% of women, in the second group 2.0% of women, there was no significant difference, $p > 0.05$. Premature childbirths were in 5 women (3.4%) of the second comparison group.

The number of women with complicated childbirths in the first group was 19 (12.0%), in the second group – 32 (21.8%), which is significantly more often than the first group $t = 2.29$, $p = 0.02$, in the control group childbirths were complicated in 12 women (8.0%), which is significantly less likely than in the second group, $t = 3.41$, $p < 0.001$. In pregnant women with chronic pyelonephritis (2nd group), the complications of birth were significantly more frequent than in the first group – 14.6%, $t = 3.39$, $p < 0.001$ and control group 8.7%, $t = 4.43$, $p < 0.001$.

Table 1

Features of the course of the gestational process (per 100 surveyed)

Indicators	Maingroups				Control group	
	I group		II group			
	n = 158		n = 147		n = 150	
	abs.	M ± m	abs.	M ± m	abs.	M ± m
Number of women with complicated pregnancies	49	31.0 ± 3.7***	34	23.1 ± 3.5***	15	10.0 ± 2.5
Typesofcomplications:	125	79.1 ± 3.2***	65	44.2 ± 4.1***	15	10.0 ± 2.5
Hydronephrosis transformation of the kidneys	5	3.2 ± 1.4	6	4.1 ± 1.6	–	
Gestationalanemia	49	31.0 ± 3.7	21	14.3 ± 2.9	15	10.0 ± 2.5
Light degree of preeclampsia	2	1.3 ± 0.9	–	–	–	
Hard degree of preeclampsia	5	3.2 ± 1.4	7	4.8 ± 1.8	–	
Oligohydramnios	15	9.5 ± 2.3	3	2.0 ± 1.2**	–	
Hydramnios	19	12.0 ± 2.6	1	0.7 ± 0.7***	–	
Fetoplacental insufficiency	13	8.2 ± 2.2	4	2.7 ± 1.3*	–	
Intrauterinegrowthretardation	–	–	5	3,4 ± 1,5	–	
Threatofmiscarriage	11	7.0 ± 2.0	8	5.4 ± 1.9	–	
Partialprematureplacentalabruption	–		5	3.4 ± 1.5	–	
Intrauterine infection	6	3.8 ± 1.5	4	2.7 ± 1.3	–	
Antenatalfetaldeath	–	–	1	0.7 ± 0.7	–	

Note: the reliability of the differences between the groups * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In the first group (women with gestational pyelonephritis), births were complicated by soft tissue injuries in 7.6% of women, prenatal outflow of amniotic fluid – 5.7% and pelvic presentation – (1.3%).

In women with chronic pyelonephritis (2nd group), in the structure of complications, the first ranked place falls on the prenatal outflow of amniotic fluid in 22 women – (15.0%), the second – soft tissue injuries 5.4%, in third place is a premature detachment of normally located placenta – (3.4%), the fourth – pelvic presentation – (2.7%), followed by hypotonic bleeding -(1.4%) and weakness of birth activity – (0.7%).

In the control group, the structure of the complications in birth is as follows: the first rank place falls on the prenatal outflow of amniotic fluid, which complicated birth of 6 women (4.0%), soft tissue injuries in 3.3% of women and pelvic presentation – (1.3%).

Comparing the groups among themselves, in the second group we found a statistically significant difference in the anterior distribution of amniotic fluid with the first group $t = 2.72$, $p = 0.006$ and control group, $t = 3.32$, $p = 0.001$.

In addition, in the second group, birth was complicated by postpartum endometritis of 3 women (2.0%).

The outcome of birth for the fetus and the newborn is presented in Table 3. In the first (94.3%) and in the second (87.8%) groups, significantly less healthy newborns compared with the control group ($t = 3.177$, $p = 0.001$ and $t = 4.52$, $p < 0.001$, respectively). When assessing the state of a newborn on the Apgar scale, it is seen that children in the control group were significantly more likely to be born with a higher score (8-9 points) than in other groups. In the first group, 88.6% of children compared with the control group (100.0%) $t = 4.56$, $p < 0.001$ and in the second group 84.4%, $t = 5.20$, $p < 0.001$. In the first group, 3.2% of newborns at childbirths were evaluated at 7-6 points, in the second group at 3.4% of the total number of newborns, there was no significant difference between the groups, $p > 0.05$. Less than 6 points were in 3.8% of children in the first group and 2.7% in the second, $p > 0.05$. In addition, in the second group there was 1 stillborn child (0.7%) and 1 newborn with congenital heart disease (0.7%). The dead children in the compared groups were not identified.

Table 2

Features of the course of birth (per 100 surveyed)

Indicators	Maingroups				Control group	
	I group		II group			
	n = 158		n = 147		n = 150	
	Abs.	M ± m	Abs.	M ± m	Abs.	M ± m
Immediatechildbirths:	152	96.2 ± 1.5**	139	94.6 ± 1.9**	150	100.0 ± 0.0
– independentchildbirths	137	86.7 ± 2.7	119	81.0 ± 3.2	130	86.7 ± 2.8
– abdominal (CS) childbirths	3	1.9 ± 1.1	9	6.1 ± 2.0*	2	1.3 ± 0.9
– abdominal (scar on the uterus) childbirths	12	7.6 ± 2.1	11	7.5 ± 2.2	18	12.0 ± 2.7
Veryearlychildbirths	2	1.3 ± 0.9	–	–	–	–
Early childbirths	4	2.5 ± 1.3	3	2.0 ± 1.2	–	–
Prematurechildbirths	–	–	5	3.4 ± 1.5	–	–
Number of women with complicated childbirths	19	12.0 ± 2.6	32	21.8 ± 3.4	12	8.0 ± 2.2
Typesofcomplications:	23	14.6 ± 2.8	45	30.6 ± 3.8	13	8.7 ± 2.3
– pelvicpresentation	2	1.3 ± 0.9	4	2.7 ± 1.3	2	1.3 ± 0.9
– prenatal discharge of amniotic fluid	9	5.7 ± 1.8**	22	15.0 ± 2.9***	6	4.0 ± 1.6
– premature detachment of a normally located placenta	–	–	5	3.4 ± 1.5	–	–
– weakness of birth activity	–	–	1	0.7 ± 0.7	–	–
– hypotonicbleeding	–	–	2	1.4 ± 1.0	–	–
– softtissueinjuries	12	7.6 ± 2.1	8	5.4 ± 1.9	5	3.3 ± 1.5
Postpartumcomplications (endometritis)	–	–	3	2.0 ± 1.2	–	–

Note: the reliability of the differences between the groups * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3

Outcome of birth for the fetus and newborn (per 100 surveyed)

Indicators	The main groups				Control group	
	I group		II group			
	n = 158		n = 147		n = 150	
	Abs.	M ± m	Abs.	M ± m	Abs.	M ± m
Healthynewborns	149	94.3 ± 1.8***	129	87.8 ± 2.7***	150	100.0 ± 0.0
Condition at birth by Apgar: 8–9 points	140	88.6 ± 2.5***	124	84.4 ± 3.0***	150	100.0 ± 0.0
7–6 points	5	3.2 ± 1.4	5	3.4 ± 1.5	–	
< 6 points	6	3.8 ± 1.5	4	2.7 ± 1.3	–	
Stillborns	–	–	1	0.7 ± 0.7	–	
Averageweightofnewborns	140	88.6 ± 2.5	124	84.4 ± 3.0	136	92.5 ± 2.2
Largechildren	5	3.2 ± 1.4	6	4.1 ± 1.6	11	7.5 ± 2.2
Small children	8	5.1 ± 1.7	7	4.8 ± 1.8	3	2.0 ± 1.2
Congenitalmalformations	–	–	1	0.7 ± 0.7	–	–
Prematurechildren	6	3.8 ± 1.5	8	5.4 ± 1.9	–	–

Note: the reliability of the differences between the groups * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

There were 6 premature infants in the first group of newborns (3.8%) and in the second group (5.4%), the difference was not statistically significant, $p > 0.05$.

Thus, in the course of the research, we proved that:

1. Complicated pregnancy course was more often detected in the group with gestational pyelonephritis (31.0%) than in the group with chronic pyelonephritis (23.1%). In the control group, pregnancy was complicated significantly less reliable (10.0%) than in the first group $t = 4.70$, $p < 0.001$ and in the second comparison group $t = 3.05$, $p = 0.001$.

2. In the first group, 2.5 complications occurred in 1 pregnant woman, in the second group – 1.9 detected complications, $t = 6.71$, $p < 0.001$, in the control group complications (15 women) were significantly less frequent, in comparison with the first group $t = 17.02$, $p < 0.001$ and with the second group – $t = 7.12$, $p < 0.001$.

3. Pregnancy with gestational pyelonephritis was complicated: gestational anemia (31.0%), hydramnios (12.0%), oligohydramnios (9.5%), fetoplacental insufficiency (8.2%), threat of miscarriage (7.0%), intrauterine infection (3.8%), hydronephrosis transformation of the kidneys (3.2%), hard preeclampsia (3.2%) and light preeclampsia (1.3%).

4. In the group with chronic pyelonephritis, pregnancy was complicated: gestational anemia (14.3%), threat of miscarriage (5.4%), hard preeclampsia (4.8%), hydronephrosis transformation of kidneys (4.1%), intrauterine growth retardation (3.4%), partial premature detachment of the placenta (3.4%), fetoplacental insufficiency (2.7%), intrauterine infection (2.7%), oligohydramnios (2.0%), antenatal fetal death (0.7%) , and hydramnios (0.7%).

5. Comparison in the first group was significantly more frequent: hydramnios ($t = 4.20$, $p < 0.001$), oligohydramnios ($t = 2.89$, $p = 0.004$) and fetoplacental insufficiency ($t = 2.15$, $p = 0.03$). At the same time in the first group there were no cases of partial plaque detachment, intrauterine growth retardation and antenatal fetal death.

6. Immediate birth was 96.2% of the first group and 94.6% of the second group. In the control group, the pregnancy ended in immediate birth (100%), which was statistically significant with the first group ($t = 2.53$, $p = 0.01$) and the second comparison group (= 2.84, $p = 0.004$).

7. In pregnant women with chronic pyelonephritis, the complications of births were significantly more frequent: 30.6%, than in the first group – 14.6%, $t = 3.39$, $p < 0.001$ and control group 8.7%, $t = 4.43$, $p < 0.001$. The number of women with complicated births in the first group is 12.0%, in the second group – 21.8%, $t = 2.29$, $p = 0.02$, in the control group – 8.0%, which is significantly less than in second group, $t = 3.41$, $p < 0.001$.

8. In women with chronic pyelonephritis in the structure of complications: prenatal discharge of amniotic fluid (15.0%), soft tissue

injury (5.4%), premature detachment of the normally located placenta (3.4%), pelvic presentation (2.7%), hypotonic bleeding (1.4%), weakness of birth activity (0.7%), postpartum endometritis (2.0%).

9. The first (94.3%) and the second (87.8%) groups significantly fewer healthy newborns in comparison with the control group ($t = 3.177$, $p = 0.001$ and $t = 4.52$, $p < 0.001$, respectively). When evaluating a newborn children by Apgar, the children in the control group (100.0%) were significantly more likely to have a higher score (8-9 points) than in the first group, 88.6% of children $t = 4.56$, $p < 0.001$ and in the second group 84.4%, $t = 5.20$, $p < 0.001$.

10. Less than 6 points were estimated to 3.8% of children in the first group and 2.7% in the second group. In the second group congenital malformation and stillbirth occurred in 0.7%. Premature children in the first group – 3.8%, in the second – 5.4%.

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INFLUENCE ON QUALITY OF LIFE OF MANUAL THERAPY'S METHODS ON PREGNANT WOMEN DIAGNOSED WITH DORSOPATHY

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A study was conducted to define the effectiveness of manual therapy use for pregnant women diagnosed with dorsopathy in the second and third trimesters of pregnancy in order to improve their quality of life. During this period, 50 pregnant women were examined among which two groups were identified (control (n = 25) and study(n = 25)). The age of the pregnant women participating in this study was from 22 to 39. During the study are used the following methods: cranio – sacral technique, traction technique, myofascial release, post-isometric relaxation, soft tissue techniques. The number of sessions for pregnant women with dorsopathy is ranged from 1 to 4.In the current study, preliminary results have been already obtained and prove the effectiveness of the use of manual therapy for pregnant women in the 2nd and 3rd trimesters in order to improve the quality of life and reduce back pain. And also outcomes of pregnancies showed a decrease in the number of abdominal delivery. All children (from women from the study group) were born in a satisfactory state with an Apgar score of 7 or more.

Keywords: quality of life, pregnancy, manual therapy, dorsopathy

The relevance of dorsopathy problem essentially lays in the morphological multiplicity of the forms included in this collective concept as well as in the high prevalence among the population [2, 7]. According to WHO experts at the present time in developed countries the problem of back pain can be compared to the pandemic and is a serious medical and socio-economic problem [9]. During lifetime, at least one episode of back pain occurs for 70-80 % of the population, where the annual rate varies from 25 % to 60 % in different ethnic groups [4, 1, 6, 14]. For preagnent women pain in the lower back and pelvic pain both caused by dorsopathy are the most common phenomenons, and have recently been considered as a normal part of pregnancy [6]. In the national literature there is little data on the occurrence of dorsopathy for pregnant women and its possible methods of treatment [13]. As return, dorsopathy leads to a painful predominantly syndrome in the back area, interferes with daily actions, it also affects the emotional state (leads to depression), a decrease in sexual activity, and there is a disturbance in sleep [6]. Various foreign studies have shown that about 50 % of pregnant women experience back pain at different stages of their pregnancy. For 25 % of pregnant women back pains leads to serious health problems with some half disabling already at first and second trimesters, and for 8 % leads to disabilities of varying severity [10]. In addition, often symptoms of dorsopathy are taken as the symptoms for termination of pregnancy at different gestational periods, so it is necessary to study deeply this problem in order to reduce hospitalizations themselves as well as the aimlessly practice of magnesia and tocolytic therapy for pregnant women. During pregnancy the load on the lumbosacral spine increases, especially at the very peak of fetal growth 16-18 weeks, 26-28 weeks, 32-34 weeks [12]. It should be noted that the health of women, mothers and children is the main and objective indicator of the health of the population and therefore the protection of women's health is one of the priorities of the state [11].

Goal of the research is to improve the quality of life of pregnant women with dorsopathies using the methods of manual therapy (MT).

Materials and methods of research

The study defining possible effect of MT methods on the quality of life of a pregnant woman with dorsopathy. During this period, 50 pregnant women were examined (gestation period – II and III trimester (from 18 to 38 weeks of pregnancy) with a diagnosis of "dorsopathy", among which two groups were identified (control (n = 25) and study(n = 25)). The age of the pregnant women participating in this study was from 22 to 39. Before the application of MT methods on pregnant women, the functional condition of the pelvic girdle was assessed. This approach made it possible to determine the necessity of applying methodical techniques of a mixed character, i.e. related, both to the upper and lower parts. In the standing position were evaluated the following parameters: the direction of the pelvic plane, the descent of any margin, the curvature of the spine, the tension of certain muscle groups, the state of the pelvic lobes, the lower edge of the gluteal muscles, the condition of the thighs, legs and feet, and the lengths of the lower extremities. During the

assessment of the functional state of the pelvis the position of the knee joints, as well as the size of the arch of the foot are important. A particularly significant effect on the pelvis is the unilateral overextension of the knee joint. In addition was performed an evaluation of the Michaelis rhombus and the condition of the interannual and anal folds [5]. As the next step while applying the MT the following methods were used: 1) diagnosis and correction of dysfunction of the thoraco-abdominal diaphragm; 2) decompression at the level of the lumbar spine, balancing the chest lumbar fascia, lumbar and quadrate muscles; 3) correction of lumbosacral articulation L5S; 4) correction of the sacroiliac joint; 5) diagnosis and correction of dysfunction of the false joint; 6) diagnosis and correction of coccyx dysfunction; 7) diagnosis and correction of dysfunction of the pelvic muscles. An assessment of the quality of life of pregnant women with dorsopathies was conducted using the following methords: EuroQol-5D questionnaire, the Oswestry questionnaire, the medical and social characteristics, the pain syndrome using the McGill questionnaire, the visual analogue scale (VAS), and the verbal evaluation score scale [2, 8].

Results of research and their discussion

Preliminary results of the current study have been already obtained and were evalueted using different methods, assessing the condition of preagnatn women before and after applying MT. Were analyzed the following paramenters of pregnant women condition: sleep, pain/discomfort, anxiety/ depression and self-care.

According to the verbal assessment scale [3, 15] there was as well a decrease in the pain syndrome. Six pain assessment options were taken into account: 0 no pain, 2 weak pain, 4 moderate pain, 6 severe pain, 8 very severe pain, 10 unbearable pain. Prior to the MT pregnant women were asked to assess their current pain stage and gave the following numbers : “4” was noted for 8 women (32%), “6” – for 5 (25%), “8” – for 12 (48%) and no one voted for the following levels: “0”, “2” and “10” – (0%) (Fig. 1).

After applying the MT methods pregnant women were again asked to assess their condition and the results were the following: “0” was noted for 10 of them (40%), “2” – for 15 (60%) and “4”, “6”, “8” and “10” – 0 (0%) (Fig. 2).

Table 1

The indicator of quality of life – sleep

Oswestry’s questionnaire [3,15]:	Before MT (%)	After MT (%)
(1) I sleep good and the pain does not violate it	5 (20%)	21 (84%)
(2) I can sleep soundly only with the help of pills	12 (48%)	4 (16%)
(3) Even after taking the pill, I sleep less than 6 hours at night	2 (8%)	0 (0%)
(4) Even after taking the pill, I sleep less than 4 hours at night	2 (8%)	0 (0%)
(5) Even after taking the pill, I sleep less than 2 hours at night	0 (0%)	0 (0%)
(6) I do not sleep at all due to pain	1 (4%)	0 (0%)

Table 2

The indicator of quality of life – pain and discomfort

EuroQol-5D questionnaire [3,8]:	Before MT (%)	After MT (%)
“I do not feel pain or discomfort”	4% (n = 1)	24 (96%)
“I experience mild pain or discomfort”	72% (n = 18)	1 (4%)
“I’m completely bedridden”	24% (n = 6)	0 (0%)
Oswestry’s questionnaire [3,15]:		
(1) Currently I have no pain	0 (0%)	20 (80%)
(2) Currently the pain is very easy	8 (32%)	5 (20%)
(3) Currently moderate pain	13 (52%)	0 (0%)
(4) At the present time the pain is very strong	2 (8%)	0 (0%)
(5) At the moment the pain is very strong	2 (8%)	0 (0%)
(6) At the present time the pain is so strong that it is difficult to imagine	0 (0%)	0 (0%)

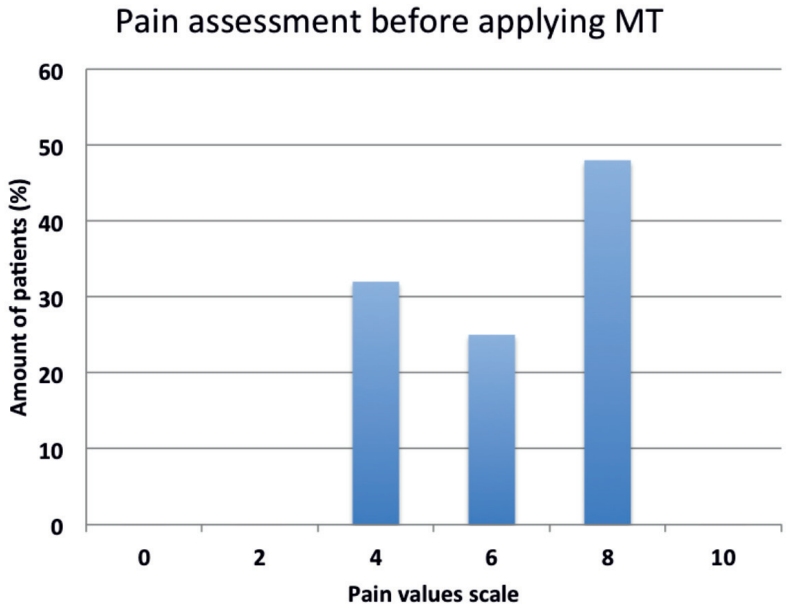

Fig. 1. Assessment of the pain syndrome of pregnant women with dorsopathy using a verbal evaluation scale before applying manual therapy

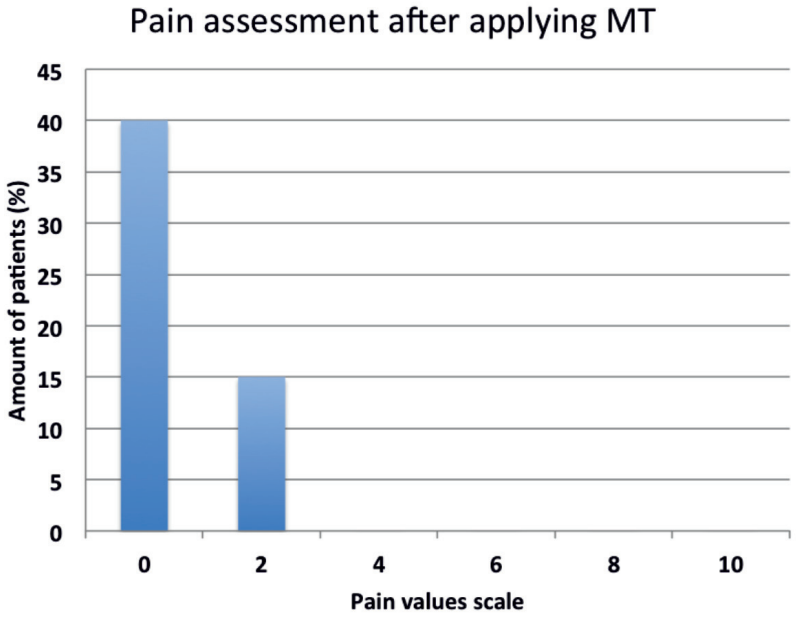

Fig. 2. Assessment of the pain syndrome of pregnant women with dorsopathy using a verbal evaluation scale after applying manual therapy

Table 3

The indicator of quality of life – anxiety and depression

EuroQol-5D questionnaire [3, 8]:	Before MT (%)	After MT (%)
"I do not experience anxiety or depression"	9 (36%)	25 (100%)
"I experience mild anxiety or depression"	13 (52%)	0 (0%)
"I experience extreme pain or discomfort"	3(12%)	0 (0%)

Table 4

The indicator of quality of life – sdelf-care

EuroQol-5D questionnaire [3, 8]:	Before MT (%)	After MT (%)
"I have no problems with maintenance"	6 (24%)	24 (96%)
"I have some problems with washing or dressing"	18 (72%)	1 (4%)
"I'm completely bedridden"	1 (4%)	0 (0%)
Oswestry's questionnaire [3, 15]:		
(1) Self-service is intact and does not cause additional pain	3 (12%)	16 (64%)
(2) Self-service is intact, but causes additional pain	9 (36%)	9 (36%)
(3) In self – care due to increasing pain I act slowly	8 (32%)	0 (0%)
(4) In self-service, I need some help, but most of the actions I do myself	3 (12%)	0 (0%)
(5) I need help with most self-service activities	2 (8%)	0 (0%)
(6) I can not get dressed, I wash with great difficulty and I stay in bed	0 (0%)	0 (0%)

Conclusion

In the following study, the results that have been obtained allow us to speak about the effectiveness of manual therapy's use on pregnant women at the II and III trimester of pregnency with the results of not only reducing but also completely eliminating the pain syndrome caused by dorsopathies in most of the cases. In the study group there was a marked improvement immediately after the first session of manual therapy. Another preliminary results of the study is that an analysis of the outcome of pregnancies showed a decrease in the number of abdominal delivery, which is fundamental in light of current attitudes toward reducing the rate of cesarean section (87.5 % of women were delivered through natural birth canals). It should be noted that all children (from women from the study group) were born in a satisfactory state with an Apgar score of 7 or more. A decrease in the number of sick leave cards for this disease was noted, as well as an improvement in the quality of life for pregnant women. The obtained data confirm the effectiveness and necessity of sending pregnant women with dorsopathies in the II and III trimesters to manual therapists for appropriate treatment.

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INTERSPECIFIC DIFFERENCES OF CONJUGATION KINETICS GROWTH AND HYDROPHILIC-LIPOPHILE BALANCE OF THE STAPHYLOCOCCUS SP. WITH FIXING OF FACTORS INTERMICROBIAL INTERACTION

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The change in the dynamics of growth in the biomass of cells and the specific growth rate of S. aureus and coagulase-negative staphylococci is associated with an increase in the diffusion zone of peptidoglycan lyzing factor. On the average for coagulase-negative staphylococci a large diffusion zone of peptidoglycan lyzing factor is characteristic, than for S. aureus. In the case of two cultures of S. aureus differing in the specific growth rate, it was shown that for staphylococci with a lower specific growth rate, a large diffusion zone of the peptidoglycan lyzing factor and a higher hydrophobicity of the cells are characteristic. Interspecific differences of staphylococci associated with the dependence of peptidoglycan lyzing factor release on the growth rate of staphylococci allowed them to be located in the next gradient series of S. aureus > S. haemolyticus > S.epidermidis > S.xylosis > S.hominis and high hydrophobicity – S. aureus > S.epidermidis > S.haemolyticus > S.hominis.

Keywords: Staphylococcus aureus, coagulase-negative staphylococci, HLB

Survival of staphylococci on the nasal mucosa critically depends on their antagonistic activity, while the presence of factors of intermicrobial interaction is one of the important selective advantages of staphylococcus persistent. Factors of intermicrobial interaction, of which the most significant are enzymes (peptidoglycan lyzing enzymes) and non-enzymatic factors of peptide origin – bacteriocins [7], give a selective advantage to staphylococci during colonization of the open ecological niches of the host organism [4].

Interestingly, staphylococci isolated from the nasal mucosa from the blood in chronic infections are often characterized by low virulence, reduced hemolytic activity, decreased growth rate, the shape and size of the colonies, autotrophic feeding, altered metabolism, and impaired peptidoglycan formation [1, 3]. As shown by us earlier, bacteria isolated from foci of purulent-inflammatory diseases of soft tissues are more hydrophilic than bacteria that live (parasitizing) on mucosal surfaces [9].

Moreover, the chemical structure of many intermicrobial interaction factors remains unknown, and therefore empirically they can be combined into a peptidoglycan lyzing factor (PLF), combining chemical compounds of various types (peptidoglycan enzymes and non-enzymatic factors (bacteriocins)).

Therefore, the aim of the study was to determine the chronological conjugation of the growth kinetics of staphylococci with the dynamics of peptidoglycan lyzing factor release and physicochemical properties.

Materials and methods of research

The material of the study was 66 strains of clinical isolates of staphylococci (S. aureus-20, S. epidermidis-10, S. haemolyticus-24, S. hominis-12) isolated from the nasal mucosa and peptidoglycan-lysing activity. In the work, cultures adapted to the medium and synchronized cultures of staphylococci were used. Every hour, the (OD) cultures were recorded on a spectrophotometer (λ = 540 nm) and the specific growth rate (μ, h^{-1}) [6] was determined.

Isolation of peptidoglycan lyzing factor. In parallel with the measurement of the reproductive potential of staphylococci, the diameter of diffusion zone of peptidoglycan lyzing factor was measured. As a marker for the presence of peptidoglycan in the medium, the strain Micrococcus lysodeikticus N2665, GISK im. Tarasevicha (the presence of a more "loose" peptidoglycan mesh in Micrococcus lysodeikticus, promotes high lysis of cell wall lysozyme).

On the surface agar (NPO "Nutrient mediums", Makhachkala, Russian Federation) with a dots with d = 5 mm, daily culture of staphylococcus was applied, cultivated in +37 °C. Cultures were lysed (chloroform pairs, 5 min) and filled with a continuous lawn of M. lysodeikticus. On the following day, the diameter of the growth retardation zones was measured (they corresponded to the diameter of the diffusion zones of peptidoglycan lyzing factor).

Sowing on agar plates, a producer of peptidoglycan lyzing factor (S.epidermidis SE711), was performed by inoculation with streaks at intervals of 20 mm, after 24 hours of growth, the agar stripe was cut from the spirit of the sides from the grown colonies 5 mm from the edge of the colony and width of 10 mm. Agar plates 1×50 mm were filled with 50 ml of 0.1 % AcOH solution and dispersed on a magnetic stirrer. The resulting extract was further clari-

fied (Durapor filters, 0.22 nm) and separated by reversed-phase HPLC.

Analytical study of agar extracts (containing peptidoglycan lyzing factor) was carried out on a liquid chromatograph "Smartline" (Knauer, Germany). We used Waters chromatographic columns packed with μ-Bondapak sorbent (C18, 5 μm, 3.9×300 mm). For reversed-phase high-performance liquid chromatography (HPLC), the preparations were diluted (1: 100) with 0.01% AcOH solution, layered 5 μl per C18 column (3.9×300 mm). The elution was carried out with a linear gradient (acetonitrile + 0.1% TFA / H2O + 0.1% TFA) for 10 min, the detector response was fixed at two wavelengths of 220 nm and 280 nm.

Measurement hydrophobicity of bacteria. To measure the degree of hydrophobicity of the surface of bacterial cells, a two-phase separation of bacterial suspension in the system "polyethylene glycol PEG 6000-dextran T500" was applied [2]. The optical densities of the upper (PEG 6000, Upsala (Sweden)) and lower (dextran T500, Upsala (Sweden)) phases were measured on a spectrophotometer at a wave length (λ = 540 nm). The hydrophobicity was expressed as a hydrophilic-lipophilic balance (HLB = Lg [ODPEG / ODDextran]) of the surface [8]. For standardization of results, they were expressed in absorbance units (AU).

Statistical analysis. The obtained results were subjected to statistical processing by the methods of variation statistics [5].

Results of research and their discussion

At the first stage of the study, clinical strains of staphylococci were selected, with growth on a solid nutrient medium peptidoglycan releasing factor (peptidoglycan lyzing factor). As a result, 20 cultures of S. aureus and 46 cultures of coagulase-negative staphylococci (10-S.epidermidis, 24-S. haemolyticus and 12-S. hominis) were selected.

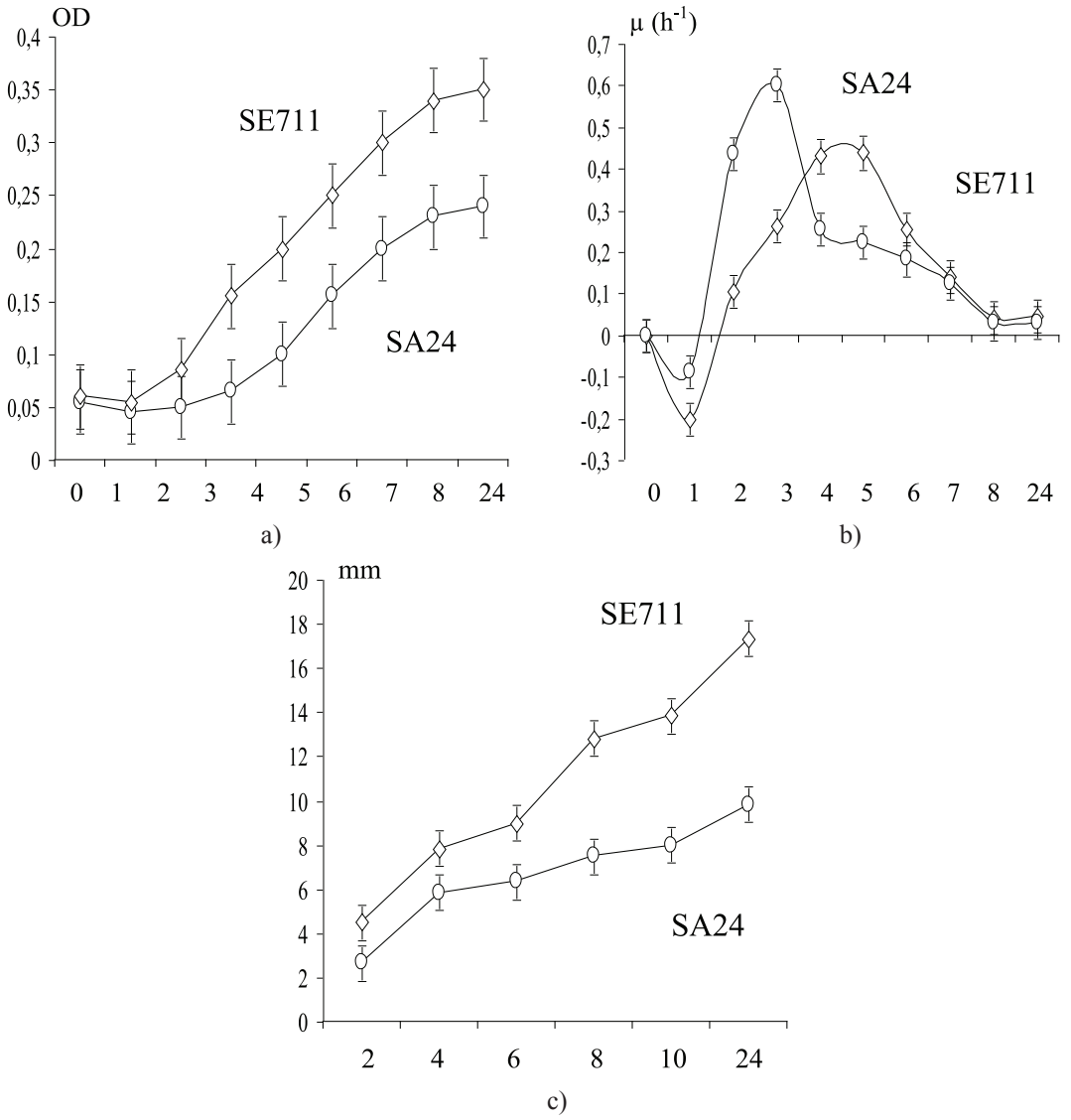
In the cultivation of staphylococci on a solid nutrient medium, the time for the initiation of peptidoglycan lyzing factor isolation over the M. lysodeikticus growth inhibition zone was noted. For S. aureus, the first signs of the release of the factor (peptidoglycan lyses activity) were observed after 6 hours of growth, with the formation of a characteristic lyses zone of M. lysodeikticus (4.5 ± 0.3 mm). Later, the growth dynamics of the diameter of the M. lysodeikticus lysis zone were noted. By 8 hours of growth, the diameter of the M. lysodeikticus growth inhibition zone increased by 29% (5.8 ± 0.3 mm), and after 24 hours of growth, it was 84% (8.3 ± 1.0 mm). Coagulase-negative staphylococci were characterized by more pronounced peptidoglycan expression of lysis activity. Thus, the diameter of the diffusion zone of PLP for S. epidermidis already by 6 hours of growth was (3.1 ± 0.3 mm), by 8 hours it increased by 19% (3.7 ± 0.4 mm), and after 24 hours by 106% (6.4 ± 0.7 mm). But the largest increase in the diameter of the M. lysodeikticus lyses zone was noted in the cultivation of S. haemolyticus clinical cultures. If by 6 o'clock growth the diameter of the diffusion zone of the FLP was 3.3-0.5 mm, by 8 hours it increased by 45% (4.8 ± 0.9), and after a day of growth by 142% (8.0 ± 1.0). The mean values of 18-hour staphylococcal cultures for hydrophobicity for Staphylococcus-releasing PLF: S. hominis (-1.725 ± 0.17 AU), S. haemolyticus (-1.317 ± 0.12 AU), S. epidermidis (-1.024 ± 0.13 AU), S. aureus (-0.893 ± 0.15 AU).

At the next stage of the study, two clinical isolates of staphylococci differing by the maximum specific growth rate of S. aureus SA24 and S. epidermidis SE711 with high expression peptidoglycan lyzing factor (Figure), extraction of peptidoglycan lyzing factor was carried out.

In two cultures with the highest dynamics of peptidoglycan isolation, fractionation by reversed-phase chromatography (HPLC) For preparation of reversed-phase liquid chromatography, preparations of agar extracts containing peptidoglycan lyzing factor were diluted (1: 100) with 0.1% acetic acid solution, layered (3.9×300 mm), elution was carried out with a linear gradient (acetonitrile + 0.1% TFA / H_2O + 0.1% TFA) for 10 minutes, the detector response was fixed at two wavelengths of 220 and 280 nm (Table).

In the gradient elution mode, the maximum efficiency of the agar extract separation was achieved at a ratio of 60:40 (acetonitrile + 0.1% TFA / H_2O + 0.1% TFA), with an elution rate of 1 ml / min. Fractionation was carried out in duplicate. At the first separation, two fractions were obtained with a retention time of 2.9 and 4.7 minutes. Lyophilisates of all peptidoglycan fractions did not have any activity (lysed M. lysodeikticus cells in a test tube, in control lysozyme solution). With the second separation by reverse phase HPLC on a C18 column, 2 fractions were obtained with a retention time of 2.6 and 3.7 minutes.

Interestingly, cultures in which the peptidoglycan lyzing factor was released up to 6-8 hours of cultivation, according to the inhibition of M. lysodeikticus growth, but after a day of growth we did not observe this activity. Perhaps this is due to the inactivation of the released peptidoglycan lyzing factor.



Chronological conjugation of morpho-physiological properties of staphylococcus producers of peptidoglycan lyzing factor (PLP) with a diameter of the lysis zones. On the abscissa axis: cultivation time (hour); on the ordinate axis: a) – biomass OD; b) is the specific growth rate μ (h-1); c) – diameter of the lysis zones of Micrococcus lysodeikticus (mm); SE711 – Staphylococcus epidermidis and SA24 – Staphylococcus aureus producers of peptidoglycan lyzing factor (PLP)

Fractionation of agar extract

Fractions	Fractionation 1				Fractionation 2			
Wavelength, λ	220 nm		280 nm		220 nm		280 nm	
Peaks	1	2	1	2	1	2	1	2
Max. RT	2.87	4.68	2.87	4.70	2.63	3.67	2.63	3.68
Start RT	2.77	4.10	2.77	4.03	2.48	3.40	2.45	3.42
End RT	3.00	5.28	2.98	5.28	2.78	4.08	2.78	4.08
Area	2.63	11.04	2.23	11.68	1.91	3.59	1.69	3.46
Heigh	29.39	34.68	25.42	34.49	23.55	14.24	19.91	14.01
Width	0.08	0.24	0.08	0.25	0.07	0.23	0.24	0.23

Note: Max. RT (min) is the peak hold time; Start RT (min) – start time of peak integration; End RT (min) – the retention time of the end of peak integration; Area (mAU * min) – area of the peak; Heigh (mAU) – peak height; Width (min) – peak width.

The presented experimental data indicate that one of the characteristics of the more characteristic coagulase-negative staphylococci, in contrast to S. aureus, is the hyper production of the peptidoglycan lyzing factor. For staphylococci with a low specific growth rate, hyper production of the peptidoglycan lyzing factor and the higher hydrophobicity of the cells are characteristic. Perhaps this is one of the factors of inter-microbial antagonism contributing to the maintenance in the population of clones with a low growth rate and one of the criteria for selecting a morphotype with special physicochemical properties of the surface. The explanation of this phenomenon is probably associated with a different survival strategy for CNS and S. aureus on mucous membranes. An unsuccessful attempt to isolate the peptidoglycan by the HPLC method is due to the inactivation of the phosphate factor present in the agar and, to a greater extent, in the broth, the main component of which is the sprat hydrolyzate. This, to some extent, can explain the manifestation of low activity in the period of 6-8 hours of growth of staphylococci and the lack of activity after 24 hours of growth.

Conclusions

A comparative analysis of the dynamics of the increase in the zone of inhibition of the growth of micrococcus showed that the largest diameter was observed in S. aureus, and among the coagulase-negative staphylococci, S. haemolyticus showed the greatest dynamics of growth of the zone of inhibition of M. lysodeikticus cells growth. By the peptidoglycan lyzing factor expression criterion, all clinical isolates could be arranged in a gradient series: S. aureus > S. haemolyticus > S. epidermidis > S. xylosis > S. hominis. By high hydrophobicity in a gradient series: S. aureus > S epidermidis > S.haemolyticus > S.hominis.

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SPANISH FLAMENCO DANCE REPRESENTATION IN THE CONTEXT OF STRUCTURAL AND LINGUISTIC ANALYSES

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The flamenco dance is viewed in the context of structural and linguistic approach. The etymology of the term "flamenco" is thoroughly analyzed. Different semantic meanings of the given term suggested by the flamenco researchers (K. Simorra, B. Infante, R. Marina etc.) are presented in the article. Lexical and semantic meanings of certain Spanish terms and exclamations typical for flamenco dance are considered in the article. The reconstruction of linguistic interpretation has been applied for the basic elements of flamenco dance and singing: salida (entrance), copla (couplet), llamada (transition point), desplante (final) etc. These terms defined as common structural elements of the most of flamenco songs and dances have their corresponding vocal and choreographic expressions while performing. Based on the analyses of flamenco research literature, Spanish film-ballets and participant observation conducted by the authors, the article presents a table, describing each of those elements in terms of performing on stage. A special attention is given to the meaning of a term "duende" – a phenomenon which has spiritual nature and is an integral part of the flamenco art, as well as to its structural and functional model previously developed by the authors. The article presents sociological research results conducted by the authors within the city of Vladivostok which reveal a level of awareness of the "duende" phenomenon among the Russian flamenco dance performers. The following conclusion is drawn: professional performing of flamenco dance includes not only mastering the dance technique and its rhythmic structure, but also deep penetration into the essence of flamenco art, expressed by the linguistic means of the Spanish language.

Keywords: flamenco dance, flamenco etymology, dance structure, Spanish language, "duende" phenomenon, zapateado, jaleos

A traditional folk trend of dancing art – flamenco is a combination of three genres: traditional singing, guitar playing and dancing. Throughout the 20th century, flamenco dance and music have been serving as a national symbol of Spain, as a "visiting card" of this country.

However, as G. Edwards notes, the art of flamenco has derived from complex social, cultural and historical processes, and having gone through a number of stages of its development it was preserved until present time [1, p.19]. Flamenco originates from the southern Spanish province of Andalusia in the 15th century. Flamenco art was formed in the result of cultural interaction between several nations settling in the south of Spain: Spanish, Gypsy, Moorish, Jewish and Greek. However, M.H. Hayes believes that the leading role in forming and developing flamenco art belonged to the Gypsies. Since the 16th century the style of dance eventually to be called "flamenco" has been performed by the Gypsies in their national districts near big cities of Andalusia. In Cadiz they settled in Puerta-del-Tierra area, in Seville – in a district of Triana, in Granada – in Sacramonte area etc. [2].

During the recent two decades, the flamenco dancing art has gone beyond the framework of purely Spanish culture having become the cultural heritage of the whole world. In Russia, this dance has become widespread all over the country: almost every big city has its own flamenco schools, there are annual flamenco festivals in many regions of Russia. Along with the dance, a big number of Spanish words and terms related to flamenco art have been adopted by the Russian flamenco performers, as well as numerous admirers of this style. These Spanish words are not limited to: duende, zapateado, cante jondo, floreo, bata de cola, etc. Certain words belonged to the flamenco vocabulary can not be translated into Russian language having their meaning only in the context of this dance art, as, for example, the word "duende". M. Cuellar-Moreno in her article presents a special glossary containing the words and expressions typical for the flamenco dance, giving their interpretation from the perspective of a non-native flamenco culture representative [3].

Materials and methods of research

The article encompasses a combination of methods, widely used for both linguistic and art analyses. Thus, descriptive, historical and comparative-historical methods were applied for researching the etymology of the term "flamenco". Contextual analysis using ethno- and cognitive linguistics was applied to research certain notions and terms of the Spanish language, typical for the dance of flamenco.

A method of structural analysis, a problem-logical and a general research method of modeling were applied to study the "duende" phenomenon allowing to consider the content elements of this phenomenon in their logical

sequence, as well as to develop its structural-functional model. A semiotic analysis of the Spanish films-ballets allowed to develop the general structure of the flamenco dance presented in a Table 1.

Sociological methods, such as questionnaire and participant observation were used to identify the criteria for expressing the "duende" phenomenon by Russian performers, as well as their level of awareness of this phenomenon in their performing (presented in a Table 2).

Results of research and their discussion

Until the present time the etymology of the term "flamenco" causes a lot of scientific debates among researchers of this art, giving rise to various hypotheses of its semantics. According to one opinion, initially the word "flamenco" was used to refer to the "singers from Flanders" (Northern Belgium) who used to sing in the cathedral chapels of Spain in the early 16th century, arriving at this country together with the Emperor of the Holy Roman Empire Carlos the Fifth. Eventually, the word "Flemish man" (which is "Flamenco" in Spanish) has become synonymous with the word "singer", especially a talented one. However, K. Simorra expresses different opinion, emphasizing that the word "flamenco" originally had a negative connotation and referred to the Flemish nobility who settled at the Spanish court in the 16th century [1, p. 20]. In his opinion, the word "flamenco" meant "Flemish upstart", "cunning and villain fellow from Flanders", and since the Gypsies were considered to be descendants from Flanders, they were also called "flamencos", which matched their national image in the Spanish society of the 16th century.

Thus, the term "flamenco" was used to refer to gypsies in the work of the English traveler George Borrow, who visited Spain in the 30s of the 19th century. He wrote that the Gypsies in Spain were called "the Germans", "New Castilians" and "Flamencos", because they arrived at Spain through the German territories, having passports and passes of the German authorities. However, the term "flamenco" was not still used to refer to the dances and songs performed by the gypsies [1, p. 20-23].

According to another opinion, the term "flamenco" is of Moorish origin and means "a fugitive peasant". At the period of pressures against the Moors in Spain in the 16th century, the Moors were called "fugitive peasants", which in Arabic sounds as "felamengu", where "felah" means "peasant" and "mengu" means "fugitive". Blas Infante insists on the Moorish origin of the term "flamenco", justifying this by the fact that in the 16th century the Spanish society enslaved the representatives of the Moorish nation and displaced them to the south of the country, to Andalusia. However, the Mauritanian national traditions, grief and protest of the oppressed people have been preserved in the Andalusian style of singing and dance, called "felah-mengu" [1, p. 19].

In his turn, K. Simorra proving the Arabic roots of the flamenco art gives an example of the traditional flamenco dance of Zambra, which has the Arabic name as "sambra", meaning the "Moorish dance with outcries". This opinion is shared by the flamenco researcher S.E. Calderon, who noted that the famous flamenco song-dance Caña, which is, in fact, the ancestor of many flamenco styles, comes from the word "gannia", which in Arabic means a "song." Having analyzed the views of different authors, E.M. Andi in his work concludes that the original meaning of the word "flamenco" was associated with some oppressed and persecuted people, especially the Gypsies and the Moors [4, p. 23]. Thus, the fact of cultural interaction between the Moors and the Gypsies was confirmed linguistically, giving rise to a new form of art called "flamenco".

Another version of the etymology of the term "flamenco" suggests its origin from the Latin word "flamma" (fire, flame), revealing the expressive, "fiery" nature of Andalusian songs and dances. Meanwhile, the researcher R. Marina associates the name of flamenco art with a flamingo bird, in Spanish called "flamenco". The researcher highlights a similarity between the bright costumes of the flamenco dancers and the choreographic positions of the dance with the feathers coloring and the poses of this bird [4, p. 32].

In terms of etymology of the term "flamenco" the authors of the given article share the opinion of the researchers who believe that this term corresponds to the notion of "flame" (Latin "flamma"). The semantics of the term "flamenco" in the meaning of "flame" covers the key characteristics of this art: bright emotional self-expression, mood of protest, contrasting character of its rhythmoplastic movements and musical intonations.

No less controversial in terms of linguistic reconstruction of etymology is the term "cante jondo", which means "deep singing" – emotionally rich throaty singing with a deep vocal register. This notion is equally referred to dance: dancing in the style of "jondo" reveals the strongest and the deepest feelings of a performer. Meanwhile, none of the flamenco studies analyzed give a precise answer, whether

to consider the words "flamenco" and "cante jondo" as synonyms, whether they are different notions, where one results from the other, or they are the "branches of one body". According to M. Hernandez, singing in the style of "cante jondo" is "the quintessence of flamenco", the word "flamenco" denotes what is sung, while the word "cante jondo" defines the way it is sung [4, p. 37].

Let's consider some terms referring to certain elements of the flamenco dance. A female dancer, or "bailaora" performs a dance in a traditional bouffant long dress, fitting the upper part of the body which has a lot of flounces and frills, often with a train that she gracefully kicks with her feet during the dance. Such dress is called "bata de cola".

The typical flamenco dance gestures are the fan-shaped rotations of hands and fingers, called "floreo" (derived from a Spanish word "flor", which means a "flower") as well as special positions of arms, called "braceo" (derived from the word "braso" meaning an "arm"). Flamenco dance is also characterized by the rhythmic tapping made by the feet of the dancer, either by his heel, toe or the full foot, called "zapateado" – tapping footwork (a derivative of "zapato" which means a "shoe"). By means of "zapateado" a certain rhythmic pattern is created, which is integrated into the dance by a performer. Nowadays "zapateado" is used by both men and women, although for a long time it was performed only by men, since the intensive footwork requires much physical efforts and an excellent sense of rhythm [1, p. 66].

In the art of flamenco, singing, music and dance are tightly interrelated, but the primary art form is rightfully considered a song which sets the rhythm ("compás") and the general mood of music and dance, while the dance just follows the song [5, p. 84].

There are more than 50 different styles within the art of flamenco, each of which has its own name, origin, character and rhythm. The initial form of each style is a song. Although, each style has its individual features, the song structure of all styles is approximately the same. The main components of each song are as follows: the guitar introduction, "salida" (entry), "copla" (couplet), "llamada" ("bell" which means transition point), "falseta" (solo part of the guitar), "escobilla" and "desplante" (solo parts of the dancer).

Based on the analysis of traditional flamenco singing, as well as the dance performances of the recognized masters of flamenco dance such as; K. Oyos, A. Gades, H. Antonio Jimenez, L. del Sol, etc., a generalized conclusion is drawn about the flamenco dance structure, encompassing certain choreographic movements and positions corresponding to the basic elements of singing (see Table 1. "General structure of flamenco dances").

A notion of "duende" is an integral part of the flamenco dance, its authentic "spirit". As professional performers and a number of researchers (such as: A.P. Claramunt, R. Molina, A.G. Clement, E.M. Andi, F.G. Lorca and others) assume flamenco dance can not exist without "duende". According to the dictionary of the Spanish language, one of the meanings of the word "duende" is "magic and enchantment of magnificent and sincere singing" [10]. In Spanish folklore, "duende" is understood as a "supernatural being, spirit, invisible creature". With reference to the art of flamenco, the term "duende" implies the inner energy of a performer, his emotional uplift, which has a certain similarity with an element of expressiveness in some Russian and Gypsy folk dances associated with "fire". According to E.M. Andy, the Spanish expression "no tiene duende" referring to some flamenco performer, which in translation means "there is no fire in him," completely ruins his performing career [3, p. 36]. Meanwhile, the term "duende" in the meaning applicable to the flamenco dance is not contained in any Russian dictionary of foreign words.

Speaking about flamenco dance, it should be noted that two basic principles are combined in this art – physical and spiritual. The physical side includes, first of all, the dancing technique, keeping the rhythm and complex choreography. However, unlike many other dances, where the spiritual aspect is limited to artistry and demonstrating expression, the flamenco dance contains a certain spirit – "duende". Without "duende" the art of flamenco looses its identity. Recognizing the role of dancing technique in flamenco, we assume, however, that the "duende" phenomenon has a paramount importance since it provides a sense of authenticity and passion to the art of dance.

As E.V. Smirnova notes, the art of flamenco creates a special meditative ambiance, turning flamenco from merely a form of dance into some mysterious ritual, creating its special world with its own traditions, customs and meta language. This meta language consists of its signs – choreographic movements, styles and rhythms which reflect the drama and suffering of the expelled peoples. Thus, the notion of "duende" is also a sign of such meta language, having its meaning similar to the one of inner spiritual energy [11].

Table 1

General structure of flamenco dances

Structural element of singing	Description of the element	Choreographic positions
"Salida" (entry) is the beginning of singing	A performer comes out and starts singing. Depending on a style, singing begins with some typical exclamations of a singer expressing sorrow, complaint or joy: "ay", "tirititran", "lerele", "ay, ay" etc.	A dancer often stands in the position of "back to the viewer", making slow smooth movements with his hands, for example, "braseo" (rounded arms moving from one position to another), "floreo" (fan-shaped rotation of the hands), there may also be soft rhythmic claps and head turns.
"Coplas" (song couplets) "Copla de preparación" (the first preparatory verse).	The couplets tell a certain story, accompanied by a corresponding melody and mood. The first one is quite simple for performing At this stage the storyline of the dance begins, it is a set-up of the intrigue.	A dancer performs various choreographic movements, highlighting the arms and the upper part of the body: "braseo" in combination with "rondas" (circular movements of legs on the floor), various bends, etc.
"Cante valente" (brave singing), the subsequent couplets of the song.	At this stage, there is a culmination of the song and dance story. The singer performs a vocal part of the most complex melodic structure which is usually higher in tone, keeping the melodic phrase in one breath, demonstrating a high level of professionalism.	The dancer performs multiple rotations, lunges, swings of the skirt' train, various turns of the body ("heron turn", a "broken turn" etc.) The dancer performs all kinds of complex choreographic combinations except the footwork of "zapateado", so that the tapping beats do not interfere with the vocal part.
Falsetas – solo guitar parts.	Falsetas can be very long, filling pauses between the vocal fragments. The guitarist demonstrates his skills, often using free improvisation	During the falsetas, the dancer performs background improvisational movements, often clapping his hands to the rhythm of the music.
Escobillo is the "music of the feet" of a dancer	The dancer performs a solo part. The emphasis is on tapping the rhythm with the feet. At the same time, the dancer, accompanying the guitarist, creates his own rhythm by means of the footwork.	The dancer performs rapid and complex tapping combinations, demonstrating a high level of "zapateado" technique.
Llamada – a "bell" which means a transition point.	This is a part of a song or a dance, informing about the change of rhythm and the transition from one structural element to another.	Any dance movements or a series of choreographic steps and positions can be used here. Usually they pass through the whole dance as a refrain.
Desplante –completion	At this stage which is usually followed after the "llamada" certain dance steps indicating an approaching break or ending of the song are used. This part assumes interaction of different rhythms.	The dancer often uses improvisation tapping "zapateado" and clapping hands accompanying the guitarist.

Note: Compiled on the basis of: [5, p. 50-53], [6, p. 45-47], [7], [8], [9].

Thus, the phenomenon of "duende" can be interpreted and understood through the notion of "spirit". Comparing "duende" to spirit, F. Garcia Lorca developed his aesthetic theory of "duende". According to his theory, this phenomenon explains the essence of the world. He noted that the demonstration of "duende" in a dance can be compared to the exclamation: "The God is alive!" F.G. Lorca compares "duende" to a passionate and deep sense of God

perceived with all five human senses who entered into the voice and body of the dancer. The poet also compares "duende" to the freshness of a rose which awakens a religious delight [12, p. 407]. A Canadian flamenco dance researcher I. Goulett considers "duende" a "liminal experience", which requires both high level of professionalism and personal inner freedom from a performer [13, p. 122]. However, despite the primary importance of the "duende" phenomenon in flamenco dance, until today there is no scientific analysis of this phenomenon.

Having compared the concepts of "duende" and spirit, having taken into account the opinions of flamenco researchers, the authors of the given article made an attempt to scientifically identify this notion by developing its model, represented by five structural components: creative imagination, inspiration, emotional give, improvisation and trance. The "duende" phenomenon emerges in the result of combination of the above-mentioned elements and is determined not only by a special inner energy of a performer, but also by a catharsis reaction of the viewers. Thus, "duende" is a complex sociocultural phenomenon that requires the performer to express the content of his conscious and unconscious psychic reality during dance performing [14].

According to the results of the social research, conducted by the authors within the city of Vladivostok, the majority of Russian flamenco dance performers have a fairly clear idea of what "duende" is by reflecting and analyzing this phenomenon. Meanwhile, the most of them can not express "duende" in their performing due to insufficient inner freedom and emotional give during dancing. Despite the urgency and importance of "duende" in flamenco dance, according to the survey, 70% of respondents considered this notion to be subjective, and 20% found it difficult to answer. Table 2 represents the main criteria for expressing the "duende" phenomenon by Russian performers.

Meanwhile, according to the research data, objective criteria – enthusiasm and ovation of the audience (47%) keep the leading position in comparison with the subjective criterion – a sense of dancer's satisfaction (35%). Such reply rates confirm the structural model of the "duende" phenomenon, according to which a special reaction of the spectators – catharsis (in this case – enthusiasm and applause) serves as an indicator of the "duende" expression. Such a criterion as "a sense of harmony and unity with the world" was mentioned as the "other" reply option [15].

Another distinctive feature of the flamenco dance is the "jaleos" which means various emotional outcries accompanying the dance, encouraging the dancer and involving the viewers into the flamenco performance. Such exclamations include the following: "Toma que toma!", "Así se baila!", "Venga!", "Vamos ya!" "Ole!" etc. Such outcries can be approximately translated as: "Come on, come on!", "Burn!", "Keep dancing!", "Come here!" etc. These "jaleos" highlight vivid expressiveness and a feeling of euphoria, typical for the flamenco dance. At the same time, such expressive outcries should necessarily correlate with the meaning of the dance and correspond to its rhythm. The "jaleos" are used in the art of flamenco in order to emotionally enhance the culmination point of singing or dancing, fostering the emergence of "duende" [16].

A European choreographer Rudolf von Laban, a representative of the modern dance ("free dance") who created the first movement-analytical theory of modern dance, believed that the dance improvisation, which is the basis of any dance, should include not only movements, but also various verbal and sound expressions [17, p. 40-45]. Thus, Laban's approach to improvisation has certain similarities with flamenco art which uses "jaleos". American dancer of the early 20th century I. Duncan was among the first to develop the idea of dance improvisation searching for the "authentic natural movements hidden deeply in the soul". We assume that flamenco dance with its spiritual "duende" phenomenon and spontaneous "jaleos" can suggest certain ways how to express such movements [18].

Table 2

Criteria of "duende" expressiveness

Question: "What, in your opinion, determines the level of "duende" expressiveness in a dancer's performing?"	Criterion	Percentage of respondents
	A sense of dancer's satisfaction	35
	delight and ovation of the audience	47
	A sense of harmony and unity with the world	7
	High evaluation among the professionals	3

Conclusions

Thus, the combination of linguistic and art criticism, as well as general research methods aimed at analyzing the dance of flamenco, has shown that the art of flamenco is a certain way of life, requiring a non-native flamenco culture representative to immerse into this cultural and ethnic environment, including not only mastering choreographic technique and rhythmic structure of the dance, but also a full semantic comprehension of its components, which are an integral part of the art of flamenco.

For the professional mastery of the flamenco dance, the Russian performers should not only acquire certain knowledge of the complex history and development of this ancient dance art, understand the translation of the basic flamenco terms and expressions, but also should have a clear understanding of the symbolic semantics of the dance content and elements of the Spanish culture manifested in the flamenco dance.

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COMPARATIVE ANALYSIS ANTHROPONOMY IN KAZAKH, KYRGYZ, UZBEK AND TATAR LANGUAGES

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This article discusses anthroponomy Arab-Persian origin, which is devoted to the cults of the Moon, Sun, Stars, and related cognitive phraseology in Turkic languages. And given the names of many groups of people: the celestial bodies, wild animals, pets, sacred number. Language of the world – a special method to reflect the language and the representation of reality in the forms and structures of the language in its relation to the person who is the central figure of the language. Now consider the linguistic picture of the world as a whole of human knowledge in the unity of the model of the world, and with the same conceptual point of view, the world is a philosophical and philological concept.

Keywords: anthroponomy, Linguistic Map of the World, the Moon, the Sun, the Star, celestial bodies, wild animals, pets, sacred number

The Turkic world share a common value Turkish write – common history, similar fates of Turkic-speaking countries` historical heritage, culture and language in terms of the ability to appreciate the most precious treasure that one of the main tasks in the immediate present.There are a lot of works about anthroponomy in Kazakh, Kyrgyz, Uzbek and Tatar languages. In particular Zh. Balasagun, E. Zhubanov, M. Gabdullin, G.F. Sattarov, A. Idrisov, Sh. Zhaparovdun, K. Dyikanov, T. Zhanuzakov, V.U. Makhpirov, U. Erzhanova, M.Musabaeva, B. Biarov, K.K. Rysbergen and some other scientists contributed for Turkic-speaking countries` historical heritage.

The history of the turkic people, the historical and spiritual interlacing, each nation on culture of the turkic people expresses symbols of lingvokulturny unity, investigating etnolinvistichesky aspects. The history, culture, similarity of the Kazakh, Kyrgyz, Uzbek and Tatar languages, were summarized concepts concerning names a cult, seemed to similarity and feature. The concept of a lexeme "cult" phraseological, paremiologichesky conceptual unit, as a part of a frame, is shown in the form of the scheme, the ethnocultural table of contents is chosen. The Sun, The Moon, The Water, The Fire, The Mother Umay, A Tree, a cult of Spirits and "God's forces" conceptual phraseology, proverbs – sayings, popular expressions, legends, fairy tales, art compositions, is considered richness of language, in the above-named concepts associative features are specified, all this proves that there is an opportunity to distinguish features language images in the world and the universe.

Theoretical importance of research work

Antroponima in Turkic languages – the historical, cultural and social phenomenon which is leading up ethnic information from ancient times. Entering into this system in ethnoculturological and historical essence ethno Antroponima the shape of different ethnoses and historical origins of ethnic groups, as their geographical movements. Anthroponomics is manifested in various forms and types of the public and social device, the material and cultural phenomena in the life and household of people in the past. Any nation retains the gender system of naming and this accounts for the usage of notions connected with world outlooks, cultural and social phenomena, life and household daily routine, a form of economy with this or that nation. Owing to this we distinguish the following groups of people's names:

- Names connected with names of celestial bodies;
- Names connected with names of wild animals;
- Names connected with names of domestic animals;
- Names connected with names of sacred numbers.

The Turkic people gave *the names of celestial bodies* associated with *the Moon, the Sun, Stars and Light*, Sunshine, from that we can see words connected with the Moon and the cult of the sun and unlimited respect and trust for the Moon, the Sun, the Star. With ancient Turkic people the Moon's cult was in the first place, the names as *Ai qagan, Ai öldi, Ai toldi [*1;25] were given. In Zh.Balasagun's work called "Kutti bilik" were mentioned the girls' names Aitoldy and Kuntudy also have a proper cognitive meaning. These names are connected with wealth (happiness) and justice (T. Zhanuzakov). Professor E.Zhubanov says about the names of *Kunsulu, Aisulu, Tangsulu, Kunzharik, Aizharik, Tangzharik.* He says: "It's

true that the cases of retaining the supposed ancient order of words are single. It wouldn't have been otherwise as the supremacy of the new form could be realized after the old one is ousted. Therefore, also there where the attribute stands after the attributed one our grammatical thinking is not always able to see this, moreover, it is able to change the attribute into the attributed one and vice versa. Perhaps such strange combinations as *Kunsulu* (about the beauty), *Aisulu* (the beautiful moon), *Tangsulu* (the morning dawn is beautiful), met in traditional personal female names, or analogical with them male names like: *Kunzharyk* (the bright Sun), *Aizharyk* (the bright Moon), *Tangzharyk* (the bright morning dawn) have been the samples of such a word order in which the attributes expressed by adjectives sulu (beautiful) and zharyk (light), followed the attributed kun (sun), ai (moon) and tang (morning dawn). Such an admission is more likeable because here in the last components (sulu and zharyk) it is not possible to trace the predicate, and in the first (kun, ai, tang) – the subject, as the combinations comprising personal names very rarely acquire the form of a sentence like: Zhyl keldi (Spring has come), Kozham berdi (My boss has welcomed), etc. Very often personal names, simple or complex represent an expression either of an attribute of some substance or the predicate of some subject. In the first case a person bearing the name is thought of as a substance, in the second as a subject. So the full translation of thoughts included in the abovementioned names may be like this: "(this is) – a beautiful sun", "(this is) – a bright sun" and etc [2;126].

The Turki-tatars as well as in the Kazakh language such word as *"Ai, Kun/ Kon, Tang"* by antropoleksem: *Aibulat, Aivar, Aidyn, Ainur, Aizat, Aidar, Aidos, Aigol, Aizada, Aidana, Aizhan, Aisulu, Ainaz, Tang, Tangol, Tangshulpan, Tangsulu, Tangnur, Tangsu* and occur [3;19]. In addition, the article by G.F.Sattarova anthroponym Tatar language in the ancient faith compliance with the Turkic kneel in the sky; nature names: *Kugai, Aisylu, Chulpan* describes the worship in the sky, in nature [4;69] and the Kyrgyz names Ayzhamal, Tolganay, Aichurek describe the worship of the moon.

In Kazakh, Kyrgyz and Tartar the male and female names are associated with the Moon, the Sun mean beauty, kindness and tenderness. The people's names are created from combining of two words. For example, in the Kazakh language the names associated with the moon are: Ay + sulu, Ay + zharyk, Ai + nur, Ai + shuak, Ai + barsha, Ai + zhan, Ai + kumis, Ai + saule, Ai + para, Ai + bek, Ai + dos, Ai + dar, Ai + dar + bek, Ai + toldy and other names. Associated with Sun and Shine are: Kun + sulu, Kun + zharyk, Kun + tu, Kun + tuar, Kunim + zhan, Kun + toldy, Nur + ai, Nur + sulu, Nur + zhan, Nur + ganym, Nur + tai, Nur + bala, Nur + bol, Nur + bai, Nur + bek, Nur + bubi, Nur + aly, Nur + galim, Nur + sultan, Nur + sulu, Nur + gul, Nur + zhigit, Nur + kasym, Nur + tugan, Nur + saule and other names. The Turki-tatars names associated with the moon are: Ai + bulat, Ai + vaz, Ai + var, Ai + din, Ai + nur, Ai + zat, Ai + dar, Ai + gul, Ai + zida, Ai + dana, Ai + zina, Ai + sylu, Ai + zila, Ai + naz and other names related to the Kirghiz associated with the moon are: Ai + zhamal, Tolgan + ai, Ai + churek and other names have this meaning.

We believe that the "Sky" – the ancient goddess worship only the Creator of the Turks. God cult religion all over the world, all life, the creator of all creation, only stated that there is a powerful force. Perhaps that is why the ancient Turks in ancient times to rejoice and grieve, even if its share of problems, the next goal is to achieve the dream of doing something, even long-distance travel, wellbeing, health, luck, and looking up to heaven worship.

Eventually some motives of name, which had put in ancient period of Turkic, have disappeared; names with the components *"Ai", "Kun", "Tang"* found to be the most prevailing and reached up to nowadays. Ancient representations of ancestors found the reflection in anthroponomical system, and being remained in national memory in the form of the mere cipher language signs, were transformed to the future generations.

The small group of names, which have animistic representations on its basis, is connected with a cult of the Sun, the Moon, the Star and the Water. Names with the component "Su" aren't extended in names of Tatars, the reason of it that is water-symbol of time, and the transience, irrevocability is peculiar to it. Other aspect of name giving, which is based on beliefs of the ancient Turkic and connected with water, consists of the metaphorical use of a word "SU" and associates with cleanliness, innocence.

The people's names connected with *wild animal's names*. Naming a child with wild animal's name that they were (kushty), (karuly bolsyn) and (solardai erkin omir sursin). Bori, kaskyr, arystan, zholbarys, aiu, barys, bugy, kaban, kulan, maral and other names regard these

names as an honour to transform into people's names. In the ancient monuments writing *Arslan* (arystan), *Aşına* (kaskyr), *Bars* (barys), *Buqa* (ogiz), *Küçük* (kushuk), *Qaban* (kaban), *Qulan* (kulan), *Teka* (teke, koy) т.б. Kushuk (kushuk), gabah (kaban), gulan (kulan), teka (teke, koy) and other names are met. In Tatar people the wolf are called (buri), dative (bars), lion (arslan) and etc. The names which naming people with these animal`s names are: *Baiburin, Buriev, Baiburin, Burikbaev, Barus, Barsil, Aibarys, Ilbarus, Ilbaris, Bibars, Akbars, Arslan, Jhofar, Baibure, Buga, Baibuga, Kochek, Kubak,* etc. But in ancient Turkic languages Arslan/Arslan esimi Turfan, Karahan are the names of king: *Arslan balban, Arslan tegin, Arslan Bilge Tengri ilig [*5;156]. Also, in Kazakh bori, kaskyr, arystan, zholbarys, aiu, are of honors consume and changed to name of people. Nowadays they exist in peoples names. They are: Arystan, Arystanbek, Arlan, Zholbarys, Kaskyrbay, Boribay, Boribek, Aiubai, Aiukhan, Bugybai, Maral, Maralbek, Maraltay, Akmaral etc. So some names such as met in Kirgiz peoples name. Names of Kirgiz are investigated by A.Idrisov in his work on "Kyrgyz tilindegi ysymdar" ("Кыргыз тилиндеги ысымдар)" work. To the Kirgizia and Turkic prejudice – according the sky, animals and nature name are described with the cult name: *Shur, Bars, Shumkar, Arsyan, Boribasar, Shalkuieyk, Telrou, Sureshki, Sarala, Akborshuk, Akkula, Kerbilek, Akshumkar,* and others [6;17]. Name which are connected with animals names are important. When people are given names, in their sense describing – heroine, heroic, urgent, idea is obvious.

The name "Kaskyr" we can indicate via this example: *wolf* is → wild animal → molar and urgent → threat → sharp. Name wolf is not used in only Kazakh, but in Kirgiz, Uzbek, Turki-Tatar think that wolf is saint and never called in straight for example, Kazakh people said how "uzyn kulak", "tik kulak", "ulyma", "kokzhal", "it-kus". Uzbek people used changeable meaning to his "itkush" (it-kus), then Turkmen people used euphemisms such as, "ady zhiten" (aty zhok), "mesdan it" (dala ity). Kazakh people up to now they asked "Malyn it-kustan aman ba?" It is a track of totomistic conception of long ago. People have such conception, that if traveler meets a wolf, it means he always has luck. Maybe therefore, Kazakh people thought that heroes look like wolves, and they taught courageous, tearless and daring like wolves. In our language phraseologisms explain that wolves are very courageous, fearless and daring through such words: *"kaskyr zhurekti", "kaskyrdai ozhet", "kaskyrdai zhauyiz", "kokzhal boridei"*. They mean courageous, fearless and daring. After that among our nation had brought about such words like: *"Borikti tastap, boriden kutylyp bolmas", "Bori tusin ozgertkenmen, tisin ozgertpeidi"*, these words mean to characterized as a wolf, but these learn to be proud like wolves [7;242].

Used methods during research

The people's names connected with *domestic animals.* In ancient time our nation named their babies connecting to *Camel, Sheep, Horse, Caw* in order to the babies be able to be very wealthy. For example: Kazakh people considered a camel as sacred "Oisylkara", and called own babies Bota, Botakoz, Akbota, Zhanbota, Narbota, Nartai, Nartailak, Narbura, Burabai, Tuyebai, and respected the sheep "Shopan ata", called own babies Koishybai, Koibagar, Kozybek, respected the horse "Kambar ata", called own babies Zhylkybai, Zhylkybek, Zhylkyaidar, the cow is "Zengi baba", called own babies Ogizbai, Okresh, Buzaubai. Scientist K.K.Rysbergen said that some names are connected with body's parts of animals, because for a long time our nation was related to animal culture, that's why it has names like: Aktailak, Aktuye, Alaaytal, Akzhainak, Atottagan, Botamoinak, Koshkar, Eshkiolmes etc. [8;13].

In our nation's custom one of the way of respect to a person – follow "At tergeu" name. In work of N.I. Ilminski, G.N. Potanin, N.A. Baskakov, A. Axmetov not allowing words, tabu, euphemism and custom affected name. Kazakh women don't call father-in-law, mother-in-law, brother-in-law, younger brother-in-law, or relative-in-law, brother's wife, straightly even they don't call their husband by their name; give the name peculiar to himself- \at tergeu\- one of the founding shows. The name of father-in-law, brother-in-law, younger brother-in-law, or relatives-in-law: *Ulken ata, Bi aga, Mirza zhigit, Torem, Shyrak, Ortanshym, Sarybala, Kishkenem, Tentegim, Erkem,* name of mother's-in-law, sister's-law: *Ulken azhe, Ak azhe, Sheber azhei, Syrgalym, Shashbaulym, Shyrailm, Kishkene kyz, Kenzhem, Bikesh, Boizhetken, Botagoz, Ake kyz, Erkem, Erkezhan, Erke kyz, Akerke, Akbota, Karakoz, Kozzhaksym.* All this is the best sign of pride and respect. There is a story which is tied to it. One day a daughter-in-law who couldn't call her father-in-law's, brother-in-law's names from respect way, when she went to the other side of reed, a wolf went to

eat sheep, the daughter-in-law rescue the sheep and cut it, then she provided its meat to people in village and she said to mother-in-law. "Syldyramanyng ar zhagynda, sarkyramaning ber zhagynda mangyramany ulyma zhegeli zhatyr eken, zhanymany bilemege bilep-bilep zhiberip, bauyzdap keldim" said she. Syldyrama-reed, sarkyrama-river, zhanyma-knife, bileme-sharpener. The reason of their names of father-in-law, brother-in-law: *Kamysbai, Ozenbai, Koishybai. Kaskyrbai, Bakibai, Kairakbai.* We can see daily life of Kazakh nation's totem is faith.

Anomastic names are associated with the *sacred numbers*. About names associated with the numerals scientist T.Januzakov wrote: the names of the numeral are associated with the birth date of a child. Environment, with life and others are connected with gift's number. For example, names such Ushbai (thirty), Zhetibai (seventy), Togyzbai (90 ninety), Kyrykbai (forty) are connected with people's traditions, customs and cultures and often use with words such *"zheti", "togyz", "kyryk",* said. With words *"ush", "zheti", "togyz", "kyryk"* also numbers such "bir" and "bes" gift connecting: *Birzhan, Birimzhan, Birmagambet, Ushbay, Ushlik, Tortbai, Besbai, Zhetibai, Togyzbai, Togyzak, Kyrykbai* and etc. It was common to call children by the age of their fathers or grandfathers.

Particularly Kazakh people were very careful with names. Good and famous people give names to babies and give them "Bata". Very famous person of a village takes baby on hand and repeat his name three times. Ages ago when unusual baby was born with shine forehead and especially to be called in names such as "Itaiyak", "Kushuk", "Zhamanbala", "Karabala" were. Nowadays people are trying to call their babies according to national traditions. For example, for wisdom and famous to give such names – *Abai, Zhambyl, Saken, Dinmuhamed, Margulan,* for poet – *Dina, Kurmangazy, Nurgisa;* for famous singer – *Roza, Bibigul, Makpal,* for heroine – *Edige, Zhanibek, Alpamys, Kobylandy, Abylay, Kabanbay, Aliya, Manshuk,* for cleaver mother's names such as *Zere, Aiganym, Tomiris,* and in the last time in order like our president such sober – minded called *Nursultan*.

Conclusion

Naming the person is one of spheres of enrichment of language. This spiritual wealth belonging to the same people showing national essence of their long history. Above the mentioned values of names in the Kazakh, Kyrgyz, Uzbek, Tatar languages have on value the general understanding, communication in outlooks. In all these languages names on sounding are exposed to phonetic changes, but semantic values are identical. Above Turkic-speaking people have a common understanding of the meanings of their names; the outlook is inferred that there is a connection. This change people phonetic spelling of their names in four languages, but the semantic meaning is the same. In conclusion sphere of linguist cultures discovered anthropological Kazakh-Turkish languages give information's from ethic history cultural and social phenomenon. In this range seem family of historical groups and geography movement of ethnic groups. One of the language branches of development seems public like such treasure and national existence.

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MULTILINGUAL EDUCATION: DEVELOPMENT OF COMMUNICATIVE COMPETENCE

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The concept of education development in Republic of Kazakhstan is directed on quantative renewal and methods of preparation professional staff corresponding to the universal standards, and that is why the essential attention is paid to the multilingual education. In conditions of deepening of integration processes in the world educational space of multilingual teaching is considered as vital requirements. Multilingual competence became the necessary element in preparation of highly qualified and competitive specialists in international labor market. The process of acquiring communication with multilingual culture requires to creation of situation of practical language use as the instrument of intercultural cognition and interaction. For supporting the rates of development in our country it is necessary to supply a break in electronic services [from the speech of N.A.Nazarbayev in the message "Bolashak"].

Keywords: multilingual, content, competiveness, improvement, stipulate, contribute

The concept of education development in Republic of Kazakhstan is derected on quantative renewal and methods of preparation of professional staff corresponding to the universal standards and that is why the essential attention is paid to the multilingual education. The main problem of multilingual education is a precise definition of aims, content, continuity of multilingual education in all stages and that is why the differentiation of expectation and requirements to the system of education is increased. In modern condition of rapid growth of scientific knowledge, innovation technologies, changes and modernization of policy in education, improvement, management and quality control of preparation of specialists is an important social-pedagogical problem. The innovation development and improvement of competitiveness, growth of effectiveness of the government expenses in the region of science and technologies in conditions of international competition. The mechanism of global changes in the world, changes of ecological and social cultural tenors in our country leads to teaching of multilingual education in higher schools takes aw important place in future preparation of specialists. In all spheres of education the methods of identification and modernization of preparation system, improvement of quality of education with the use of innovation technologies of teaching administration are used. The use of innovation technologies in the process of teaching gives the possibility to utilize the psycho-pedagogical elaborations. The powerful stimulus of innovation processes became the requirement of specialist preparation possessing multilinguality both in everyday and in professional communication. At present the aim of multililingual teaching it directed to the development in students of communicative competence.

In conditions of deepening of integration processes in the world educational space of multilingual teaching is considered as vital requirements. Multilingual competence became the necessary element in preparation of highly qualified and competitive specialists in international labor market. The process of acquiring communication with multilingual culture requires to creation of situation of practical language use as the instrument of intercultural cognition and interaction. For supporting the rates of development in our country it is necessary to supply a break in electronic services [from the speech of N.A. Nazarbayev in the message "Bolashak"][1]. The volume is increased and the content of knowledge, skills and habits is changed that modern specialists must potsess. Our country tries to supply the multicultural and spiritual growth of nation, strengthening the role of native language as the factor of strengthning of Kazakhstan state system such as Russian and English languages and of course improvement of formation of multicultural person trend is stipulated by the integration process, creation of the society in which interpersonal and interethnic cooperation is the main aim. Consolidation of efforts of international assosiation in questions of upbringing and education of young generation in the spirit of tolerance and respect of values and traditions of the representatives of other people, religions and cultures are supposed by modern challenges. The strategy of integration in which the synthesis of two cultures is occurred more successful. In choice of this strategy the less probability of the development of various psychologic disturbances. The choice of strategy of integration allows to decrease the consequences of cultural shock and contributes to the support of the positive self-identification. The native languages are considered as

an important value that is why the respect of the native languages from the side of bearers of other languages must be compulsory norm and reverse process. In conditions of integration of the native education in the world educational space is actual and contributes to the improvement of the competitiveness of education. The main transition from one language into another is not difficult. One of the most important things in multilingual education is the composition of modernized teaching program, instructions and accelerated teaching of multilingual teacher posseting the innovation pedagogical technologies in conditions of multilingual education for further education receiving. The programs of multilingual teaching foreseeing the teaching of subjects both in native language and in the second and third languages. It is necessary to realize that our wish to correspond to the European standards require of purposeful work of higher school, which must be encouraged and supported and financed by the state. In teaching the teachers – linguists for the method of multilingual teaching it is necessary to have technical facilities and training materials, experimental work in optimization of lingual teaching. The aim of the program is the improvement of quality of teaching to the state language and preserving the national and cultural originality of national minorities and education of tolerance, advancement of common European languages through adaptation of advanced technologies of multilingual education. Multilingual education supposes to use two or more languages of teaching. Exactly the cultural aspect of the language attracts the special attention of modern researchers in situation of cultural moral and growing globalization. The language is the deepest of cultural values, the culture expressed in the language units is the lingual picture of the world including the volume of knowledge which is fixed in the language of nation [2].

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THE IMPORTANCE OF COGNITIVE AND METACOGNITIVE METHODS IN TEACHING

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This article deals with strategies used to teach students a foreign languages. The main idea is cognitive and metacognitive methods in teaching. The article gives valuable information about learning style. The author writes that motivation and desire to learn more are great tools.). The aim of this article is to give an evident proof of using the psychological process of thinking and criticism at the lesson, showing the skills of teaching and learning at the same time, and the effectiveness of cognitive and metacognitive methods during the education process. In conclusion the authors write that introducing and producing these methods (cognitive and metacognitive) will be success both to the teacher and to the students taking into consideration the of knowledge, at the lesson, showing, effectives of cognitive and metacognitive methods.

Keywords: Success, value, strategy, approach, motivation, knowledge

There are a lot of strategies used to teach the students a foreign language. The use of the strategies is a successful way to achieve a teacher's goal – to make a student communicate properly in different situations, keeping in mind the 4 majors of methods of teaching. They are: reading, speaking, listening and writing.

Different students have different ways of learning. Some of them look out conversation partners, some group words to be learned and then label them, the others use gestures to communicate when the words do not come to mind or use guessing when reading [1].

Part of the effectiveness of the cognitive apprenticeship model comes from learning in context and is based on theories of situated cognition. Cognitive scientists maintain that the context in which learning takes place is critical (e.g., Godden & Baddeley, 1975). Based on findings such as these, Collins, Duguid, and Brown (1989) argue that cognitive apprenticeships are less effective when skills and concepts are taught independent of their real-world context and situation. As they state, "Situations might be said to co-produce knowledge through activity. Learning and cognition, it is now possible to argue, are fundamentally situated" [2]. In cognitive apprenticeships, the activity being taught is modeled in real-world situations.

By using processes such as modelling and coaching, cognitive apprenticeships also support the three stages of skill acquisition described in the expertise literature: the cognitive stage, the associative stage, and the autonomous stage.[3] In the cognitive stage, learners develop declarative understanding of the skill. In the associative stage, mistakes and misinterpretations learned in the cognitive stage are detected and eliminated while associations between the critical elements involved in the skill are strengthened. Finally, in the autonomous stage, the learner's skill becomes honed and perfected until it is executed at an expert level.

Like traditional apprenticeships, in which the apprentice learns a trade such as tailoring or woodworking by working under a master teacher, cognitive apprenticeships allow the master to model behaviors in a real-world context with cognitive modeling.[6] By listening to the master explain exactly what she is doing and thinking as she models the skill, the apprentice can identify relevant behaviors and develop a conceptual model of the processes involved. The apprentice then attempts to imitate those behaviors with the master observing and providing coaching. Coaching provides assistance at the most critical level – the skill level just beyond what the learner/apprentice could accomplish by herself. Vygotsky (1978) referred to this as the Zone of Proximal Development and believed that fostering development within this zone leads to the most rapid development. The coaching process includes additional modeling as necessary, corrective feedback, and reminders, all intended to bring the apprentice's performance closer to that of the master's. As the apprentice becomes more skilled through the repetition of this process, the feedback and instruction provided by the master "fades" until the apprentice is, ideally, performing the skill at a close approximation of the master level.

Students need a good conductor to teach them to use the language properly, and the conductor, or a teacher, should know there are different types of students who demand a different approach. The approaches extend as far as the knowledge and understanding of the learner's motivation, gender, cultural background, attitude and belief, type of a task given, age,

student's personal learning style and tolerance of ambiguity [ibid.].

Motivation touches upon the most difficult point among us, teachers, as it see-ms to be the most important and at the same time, the debatable question: What can a teacher motivate a student with? In our case the answer is often as not tends to grading bias, though not only assessment can become a true motivational zone for a student. The future plans connected with the professional growth are usually one of the answers too. However, nowadays it is not so easy to say that a profession of a foreign language teacher is of great value or importance. Here, to my mind, a more reasonably would sound the real desire of a student to become a teacher. Of course, the thing arises out of the love, devotion and choice of a person.

The other important point is learning style. The analytical-minded students prefer contrastive analysis, rule-learning, dissecting words and phrases; the global students use guessing, scanning, predicting, paraphrasing, gesturing [ibid.]. The research shows cognitive and metacognitive methods are often used together supporting each other.

Cognitive methods in learning involve translating, analyzing, grouping, taking notes, making summaries, mental images, relating new information to previous concepts and skills; and metacognitive comprise planning for learning, monitoring comprehension and production, evaluating how well learning objectives have been achieved.

The role of the last method, thinking, or metacognition, which allows the students to plan, control, and evaluate their learning strategies depending on the topic of the discussion. And one of the important things here is evaluation of the success achieved. A teacher can suggest several questions like:

1) What am I trying to accomplish?
2) What strategies am I using?
3) How well am I using them?
4) What else could I do?

Responding to these questions allows the second language learner to reflect through the cycle of learning [3].

Critical thinking and self-assessment are involved in this kind of activity.

Concerning the students we can say, that motivation and desire to learn more are great tools to reach the goals. Moreover, metacognitive process in the minds of our student will give rise to new creative ideas. The students are allowed to think free and evaluate their actions. Cognitive methods are also important during the study. As a matter of fact both these methods are successfully used by our teachers at the lessons of the English language as a second/foreign language. Nevertheless, continue to use them gives the teacher an opportunity to properly evaluate the student, give necessary advise to achieve better results.

Metacognitive strategies are sequential processes that one uses to control cognitive activities, and to ensure that a cognitive goal (e.g., understanding a text) has been met. These processes help to regulate and oversee learning, and consist of planning and monitoring cognitive activities, as well as checking the outcomes of those activities. However, the majority of learners instinctively obtain metacognitive knowledge and skills from their relatives such as parents, classmates, and especially their teachers, metacognitive strategies instructions demand to enhance metacognition and learning in a wide spectrum of students, particularly low achievement learners. In a proposition to facilitate students in learning activities, many researchers have outlined a variety of metacognitive strategies that need to be taught. (What to-do, Why they are beneficial, When to use them, and How to use strategies) For a valid metacognitive strategies instruction based on three fundamental principles as: 1) Integrating this instruction in the content material to ensure connection between a purposed task and relevant metacognition skills. 2) Informing learners about the effectiveness of metacognitive activities for stimulating them to the initial extra effort during performing related tasks, and 3) Extended training to guarantee the use and maintained application of metacognitive activity. In this respect, Lai (2011) asserted that the most effective instructional strategies included the textualdissonance approach, self-questioning, and backwardforward search strategies, although the authors recommend using a variety of diverse techniques for best results. Furthermore, results suggest that instructional interventions involving fewer than 10 minutes of instruction per lesson are insufficient for producing these types of effects. On the other hand, metacognition becomes more domain-specific as students age and acquire more specialized content knowledge, therefore self- report strategies which emphasize on general metacognition skills may be ineffective in older-students (tertiary level). Therefore, encouraging the students to ask questions themselves in a specific subject is one of the strategies which can be used for developing metacognition within the framework of constructivism learning. According this view, Hacker and Dunlosky (2003) stressed that teachers should ask the following questions as metacognitive strategy instruction

in activating the thinking and contributing to the development of metacognitive abilities such as What about next? What do you think? Why do you think so? How can you prove this? Most important, these effective questions are a type of scaffolding can build a good self- questioning habit as a common metacognitive comprehension monitoring strategy. However, there exist several researches about the role of metacognition strategies in problem solving at different level of education, the metacognitive skills and strategies have yet reminded less- known in problem posing. We engage in metacognitive situation every day. metacognition enables us to be successful learners, and has been associated with intelligence and stimulates higher- order -thinking which involves active control over the cognitive processes engaged in learning. metacognition situations encourage activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress toward the completion of a task. Due to students have shown a considerable variation in their metacognitive adequacy, it is important to expose learners in metacognitive situations to determine how students of various education levels can be taught to better apply their cognitive resources through metacognitive control. Therefore, educational researchers and teachers need to assess the learners' behaviors in proposed metacognition situations to can improve students' metacognitive skills. Lai (2011) stressed that assessment of metacognition is challenging for a number of reasons: 1) Metacognition is a complex construct, involving a number of different types of knowledge and skills. 2) It is not directly observable. 3) It may be confounded in practice with both verbal ability and working memory capacity. 4) Existing measures tend to be narrow in focus and decontextualized from in-school learning. Therefore, considering the ambiguity of the definition and theory of metacognition, more difficulty is created in measuring metacognition. Briefly, metacognition is usually assessed in two principal ways: observations of students‟ performance or by selfreport inventories. Therefore, few popular techniques used in measuring metacognitive knowledge and processes are; self-report such as questionnaires or rating scales, error detection, interview (structured, semi structured, unstructured, open-ended, closed, introspective, and retrospective) and thinking-aloud. However, each technique has inherent weaknesses and strengths. In order to decide which method to use [1].

In conclusion we would like to say that introducing and producing these methods in class will be a success both to the teacher and the students taking into consideration the level of knowledge (from A to C). The am of this article was to give an evident proof of using the psychological process of thinking and criticism at the lesson, showing the skills of teaching and learning at the same time, and the effectiveness of cognitive and metacognitive methods during the education process. Actuality of these topics is quite obvious, as teachers should learn and introduce new methods of teaching at the lesson, keeping in mind the ability of the learners to study harder.

Cognitive apprenticeship is a theory of the process where a master of a skill teaches that skill to an apprentice.

Constructivist approaches to human learning have led to the development of a theory of cognitive apprenticeship.[1] This theory holds that masters of a skill often fail to take into account the implicit processes involved in carrying out complex skills when they are teaching novices. To combat these tendencies, cognitive apprenticeships "…are designed, among other things, to bring these tacit processes into the open, where students can observe, enact, and practice them with help from the teacher…". This model is supported by Albert Bandura's (1997) theory of modeling, which posits that in order for modeling to be successful, the learner must be attentive, must have access to and retain the information presented, must be motivated to learn, and must be able to accurately reproduce the desired skill.

Teaching methods. Collins, Brown, and Newman developed six teaching methods rooted in cognitive apprenticeship theory and claim these methods help students attain cognitive and metacognitive strategies for "using, managing, and discovering knowledge".[2] The first three (modeling, coaching, scaffolding) are at the core of cognitive apprenticeship and help with cognitive and metacognitive development. The next two (articulation and reflection) are designed to help novices with awareness of problem-solving strategies and execution similar to that of an expert. The final step (exploration) intends to guide the novice towards independence and the ability to solve and identify problems within the domain on their own. The authors note, however, that this is not an exhaustive list of methods and that the successful execution of these methods is highly dependent on the domain.

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REFLECTION AS A ASSESSMENTMEAN OF STUDENTS 'ACADEMIC ACTIVITY (ON THE EXAMPLE OF TEACHING DISCIPLINE "PEDAGOGIC OF DIALOGUE")

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Reflection as a means of evaluation of students' educational activity in accordance with the methodology of heuristic learning (on the example of discipline "Pedagogy of dialogue"). The introduction discusses the basic concepts relating to reflection. The aim of the study is the ability to use reflection as an assessment of educational activity of students using the heuristic dialogue. The correlating model of the stages of identity formation, the model of heuristic dialogue groups and levels of learning Russian as a foreign language is shown in the main part. The author shows that the development of different types of linguistic identity in accordance with the structure of the heuristic dialogue significantly increases the efficiency of studying the Russian language students, develops independence and creativity of students to continuously break new ground, to create their own "educational product". Work organized in such manner is directed on realization of principle of humanistic education.

Keywords: reflection, communicative competence, heuristic dialogue, educational product

One of the most important requirements of modern higher education is the ability to learn. V.V. Davydov asserted: "The ability to teach oneself means a person's ability to overcome his own limitations not only in the field of specific school knowledge and skills, but also in any field of activity and human relations, in particular – with himself as a man unskillful and lazy, inattentive or illiterate, but capable of changing, making themselves different. To teach and change oneself, a person must, first, know about his limitations in something, and secondly, be able to overcome it. These component of skills to learn by their nature are reflexive entities" [1, p. 158].

The following reflexive processes are distinguished: self-understanding and understanding of another, self-evaluation and evaluation of another, self-interpretation and interpretation of another [2, p. 62-63].

Reflection is not just the knowledge or understanding by the subject of oneself, but also the elucidation of how others know and understand the "reflector", his personality traits, emotional responses and cognitive (cognitive) representations. Reflection involves the ability to detect problem situations in their activities that arise when the goals and results of the pedagogical process do not coincide, analyze their causes and search for solutions. There are two approaches to the treatment of reflection: 1) a reflexive analysis of consciousness leading to an explanation of the values of objects and their construction; 2) reflection as an understanding of the interpersonal communication meaning. The following reflexive processes are distinguished: self-understanding and understanding of the other, self-esteem and evaluation of the other, self-interpretation and interpretation of the other [3, p. 62-63].

G.K. Seleuco talks about the reflection of students' goals and needs, which are related to self-development [4]. The student's activity is organized as satisfaction not only of the cognitive need, but also of a number of other needs for self-development of the individual: in self-assertion, in self-expression, in security, in self-actualization. The goal and means in the pedagogical process is the dominant self-improvement personality, including the setting for self-education, self-education, self-affirmation, self-determination, self-regulation and self-actualization.

In the opinion of M.A. Vorobyova, the formation of motivation should be carried out on the basis of the totality of the content of the student's learning and aspirations to overcome difficulties in work, to show perseverance in achieving positive results, despite the situation of failure in any part of the activity [5, p. 183].

The content of the "reflection" concept is considered most often in connection with the study of student learning activities from the point of view of pedagogy. V.V. Davydov calls the reflexion "... the ability of students to identify, analyze and correlate with the situation in their own methods of learning activities, a special ability to assess the possibilities of their actions in terms of plans and programs of the learning activity itself" [6, p. 240]. N.F. Talyzina defines reflexion as "... the ability of a person to realize what he is doing and to argue and justify his activities" [3, p. 39]. In the opinion of V.V. Krayevsky and A.V. Khutorskoy, reflection is one of the principles that determine the student's educational activity in person-oriented learning. In their interpretation "the reflection is not a recall of the main thing from the lesson or the conclusions formulation, it is an

awareness of the activity methods, the discovery of its semantic features, the educational increments identification of the pupil or teacher. The student is aware not only of what has been done, but also of the ways of doing things, how it was done" [7, p. 52].

Purpose of the study

Intellectual reflection is of the greatest importance for the students' learning activity development. Intellectual reflection changes, therefore, student's developing psychological entity. The task is to achieve the highest level of intellectual reflection, which manifests itself in the ability to consciously allocate and use strategies for analyzing and managing thinking in solving problem situations [8].

Materials and methods of research

The third year students have studied the discipline "Pedagogy of Dialogue" on the basis of the philological faculty of the "Grodno State University named after Yanka Kupala" in 2015-2016 academic year. The number of students is 85.

The course trains both Belarusian students and foreign students in ratio of approximately five to one. After the completion of the study of the discipline "Pedagogy of Dialogue" students passed the test. The reflection of educational activity was one of the final tasks.

Results of research and their discussion

The students were offered the following types of reflexions in the studying course:

1. Reflection after each covered topic (G.K. Selevko, reflection of students' goals and needs related to self-development). These reflections can be divided into two types [4]:

1.1. Full-time (during the lesson): *a) Fill in the table in which explain what do you liked about studying this topic, what dislike, which seemed particularly interesting. b) Write down the phrases: I especially liked ...; the most interesting was ...; completely unacceptable ...*

Capabilities:

– the opportunity to instantly react to all students' wishes and remarks.

Disadvantages:

– it is difficult for some students to express their opinions aloud;

– there is no way to listen to all students' the answers.

1.2. Distant (in the Internet):

A. Reflection on the forum: *Express your opinion on the topic "We should be close to parents", arguing their point of view at the forum. Prove your point of view (give at least 3 arguments or questions that will help convince others of your rightness).*

Capabilities:

– the option is prolonged in time (students can perform a reflection when it is comfortable for them).

Disadvantages:

– possible distraction for communication in a social network.

B. Reflection using a joint on-line board. Limnu.com – this is one of the resources that allow you quickly create online board.

There is an opportunity to draw, to print, to insert images and to communicate with the students working on the board of the group. The boards are available for editing within 7 days and the number of active boards is limited to 3 in the free version of the program. You can work together with an unlimited number of users in both paid and free versions. Invite others to work together either by email or by sharing a link to the board. Any board in Limnu can be saved as an image [9].

You can invite students to perform the following task-reflection using a joint on-line board: *Conduct a reflection of the lesson using the service "Joint board Limnu". Place on the chalkboard either a phrase or a picture that would characterize your impression of today's lesson.*

Capabilities:

– this variant is prolonged for time (students have 7 days to complete this task); the teacher can save all the completed reflections in the form of drawings for their further analysis; students can express their opinions with the help of not only words but also images.

Disadvantages:

– possible distraction for communication in a social network.

C. Reflection using the virtual Plickers service. The basis is a mobile application, a site and printed cards with QR-codes. One card is given to each student. The card itself is square and has four sides. Each side has its own answer (A, B, C, D), which is indicated on the card itself. The teacher asks the question, the student chooses the correct answer and raises the card with the corresponding side up. The teacher uses the mobile application to scan the responses in real time (the Augmented Reality technology is used for reading). The results are stored in a database and are available both directly in the mobile application and on the site for instant or deferred analysis [10].

Capabilities:

– one mobile phone from a teacher running iOS or Android with the installed Plickers application, students do not need phones;

– very quick survey and instantly graphically presented survey results.

Disadvantages:

– there is no way to evaluate the open type of questions.

2. Final reflection (intellectual reflection). This kind of reflection was offered to students as one of the test assignments after completing the study of the discipline "Pedagogy of Dialogue". The students were offered the following scheme for writing the final reflection (author A.D. Korol):

1. What did you expect from studying the discipline and what happened? Analyze your preliminary goals and the results actually achieved, their novelty and practical significance for you.

2. What was the most unexpected for you when studying the course "Pedagogy of Dialogue"?

3. You have become acquainted with the technology of heuristic learning. What positions and activities specific to this type of training are closest to you?

4. What did you most succeed in the course of studying the discipline, which tasks or their elements were most successful?

5. In what way do you see your own increment as a student?

6. List in descending order the main problems and difficulties that you experienced while studying the discipline.

7. In the classroom, the work was organized individually and in a group format, and many of the assignments presupposed the communicative activity of each student.

8. What can you say about the purposes, content and organization of the study of this discipline? Formulate proposals for the development of this work: yourself, your colleagues, teachers.

Capabilities:

– students express their opinions in expanded form and in real time.

Disadvantages:

– there is no direct contact with the instructor;

– Based on the results of this type of reflection, the teacher can only draw conclusions for his future work, but not improve the quality of teaching with students who have written a reflection.

The following results were obtained in the analysis of reflections,. These results can act as an "educational product" of students, which corresponds to the methodology of heuristic learning. A total of 83 students took part in the final reflection.

The majority of the students of the course (72 people – 87%) expected something new from the "Pedagogy of Dialogue" discipline, about half of the entire student sample (40 people – 48%) either did not even suspect the content of this discipline, or considered it a continuation (or repetition) of the discipline "Pedagogy". The objectives of the students were very diverse: starting from the goal "to understand what kind of thing" and ending with the goals related to self-development: "learn to maintain dialogue," "find oneself," etc. Almost 80% of students (65 people) emphasize that discipline surprised them, because they were able to realize their goals, they were able to learn something new. About 70% of students (56 people) are going to apply this knowledge in practice. All students (83 people) recognized that the course provided an opportunity for professional and personal growth. For 62 (74%) students, the unusual and new style of learning aimed at building partnerships became quite unexpected, but many students also noted that it was this group work that caused the most difficulties, for example, due to the need to listen to their own opinions group and come to a consensus (30 people – 36%). The students were surprised by the form of the lectures; earlier in the lectures, students were only attuned to the adoption of information, but in no way to dialogue. It turned out to be unusual for me to formulate my own goals. 64 students (77%) note the effectiveness of classes in social networks, they were very impressed by the possibility of organizing group discussions at the forum, it was said that "modern teachers underestimate the educational opportunities of social networks." As part of the work on social networks, the discussion of the question was remembered: "Is the student a seed or a blank leaf?". The students noted that they had mastered the theoretical foundations of the discipline "Pedagogy of Dialogue", particularities of working with heuristic (open) assignments. In practice, students have learned to develop heuristic (open) tasks and are going to apply this knowledge in practice. In practical classes, students mastered the development of lessons on the basis of the basic triad of questions "What? How? Why?".

Conclusions

The formation of a complete personality is impossible without self-reflection and reflection of its activities as practice shows. We can state that there is a connection between educational activity and the reflexive student's activity. Modern electronic resources give us great opportunities for conducting reflections. The more the student is interested in the discipline and its content, the more he will be motivated

to gain knowledge and skills for further professional development.

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TO THE PROBLEM OF DEVELOPMENT OF AUTONOMOUS LEARNING SKILLS OF UNIVERSITY STUDENTS IN LEARNING A FOREIGN LANGUAGE

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In the context of globalization of the world educational space the higher professional education aims at training a specialist with international, competitive, high level of both professional and language competencies. In the modern world the relevance of mastering foreign language communicative competence by the future specialist is crucial for the professional career. Therefore, the focus of teacher's attention should be directed not on teaching a foreign language but on learning a foreign language by learners. In the system of credit accumulation technology in higher education, when the amount of time allotted for autonomous work of learners is two-thirds of the studied course, the need of autonomous learning skills of students takes on an acute significance. This article deals with various aspects of the problem of formation and development of autonomous learning skills of university students in learning a foreign language in higher education institution in the literature of foreign, Russian, and domestic scientists.

Keywords: autonomy, the essence of learner's autonomy, the types and forms of autonomous work of learners, autonomous learning skills, learning a foreign language, higher education

On the Concept of State Youth Policy of the Republic of Kazakhstan till 2020 "Kazakhstan – 2020: the Way of the Future" the main purpose of education is determined not as a simple set of knowledge and skills, but as a personal, social and professional competence based on them, the ability to independently produce, analyze, and effectively use information, the ability to efficiently live and work in a rapidly changing world. According to one of the main directions of realization of the State Education Development Program for 2005-2010, the implementation of credit accumulation system of education in universities was designed to encourage active autonomous work of learners. Therefore, one of the main tasks of the educational process in the credit accumulation system, when 70% of time is given to autonomous learning, is strengthening the role of autonomous work of learners, including teacher-guided work. So, the researchers Zhetpisbayeva B.A. and Asanova D.N., arguing sharply increasing role of the autonomy of the learner in the conditions of credit system of education, cite the classification, characterizing the learner in the educational system and including the following groups of skills of autonomous work: skills of planning self-education; preparation of individual plan of independent activities; purposeful work according to the plan; implementation of self-control over the activities; the timely introduction of required corrections; skills of orientation in the scientific and educational information; independent analysis and evaluation of new information; the conduct of the search and selection of information sources depending on the aspect of the study of the problem; vision of a new and promising content of incoming information; the integrated use of sources of information (Internet, television and radio broadcasts, scientific and educational literature, periodicals, etc.); skills of bibliographic work; systematic use of the bibliographical manuals and catalogues; maintaining a register of scientific, educational and other literature on specific issues based on rules of scientific bibliography, etc.; skills of rational and proper hearing and recording lectures; writing topics and the plan of the lecture, recommended literature; the correct perception of the presented information; identifying the main problems, positions and ideas; brief quotes of the main content in the own words; systematic treatment of records, storing and using them for the purposes of self-education; skills to work with a book; familiarization with the book as a whole: with its author, introduction, content, conclusion, illustrations and annotations; singling out the logical structure of the book; a quick, focused read with a pencil in hand, with fixation of the read content in the own words; the attraction of additional benefits for a more complete understanding of the studied material (dictionaries, encyclopedias, reference books); recording of the material in the form of abstracts, summaries; presentation of ideas and arguments of the author briefly and in the own words with references to some quotes; compliance with the rules of appearance of the abstracts (title of paper, author's name, year and place of publication, the correct citation of material from other sources with a link to the page, articles); recording of the abstract of additional materials from other sources; skills of using Internet resources; searching for the right addresses on the Internet; information processing and so on [3, p. 11-12].

In psychological-pedagogical literature the problem of autonomous work has found the most complete coverage. Its study is the subject of numerous researches: works of Golant E.Y., B.P. Yesipov, P.I. Pitkasistyi, A.V. Usova. Psychological aspects of autonomous work of learners were considered in the works of V.V. Davydov, N.A. Menchinskaya, V.A. Petrovsky, N.F. Talyzina. The problem of formation of skills of independent educational and cognitive activities is paid attention in the works of M.A. Danilov, T.I. Ilyina, B.F. Lomov, A.A. Lublinskaya, O.A. Nilsson, R.B. Sroda. The works of domestic scientists A.A. Adelbaeva, G.K. Aizhanova, S.V. Begalieva, G.E. Alimuhambetova, N.A. Darkhanova, L.F. Zherebyatieva, J.A. Karaev, M. Kurmanov, B.T. Nabiyeva, J.E. Sarsekeeva, H.S. Suleimanov are devoted to various aspects of autonomous work. The problems of introduction of credit accumulation system of education were reflected in the works of Baidenko, S.A. Medvedev, K. Pursiainen, L. Grebnev, B.A. Sazonov [1, 4].

However, both domestic and Russian researchers note that, despite the development of many aspects of autonomous work of learners, in science and practice there is still poor understanding of peculiarities of its organization in the process of modern foreign language education, especially in the conditions of credit accumulation system.

Attempts to understand the problem of autonomy were made in the 18th century in the philosophical works of J.J. Rousseau and I. Pestalozzi, where the importance of shaping a child's independence in learning and education was stressed. [5, 9] In modern scientific works this topic is presented quite extensively. There is still no single developed definition in theoretical works on the issue of the nature of autonomous work, because the definition of this concept is multifaceted and dynamic; its meaning varies depending on changes in modern science and education and can be considered from different points of view. Different approaches to the essence of autonomous work of learners lead to different interpretations, considering it either as a form of organization (extracurricular work of learners) or as a teaching method (the use of autonomous work in the classroom), or as a learning tool (system of tasks for classroom and extracurricular work). Scientists Golant E.I., Esipov B.P., Michelson R.M., Pidkasistyj P.I. define the essence of autonomous work through a description of either ways of evaluation its implementation, or forms of organization of lessons. Of course, the effectiveness of autonomous work of learners in the learning process largely depends on the conditions of its organization, content and nature of knowledge, logic of their presentation, source of knowledge, the relationship of current and assumed knowledge in the content of this autonomous work, the quality of results achieved by the learner in the course of this work, etc. Golant E. Y. describes the following essential features of an autonomous work: the presence of a specific learning task consisting of several actions, its fulfillment without direct supervision of the teacher, and without evaluation of each activity by the teacher. [3, p. 16]

E.Y. Golant, without defining this concept, stresses that in the theoretical analysis of the problem the autonomy of learners as an inborn capacity should not be identified with the autonomy of learners as a condition for training the necessary skill. He views expression of autonomy of learners in three directions: 1) technical and organizational autonomy; 2) autonomy of practical activities of learners; 3) autonomy in the process of cognitive activity. Next, Golant E.Y. separates out the last activity into two ones: the first is expressed in oral and written performances and the second is connected with physical labor.

B.P. Esipov notes that the autonomous work of learners included in the learning process is the work which is performed without direct participation of the teacher, but at his direction and in a specially provided time; in this, learners consciously seek to achieve the task goals, using their efforts and expressing the result of mental or physical (or both together) action in some form. However, in the opinion of Pitkasistyi P.I., the weaknesses of this concept cannot be ignored. First, in the interpretation of B.P. Yesipov the essence of autonomous work does not sufficiently represent a significant sign, the creative work of the learner, which, in the structure of cognitive activity, is an essential internal symptom of procedural and productive (effective) sides of independent activity of learners. Second, in the concept there is the lack of reflection of the question of procedural and logical-content unity of each type of independent activities.

In educational practice all these underrecognized points generate formalism in using various types of autonomous work and boring, monotonous activity of learners [3, p. 20].

These weaknesses of the concept Yesipov B.P. were taken into account in its time by Dairy N.G. Filling a gap in the understanding and disclosure the essence of autonomous work, he allocates the following features:

a) the learner does it on his own without any direct assistance; b) he really relies on his own knowledge, skills, beliefs, life experiences, world view, he actually uses them when considering the question and decides it on his own, expressing personal attitude, expressing his own arguments, showing initiative, creativity; c) the content of the work, educational and logical, is important, meaningful, and therefore enriches the learner, causes stress thinking and its development [2, p. 415].

Evidence of this autonomous work is: a) setting the essence of the phenomenon by learners on the basis of factual material; b) in addition to this, the identification of the actual material; its collection on their own; c) autonomous application of one or other logical operations specified by the teacher; d) autonomous selection of these operations when receiving tasks from the teacher; d) self-understanding of the problem and autonomous task setting etc.

It should be noted out that the contents and structure of educational material as an important condition for the success of training does not specify the process and the structure of learning activities, as the didactics, involved in the problem of autonomous work, are often inclined to consider. In fact, as Pidkasistyi P.I. notes, if the content and structure of training material makes a system, then in order to make this system function, it necessary to find those properties that arise as products of qualitatively distinctive interactions of the learner and the display of facts, phenomena, events in the system of educational material content, i.e. to extract components of autonomous work as micro-systems of learning. Such components in an autonomous activity, according to Pitkasistyi P.I. are: a learner, acting as a subject of activity, and real objects, phenomena, events or displaying them iconic models, as an object. Alleged links between the subject and object in this system are generated on the basis of their interaction, and act themselves only in the presence of conceptual task. In this regard, in the structure of an autonomous work as a means of engaging learners in the autonomous activity it is necessary by morphological and genetic analysis to discern its "genetic cell", which is essentially kind of a trigger of any cognitive activity and autonomy of the learner. Any training problem or a cognitive task can act as such "a genetic cell", as the core of any autonomous work. [6, p. 128]. This follows primarily from the fact that the educational material, as it is evidenced by numerous psychological studies, may be included in the structure of educational activity of learners only in the form of a system of educational tasks, the choice of which is determined by the characteristics of the object of cognition and the structure of the cognitive activity of the learner. The task, in the revelation of the essence of autonomous work and, especially, in the classification of types of autonomous work, thus has become a means of logical and psychological organization of the material, which is carried out in order to ensure a certain structure of learning activities.

Only such approach to the consideration of the nature and role of autonomous work of learners, as Pidkasistyi P.I. notes, allows to remove the antithesis between external conditionality of autonomous work in educational process and its internal essence, which leads to the development and optimal expression of genuine learner's cognitive activity and autonomy, development of the learner's cognitive abilities. [5, p. 608]. The task identified in each type and form of autonomous work (if it is accepted by the learner) allows involving learners into controlled cognitive activity, i. e. gives them a certain mental activity of different structures, which is governed by the perceived goal. Thus, the above review of literature shows the activity approach to the investigated issues when autonomous work is understood not as a form of organization of lessons and not as a teaching method, but rather as a means of engaging learners in independent cognitive activity, a means of logical and psychological organization. And as any other means, autonomous work, without the presence of a clearly formulated task, remains at best neutral in relation to the nature of cognitive activity. Educators have repeatedly made efforts for description and systematization of various types of autonomous work. In the background of certain achievements in the theory and practice of higher education the lack of scientifically well-founded system of autonomous work is revealed. It should be noted out that most didactics and methodologists in justification of the classification of autonomous work base on either the degree of autonomy of the learner, which is, incidentally, determined by external signs, or on didactic purpose of autonomous work.

According to the classification of Malkin I.I., the types of autonomous work include reproductive, educational- heuristic, cognitive-practical, creative. [7]

The classification of Pitkasistyi P.I. in the selection of the types of autonomous work is similar to the classification of Malkin I.I. He offers the following types of autonomous work: reproducing, reconstructive-variable, heuristic, and creative. [6, p. 229]. According

to this classification the first type of work allows to perform tasks modeled on the sample and provide learners with the ability to perform the specified sequence of actions, to recognize obtained information in repeated perceptions. The second type allows forming the skills of reproduction of learned information from memory, on the basis of reproduction and partly on an independent search for solutions to common problems. The task of the third type allows learners to learn to solve non-typical heuristic tasks on the basis of the previous experience. The fourth type of tasks is aimed at creative activity when learners are able to penetrate deeply into the nature of the objects concerned to establish new facts, to transform them. Thus, in the selected classifications, the authors try to show a gradual increase of difficulties, which in turn allows each learner to move to a higher level of performance of autonomous work.

It is also important that in the process of organizing an autonomous work of learners the specificity of the discipline must be taken into account, since in the teaching of a foreign language not the basics of science are taught but the skills through various types of activities. For that reason the features of organization of autonomous work are associated with the following points: the creation of language environment, i.e. the combination of foreign language activities with cognitive activities of learners; parallel development of all types of foreign language activities, such as speaking, reading, writing; revitalization of the work of all memory types (learner must not only learn a certain amount of material and reproduce it, but put it in long-term memory for subsequent reuse and utilization); organizing autonomous work should be associated with knowledge of individual typological peculiarities of learners. Formation of skills of autonomous work of learners when learning a foreign language significantly differs in a number of different criteria from training in other specialties. As any other educational activity this learning process is implemented in certain conditions: the content of education with taking into account characteristics of a foreign language; the use of innovative technologies in the process of independent language learning; linking substantive-procedural preparation and intrapersonal formation of readiness of learners to autonomous work in learning a foreign language. Based on the fact that the language is a major means of human communication, an instrument of formation and expression of thought, it can be concluded that the main challenge when learning a foreign language is mastering the ability to participate in intercultural communication, i.e. the formation of speaking skills related to activities of the intellect of the learner. Due to the fact that foreign language as a school subject is focused primarily not on the acquisition of knowledge but on the formation of activity skills, it is necessary to consider autonomous work on foreign language acquisition as a result of the learner's own activity, i.e. learning efficiency is determined by the identity of the learner who needs to take responsibility for the results of training. Scientists Zhetpisbayeva B.A. and Asanova D.N. believe that successful implementation of communicative skills and an ability of learners is possible only under appropriate conditions: the creation of an external, "foreign" environment and authentic situations of communication; formation of domestic "foreign language" consciousness, the way of "the world view", inherent in the target language culture. [3, pp. 34-35] They offer a "milieu" approach to learning a foreign language when it is built on the basis of the same psychological principles as learning the mother tongue with planned rational balance between the conscious and unconscious psychological mechanisms taken into account. The essence of the "milieu" approach to learning foreign language is determined by the specifics of the content, methods, forms, principles and means of realization of complex cognitive, developmental and educational purposes. Such a definition of the structure of the educational environment is consistent with the didactic concept of "secondary language personality", which contains the value-based, cultural, and personal components, logically mapped to the structure of the educational environment: an educational objective, determining linguistic content, forms the cultural component of a language personality; developmental and educational objectives aim respectively at the formation of personality and value-based components. In the basis of the developed educational language model aimed at the formation and further development of skills of autonomous work of learners in learning a foreign language there is the method of vector modelling by V.A. Yasvin. Basing on the concept of the learner-centered approach and the idea of the "milieu" approach, the authors have analyzed and integrated the following principles of autonomous work of learners in a foreign language in the conditions of credit accumulation system of education:

– principles of organization activities: the development of the target language through the mastery of strategies and techniques of autonomous learning;

– principles of organizing of incentives: the personal meaning of the content of activities, variability, flexibility and mobility of educational programs;

– principles of influence: transformation of external factors of motivation into the inner ones, dominance of indirect effects.

The epicenter of this educational language model is the learner as the poly-lingual person possessing intercultural competence and capable of self-realization in the framework of the dialogue of cultures [3, p. 44].

In the modern pedagogical theory and practice the relevance of application of different technologies in all new areas of pedagogical knowledge is becoming increasingly significant. Modern education system has come close to the introduction of innovative technologies in the educational process on a broad scale. The basis for the development of educational technology in recent years is the principle of humanization of higher education, which has changed ideas about the aims and objectives of pedagogical practice, putting the spotlight on the personality of the learner, on the internal resources of the personality. In this regard, the task of a pedagogical science is the study of the favorable conditions conducive to the self-revelation of personality.

Formation of skills of autonomous work of learners when learning a foreign language significantly differs in a number of different criteria from training in other specialties. As any other educational activity this learning process is implemented in certain conditions: the content of education with taking into account characteristics of a foreign language; the use of innovative technologies in the process of independent language learning; linking substantive-procedural preparation and intrapersonal formation of readiness of learners to autonomous work in learning a foreign language.

The allocated pedagogical conditions of formation of abilities and skills of autonomous work of learners in learning a foreign language allows to coordinate the efforts of teachers most efficiently to fit every discipline into the overall system of training and make the most of independent educational activity of learners more organized and focused.

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CREATION OF SPECIAL CONDITIONS TO LEARN SCIENCE FOR THE DEAF AND HARD – OF- HEARING STUDENTS IN INCLUSIVE PROGRAMS AT TECHNICAL UNIVERSITY

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Adaptive, organization and technology solutions have been designed and implemented at Bauman Moscow state technical university to raise efficiency in mastering chemistry of those deaf and hard-of hearing students who study chemistry in the inclusive programmes. Key solution is an introduction of the special adaptive accompanying chemistry course named "Cognitive technologies to accompany basic discipline of Chemistry" which is being taught side-by-side with the main "Chemistry" course. Such a combination of two teachers' efforts within teaching chemistry deaf and hard-of hearing students is being considered as a "cooperative teaching". As major focus of the adaptive course authors consider actualizing basic knowledge in chemistry of deaf and hard-of hearing students applied to studied materials in the main chemistry course as well as identifying their individual cognitive difficulties while study chemistry and their overcoming through forming cognitive general cultural and special competences. Teaching adaptive chemistry course in specialized multimedia classrooms with use state-of-the art information and communication technology, demonstrating and clarifying chemical experiments during classes, preparing training materials based on peculiarities of students as well as doing students' research works contribute to the development of these competencies in the deaf and hard-of hearing students and their better understanding the "Chemistry" content semantic. In this way, teachers are able to explore and use opportunities for multimodal instruction. Success indicators of hearing impaired students in chemistry are given before and after the introduction of the adaptive course in their educational process.

Keywords: deaf and hard-of hearing students, inclusion, special education conditions, accompanying, adaptive technological course, multimodal instruction

Employees to fill jobs in the areas of science, technology, engineering and mathematics (hereinafter -STEM) currently are in high demand nationwide and worldwide. However, many of the available jobs are going unfilled due to the lack of individuals trained to work in those fields. Research indicates [1] that particularly deaf and hard-of hearing people are underrepresented in the STEM workforce, and comprise an untapped pool workers for these STEM positions. To better prepare deaf and hard-of hearing students to excel and find jobs in STEM after graduation special conditions have to be created at education institutions.

"Plan of measures on the implementation in the regions of the Russian Federation of programs for accompanying young people with disabilities while receiving vocational education and promoting subsequent employment (Decree of the Russian Federation Government from July 16, 2016 No. 1507-p)" points out "*inclusive vocational education and creation of special conditions*" at institutions of vocation education, including technical universities.

University students with a disability [2] are young persons aged 18 to 35 with an impairments causing persistent disorganization of the body due to diseases, as a consequence of injuries or defects that led to limitation of his/her basic life categories [3], including learning and communication abilities.

As a result of these impairments, students with health limitations [4] including ones with a disability have *special educational needs*, which require *an individual approach to each student* in all educational disciplines, including "Chemistry".

Chemistry is a central science, and the study of chemistry is a gateway to a whole range of careers in the sciences and engineering professions. Non-accommodation in chemistry classes would foreclose a large range of career options to people with disabilities, including deaf and hard-of- hearing people.

Unfortunately, in the absence of special conditions, non-accommodation in chemistry classes at secondary schools school leavers with hearing impairments demonstrate extremely low level of knowledge in basic chemistry. This is being confirmed by the results of annual testing basic knowledge in chemistry in those deaf and hard-of- hearing students at Moscow state technical university named after N.E. Bauman (hereinafter – BMSTU), who are beginning to study chemistry at university. Test results of this category of students in 5 school years period (2013-2018 school years) are given in Table 1.

The test results of the deaf and hard-of hearing students are much lower than the results of ordinary BMSTU students in similar tests [5] and show almost full absence

of basic knowledge in chemistry in this category of students, – especially among inclusive schools' leavers.

The objective is to create special conditions (by different accommodations) to learn chemistry for those deaf and hard-of- hearing BMSTU students who study in the inclusive programmes and to raise by this their effectiveness in mastering chemistry to the level of ordinary students.

At BMSTU students who are the deaf and hard – of – hearing are trained in adapted (*inclusive*) basic professional education programs (hereinafter – ABPEP) of baccalaureate. Training in the ABPEP lasts five years – one year more than training in bachelor *programs* for ordinary (able-bodied) students.

As research data "Academic Performance Indexes" (APIs) in Chemistry of those deaf and hard-of- hearing BMSTU students who have learned basics of Chemistry in 2011-2018 years within ABPEP have been used. As a method of research comparative analysis of students' APIs in periods of time before the introduction of accompanying adaptive course (2011-2013 years) and after its introduction (2013-2018 years) has been used.

An analysis of the deaf and hard-of-hearing students' problems while studying chemistry confirmed that main their difficulties are the same as in ordinary students and are connected with their school experience in chemistry [6] in the absence of special conditions and features of the semantics of the discipline "Chemistry."

Meanwhile, common problems for all students studying chemistry deepen for students with hearing impairment as they are exacerbated by their individual features and limitations due to their hearing loss [7], including weak forming of cognitive skills. In this connection, they need to be accompanied in the process of studying chemistry at the technical university.

The number of the deaf and hard-of-hearing students who study chemistry is about 0.1 % of the total number of ordinary BMSTU students studying this discipline. They study chemistry on the same program as ordinary students. To master this program hearing impaired need one semester more than able-bodied students who have only *one semester*. Lectures and seminars in "Chemistry" are being held in the specialized multimedia classes where lecturer use education materials in digital format. Lectures are being supported by interpreting. These ways to accommodate the education process in science disciplines for ABPEP students have been undertaken at BMSTU since the beginning of 2000-th.

Table 1

Test results of the deaf and hard-of-hearing BMSTU students in basic course of chemistry in the period 2013-2018.

Themes of the school chemistry course essential for studying chemistry at technical university	Amount of unsatisfactory answers (%) of the deaf and hard-of-hearing BMSTU students to test tasks				
	School years				
	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Chemical formulas and compounds' names	60	75	90	90	93,75
Calculation of the amount of a substance based on Avogadro's law	60	75	80	90	100
Determining the degrees of oxidation of atoms of a given element in chemical compounds	60	75	80	93	93,75
Equations of electrolytic dissociation of salts with pointing out of cations and anions	80	80	100	100	100
C equations of chemical reactions using the electronic balance method, indicating the oxidant and reducing agent	90	90	100	100	93,75
Tasks based on calculation of excess or deficiency of reagents	90	100	100	100	100

But there are some essential problems. Interpreters in chemistry lectures ideally should have an appropriate knowledge of the subject material and experience in *converting scientific terms into signs*. Interpreters with adequate knowledge of chemistry hardly can be found on the higher technical school level. It is impossible to find interpreters who are familiar with advanced chemistry concepts and terminology for the undergraduate and graduate student. Teachers should be aware that most scientific (chemical) terms *have no specific counterparts in sign language*. That is especially common in new or rapidly evolving scientific fields including those in chemistry, in which terms are constantly being coined. In these situations, the interpreter usually use finger-spelling words, thus slowing down his/her pace and losing teacher's information.

Those deaf students who orient on sign language should be able to recognize signs and gestures, interpret them into Russian and rapidly make their notes, that is *they should be familiar in advance* with meanings all those gestures that interpreters use to express specific chemical terms and concepts. Otherwise they lose a lot of needed information. Thus using sign language in science subject matters at state-of-the art-technical universities is nonsense.

Another essential problem is following. The program of discipline "Chemistry" for the deaf and hard-of- hearing students is being developed and implemented by assigned teacher of the department "Chemistry", who usually does not have special knowledge in the field of problems connected with hearing impairment as well as psycho-physiological characteristics of this specific category of students and can not appropriately work with each student. So, the abovementioned accommodations in teaching "Chemistry" for the deaf and hard-of-hearing students were not admitted enough.

Students often must coordinate multiple tasks at the same time: speech reading the instructor's spoken words or watching the interpreter while simultaneously taking notes; reading written material on overheads or whiteboards; or watching demonstrations, video. A potential problem arises because many *students who are deaf* receive and process *only visual information from one source*, instead of visual information supplemented by auditory cues.

The teacher's responsibility is to teach deaf and hard-of hearing students effectively doing appropriate accommodations. The purpose of accommodations is to provide equity of access and a level playing field for each student, regardless of his or her disability.

With this background a *special adaptive chemistry course* has been developed and implemented at BMSTU to accompany and support hearing impaired students in studying "Chemistry". The adaptive course named "Cognitive technologies to accompany basic discipline of Chemistry" (hereinafter – "CTABD Chemistry") is intended only for those students with disabilities who study in ABPEP. This course is included in the category of *compulsory BMSTU disciplines* to be mastered by this specific students' contingent.

The introduction of "CTABD Chemistry" in the process of teaching/learning chemistry for the deaf and hard-of-hearing students is being considered as its important accommodation.

The "CTABD Chemistry" course is based on the "Chemistry" content. The main objectives of the "CTABD Chemistry" course are:

– actualizing basic knowledge of hearing impaired students applied to studied materials in the chemistry course;

– identifying individual cognitive difficulties in students who study chemistry and overcoming them through the formation of cognitive general cultural and special competences [7], which ensure a reduction in labor intensity and an increase in the efficiency in the study of "Chemistry" (and other natural sciences as well).

In this regard, another important feature of "CTABD Chemistry" course is that it is being developed and implemented by those teacher of the "Chemistry" department who does have special knowledge in the field of hearing loss, psychophysiological characteristics of students with hearing impairment and experience of longstanding work with this category of students.

The modular adaptive program of "CTABD Chemistry" course is being corresponded in content and structurally to the program of the "Chemistry" course. The key feature of "CTABD Chemistry" is its cognitive and technological component: the educational material in "Chemistry" is being clarified and mastered in the classes of "CTABD Chemistry" using following cognitive technologies [8]:

– expanding vocabulary and forming definitions in the thematic areas of chemistry (glossary technology);

– converting chemical information from one representative form to another;

– information and communication technologies (hereinafter – ICT) to search and analyze relevant chemical information;

– forming operational (logical-algorithmic) thinking and working with information, including ICT and others.

Thus, accompaniment of students with disabilities (deaf and hard-of-hearing) in studying chemistry by special adaptive course is being considered as program-technological accommodation.

The organizational accommodation in teaching Chemistry for the deaf and hard-of-hearing students at BMSTU is providing *parallel (side-by side) chemistry classes on two programs*, namely: the main "Chemistry" program and the adaptive "CTABD Chemistry" program. To increase the effectiveness of studying "Chemistry", teachers attend each other's classes to monitor students' work, their difficulties and progress. Then they discuss and adjust the content of their classes. Such a combination of efforts of two teachers in the inclusive educational process in chemistry for the deaf and hard-of-hearing students can be considered as a "cooperative teaching (co-teaching)". Different models of "co-teaching" within inclusive education are given in [9]. The guarantee of effective cooperation of these teachers is knowing one of them problems of hearing loss; understanding individual features and difficulties of students with hearing impairments and finding ways to solve them within their courses.

The diversity of student's needs requires customizing accommodations for each student.

For this reason, teachers can explore opportunities for multimodal instruction. Using different methods of imparting information accommodates different styles of perception information.

In this connection education environment's accommodation is the important way of creation of special conditions. Lectures and seminars on "CTABD Chemistry" are being conducted in specialized multimedia classrooms, where teachers have access to a wide variety of multimedia ICT. ICT, including smart-board and document camera's technologies, speech-into -text technologies, Internet technologies and information office technologies are being considered as an important factor in cognitive learning. They provide visualization of verbal information; help to search, process, interpret information, make a glossary, form algorithms and structures of chemical experiments and processes, etc., activating the cognitive activity in students [10]. In this way, they form cognitive information competences in students, contributing to their better understanding the semantics of "Chemistry" subject matter.

The teacher of "CTABD Chemistry" prepares and provides training materials for students as well as individual student tasks, in electronic format, taking into account peculiarities of student's perception of information and his/her reading skills. The teacher use different interactive forms to work with students in the classes, including viewing and discussing video materials, demonstrating and analyzing chemical experiments, problem solving, ets., to involve them and to raise their cognitive activity. Thus, ICT support both students and teachers.

Demonstration of chemical qualitative and quantitative experiments during classes is another important feature of the "CTABD Chemistry". Experiments give students a clear idea of the chemical processes. They help students to make a connection between real substances and chemical signs, come to understanding methods of composing formulas and equations and thus to overcome the psychological barrier while transition from the empirical level of cognition to the theoretical one.

Laboratory research experience, a fundamental part of many scientific disciplines, is especially important for experimental sciences like chemistry. Most deaf and hard of hearing students can work safely and effectively in the laboratory doing teacher-led research work if they understand its purpose and tasks, orient in it and are motivated to do it. Research students' work is a kind of accommodation of education process in Chemistry through "CTABD Chemistry" course. Deaf and hard-of-hearing students participate in developing chemical demo experiments within topics of "Chemistry". They compose equations of appropriate oxidation-reduction reactions as well as thermodynamics equations thus currying out a "full and thorough" examination of chemical process.

Table 2

Indicators of progress in Chemistry of hearing impaired students before and after the introduction of "CTABD Chemistry" course, %

School year	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
APIs in Chemistry of the deaf and hard-of hearing students, %	70,2	80,1	100	100	91,7	93,3	96

Usually hearing impaired students are very friendly with modern mobile gadgets. They are able to provide qualitative video materials of chemical experiments, to make needed calculations and to develop multimedia presentations which are being considered as education tools of a high demonstrativeness.

The evaluation of the deaf and hard-of hearing students' success in mastering Chemistry is being based on their tests' results throughout the semester and intermediate credit or examination in the end of semester. Students who are deaf or hard-of-hearing generally can take the same written examinations basing on the same approaches as ordinary students take [11]. To understand oral instructions, however, they will require the same accommodations used during regular classroom sessions. Teachers should be aware that written tests may not be the most equitable way of evaluating students who became deaf very early in life, before acquiring language skills. Students who became deaf before learning to speak often have difficulty expressing themselves, which is largely due to the difficulty in learning to read and write a language they have never heard. Russian language is a second language for some deaf students. So, students' level of learning cannot always be measured by their ability to read and express themselves in written Russian. Therefore, when grading tests, teacher's care must be taken to distinguish the student's grasp of the subject matter from deficiencies in written Russian language skills.

APIs in Chemistry of the deaf and hard-of hearing students confirm raising the efficiency in learning Chemistry by these students with use above mentioned accommodations based on "CTABD Chemistry" course. Indicators of progress in Chemistry of hearing impaired students before and after the introduction of "CTABD Chemistry" course are given in Table 2.

Conclusions

Accompanying the deaf and hard-of-hearing BMSTU students who study "Chemistry" within ABPEP by parallel adaptive "CTABD Chemistry" course raises their efficiency in learning chemistry on average by twenty percent.

The "CTABD Chemistry" course focuses on individualized support of the deaf and hard-of-hearing students while learning chemistry. So it must be developed and implemented with participation of those teacher or specialist who understand students' problems connected with hearing loss as well as their psycho-physiological peculiarities and takes them into account planning his/her classes.

The cognitive-technology component of the "CTABD Chemistry" course requires multiple accommodations in the education process to provide better understanding of Chemistry content in the deaf and hard-of-hearing students and reduce their labor input while mastering chemistry.

Teaching "CTABD Chemistry" course in specialized multimedia classrooms with use a wide set of ICT, demonstrating chemical experiments during classes, laboratory learning experiences as well as carrying out teacher-led research students' work are being considered as creation of special conditions (accommodations) for *multimodal cognitive instruction*. Using different methods of imparting information accommodates different ways of information perception in students with hearing loss.

Deaf and hard-of hearing students must be in an environment that provides *full access* to the educational experience available to their able-bodied peers. The main goal of their education process is not just "inclusion" but "full participation". The adaptive technology course "CTABD Chemistry" through different accommodations ensures forming cognitive cultural and specific competencies in hearing impaired students, thus leveling their possibilities in educational and professional activities with those in ordinary people. Attention to individual needs can ensure that students with health limitations including those with disabilities *participate fully in the education process*.

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ACTIVE METHODS OF TEACHING A FOREIGN LANGUAGE

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The reason for writing the article was the observation of a general decrease in students' interest in learning activity. Indicators of this are the inability to work with information placed in various sources; inability to organize independent research activities, express their thoughts clearly and analyze their own activities when working with data. The result is a delay in the development of self-awareness and self-control, a habit is formed for thoughtless, meaningless activities, the habit of writing off, responding with a clue, a cheat sheet. Work on this problem has prompted the search for such forms of training, methods and techniques that increase the effectiveness of mastering knowledge. The maximum full involvement of students in the educational process, the maintenance of high cognitive activity of students throughout the class, the guaranteed achievement of its goals. It is this organization that involves the use of active teaching methods. Practice shows, especially brightly remembered what is non-standard. Active methods allow you to dilute boring and habitual activities and make them interesting and more informative. Active methods and new modern technologies make it possible to prepare a student with the necessary set of modern knowledge, skills and qualities that enable him to feel confident in an independent life, to be able to adapt quickly to new conditions, and find optimal solutions to complex problems. The use of active teaching methods ensures high-quality education, upbringing, development and socialization of students, which is in demand in modern society.

Keywords: active teaching methods, activity, personality activity, active and interactive teaching methods, gaming technologies, project method, method of problem training, training in cooperation, research method, case method, discussion, trainings, game, business game

In recent years, the priorities of education have changed significantly. At the forefront, modernity sets the goals for the development of the personality of the student. Therefore, the instructor himself must freely and flexibly operate with information, be able to easily show the students the level of their own knowledge and teach them how to improve them. A modern teacher should keep pace with the times, introducing new technologies.

The focus on active learning has become one of the most important components of the education strategy in higher education. The use of active teaching methods in foreign language lessons is a means of improving the quality of teaching a foreign language in order to develop the personality of students who are able and willing to participate in intercultural communication in the language of study and independently improve themselves in foreign speech activity. To effectively achieve key professional tasks, the teacher needs to build training on understanding the essence of academic work as a process of interaction between the teacher and students, which includes humanistic relationships, the desire for participation, empathy, acceptance of each other.

Active methods of teaching are methods that induce students to actively think and practice in the process of mastering educational material. They contribute to the formation of positive educational motivation, develop the creative abilities of students, actively involve them in the educational process, reveal the personality-individual abilities of students, develop non-standard thinking, increase cognitive activity, allow more effective acquisition of a large volume of material, develop the communicative qualities of the individual, the ability to work in a team, conduct joint project and research activities, defend their position and listen to strangers to be responsible for themselves and the team.

There are two groups of teaching methods: traditional and active. They differ from each other, primarily in their task.

Traditional – aimed at the transfer of a certain amount of knowledge, the formation of practical skills and are reproductive.

Active methods of teaching are aimed at developing students' independent thinking and ability to solve non-standard problems.

The goal of learning is not just knowledge, skills, and skills, but the ability to think, reflect, and comprehend one's actions. Knowledge is not acquired "in reserve", it is taught not to the culture of the executive action, but to the culture of thought-creative activity, since the tasks, circumstances and situations of activity can change. It is known that one of the general laws of the process of mastering knowledge is the dependence of the effectiveness of the process of assimilation on the learner's own intellectual activity. Active methods of training provide more activity for the learner than traditional methods, as it has been experimentally established that up to 10 % of what he hears, up to 50 % of what he sees and up to 90 % of what he does, is remembered in a person's memory.

Activity – the own dynamics of living beings as a source of transformation or maintenance of vital links with the world around them.

Personality activity is a person's ability to produce socially significant transformations in the world on the basis of appropriating the riches of material and spiritual culture.

The concept of "active" and "interactive" teaching methods are used as synonyms and characterize learning immersed in the process of communication of people. Methods of active learning – a set of ways to organize and manage educational and cognitive activities, a feature of which is its forced nature, experts say. Active teaching methods are built on the conscious creation of a tense, often conflict situation, which forces students to make decisions to achieve a given goal, in the conditions of incompleteness of the information they provide, the limited material and time resources, and in some cases – against opposition from the leadership of the game or other sites. In such conditions, the development of decisions is accompanied by emotions, which in turn ensures the mobilization of intellectual reserves, stimulates cognitive activity, allows for a long time to keep attention.

Interest in active teaching methods is caused by the acute need to improve the modern didactic system and do this with the least risk, that is, at the expense of the teacher's skill, not overloading the students. Active methods of teaching in the process of pedagogical communication introduce non-traditional relations between the teacher and students in the classroom. New philosophy and values of semantic education.

Mastering the technology of active teaching methods gives the teacher the tools that can really change the situation in the classroom. Reduction of energy costs of the teacher and students, creating a comfortable creative environment, a favorable psychological atmosphere – these and other positive effects determine the active learning and application of this educational technology by teachers. Pedagogical, psychological and sociological aspects aimed at active, interested participation of all students in the educational process, providing comfort in the employment of each student, and shaping the students' focus on achieving results were used as the basis for the development of goals, principles, content and active teaching methods.

The technology of active teaching methods effectively solves the tasks assigned to education, including in the classroom for a foreign language.

First, it involves intensive group interaction. Working in a team, defending one's position and tolerant attitude towards someone else's opinion, taking responsibility for oneself and the team form the personality qualities, moral attitudes and values of students that meet the modern needs of society.

Secondly, the technology of active methods is able to provide a high degree of motivation for students to learn a foreign language, their involvement in the process of active communication in a foreign language.

One of the main advantages of active teaching methods is that they help to create a positive emotional mood, an atmosphere of psychological comfort, orientation to the success of each student, which significantly increases the effectiveness of the session.

The structure of the lesson using the technology of active teaching methods corresponds to the structure of the activity using the system-activity approach, which is the basis for the standards of the new generation. It includes the following main stages: initiation (greeting, acquaintance); entry or immersion in the topic (definition of the objectives of the activity, expectations and fears of students); work on the topic (interactive lecture, working out the content of the topic in groups); relaxation, emotional relaxation; reflection, summing up.

It is very important for the educator to work through all the steps, create a complete picture of the occupation and thereby ensure the systemic and integrity of the educational process.

The use of technology of active teaching methods in class provides a high level of interest of students, their cognitive and creative activity, allows creating a situation of success for each student. This, in turn, helps to make the learning process rich, quality, effective and psychologically comfortable not only for students, but also for educators.

His contribution to the development of active teaching methods was made by A.M. Matyushkin, T.V. Kudryavtsev, M.I. Makhmutov, I.Y. Lerner, M.M. Levi. It should be noted that, A.M. Matyushkin in his works not only substantiated the need to use active methods in all types of student teaching, but also introduced the concept of dialogical problematic learning as the most fully conveying the essence of the processes of joint activity of teachers and students, as well as their mutual activity within the framework of the "subject – subjective" relationship [1, p.129]. At the same time, the basis of the initial provisions of the theory of active teaching methods is the concept of "subject content of activities", developed by Academician A.N. Leontyev, it is with this knowledge is defined as an activity aimed at the development of the objective world. Therefore,

when entering into contact with the objects of the external world, a person learns them and is enriched by practical experience both in the cognition of the world (learning and self-learning) and in influencing it [2, p.178].

Formation of active learning of students is one of the means of development of cognitive activity. The application of problematic and developmental training in practice led to the emergence of methods called "active".

In the process of teaching, the teacher can choose as one active method, and use a combination of several. But success depends on the system and the correlation of the chosen methods and tasks.

Consider the most common methods of active learning: presentations, case studies, problem situations, didactic games and others.

For each stage of the session, active methods should be used to effectively solve specific problems. Most methods are universal and can be used not only in foreign language classes, but also in classes in other academic disciplines.

A special place among active teaching methods is the *method of projects* – this is a comprehensive teaching method that allows individualizing the learning process, enabling the student to show independence in planning, organizing and monitoring his activities.

The project method allows students to show their independence in choosing a topic, sources of information, the way they are presented and presented. The project methodology allows individual work on a topic that is of greatest interest to each student of the project, which undoubtedly entails an increased motivated activity of the student. He himself chooses the object of research, he decides for himself: to confine himself to a textbook on a foreign language (simply by performing the next exercise), or read other textbooks provided by the program. However, often students turn to additional sources of information, analyze, compare, leaving the most important and entertaining.

At different stages of the lesson, *methods of problem-based learning* should be used. Problem training is a system of teaching methods, in which students gain knowledge not by memorizing and remembering them in a finished form, but as a result of thinking work to solve problems and problem problems built on the content of the material being studied.

A problematic situation is a cognitive difficulty, for the overcoming of which students must acquire new knowledge or make intellectual efforts. Problem situations can be objective (the situation is set by the teacher) and subjective (the psychological state of intellectual difficulty in solving the problem posed).

It is also possible to distinguish four interrelated functions of the problem situation: a) stimulating; b) teaching; c) organizing; d) controlling. The problem situation stimulates speech activity, increases its volume and variety of forms of utterance, and also promotes the strength of the formed speech skills and abilities.

The problem situation, realized and accepted by the learner for the solution, grows into a problem. The problem with specifying the parameters and conditions of the solution is a problematic problem. A problematic task is a learning problem with given conditions and, by virtue of this, the resulting limited search field available for the solution to the students. The totality of such purposefully designed tasks is designed to provide the basic functions of problem training: creative mastering of educational material and mastering the experience of creative activity.

Research method. For the organization of research activities in the lesson, it is necessary to correctly select assignments for the development of skills in scientific research and search activity, taking into account the type of the lesson and its place in the curriculum. Innovative activity takes place in various forms and manifestations: problem lessons and mini-projects, individual creative compositions and reasoning, search work, intellectual games, competitions of scientific projects. Obviously, research activity is a complex process that has a beneficial effect on the formation of all types of speech activity, while students need at least a minimum of linguistic knowledge.

One of the options for interactive learning is *learning in cooperation*. Training in cooperation (cooperative learning), training in small groups. The main idea of this method is to create conditions for active joint learning activities of students in different learning situations.

Students are different: some quickly grasp all the explanations, easily master lexical material, communicative skills; others need not only much more time to think about the material, but also additional examples, explanations. Such students, as a rule, hesitate to ask questions at all, or simply do not realize that they do not really understand, can not formulate the question correctly. If we combine students into small groups (3-4 people each) and give them one common task, stipulating the role of each group in the performance of this task, a situation arises in which everyone answers not

only for the result of their work but, what is especially important, for the result of the whole group. Therefore, weak students try to find out from the strong all incomprehensible questions to them, and strong students are interested in ensuring that all members of the group, especially the weak student, thoroughly understand the material. Thus, joint efforts eliminate gaps. This is the general idea of learning in cooperation. Practice shows that together learning is not only easier and more interesting, but also much more effective.

One of the most successful and widely used methods of teaching a teacher is *discussion* as a method of group interaction. This is a special form of collective cooperation, which causes active intense mental activity. With the help of the discussion, the teacher skillfully includes students in important for them, diverse life situations that cause them the desire to talk and communicate and gives the opportunity to express their point of view, their understanding of the issue under discussion. Forms of participation of the teacher in the discussion of students can be very diverse, but in no case by imposing one's opinion. It is best to do this by subtly calculated management of the discussion, through the formulation of problematic issues that require productive thinking, creative search for truth. This is possible when the teacher expresses his point of view only in the order of extracting the conclusions of their statements of students and the reasoned refutation of erroneous judgments. His position may coincide with the views of students, because they appeared as a result of leading questions of the teacher. It is by these methods that one can not simply direct the informative, intellectual-cognitive side of the discussion of theoretical questions, but also construct joint productive activity, thereby influencing the personal position of students, transforming their educational activity, thereby influencing the personal position of students, transforming their educational activities into educational and upbringing [3, p. 3].

Case-method: *the analysis of concrete situations* echoes the requirement of a new educational standard, including the ability to apply the acquired knowledge and skills to solve various typical life situations, as well as the problems associated with the person's performance of typical social roles (family member, employee, owner, consumer and etc.). Such skills can be developed using the case method. This is a method of training, known as the case study (Case study) – a method for analyzing situations. The essence of it is that students are offered to comprehend the real life situation, the description of which simultaneously reflects not only a practical problem, but also updates a certain set of knowledge that must be learned when solving this problem. However, the problem itself does not have unique solutions.

Verified and inalienable in the educational process are *gaming technologies*: *business game, role-playing game, simulation games*.

The game is a powerful stimulus for mastering a foreign language and an effective reception in the arsenal of a foreign language teacher. Particular attention deserves, the method of "business game", which originally appeared, strangely enough not in the education system, but in the practical sphere of government. Now business games are used in research work, in the process of project development, in collective decision-making. In the university business game is used most often for management training. The method of the business game is to model the situation of the activity that the students are to teach, in order to train future specialists in the models, and not on real objects, to perform the corresponding professional functions [1, p.133].

For practical testing of the studied material, it is possible to successfully apply *trainings*, when in the process of modeling specially designed situations, students have the opportunity to develop and consolidate the necessary knowledge and skills, change their attitude to their own experience and applied in the work.

The concept of training has a common collective significance. In training, various methods and techniques of active learning are commonly used: business, role and imitation games, case studies and group discussions.

Using the technology of active teaching methods allows you to make lessons that are modern, meet the needs of students and increase the level of motivation of students and their activity in foreign language lessons.

All active and interactive teaching methods are designed to solve the main task – to teach the learner to learn. That is, the truth should not be presented "on a silver platter". It is much more important to develop critical thinking based on the analysis of the situation, independent search for information, building a logical chain and taking a weighted and reasoned decision.

In conclusion, we would like to express gratitude to our scientific advisor – the Head of Foreign Languages Department, c.p.s., associate professor V.A. Burmistrova.

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POLYLINGUAL EDUCATIONAL ENVIRONMENT AS A FACTOR OF THE STUDENT'S PROFESSIONAL AND CULTURAL DEVELOPMENT

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The article deals with the problem of organizing the educational process in higher school polylingual educational environment. In fact, a modern University is aimed at the social and professional requirements of global cooperation. The success of the phenomenon "polylingual educational environment" is, in particular, in the integration of social, pedagogical, psychological and cultural aspects. The study of the polylingual educational environment peculiarities reflects the concept of the innovative higher education. The author considers the the polylingual educational environment as a socio-cultural factor of the student's professional, cultural and personal development.

Keywords: polylingual educational environment, phenomenon, competence, innovative higher school, professional and cultural development, future specialists

The sociocultural conditions of the modern global world determine and correlate the goals of the Russian higher education. Many issues of the higher education related to the globalization process are being updated. New problems are being acquired by the integration processes in the context of linguistics, culture, sociology, psychology and pedagogy. The relevance of studying the issues of higher education in Russian universities opens new perspectives in determining the peculiarities of the educational process organization in the polylingual educational environment. With the basic humanistic principles as a priority, we take into account the specificity of the person-oriented technologies of modern pedagogy. In fact, the trends in the structure of the higher education represent a huge freedom for the educator to choose and implement new approaches, methods, tools to promote the formation of communicative (bilingual), sociocultural, intercultural, professional competencies and the development of student's creative professional activity. It is important to note that the main mission of the modern university is not the only formation of a personality with certain competencies (according to the current educational standards), but also the development of potential individual characteristics of students in a multicultural educational environment [2].

We are inclined to think that teaching the foreign-language professionally-oriented communication in the polylingual educational environment is justified by the need to study the psychological, pedagogical, social, philological, and cultural factors in the educational process at the University. To expand the notion of "polylingual educational environment at the university" we are to justify teaching foreign-language professionally-oriented communication as a key educational strategy for activating the professional and cultural development of students in the multicultural educational environment.

The theoretical, methodological background of our scientific project is competence, culture and personality-oriented approaches. Studying the peculiarities of teaching the foreign-language professionally-oriented communication in the context of the polylingual educational environment is also important to present different research positions of the scientists. In modern pedagogy the concepts "environment" and "educational environment" are relevant. The researchers present it as the life conditions of a person, his surrounding; the unity of people connected by the these conditions and activities; the social space surrounding the person, the area of the individual's activity, his immediate development in actions: his social and personal life, the experience of communication, the influence of the media, etc. [6].

M.B. Krylov understands the educational environment as part of the socio-cultural space where different educational processes and their components are interacted, in which the learner joins cultural ties with the society, acquires the experience of independent cultural activity [3]. G.Yu. Belyaev studies the educational environment as an "educational process environment" of a particular educational institution, modeled by the pedagogical activity of teachers and the administrative managers of the institution [1]. Thus, according to the researchers' opinion, the educational environment is interpreted as a set of various conditions. This is a combination of social, cultural, as well as specially organized psychological and pedagogical conditions, as a result of the interaction of which the individual is formed as a personality. The educational environment is a pedagogically organized system of conditions, influences and opportunities for satisfying the hierarchical complex of the

needs of the individual and the transformation of these needs into vital values. Using all the opportunities ensures the student's active position in the educational process and personal self- development [5]. This creates conditions for the disclosure of the interests and abilities, the creative potential of students, further contributing to the satisfaction of their individual needs. This determines the choice and the use of educational technologies in accordance with the peculiarities of trainees. Having analyzed a number of scientific ideas and views on the stated problems, we tried to present our own ideological interpretation of the concept "polylingual educational environment", which, undoubtedly, is connected with the further questions of forming a flexible and system of methodological support in higher education processes. The results of the research identified the necessity of developing the new organizational and methodological strategies that contribute to the communicative, sociocultural, personal and professional development of trainees in multicultural environment. The polylingual educational environment at the university is an educational environment that is defined for the learner with communicative, socio-cultural, intercultural, psycho-pedagogical, organizational and methodological conditions that ensure the student's personal and potentially professional development in a multicultural environment. In our study, we consider the bilingual (polylingual) educational environment as a value, as a condition and as a means of forming the communicative (bilingual), cultural, sociocultural, intercultural and, surely, professional competencies of the future specialists in the professionally oriented communicative educational activity at the university.

In our study, we also identified the characteristic features of learning in the polylingual educational environment:

- Purposefulness in implementing the cultural and educational content of the learning process: taking into account, directly, the nature of the bilingual / polylingual environment in the university as a phenomenon, the development of the content of learning as a process and a result of social and cultural factors, having a shaping impact on the student' personality;
- Activation of professional and cultural development of students: the result of bilingual person-to-person interaction in the educational process (at the level of participants in the interaction, institutions, programs, organizational and methodological support of the learning process);
- Organizational and methodological integration of the educational process: the relationship between the resource and methodological organization of the educational process, including teachers, students, managers, social and business partners, with the support of various factors conditioned by the multicultural learning environment;
- Flexibility and variability of the learning process: the possibility of transformations and changes in the resource potential, the development and implementation of conditions to ensure the full development of the individual trainees and the realization of their abilities.

Undoubtedly, the nature of the (educational) bilingual communication defines the requirements for the personality of the future specialist within the framework of the competence approach. Training future specialists in polyilingual conditions contributes to the formation of a communicative (bilingual), intercultural, sociocultural, and professional competences that determine the success of foreign language speaking. Moreover, the need to study the formation of bilingual communicative competence in the educational environment is conditioned by the social need of the international world: the graduates of the university must be able to immediately integrate into the international business community, being a successful communicator and negotiator. It should be added that, traditionally, bilingual competence means the integrative unity of the following components: subject competence, foreign competence, bilingual educational and cognitive competence and competence of personal self-improvement [4]. All the above mentioned competences are interrelated, interdependent and reflect the basic concept of the bilingual/polylingual educational process. Thus, in the basis of the reasoning of our research, we adhere to the definition of the concept of "bilingual communicative competence" as a student's ability (knowledge of the subject language competence in two languages) and the willingness of students (the competence of personal self-improvement) to implement effective interpersonal, intergroup, intercultural communication. We support the idea of researchers that the study, formation and improvement of bilingual communicative competence are possible only on the basis of interaction of cultures, analysis and comparison of linguistic and social characteristics of a person or groups of the language community. To sum up, we can resume that professionally oriented learning in the polylingual educational environment is defined as the interrelated activity of the teachers and students, aimed at studying

specialized subjects by means of native and foreign languages. As a result, the synthesis of certain competences is achieved .The deep mastering of the subject (professionally-oriented) content, the development of professionally directed speech, the formation of a culture of professional thinking and language culture, as well as a high level of foreign language proficiency for a special purpose are provided. The phenomenal nature of the polylingual educational environment is conditioned by the multifunctionality and multidimensionality of the phenomenon being studied, which opens up the new possibilities for further practical study of the issues of polylingual education environment in higher education context.

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FEATURES OF MOTIVATION OF MARRIAGE IN REPRESENTATIVES OF DIFFERENT GENERATIONS

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The article is devoted to the analysis of the features of the motivation of marital relations in a modern family. The motives of marriage, expectations and claims in marriage for respondents with different experience of family life are considered. The article is an exposition of the results of an empirical study of differences in the features of marriage motivation and marital claims, due to the gender and age characteristics of the respondents. It has been proved that girls, as well as women who are married, do not attach much importance to the economic and personal and intimate personal motives of marriage, but consider moral-psychological and parental as more important. Boys and men note the importance of the economic motive, but disagree about the importance of intimate personal, which is significant for young men, but almost irrelevant for men. Girls and young men demonstrate a mismatch of judgments in assessing meaningful motives, while men and women show greater unanimity, expressing an opinion on the importance of parental and intimate personal motives. It has been confirmed that married couples with experience have a greater coherence in the motivation of marriage and ideas about family values and expectations from marriage.

Keywords: motivation of marriage, expectations and claims in marriage

Social and economic situation nowadays is changing rapidly, which leads to significant changes in characteristic features of a modern family. This is primarily transition from patriarchality of the traditional family pattern to equality and democratic values, masculinization and emancipation of women, tendency for feminization of men, new forms of family relations, etc. These transformations explain the interest for the research on different characteristics of a modern family. In this case, we shall dwell on the comparative aspect of marriage motivation for representatives of different generations, what is of interest for searching the ways to achieve stability of matrimony. A family functioning in an optimum way is a family which performs its functions responsibly and differentially, thus satisfying the need for growth and changes of the family as a whole, as well of each family member. Marriage motivation can act as a condition of success and harmony of family relations.

The sources of scientific legacy of domestic and foreign researchers in the family sphere go back to philosophy of Platon (dialogues "Nation", "Laws", "Feast"), Aristoteles ("Politics"), Plutarch ("Instruction for spouses"), I. Kant ("Metaphysics of morals"), G. Gegel ("Philosophy of religion", "Philosophy of law"), V.V. Rosanov ("Family issue in Russia"). Later, the points of view of such authors as E. Bern, E. Fromm, K.G. Jung, A. Adler, I.S. Kon, A.S. Spivakovskaya, V.V. Boiko, A.A. Kronik, E.G. Eidemiller, V.V. Justitskis, G. Navaitis and of many others were included into the research field of family.

The research immediately devoted to readiness of young people for marriage was carried out by I.V. Dubrovina, L.F. Filyukova, N.N. Obozov, T.M. Trapeznikova, A.N. Volkova. However, lack of modern research on this problem can be observed.

I.V. Dorno points out that the changes that are going on not always positively affect the success of marriage, decrease value of a family, and the reasons for this lie in insufficient matureness of perception by young people of each other, future family, as well as in mismatch of views on marriage early in life and after a lapse of time [5].

In the authors' opinion there is a number of variables affecting the perception of harmony in family relations, which sometimes basically do not depend on the subjects of these relations. Thus, according to the opinion of L.Ya. Gozman, depending on the situation the same characteristic of a person can be evaluated positively and negatively, and there are no absolutely "bad" or "good" characteristics. The criteria for choosing a spouse can be social-demographic features or verification of one's own views and worldview. However, it is pointed out by N.I. Adzhigikhina, "… if we are convinced in our virtues, if we know that people treat us well, the similarity loses its essential meaning to us" [2].

An essential aspect of marriage motivation problem is investigation of the influence of the freedom of choice of the marriage partner on the emotional relations in the couple. Values, norms and ideas, on the basis of which an individual builds his or her behavior, can determine that contacts with this person are prestigious

or not prestigious, desirable or undesirable. L.Ya. Gozman thinks that in order for the choice of the partner to be really free, not only it is necessary to have absence of pressure factors. There needs to be a sufficient number of contacts with potential partners. The society can either promote or hinder such contacts [3].

In this perspective, data of E.G. Eidemiller and V. Justitskis, obtained in a sample group of 326 people are of interest, and namely, that the most commonly occurring motives for marriage are escape from parents, sense of duty, a desire to escape from loneliness and following a tradition. The last places in this rating are taken by love, prestige, search for material wealth and sense of revenge [7]. E.V. Volchenkova distinguishes biological, socio-cultural, economic and psychological motives [1].

Exploring marriage motivation for representatives of different ages, A.G. Kharchev states that concordance of motive for marriage positively correlates with increase of spouses age. Therewith the greatest similarity is observed in cases when the husband is somewhat older than the wife, and the greatest difference – when the wife is older than the husband, or when the husband is much older than the wife [6].

Hypothesis. On the basis of review of theoretical research we have supposed that prevailing motives of marital relations for representatives of age group with average age 20 years are external motives (prestige value of relationships), avoiding loneliness as well as personal and pragmatic values. For representatives of the older age group whose average age is 53 years and average marital relationships experience is 28 years dominating marriage motives are spiritual values, similarity of worldview and life goals.

The sample group comprised representatives of two age groups:

1. Future newlyweds, whose average age is 20 years, education – high school diploma or undergraduate degree (group 1).

2. Married couples, whose average age is 53 years, average married life experience – 28 years, education – undergraduate degree or higher education (group 2).

Research methods. To accomplish the set goal we used the method "Role expectations and claims in marriage" (A.N. Volkova) and the method "Determination of marriage motivation" (S.I. Golod).

The analysis of the results of the method "Role expectations and claims in marriage" revealed that the most significant for the respondents from both groups are the statements which characterize positive aspects of a family.

The respondents from group 1 irrespective of gender distinguish as the most significant family value the possibility to satisfy the most important emotional and psychological needs: understanding, psychological support (young men – 90%, girls – 96%). The opinions of the respondents from group 2 divided: women think that the main family value is children (84%), and men give the first place to the family as a place where a person can be own self (84%).

For the respondents from group 1 these values take the second place: for newlywed men it is important to be in the family the person they want to be (86%), for girls the aspect of having and raising children is important (82%). Married couples with marriage experience over 28 years put on the second place the possibility and need to feel mutual support and understanding in the family (82% – women and 76% – men).

An interesting fact is that family life is defined as a special and monotonous work by 36% of young men and 30% of girls, whereas among experienced married couples there are more such answers (48% – men and 54% – women).

Future spouses as well as representatives of experienced families think that a family in some way brings along loss of individuality, and also representatives of the young generation are more convinced in this than spouses with many years of marriage experience. But for both generations women are more convinced in this than men (54% – girls, 44% – young men and 38% – women, 34% – men).

Representatives of both groups express misgivings concerning psychological comfort in the family. The family is considered as a possible vulnerable spot in the personal destiny by 66% of girls and 40% of married women. Among young men, 48% or respondents do not exclude demonstration of lack of attention by the future wife, among men – 54%.

Married women (64%) more often than girls (50%) think that a family is a barrier for self-realization of a person, his or her career. Young men and men (38% and 30% respectively) view this somewhat more optimistic. Probably this deviation can be explained by the fact that a woman not always can make a choice in favor of a career and personal success taking upon herself the burden of family work and childcare.

It stands out that a reasonably big part of respondents think that a family can play a significant role in achieving certain goals (66% of girls and 48% of young men, 54% of married men and 40% of married women). In such a

case the number of men who agree with this statement increases with increase of marriage period, and married women are less convinced in this than girls.

In both groups it is essential to consider family relations as a solution to the problem of loneliness. 56% of girls and 72% of married women think so. 34% of young men and 58% of men agree with them.

Investigation of marriage motivation showed differences between respondents from these groups.

The most significant motive for young men is intimate-personal (60%). The less significant is moral-psychological (10%). Parental and economic-household motives are significant for 20% and 30% of young men respectively. Girls explain the need for a family first of all by birth and upbringing of children, self-realization as a mother (60%). Moral-psychological motive is characteristic for 40% of girls-respondents, intimate-personal – for 20%. The less significant for them during creating a family is economic-household motive (10%).

For married couples with experience approximation of positions concerning marriage motives is observed. As opposed to young men from group 1 where the first place is taken by intimate-personal motive, married men consider financial conditions the most important for family life and put economic-household motive on the first place (50%). Parental motive is significant for 30% of respondents, moral-psychological for 20%. It is interesting that intimate-personal motive became of less significance for men (10%).

For women the priority is in warm family relations, presence of psychologically comfortable atmosphere, that's why of utmost significance to them is moral-psychological marriage motive (50%). Probably this is due to the fact that unlike girls whose preference lies with parental motive, women have already realized themselves in the role of a mother. Just like for men, the last place for women is taken by intimate-personal motive, it was pointed out only by 10% of women. The share of other motives is distributed in the following way: parental – 40%, economic-household – 30%. In other words, both men and women unanimously give the second place to the parental motive.

Thus, data analysis has shown that girls as well as women who are already married don't place much emphasis on economic-household and intimate-personal marriage motives, but consider moral-psychological and parental motives more important. Young men and men unanimously mark the importance of economic-household motive, but differ in opinions concerning significance of intimate-personal motive, which is significant for young men but practically of no significance to men. It is obvious than girls and young men demonstrate mismatch of judgements in evaluation of significant motives, whereas men and women show more unanimity expressing their opinion on significance of parental and intimate-personal motives.

Conclusions

1. Young respondents and respondents with family life experience have positive focus on marriage, but girls and women tend to consider a family to be a barrier for personal success, career, whereas practically all young men and the majority of men disagree with this.

2. Creation of a family is regarded as a solution to the problem of loneliness, more essential for the women under test, than for men.

3. The most significant expectations from marriage for young men are realizing intimate-sexual value and social activity sphere, for girls the value of visual appeal is more significant. For young men less significant is the value of personal identification, for girls – value of intimate-sexual sphere.

4. For married couples with family life experience of the greatest value is personal identification sphere, for men of the least value is visual attractiveness, for women – intimate-sexual sphere.

5. The hypothesis has been partially confirmed. The most significant marriage motive for girls is parental motive, for young men – intimate-personal motive. The most significant marriage motive for men is economic-household motive, for women – moral-psychological motive. It has been proved experimentally that greater match of marriage motivation and ideas on family values and expectations from marriage is observed for married couples with experience.

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PREVENTION OF TERRORISM AND EXTREMISM IN UNIVERSITIES

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The authors analyze the problems associated with the prevention of terrorism and extremism in universities. A survey of students, positional experts and teaching staff of universities has been conducted. It is established that the students' views of terrorism and extremism are superficial, making it difficult to prevent these negative phenomena. A significant number of students do not consider terrorism and extremism as a real daily danger to themselves, but recognize this problem as serious and global for society. Prevention of terrorism and extremism in higher education institutions is conducted quite formally, mainly by banning the extremism related websites, in rare cases, preventive conversations of law enforcement officials, installation of video cameras in the educational buildings and the presence of a receptionist (watchman) on duty. In addition, it was revealed that the universities are poorly protected from the terrorist threat. It is established that young men are perceived a terrorist threat more seriously than girls are, which is associated with their greater awareness of the political situation in Russia and the world. As part of the survey, an analysis of the existing system of the prevention of terrorism and extremism was made in three directions: the scientific-methodical, organizational and social-educational, based on which recommendations on the system improvement were proposed.

Keywords: terrorism, extremism, individual terrorism, organized terrorism, national terrorism, regional terrorism

Relevance of the study

Positional experts note that there is an increase in extremist attitudes among young people, especially the growth of religious and national intolerance. [6, 8] Increasingly, during the public events (rallies, pickets, processions, demonstrations) appear the groups of people expressing a violent change of the existing state system. It is becoming more frequent in Russia when certain politicians actively involve minors in extremist actions. Usually, terrorists recruit schoolchildren into their criminal groups from social networks (facebook.com, vkontakte.ru.). The video clips containing information in which the actions of the authorities of any level are negatively described are posted in the Internet. These videos refer to problems in the state not as one-time objective phenomena, but as systematic mistakes of the authorities. All these actions are the part of the information war, and the situation will get worse as the presidential elections in Russia are approaching (March 2018). It is well-known that the time of elections in Russia is the most convenient period for a number of special services, hostile to Russia, to destabilize the society.

Taking into consideration the above, we attempted to study the views of students on the problems associated with the terrorist and extremist threat, as well as an analysis of the existing system of prevention of terrorism and extremism in universities.

Empirical basis of the study

In 2016-2017, we carried out a survey of students of:

– Yaroslavl State Pedagogical University named after K.D. Ushinsky (YSPU);

– Yaroslavl State University named after P.G. Demidov (YSU);

– Orel branch of the Russian Academy of National Economy and Public Administration under the President of the Russian Federation (RANEPA);

– Yaroslavl branch of the Emperor Nicholas II Moscow State University of Railway Engineering (After all merges the branch of the Russian University of Transport (MIIT)).

Quota sample. Sample frame n = 724. Quota variables: gender, age, university.

The survey of the teaching staff of universities to analyze the existing system of prevention of terrorism and extremism in universities n = 16.

In addition, the study of opinion of positional experts (police officers, the FSB officers) n = 8.

A secondary analysis of the data of:

– Russian Federal State Statistics Service;

– results of sociological researches conducted by VTsIOM (Russian Public Opinion Research Center), employees of the Institute of Sociology of the Russian Academy of Sciences and scientists of the Academy of Management of the Ministry of Internal Affairs.

Methodological basis of the study

The theoretical and methodological basis of the research is the Institutional Anomie Theory (Bjerregaard B., Cochran J.K., Burkatzki E., Messner S.F., Thome H. and Rosenfeld R.) [1, 2, 7] as well as the scientific works of such authors as Donohue L.K. and Chalk P. [3, 4].

Author's hypotheses:

1. Students' views of terrorism and extremism are superficial, making it difficult to prevent these negative phenomena.

2. Significant number of students do not consider terrorism and extremism as a real daily danger to themselves, but recognize this problem as serious and global for society.

3. Prevention of terrorism and extremism in higher education institutions is conducted quite formally, mainly by banning the extremism related websites, in rare cases, preventive conversations of law enforcement officials, installation of video cameras in the educational buildings and the presence of a receptionist (watchman) on duty.

4. Universities are poorly protected from the terrorist threat. The access system in the academic buildings and dormitories works formally. Usually receptionists (watchmen, guards, etc.) are not specially trained.

5. Young men perceive a terrorist threat more seriously than girls do, which is associated with their greater awareness of the political situation in Russia and the world.

Results of the study

First we as researchers were interested in what problems in the society are the most serious from the point of view of our respondents (respondents could list several answers). It was found out that, first of all, they are concerned about the level and quality of life of the population, as well as unemployment (74%). The second place was given to corruption, drunkenness and the crime rate (69%). The problems related to terrorism and extremism are on the third place only (57%). Then the students pointed out the problems that are less acute in their opinion: ethnic conflicts (54%), domestic violence (46%), pollution of the environment (45%) etc.

We also found out that young men perceive a terrorist threat more seriously than girls do, which is related to their greater awareness of the political situation in Russia and the world. So all the interviewed male students noted that they monitor the news of their city, region and the whole country each day. Particular attention is paid to political news. Only 26% of female students noted that they watch news covering the events in the city of Yaroslavl, the region and the whole country on the periodic basis. The girls explained that the political news worries them least, but if the news is informing them about the terrorist acts or extremism, they closely monitor the development of this situation.

Then, we analyzed what the students put into the concept of terrorism? As a result, the following answers were received (respondents could list several answers):

– 92% – terrorism refers only to hostage-taking and terrorist attacks;

– 56% – of respondents believe that terrorism includes any actions and inactions, somehow violating human rights;

– 12% – of students believe that terrorism is a form of political struggle with the authorities;

– 8% – of respondents believe that terrorism is violence and intimidation of people and authorities in order to disorganize the daily life of society and the state.

Then, we analyzed what the students put into the concept of extremism? As a result, the following answers were received (respondents could list several answers):

– 87% – extremism is a terrorist action;

– 65% – riot provocation;

– 32% – guerilla warfare.

– 17% – seizure of power;

– 13% – assassination of a politician;

– 10% – performances (demonstrations, pickets, marches etc.) against the existing order;

– 9% – incitement of social, racial and religious hatred;

– 8% – use of Nazi attributes;

– 7% – terrorism and extremism mean the same.

As can be seen from the survey, students' views of terrorism and extremism are superficial, which complicates the prevention of these negative phenomena.

Next, we attempted to find out what is contributing to the growth of extremism in society, according to university students (respondents could list several answers). As a result, the following answers were received:

– 76% – socio-economic and political crises;

– 45% – external intervention;

– 32% – totalitarian or authoritarian political regimes;

– 18% – low level of education and culture of a significant part of the population;

– 7% – low level and quality of life of the population.

Next, we tried to find out if the students know why certain individuals commit terrorist acts and extremist actions.

As a result, the following answers were received (respondents could list several answers):

– 45% – attempt to change people's lives for the better;

– 37% – desire to overthrow the existing regime;

– 29% – earn a lot of money out of threats (in particular by means of hostage taking);

– 21% – revenge for something;

– 16% – attempt to draw attention to any problems;

– 7% – desire to achieve independence for one's people or region.

Unfortunately, as can be seen from the survey, most students think about the individuals committing terrorist acts and extremist actions as avengers and fighters for a justice, which certainly does not contribute to the effective prevention of terrorism and extremism.

Accordingly, it is necessary to issue leaflets, thematic videos on the periodic basis in which it is necessary to disclose the true goals of terrorists and extremists.

Next, we studied how secure our correspondents feel themselves.

Only 23% of students believe that they and their relatives are safe, considering that the activities of law enforcement agencies and metal detectors (at railway stations and in crowded places, at the entrance to all premises) protect them from terrorist attacks. 57% of respondents consider themselves and their relatives to be insufficiently protected from the ideas and actions of extremists. 20% of respondents consider themselves and their relatives to be partially protected only.

Next, we figured out how our respondents had come across extremist information within the past year. As a result, the following answers were received (respondents could list several answers):

– 60% – did not encounter information of extremist content;

– 37% – never encountered such information before, but several times within the last year;

– 8% – pointed out that it was very rare, but they encountered information of an extremist nature;

– 5% – noted that they encountered such information from time to time mainly on the Internet portals.

Given that in our sociological research, we have previously established the fragmentary knowledge of our students about terrorism and extremism, we can conclude that the situation is much worse. Students are likely to encounter information of extremist content, but cannot determine one that is destructive one in a large flow of information simply because of their low experience and knowledge in their daily practice. In any case, the positional experts explained that they increasingly have to interact with the Roskomnadzor (Federal Service for Supervision of Communications, Information Technology and Mass Media) Office in the Yaroslavl region in order to block access to Internet sites of extremist orientation.

We established that students of non-Slavic peoples, that is Tatars, Bashkirs, Kazakhs, Azeris, Yezids, Udmurts, Ingush, Chechens, etc., are more likely than Russian, Ukrainians and Belarusians to encounter information of extremist content. It can be assumed that terrorist and extremist organizations purposefully choose an audience of non-Slavic peoples.

The study founds that 29% of respondents have never met with leaflets or videos that condemn terrorism and extremism for the past year. 71% of the respondents explained that they periodically see the broadcasts on the central television channel in which some terrorist groups are condemned. The students also noted that over the past year, the number of broadcasts in which the condemnation of terrorism and extremism is passing by has increased several times. The most popular programs for students, mainly young men, are two – "To the Barrier" and "Special Article".

The analyzed data show that the students who are the members of socio-political youth organizations (the All-Russian Public Organization "Russian Student Union", the All-Russian Public Organization "Young Guard" of United Russia political party) are more active in analyzing the events in the world and everything related to the security of our country. In particular, they actively participate in demonstrations, marches, pickets, rallies dedicated to the struggle or condemnation of terrorism and extremism. Earlier, sociologists and political scientists from Yaroslavl found that students of Yaroslavl universities are indifferent to political practices associated with extremism and radicalism. [5]

67% of students indicate that the curators of their student groups periodically hold the talks on the prevention of terrorism and extremism.

Absolutely all the teaching staff believe that they need additional knowledge in the field of prevention of extremism and terrorism. Our analysis of the activities of the Institute for Advanced Studies of the Yaroslavl State Pedagogical University has shown that there are all necessary opportunities for further training in the field of countering extremism and terrorism. Teachers and students explained that, in spite of the fact that at the entrance to the buildings of the universities there is a receptionist or watchman, as well as a turnstile and video camera, the reality is that any stranger can freely enter the building.

Positional experts explained that the most effective work on the prevention of extremism and terrorism is carried out when it is conducted in a complex. The main thing here is the work with residents and agents. This part

of the work, as a rule, is not visible to most of the citizens. The effectiveness of this part of activity of law enforcement bodies is mainly known from the media, when people are informed about the prevention of the terrorist act.

In addition, positional experts explained that recently extremists have intensified their activities in the territory of the Central Federal District, including the Yaroslavl region. So, in 2015, five students who came from Tajikistan to study at the Yaroslavl State Technical University, went to fight in Syria on the side of ISIS (The terrorist group banned in Russia). And these are only established facts. Experts explained that there are a lot of examples when they managed to dissuade students who came under the influence of extremist ideology, not to go to war on the side of ISIS (The terrorist group banned in Russia).

Conclusion

Within the framework of the conducted research it is established that the students' views on terrorism and extremism are superficial, making it difficult to prevent these negative phenomena.

Moreover, a significant number of students do not consider terrorism and extremism as a real daily danger to themselves, but recognize this problem as serious and global for society.

Prevention of terrorism and extremism in higher education institutions is conducted quite formally, mainly by banning the extremism related websites, in rare cases, preventive conversations of law enforcement officials, installation of video cameras in the educational buildings and the presence of a receptionist (watchman) on duty.

Universities are poorly protected from the terrorist threat. The access system in the academic buildings and dormitories works formally. Usually receptionists (watchmen, guards, etc.) are not specially trained.

Young men perceive a terrorist threat more seriously than girls do, which is associated with their greater awareness of the political situation in Russia and the world.

In order to prevent extremism and terrorism in higher education institutions it is necessary to:

1. Carry out constant monitoring and timely diagnostics of extremist behavior; Carry out sociological research aimed at studying the values, interests, needs of students.

2. Conduct scientific and practical conferences, trainings, round tables with the participation of representatives of the clergy, law enforcement agencies and a number of other structures, within the framework of which to conduct talks about the causes of extremism and terrorism.

3. Systematically improve the qualifications universities' teaching staff in the field of prevention of extremism and terrorism among students.

4. Include special courses which detail the material on religion and cultural characteristics of other countries to the educational process.

5. Administrations of universities, together with the Ministry of Internal Affairs and the FSB, to monitor the use of Internet resources by students to exclude access to websites calling for extremism and terrorism.

6. Strengthen the control over the entrances and exits to the educational buildings and dormitories. Establish a video surveillance system on all the floors of university buildings. In addition, to tighten the requirements for candidates for the post of receptionist (watchman), for which purpose to provide more decent salaries for candidates for these positions

7. Issue brochures, thematic videos on the periodic basis which detail the rules of personal safety. Purposefully and systematically conduct trainings with students and faculty for actions in case of emergency

8. Hold scientific and creative contests to counter extremism and terrorism on the systematic basis.

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INTERACTION BETWEEN FIBER MATERIAL AND CONTINUOUS ENVIRONMENT IN DRYING AND RINSE PROCESSES

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In the article, based on the materials of the authors` monograph, the mechanism of interaction of fibrous textile material with continuous media – gaseous or liquid in the processes of drying and washing is considered. The processes of drying and washing (extraction of process contaminants) of fibrous materials in the chemical technology of their finishing are the most energy- and resource-intensive ones. The influence of textile material properties as an object of technological processing on the processes of heat and mass transfer, on the diffusion rate of moisture and technological contaminants is considered. The analysis of the types of connection of the distributed component and the mechanism of their removal during the drying and washing process is carried out. A comparative analysis of methods for increasing the driving force in the drying and washing processes of fibrous materials is realized.

Keywords: fibrous material, technological contamination, washing, drying, processing facility

The drying and washing processes of textile materials are heterogeneous physicochemical processes that have much in common [1]. Indeed, if the drying process is a process of removing moisture from a textile material by evaporating it into a gaseous carrier stream due to a supply, the washing process is a process for removing contaminants from a textile material (dye, alkali, printing ink, textile auxiliaries, etc.) into the medium of a liquid carrier (washing water). Common to both processes is the transfer of the removed substance (moisture, colorant) from one phase (textile material) to another (gaseous or liquid). Therefore, such processes have received the name of mass-exchange processes in chemical technology. The transition of the removed component (from the terminology accepted in chemical technology – the distributed component) from one phase to the other occurs as a result of diffusion under the action of a concentration gradient in the volume of each phase and at the interface between phases, therefore such processes are also called diffusion [1].

Fibrous materials of both natural and artificial origin are high-molecular compounds – polymers. The properties of textile material as an object of technological processing (drying and washing) are of great importance for processes of heat and mass transfer, for example: material thickness; structure; the relationship between the distributed component and material; thermophysical characteristics. Obviously, the greater material thickness, the greater the inertia, and therefore the slower the drying or washing process, as the thickness of the material increases, the path length of the diffusion of the distributed component increases. For fiber-forming polymers, the porosity of the material layer, characterizing the distance between the particles of dispersed polymeric material in a suspended state, is of great importance. With increasing distance, all other conditions being equal, more favorable conditions are ensured for diverting the distributed component from the interface of dispersed particles to the volume of the continuous phase. As a result, the concentration gradient of the component in the polymer particles increases, which leads to an increase in the speed of the corresponding technological process.

The diffusion rate depends essentially on the pore size: in larger pores it is higher, and in smaller pores it is lower (large pores are considered to be pores whose diameter substantially exceeds the mean free path of the molecules of the diffusing substance). This is due to the different frequency of collisions of the molecules of the distributed component with the molecules of the continuous medium that fills the pores (molecular diffusion), and with the walls of the pores (Knudsen diffusion) [1]. The distributed component may be in the textile material in a loose or bound state. In the first case, in order to remove it from the material, it is sufficient to create a concentration gradient in the volume of the particle and on its surface (for dispersed material) or in the volume of the layer and on the surface of the layer of textile material (for a material consisting of mechanically interconnected fibers, material, filter layer of fibrous material, etc.). In the second case, in order to remove the distributing component from the textile material, in addition to creating a concentration gradient to the material, it is necessary to supply a certain amount of energy to break the connection between the component being distributed and the textile material. When carrying out the processes of drying and washing textile materials, it is necessary

to remove both the free and bound distributive component, so the energy supply in both cases is necessary. When the loose component is removed from the textile material, the input energy is used to intensify the corresponding technological process, and when removing the bound component, both for the intensification of the process and for breaking the component's bonds with the material, i.e. to ensure the principle possibility of the process [1]. The supply of energy to the textile material can be carried out by various methods. The most commonly used convective and conductive methods of supplying heat with a gaseous or liquid coolant, or from the heating surface. Radiation power supply, heating by high or ultrahigh frequency currents, energy supply in the form of acoustic or ultrasonic oscillations, oscillations of a continuous medium, or by means of jets of continuous medium directed to the textile material through slotted nozzles (nozzle blowing) are also used. The effectiveness of the perception of the supplied energy by the textile material is determined by its thermophysical and (or) electrophysical properties (thermal conductivity, heat capacity, permittivity, etc.) [1].

In the drying and washing processes, it is not possible to ensure the complete removal of the distributed component from the textile material to the continuous phase, since the process of mass transfer between the textile material and the continuous phase can continue only until the (as with the direct contact of hot and cold bodies, heat exchange continues only until the temperatures of both bodies become the same) [monograph].

To calculate the parameters of the drying and washing facilities, it is necessary to be able to determine the rate of heat and mass transfer taking into account the specific conditions of the process and the connection of the component being distributed with the textile material. So, it is on the basis of the speed of the drying process that the basic dimensions of the drying equipment are determined or the necessary duration of the drying process at its given dimensions [1]. The speed of the drying process depends, with all other conditions being equal, on the driving force of the process, determined by the temperature difference between the coolant and the material, and also by the deviation of the current moisture of the material from its equilibrium moisture content. It should be noted that the increase in the coolant temperature is subject to limitations due to the thermal stability (thermal lability) of the material, and to reduce the equilibrium moisture content of the material, either an increase in the flow rate of the coolant or its temperature at the outlet from the device is required [1]. The driving force of the washing process is the deviation of the current contamination concentration in the material from its equilibrium concentration. The latter, all other things being equal, depends on the washing bath module: the higher the modulus, the lower the equilibrium concentration and the higher the driving force. In addition, the equilibrium concentration of contamination decreases with an increase in the temperature of the wash water and the material. The way to increase the driving force of the washing process by increasing the wash bath module is unacceptable, since it leads to an increase in the flow rate of water, and hence the volume of the waste water [1]. Like the speed of the drying and washing processes, the driving force does not remain constant in the course of movement of the textile material in the drying or washing machine in continuous processes or in time in batch drying and washing plants.

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