

Biological sciences *Article*

- ABOUT CLINICAL URINE ANALYSIS OF PINNIPEDS IN CAPTIVITY
Erokhina I.A., Kavtsevich N.N. 4
- SOME CYTOCHEMICAL FEATURES OF BOTTLE-NOSED DOLPHIN
AND HARP SEAL LYMPHOCYTES
Kavtsevich N.N., Erokhina I.A., Minzyuk T.V. 8
- INFLUENCE OF ECDYSTERONE ON THE ACTIVITY OF ENTERAL CARBOHYDRASES
IN SUCKLING RATS
Kuchkarova L.S., Dustmatova G.A., Kudeshova G.T. 13

Ecological technologies *Article*

- ANTHROPOGENOUS ECOSYSTEMS OF VORONEZH RIVER VALLEY
Anichkina N.V., Rostom G.R. 15

Medical sciences *Article*

- THE METHOD OF "RESEARCH BASED LEARNING" ON "ABDOMINAL OBESITY",
THE STUDENTS SPECIALTY "GENERAL MEDICINE"
*Bakirova R.Y., Muravlyova L.Y., Koichubekov B.K., Grigorevskaya L.A.,
Bekov E.K., Suleimenova Sh.B.* 18
- UNKNOWN FACTORS OF TYPE 2 DIABETES REMISSION AFTER METABOLIC SURGERY
*Ghidirim G.P., Balan S.A., Rojnoveanu G.A., Revencu S.L., Contu G.I.,
Mahovici I.S., Contu O.I., Revencu D.S.* 21
- MORPHOLOGICAL CHANGES IN THE SKIN OF GUINEA PIGS
IN LOCAL EXPOSURE TO ULTRAVIOLET IRRADIATION
Mironchenko S.I., Naumova O.V., Zvyagintseva T.V. 28
- ESPECIALLY THE CONTENT OF ESSENTIAL SUBSTANCES IN THE BODY
OF MODERN SCHOOLBOYS
Setko N.P., Bulychева E.V. 32
- THE ISSUE OF EARLY CONGENITAL SYPHILIS MORBIDITY
Ufimtseva M.A., Beresneva T.A., Shubina A.S. 37
- COMPREHENSIVE STUDY OF MUSCLES OF EXTERNAL VAGINAL SPHINCTER
AFTER VAGINAL BIRTH
Ziganshin A.M. 40

Physical and Mathematical sciences *Article*

- THE FORMATION OF A SET OF INFORMATIVE FEATURES BASED ON THE FUNCTIONAL
RELATIONSHIPS BETWEEN THE DATA STRUCTURE FIELD OBSERVATIONS
Artemenko M.V., Kalugina N.M., Dobrovolsky I.I. 43
- INFLUENCE OF CONSTANT MAGNETS
ON THE ORBITAL ANGULAR MOMENTUM
Maschenko V.N. 49
- NONTANGENTIAL SUMMABILITY OF CONJUGATE FOURIER SERIES
Nakhman A.D. 52

Technical sciences *Article*

- MODELING OF BUSINESS PROCESSES
Kintonova A.Zh., Kim E.I., Kutebayev T.Zh. 57

ADVANCED COMPOSITE CONSTRUCTION MATERIALS, FILLED WITH BASALT	
<i>Rashchepkina S.A., Maharramova I.A.</i>	62
GEOGRAPHIC INFORMATION SYSTEMS AS A TOOL OF OPTIMIZATION OF MEDICINAL MAINTENANCE OF THE POPULATION AND MEDICAL INSTITUTIONS ANALGESIC DRUGS	
<i>Taraskina A.S., Kulikov A.S., Soloninina A.V., Faizrakhmanov R.A.</i>	66
MATHEMATIC MODELING OF ENVIRONMENT BY INORGANIC DUST DURING THE THERMAL PREPARATION AND AGGLOMERATION OF PHOSPHORITIC RAW MATERIAL	
<i>Turgumbayeva R.Kh., Abdikarimov M.N.</i>	69
THE FACTOR OF NOISE POLLUTION IN THE ORGANIZATION OF THE REST AREAS	
<i>Zakharov Y.I., Sankov P.N., Zakharov V.Y., Tkach N.A.</i>	73

Economic sciences

Article

TO THE QUESTION OF THE BANK DEPOSIT: OPINION OF THE EXPERT (ON THE EXAMPLE OF PJSC MAY DAY BANK KRASNODAR)	
<i>Brylev V.I., Isupova I.V.</i>	80
MARKET SEGMENTATION RESULTS OF RESTAURANT SERVICES	
<i>Starovoytova Y.Y., Chugunova O.V.</i>	83

Pedagogical sciences

Article

RUNNING AGAINST WIND OR HOMESCHOOLING PERSPECTIVES IN KAZAKSTAN	
<i>Asanbayev A.Zh., Kutebayev T.Zh., Kashkenova A.M.</i>	87
CORRECTIVE AND HEALTH-IMPROVING METHOD OF PHYSICAL FITNESS OF PRIMARY SCHOOL CHILDREN WITH SPEECH DISORDERS BY MEANS OF PHYSICAL EDUCATION	
<i>Chukhno P.V., Akhmetov A.M., Akhmetova E.T., Denisenko Y.P.</i>	90
FEATURES OF EDUCATIONAL WORK WITH YOUTH AT THE IRKUTSK NATIONAL RESEARCH TECHNICAL UNIVERSITY	
<i>Goroshchenova O.A.</i>	93
TEACHING PRACTICE OF PRE-SERVICE TEACHERS IN THEIR PROFESSIONAL IDENTIFICATION	
<i>Lukina A.K., Volkova M.A.</i>	98
INDIVIDUAL APPROACH IN TEACHING PROCESS	
<i>Stukalenko N.M.</i>	103
MODEL OF DEVELOPMENT OF THE TEACHERS' INNOVATIVE ACTIVITY IN THE PROCESS OF SCHOOL METHODOLOGY ORGANIZATION	
<i>Zhunisbekova Zh.A., Alshynbaev K.A., Sadykova D.B., Zhunisbekova D.A.</i>	108

Psychological sciences

Article

IDENTIFICATION OF SUICIDE RISK AMONG PUPILS OF 8-11 GRADES	
<i>Madaliyeva S.Kh., Yernazarova S.T., Bagiyarova F.A., Belyavskaya B.</i>	110
THE USE OF DIFFERENT PSYCHOTHERAPEUTIC TECHNIQUES FOR PANIC ATTACKS	
<i>Madaliyeva S.Kh., Yernazarova S.T., Bagiyarova F.A., Belyavskaya B.</i>	114
FORMING ATTENTION OF STUDENTS OF NON-PSYCHOLOGICAL SPECIALITIES IN THE PROCESS OF PROFESSIONAL EDUCATION	
<i>Motornaya S.</i>	116

Historical sciences
Article

OLYMPISM HISTORY

Iglin A.V.

121

Sociology
Article

VISION OF THE FUTURE AND VALUES OF UNIVERSITY STUDENTS

Baburkin S.A., Talanov S.L., Lymarev A.V.

125

THE INFLUENCE OF THE LEVEL OF MATERIAL WELL-BEING
OF THE FAMILY ON TOLERANCE OF SENIOR PUPILS*Meshalkina L.O.*

128

VIOLENCE AND AGGRESSION IN THE LIFE
OF CONTEMPORARY RUSSIAN TEENAGERS*Semenova L.E., Chevachina A.V., Semenova V.E.*

131

Philological sciences
Article

NEOLOGISMS AND BORROWINGS IN THE MODERN GERMAN LANGUAGE

Marchenko S., Boyko A.

136

ABOUT CLINICAL URINE ANALYSIS OF PINNIPEDS IN CAPTIVITY

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Results of study of some urine properties and composition in gray and harp seals in captivity are presented. It noted differences in physical properties, qualitative reactions and chemical composition of urine in healthy and sick animals. It is proposed to use tests in this study applied to assess the health status of pinnipeds at the level of the norm – pathology.

Keywords: pinnipeds, gray seal, bearded seal, harp seal, care in captivity, blood

Methods of biochemical analysis are used, as a rule, at clinical examination either to make the diagnosis or to examine the severity and kinetics of diseases process. In the first case biochemical analysis must either confirm or reject presumptive diagnosis, in the second case, it should help evaluate effectiveness of methods of treatment and prognostication [1].

Among all diseases occurring in captured sea mammals, proportion of internal uninfected ones is large. The peculiarity of the last ones that besides obviously sick animals receiving treatment, there are a lot of animals without clinical signs of a disease, but with low level metabolism or with protein, carbohydrate, lipid, vitamin and mineral metabolism. These animals also require treatment although they have no marked clinical signs. The main reasons of internal uninfected diseases are violation of feeding rules, maintenance a usage of animals [2, 3].

In view of this it is necessary to implement regular control of animal health, timely veterinary preventive measures that prevent diseases and provide for normal vital activity of animals. Analysis of urine not only points to this or that condition of kidneys but also permits to think about involvement of some other organs and systems (affection of liver, metabolism etc). This analysis is relatively simple to obtain comparing to taking blood analysis for example, and besides it doesn't scare animals. Its easiness and rather full informative range attract attention.

Materials and methods of research

Material for study was obtained from four seals delivered to Murmansk Marine Biological Institute for rehabilitation: gray seal (*Halichoerus grypus*) – “Rik”; bearded seal (*Erignathus barbatus*) – “Gip”; harp seals (*Pagophilus groenlandica*) – “Murka”, “Mishka”. Animals were housed in plastic tubs 2×2×1 m in flowing seawater. Bath was dried before urine sampling.

Results of research and their discussion

There are only two papers on study of urine properties in northern fur seal [6] and two spe-

cies of cetaceans [8], as well as general guidelines for urine analysis in marine mammals [1].

But it should be noted that practically there are no data about such investigations in sea mammals.

On basis the above-stated we made it our aim to develop and choose the simplest, most accessible and informative procedures of analyzing urine of captured seals. Besides, as we haven't found data on urine composition of seals in literature available, results obtained for healthy and sick animals, can act as starting point in this course of research.

Taking urine analysis in sea mammals presents certain difficulties because water is their habitat. However, experience shows that maintenance of animals in pools with controlled water flow allows to obtain urine analysis. But only inconvenience about it is that sometimes it takes quite a long time. It is advisable to collect urine in the morning before feeding animals and when animals are dried. To collect urine first water is removed from the pool and it is not poured into until the procedure of obtaining the analysis ends. Usually, if animals aren't scared and are accustomed to people, they allow to approach them during urination without getting excited. Investigator's only task is to carefully collect urine in glass prepared beforehand. Urine is collected in dry clean glass and examined within 30 minutes to 1,5 hours after its collection. Long storage results in changing physical properties, multiplication of bacteria and destruction of deposit. If necessary urine can be stored quite long and the best way is its storage in cold. However, in case it is impossible, some chemical agent is supplemented. Toluene is the most convenient substance that is supplemented in the amount to cover the surface of the collected urine with a thin floating layer [4].

Analysis of urine included examination of physical properties (colour, transparency, pH) and chemical analysis. Quantitative tests that allow to reveal compounds, normally not found, are convenient for express-characteristic of urine. Table 1 presents data on the qualitative urine analysis of healthy and sick animals in captivity.

Table 1

Physical properties and quantitative tests of the urine of pinnipeds in captivity

Characteristics	Healthy		Sick	
	Rik	Gip	Murka	Mishka
Colour	straw-yellow	straw-yellow	deep-yellow	rich-yellow
Transparence	clear	clear	clear	cloudy
pH	5,0	5,0	6,0	5,0
Ketones	0	0	0	0
Glucose	0	0	0	0
Hemoglobin	0	0	0	++++
Erythrocytes	G	0	++++	0
Protein assay	negative	negative	positive (0,11 %)	positive (0,18 %)
Kimbarovsky Colour Sedimentary Reaction (KCSR)	negative	negative	positive	positive

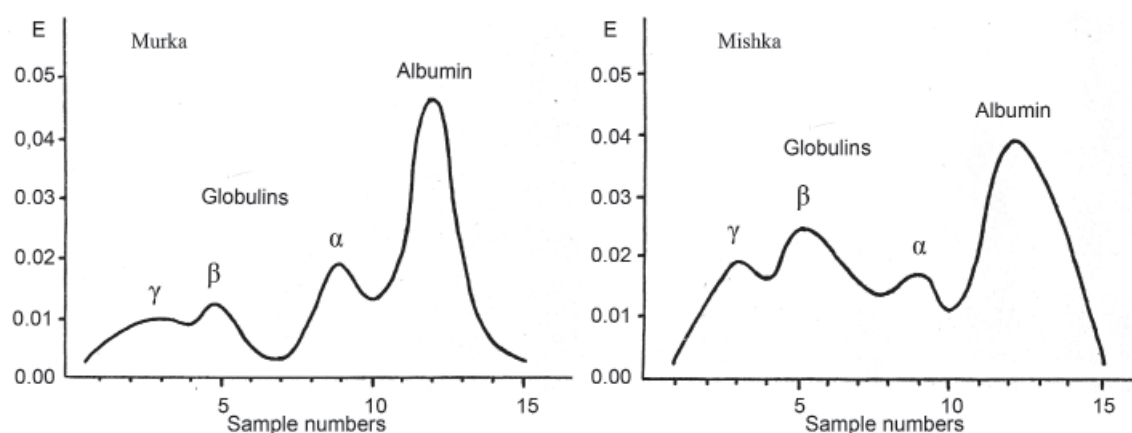
Note that pH of seals urine in this study was 5,0 in healthy animals. In the literature, there are reports that in healthy sea lions pH is of about 6,0 [6], as well as in other pinnipeds, cetaceans, sea otters, polar bears, and from 6,0 to 7,5 in manatees [2]. For comparison, the human urine pH is 5,5–6,5 [4], and in representatives of terrestrial mammals – 6,0–6,5 [7].

Urine of sick animals is seen to differ in colour, transparency, pH, presence of hemoglobin, erythrocytes, protein as well as in character of Kimbarovsky Colour Sedimentary Reaction (KCSR) that is nonspecific and is positive in any pathologic process. To determine ketones, glucose, hemoglobin and erythrocytes “La Chema” kit of diagnostic strips for semiquantitative urine analysis was used. Protein was determined with sulfosalicylic acid [4]. Normal

urine contains traces of protein and usually clinical protein assays in urine are negative. In sick individuals proteinuria develops, serum albumin being the main protein component as seen from figure. More often kidney disease is the cause of proteinuria. Albuminuria is also observed in various conditions with characteristic disorders of kidney bloodsupply (for example, at stasis of failing heart), in a feverish conditions anemia, liver diseases or different heart anomalies [5].

In Figure, electrophoretic profiles of the urine of sick animals with pathologies of different etiology look unequal.

Murka died of hypotrophy, Mishka's death followed because of systemic aspergillosis with lesions in lungs and kidneys (findings obtained by veterinary surgeon T.B. Yelfimova).



Electrophoretic profiles of proteins in the urine of sick animals

We carried out more detailed examinations of the urine of clinically healthy animals (Rik, Gip) to determine norm for further investigations. Besides, as different species of animals were used in investigations (Rik, a grey seal; Gip – a bearded seal) of certain interest is discovery of specific features of urine composition that reflects peculiarities of specific metabolic processes. Results of investigations are presented in Tables 2 and 3. Different chemical composition of urine of grey seal and of beard-

ed seal mainly consists in presence of nitrogenous components, in particular, total nitrogen, carbamide, aminoacids. These differences are connected both with features of animal feeding habitats [Suzuki et al., 2008], and with peculiarities of nitrogen metabolism. Urine animals studied varied considerably in total content of amino acids (aspartic acid, glutamic acid, glycine, alanine, valine, methionine), and to a lesser extent – on the content of free amino acids (lysine and proline).

Table 2

Chemical composition of the urine of healthy animals

Indexes	Rik	Gip
Dry compounds, %	5,48	4,62
Water, %	94,52	95,38
Total nitrogen, mg %	1541	3283
Carbamide, mg %	3194	6868
Total mineral compounds, %	3,47	5,12
Ca, mg %	14,00	24,00
P, mg %	15,00	39,00
K, g/kg	3,179	2,939
Na, g/kg	11,485	10,489

Table 3

Aminoacid composition of the urine of healthy animals (μmol/l)

Aminoacids	Total		Free	
	Rik	Gip	Rik	Gip
Aspartic acid	851,5	1439,1	196,22	260,18
Threonine	262,5	469,8	99,65	118,86
Serine	452,1	723,8	160,08	167,29
Glutamic acid	741,5	1194,2	128,06	152,42
Proline	trace	trace	108,04	441,22
Glycine	1225,2	4135,5	312,22	276,45
Alanine	716,0	2565,4	170,27	304,84
Valine	157,4	2347,5	87,60	73,75
Methionine	24,4	trace	98,48	152,42
Isoieucine	166,4	297,8	–	–
Leucine	248,1	333,0	trace	trace
Tyrosine	248,9	334,8	31,66	59,68
Phenylalanine	368,4	423,8	12,88	14,30
Histidine	4403,3	5714,8	2713,51	3205,75
Lysine	813,3	1212,8	190,26	466,00
Arginine	367,0	197,0	87,66	83,52
Tryptophan	1071,0	958,3	44,35	67,08

Conclusion

Thus, observations performed resulted in establishing the fact that physical properties and chemical composition of urine can be used for rapid evaluation of the state of sea mammal's health. It is recommended to pay attention to colour, transparency and pH of urine. Among qualitative reactions as shown by investigation, the most distinctive are protein, hemoglobin, erythrocytes assays and KCSR. If protein assay is positive, it is helpful to specify origin of albuminuria by electrophoretic examination of urinary proteins together with analysis of the electrophoretic profile significance. Probably, examination of sick animals having other pathology, will reveal additional tests necessary for evaluation of health, but this question will be the subject of our further research. It is evident that findings obtained for healthy animals and suggested as standard are helpful for evaluation of distinctive changes in chemical composition of urine in this or that disease.

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SOME CYTOCHEMICAL FEATURES OF BOTTLE-NOSED DOLPHIN AND HARP SEAL LYMPHOCYTES

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Some results of cytochemical study of bottle-nosed dolphins and harp seals lymphocytes in captivity are presented. Composition of lymphocyte population by activity of nonspecific esterase (NE) and succinate dehydrogenase, number and strength of correlations of lymphocyte distribution parameters for activity of these enzymes and the number of glycogen containing lymphocytes are different in healthy, sick, adapted and nonadapted to captivity conditions dolphins. In seals during early stages of adaptation to captivity and disease were observed significant changes of NE activity.

Keywords: marine mammals dolphins, harp seal, care in captivity, blood, lymphocyte cytochemistry

Evaluation of structure of lymphocyte population according to cytochemical signs permits not only to determine but also to predict the state of lymphoid system because metabolic reactions underlie immunologic processes. T- and B-lymphocytes of a number of land animals differ in activity of acid phosphatase, nonspecific esterase, dehydrogenases. At the same time coordination of hydrolytic and oxidation enzymes activity changing, certain correlation between lymphocytic groups with different cytochemical characteristics are necessary for effective development of immunologic processes.

Cytochemical investigations were carried out with the aim of finding possibilities to evaluate structure changing of blood lymphocyte population in cetaceans and pinnipeds occurring under influence of factors that exert on lymphoid system of wild animals in captivity. It is also possible that distribution of lymphocytes according to metabolic parameters will allow to consider from different points of view long-stated question [4] on evolutionary conditioned differences in immunologic reactivity of sea mammals and present-day land mammals.

Materials and methods of research

Venous blood from 41 bottle-nosed dolphins, 20 pups of harp seal kept in oceanarium (and from harp seals kept under natural conditions) served as investigation material. Blood smears showed nonspecific esterase [11], succinate dehydrogenase [13], glycogen [12]. Preparations were studied under oil immersion. Enzyme activity was estimated "semi-quantitative", counting dye granules. Percentage of lymphocytes with different types of reaction and glycogen-containing lymphocytes were also determined. Sampling volume of lymphocytes was 100 cells, when determining succinate dehydrogenase activity number of cells was 50. Statistical analysis included determination of mean (M); standard deviation (S); variation coefficient (V); asymmetry (As); kurtosis index (Ex); information entropy (H), information redundancy (R) and Pearson correlation coefficients between these indexes.

Results of research and their discussion

In bottle-nosed dolphins and beluga difference among leucocytes by intensity of nonspecific esterase (NE) reaction is similar to observed in man [14] and monkey [9]. Activity of NE is highest in monocytes. Granulocytes are esterase-negative or show diffuse staining. Contrary to this, enzyme activity in granulocytes of seals proved to be high as in mink and polar fox [16].

In lymphocytes coloured product of reaction localized in 1 to 20 granules with clear cut borders. One of granules opposite indent in nucleus, was larger than others. There are two types of reactions found earlier in man, depending on shape and size of this granule: "paranuclear" (PN) – product of reaction that occupied most of cytoplasm and looks like a cap, and "granular" – product of reaction is localized in limited sites of cytoplasm in form of rounded and oval granules (Fig. 1). The first reaction type is characteristic of T-cell suppressors and of null lymphocytes, the second reaction type is characteristic of T-lymphocytes-helpers and partly of B-lymphocytes of man [6].

Product of succinate dehydrogenase (SDH) reaction is concentrated in granules of identical size. Lymphocytic granula, in contrast to granulocytes, are larger. Their number varies significantly – from one to dozens of them.

In contrast to other leucocytes coloured diffusely, PAS-positive (periodic acid – Schiff reaction positive, i.e. containing glycogen) lymphocytes of dolphins contain granula, most often single, that seldom form exclusive circle around nucleus. There also occurs a special type reaction – in the form of large spots of rounded or irregular shape. This fact hampers accepted evaluation of intensity of reaction by points. Therefore we estimated only percentage of PAS-positive lymphocytes.

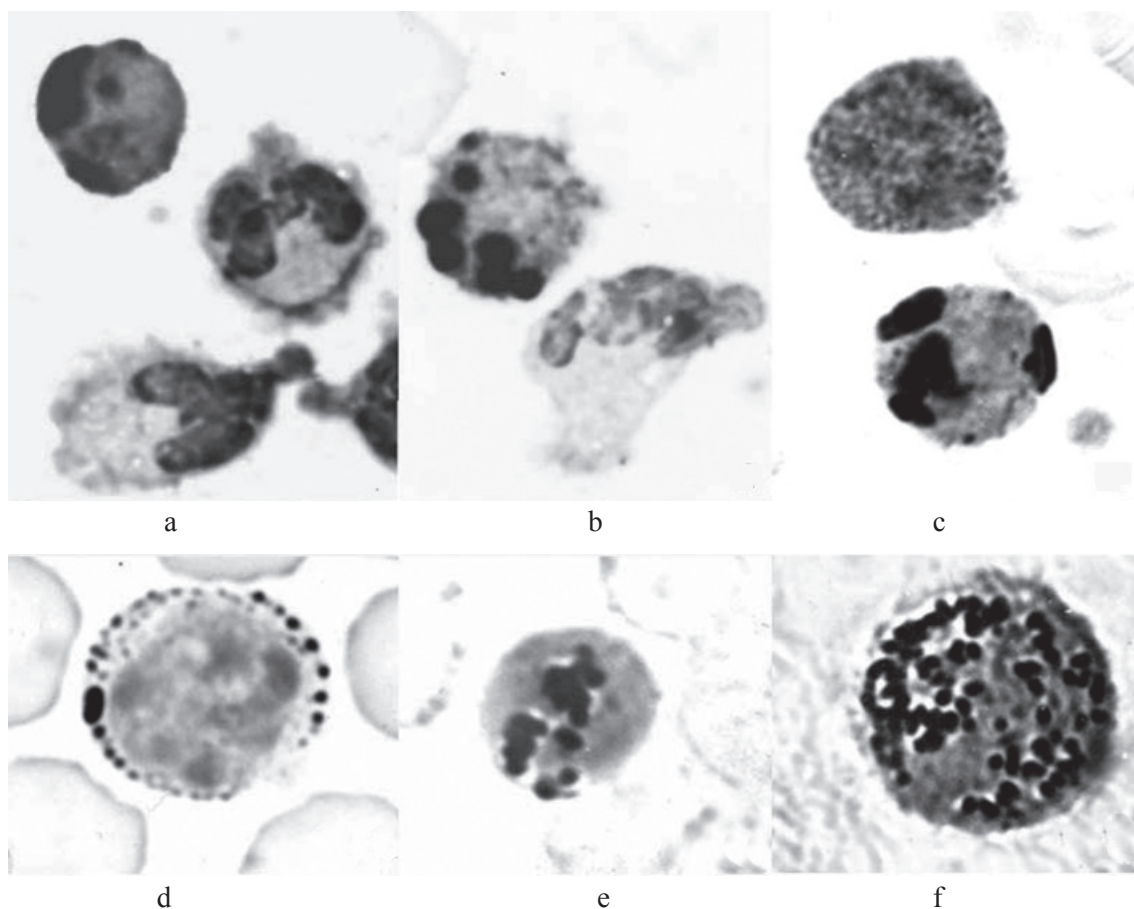


Fig. 1. Cytochemical reactions in bottle-nosed dolphin lymphocytes. Nonspecific esterase: a – “paranuclear” reaction; b – “granular” reaction. PAS-reaction: c – large granules of irregular shape; d – small oval granules. Succinate dehydrogenase in small (e) and in large (f) lymphocytes. Oil immersion, 1000×

In seals PAS-positive lymphocytes were found only in two cases (one cell out of 100), while content of glycogen in granulocytes is significant. This fact is of interest as amount of glycogen in cells of other organs and tissues of seals (skeletal and heart musculature, liver, kidneys, brain) is great, higher than in land mammals [5].

Analysis of estimation results of cytochemical reactions in bottle-nosed dolphins carried out in four groups of animals: healthy; healthy adapted (kept in oceanarium for no less than a year); healthy nonadapted (from 2 to 5 months of life in captivity) and sick animals affected by respiratory and skin diseases. Mortality among dolphins is highest during the first six months in captivity and after a year mortality among captured animals decreases sharply [1]. This permits to expect essential differences in adaptive abilities among indicated groups of

animals and associated cytochemical features of blood lymphocyte population.

Statistic values of lymphocyte distribution between groups of bottle-nosed dolphins reveal differences ($P = 0,99$). Sick dolphins differ from healthy ones by lower mean activity of SDH ($18,60 \pm 0,32$ and $21,40 \pm 0,25$ phormazan granules per one lymphocyte, respectively), by higher variation coefficient, asymmetry and excess of lymphocytes distribution according to this value. They have higher number of PN lymphocytes ($36,0 \pm 1,1\%$ contrary to $31,0 \pm 0,8\%$ in healthy ones). Variability of relative number of PAS + lymphocytes is high: 4–63% in healthy animals and 5–76% in sick ones; mean values being $24,4 \pm 0,8\%$ and $22,6 \pm 1,0\%$, respectively. In healthy adapted bottle-nosed dolphins number of lymphocytes containing glycogen ($26,7 \pm 1,0\%$) is higher than in nonadapted ones ($19,9 \pm 1,3\%$).

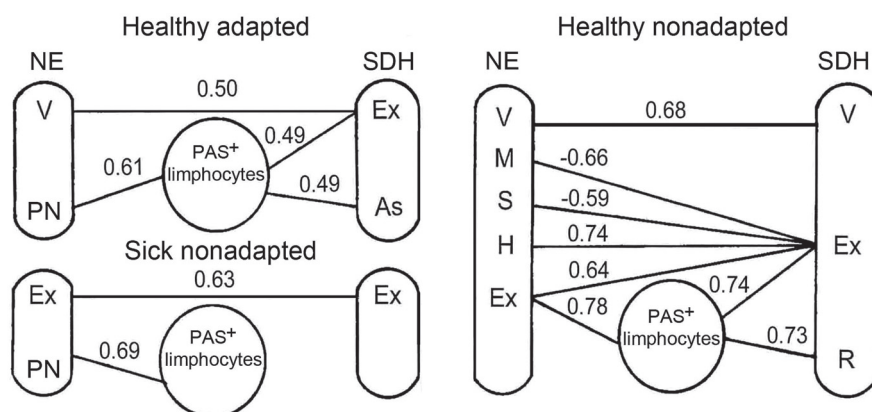


Fig. 2. Correlations of lymphocyte distribution parameters according to NE and SDH activity and number of PAS-positive lymphocytes in different groups of dolphins

Significant differences were revealed by correlation analysis (Fig. 2, shows correlations authentic at $P = 0,95$).

Highest correlation level of distribution features of lymphocytes is in healthy nonadapted animals. Correlation trend corresponding to processes that develop at lymphocyte activation: increase of enzymatic activity of lysosomes and mitochondria is accompanied by decrease of glycogen amount [8]. Intensified correlation between values of acid phosphatase and dehydrogenases activity was observed in some professional diseases [15].

During first months of captivity there develops a state in nonadapted bottle-nosed dolphins considered to be a pre-existing disease caused by increasing microbial contamination [3]. Judging by presented data, significant shifts in immune system are characteristic of this state manifesting themselves in intensification of accompanying activation processes of lysosomal and mitochondrial enzymes and utilization of lymphocytic glycogen.

To find NE in blood smears of seals two kinds of procedure were used: long (21 hrs) and short (2 hrs) periods of smear incubation in a reaction mixture. Two types of cells are distinguished among lymphocytes of seals, as in bottle-nosed dolphins and belugas too: those with paranuclear and those with granular reaction. When incubation period is short, part of lymphocytes show negative response and part of them show a positive response to NE (T-cells, supposedly). Relative number of the last ones in pups (aged about a month) that finished suckling, was $59,0 \pm 4,3\%$, that is close to value obtained for mature humans – 61% [7]. On day 3 after being placed into oceanarium, pups showed an average decrease of esterase-positive lymphocytes comparing with intact animals. Value decreased still more by day 10 of animal's stay in oceanarium when they survived their transportation by helicopter and were learning to feed on fish (Table).

Percentage of esterase-positive lymphocytes in harp seals in various periods of their life in oceanarium

Seal number	Period of life in oceanarium, days		
	3	10	18
1	$23,0 \pm 4,3$	$7,0 \pm 3,8$	$54,0 \pm 5,0$
2	$14,0 \pm 3,5$	$33,0 \pm 4,7$	$65,0 \pm 4,8$
3	$36,0 \pm 4,8$	$29,0 \pm 4,5$	$74,0 \pm 4,4$
4	$41,0 \pm 4,9$	$26,0 \pm 4,4$	$73,0 \pm 4,5$
5	$34,0 \pm 4,8$	$20,0 \pm 4,0$	$49,0 \pm 5,0$
6	$59,0 \pm 4,9$	$25,0 \pm 4,3$	$76,0 \pm 4,3$
7	$58,0 \pm 4,9$	$14,0 \pm 3,5$	$52,0 \pm 5,0$
M \pm m	$37,9 \pm 5,8$	$22,0 \pm 1,1$	$63,3 \pm 4,0$

On day 18 value increased reaching level in animals living in their natural environment. It is characteristic that while differences among individual cases on days 3 and 10 have low statistical authenticity (seals № 3, 4, 5) and in one case (№ 2) there was an increase in count of esterase-positive lymphocytes, differences among observed cases on days 10 and 18 were authentic in all cases ($P = 0,99$). By that time seals actively fed on fish, grew accustomed to room and baths where they stayed. After birth there occurs a sharp increase in number of NE⁺ lymphocytes in man [10], that is associated with formation of immune system, differentiation of T-cells. High number of NE⁺ lymphocytes in pups of harp seal during the first month of life seems to reflect those processes. On other hand, they show a high percentage of lymphocytes ($53,0 \pm 1,9$)

similar in their esterase reaction patterns to null lymphocytes and lymphocytes-suppressors. This agrees with view on inferior immunity of seal pups [2].

Having had pneumonia, a pup of harp seal showed changes in NE activity in lymphocyte population (Fig. 3). Number of lymphocytes showing paranuclear reaction to NE increased on recovery from $23,0 \pm 4,3\%$ to $70,0 \pm 4,6\%$, and the mean number of esterase-positive granules decreased from $5,93 \pm 0,54$ to $4,15 \pm 0,39$, i.e. their values approached their level in healthy wild pups of seals.

Conclusion

Thus, cytochemical features of lymphocyte population and, particularly, their correlating relationships can be used for development of quite sensitive criteria to evaluate the state of lymphoid system of seals and dolphins when

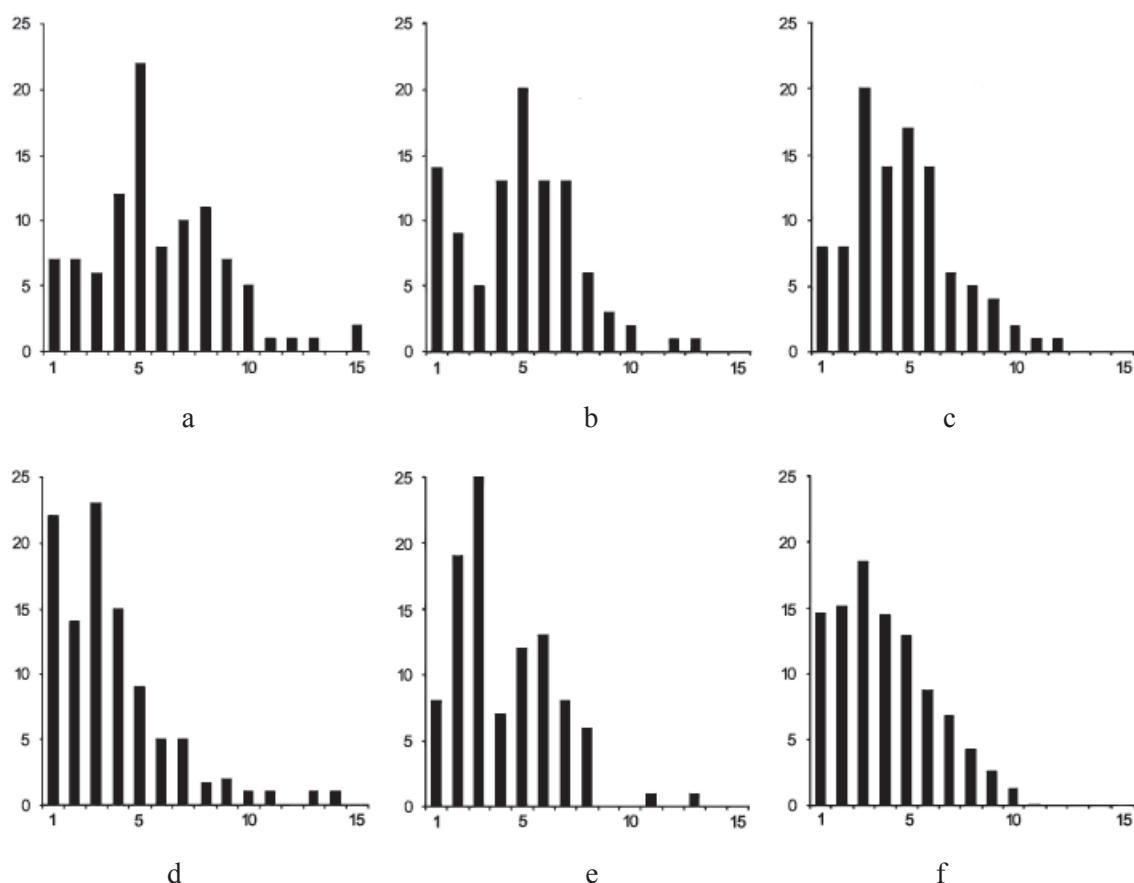


Fig. 3. Distribution of harp seal lymphocytes according to number of esterase-positive granules: a – in active phase of disease; b – a week after start of antibiotic treatment; c – 4 months after disease signs disappeared; d, e – after subsequent 2 and 6 days; f – n overall distribution of lymphocytes in 12 wild healthy pups. On axis X – number of NE⁺ granules, on axis Y – % of lymphocytes

adapting to captivity and when sick. Revealed peculiarities of blood lymphocytes composition by cytochemical features can be used to control flow of dolphins adaptation to captivity and its correction by drugs affecting function and metabolism of lymphoid cells. Degree of approximation of cytochemical parameters and correlations between them in adapting animals to those in healthy dolphins adapted can be used as indicator of adaptation level.

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INFLUENCE OF ECDYSTERONE ON THE ACTIVITY OF ENTERAL CARBOHYDRASES IN SUCKLING RATS

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The research purpose is to study effect of phytoecdysteroid – ecdysterone on the activity of sucrase and lactase of small intestine in suckling rats. 10 day old rats were treated intraperitoneally with single injection of ecdysterone in a dose 1 mg/kg. Sucrase and lactase activity were determined in the mucous of the small intestine. It was found that ecdysterone caused an increase of sucrase activity in 2,1; 2,8 and 2,5 times at 48, 72 and 96 hours after injection, respectively. However, ecdysterone had no effect on the activity of intestinal lactase. Consequently, ecdysterone has a specific effect on the activity of the intestinal sucrase and lactase in suckling rats.

Keywords: suckling rats, ecdysterone, small intestine, sucrase, lactase

It was found that the development of intestinal carbohydrases is genetically programmed. In most mammals the activity of γ -amylase, maltase, sucrase of the small intestine is weakly detected at high lactase activity expression during of milk nutrition period.

By the time of the transition from milk to definitive nutrition γ -amylase, maltase and sucrase activity are significantly increased and lactase activity is sharply reduced [2]. Such developmental restructuring of the small intestine during the weaning, clearly correlated with an increase in plasma corticosterone level [3].

Based on the above, we have assumed that the plant steroids can also have a regulatory effect on the activity of intestinal carbohydrases.

The purpose of the research is to study the effect of ecdysterone on the activity of intestinal sucrase and lactase in suckling rats.

Materials and methods of research

Experiments were performed in Wistar suckling rats. During the experiment rats were kept in the same cage with a nursing mother.

Ecdysterone was administered intraperitoneally to 10 day old rats in dose 1 mg/ kg. The animals in the control group were injected with an equivalent volume of saline. Rats were sacrificed by decapitation before the treatment and after 24, 48, 72 and 96 hours after injection.

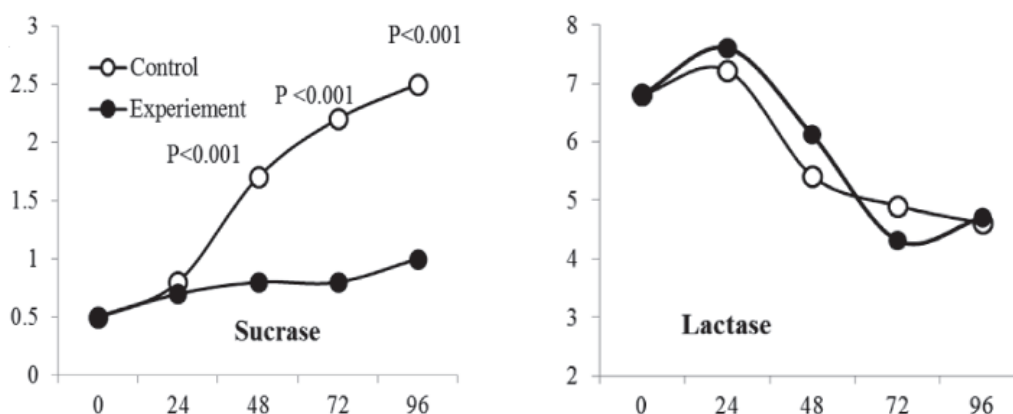
After rat sacrificing the abdominal cavity was quickly dissected, the small intestine was removed, cleaned, washed with 10 ml of saline, weighed, filled with cold saline and homogenized with a Teflon pestle for 1 min at 1000 g. In obtained homogenate sucrase (EC 3.2.1.48) and lactase (EC 3.2.1.23), activity were determined by Dahlqvist (1984) [1]. Enzyme activity was expressed in $\mu\text{moles/min/g}$ tissue of produced glucose after substrate hydrolysis.

The results were processed using the Student's t test.

Results of research and their discussion

The results on the effect of a single injection of ecdysterone to 10 day old rats on the activity of small intestine sucrase and lactase are shown in Figure.

It is revealed the sucrase activity in control animals occurs at a very low level. But in rats treated with ecdysterone sucrase activity increased markedly. The differences



Effect of ecdysterone injection of 10-day old rats on the activity of enteral sucrase and lactase ($M \pm m$; $n = 6$): Abscissa – hours after administration of ecdysterone; Ordinate – enzyme activity ($\mu\text{moles/min/g}$ tissue)

in the sucrase activity between experimental and control animal groups were absented only on the 24th hour of observing. Enzyme activity in ecdysterone treated rats was increased in 2,1; 2,8 and 2,5 times compared with their peers in the control group respectively on the 48th, 72th- and 96th hours of experiment.

Consequently, a single injection of ecdysterone lead to premature increase of sucrase activity in the apical membrane of small intestine epithelial cells in suckling rats. This increase in enzyme activity was not observed immediately after administration of the drug, but in a day later and then it was expressed at a high level.

Unlike sucrase activity, lactase activity in 10 day-old rats in the control group, as might be expected, was shown at a high level.

In the experimental group of animals lactase activity, involved in the digestion of milk lactose, no significant changed during the four-day observation.

Consequently, a single injection of ecdysterone leads to premature induction of α -glucosidases (sucrase) at the background of constant activity of β -galactosidases (brush border lactase) in rats during the milk nutrition period.

Thus, a single injection of ecdysterone causes premature increase of the enteral sucrase activity and does not affect on the lactase activity in suckling rats. The obtained data showed that ecdysterone has a non-identical effect on the activity of intestinal α -glucosidase (sucrase) and β -galactosidases (lactase) in suckling rats, resulting in premature increase of sucrase activity at the background of unchanged lactase activity. The increase in enzyme activity was not expressed immediately after the introduction of the phytoecdysteroid but on 48–96 hours of observation.

It was found that the small intestine of suckling rat after administration of hydrocortisone in many ways becomes similar to that of weaning rats. Such alteration of small intestine takes at least 72–96 hours [2, 4]. This period corresponds to the enterocyte life time [2, 5]. It was shown hydrocortisone effects on immature epithelial cells. In such immature enterocytes sucrase almost not available. However hydrocortisone effecting on immature cells prematurely increases enzyme activity in mature enterocytes [2, 5].

The data indicate that after an injection of ecdysterone population of mature cells, with high sucrase activity is increased in intestine of suckling rats on 48–96 hours of experiment. Consequently, ecdysterone as well as hydrocortisone plays a trigger role in premature of small intestine sucrase activity.

It should be noted that despite the induction of sucrase activity lactase activity not significant changes after the injection of rats with ecdysterone. This phenomenon, i.e. preservation of high lactase activity under the influence of ecdysterone and other stress factors [3] may play a biological role. Stability of lactase to various factors in general contributes to the survival of the growing organism. Saving lactase activity at a high level after ecdysterone injection plays a protective role, preserving the adapted to assimilate the milk carbohydrate enzyme in “pure” milk nutrition period from any influences.

Revealed sucrase “reactivity” and lactase “areactivity” on ecdysterone impact suggests the possibility of its using at intestinal sucrase deprivation of the growing organism to improve the assimilation of sucrase, and possibly other disaccharides of adult food.

Conclusion

1. Ecdysterone injection has specific effect on the activity of small intestine disaccharidases in suckling rats.

2. Ecdysterone injection causes premature increase of the enteral sucrase activity and does not affect on the lactase activity in suckling rats.

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ANTHROPOGENOUS ECOSYSTEMS OF VORONEZH RIVER VALLEY

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Ecosystems of Lipetsk – an the industrial city in the European part of Russia are considered. Ecosystems of the Voronezh river valley in the city boundaries of Lipetsk are compared – before and after reconstruction of the treatment facilities and the increase of investments into nature protection. Another issue is the influence of the reduction of fresh water consumption for the industry on ecosystems. At the same time the increase of industrial production did not stop. After the first stage of reconstruction the steel output increased for 11 %, but water consumption was reduced by 27 %, and dumping of industrial waters into the Voronezh river has decreased for 29 %. It is shown that despite of enormous anthropogenous load, the biological resources of the Voronezh river valley are still big. The natural system transformed by human recovers its natural functions as time passes.

Keywords: ecosystem, city, sewage, metallurgical plant, treatment facilities, biological resources, Voronezh river, meadow communities

In the twentieth century natural ecosystems of the European part of Russia underwent enormous transformations in case of construction of housing and industrial plants. Growth of the industry resulted in concentration of the population in the territories close to plants and factories. The lack of knowledge of functioning of ecosystems led to environmental problems in these territories. Scientists noted reduction of specific variety, both plants, and animal in big cities.

The city system cannot function normally without using of water resources. Bad purification of household and industrial sewage led to pollution of reservoirs and underground waters. The territories of the cities turn into zones of ecological catastrophe. The city ecosystem begin to contradict with natural ecosystems. But the fact of the time characteristic is always ignored. Very few people consider a growing city as a young ecosystem. When environmental problems increase, at the same time the understanding and forming of ecological culture develop.

Lipetsk is one of the industrial centers of Russia. The metallurgical industry developed here for centuries, and in the 20th century the engineering, construction and food industries were added to it. Then there was a rapid growth of the population and environmental problems have appeared. Pollution of the Voronezh river by metallurgical sewage became one of the most significant problems. Pollution of water worsened ecological situation not only in the city, but also in the valley and in general all Don basin. At the beginning of the twenty first century the population of the city stabilized, the new generation of the managers with ecological thinking appeared. They began to implement nature protection technologies.

Natural and anthropogenous systems of the Voronezh river in city boundaries of Lipetsk

The Voronezh river is formed from the merge at the village of Nikolskoye in the Tambov region of two small rivers by Polnoy Voronezh and Lesnoy Voronezh. It is a typical flat river with a twisting course, with a slow current, numerous loops and bends. Has generally meridional direction. The water discharge at the city of Voronezh is 70,8 m³/second. Proceeds on the Tambov, Lipetsk and Voronezh regions of Russia. The river length is 520 km. The area of the basin is 21,6 t. sq.km. The right coast – high and abrupt, with deep ravines. The left coast is sloping and low, with abundance of small lakes. The river flows in a wide flood plain, its width is from 3 to 5 km. Average depth is 3 meters. On the left coast pineries, on the right coast the deciduous wood grow. It freezes-up since the beginning of December till the end of March. The high water is in March – April, the level rises from 2 to 4 m. In several kilometers from its mouth, near Voronezh, in 1972 a dike which formed the Voronezh water storage basin has been constructed. The length of the water storage basin is 30 km, the mirror extended of 70,1 km², average width – 2,1 km, average depth – 3,5 m. The river Voronezh is one of the most polluted inflows of the river Don. Water of the river has the 4th class of pollution quality (“polluted”).

The examined site of the river Voronezh is located within the city of Lipetsk. The beginning of the site is 197 kilometers from the mouth, the end of the site – 217 kilometers from the mouth. Total length of the site – 20 kilometers. The examined site is a flood-plain valley, poorly twisting. The right slope is high and abrupt, left – low and flat. The left-bank is crossed by hollows, meander

lakes, mainly meadow. In the period of a high water the flood plain is usually filled with water layer of 1–1,5 meters, maximum – 4 meters.

On the water mode of the river a great influence was exerted by the fixing threshold on the 207th kilometer from the mouth. The fixing threshold represents a deaf concrete dike which has raised water level in the river on 1 meter. The curve subtime has extended upstream the rivers to several kilometers. Water depth reaches 6–8 meters, width here – 100 meters. However, the water level raising in the river has led also to negative consequences: there was a ground water level raising in the adjacent territories, the inundated part of the city is constantly in the waterlogged condition, the bed of the river long time remains not washed out, here a large amount of polluting substances, especially from the urban area have formed shoals. The silted course is not able any more to pass flood waters. Annually there is a threat of flooding of an urban area.

Despite essential anthropogenous loading, biological resources of the floodplain of Voronezh river are large. Water meadows are used by locals for a pasture of cattle and procurement of hay. The ecosystem of the valley copes with this loading. There live foxes, minks, boars, otters. Biological diversity of birds is big.

Within the territory there are several ecosystems:

1) meadow communities with the rehumidified sites. Here the following species of plants prevail: (*Phleum pratense*, L.), (*Rumex confertus* Willd), (*Filipendula ulmaria* L.), (*Convolvulus arvensis* L.), (*Potentilla anserina* L.), (*Carex acutiformis* Ehrh), (*Carex acuta* L.), (*Poa annua* L.), (*Geranium pratense* L.), (*Galium boreale* L.), (*Galium mollugo* L.), (*Ranunculus acris* L.), (*Butomus umbellatus* L.), (*Achillea millefolium* L.);

2) wood thickets and landings along the road, river banks and small groves. Here the following species of wood and grassy plants prevail: (*Populus alba* L.), (*Salix alba* L.), (*Alnus glutinosa* (L.) Gaertner), (*Aristolochia clematitis* L.), (*Prunella vulgaris* (L.) Scholler), (*Sedum acre* L.), (*Artemisia absinthium* L.);

3) reed communities on the humidified and boggy sites. Here the following species of plants prevail: (*Phragmites australis* or *Phragmites communis* (Cav.) Trin. Ex Steudel), (*Typha angustifolia* L.), (*Scirpus lacustris* L.).

These fragments of inundated and meadow landscapes are most significant for preservation of biological diversity of fauna in the city line. Such fragments are dated for flood plains of the rivers Voronezh and Matyra.

The flood plain complexes differ in a considerable landscape variety: the river, meander lakes,

bogs, backwaters, water meadows, bushes and the remains of the inundated woods. The most part of this territory is strongly boggy, grew with plentiful dense thickets of reed, cane and powerful osier-beds. Such structure of an inundated complex reduces anthropogenous influence and creates the good protective conditions favorable for continuous dwelling of many animal species. The conducted faunistic researches revealed a high specific variety of vertebrate animals of these territories (102 species). On these technogenic reservoirs (settlers of plants) stay of 78 bird species (12 – nesting is registered, the part of which belongs to group rare and being under the threat of disappearance). Settlers – the place of reproduction, a molt, wintering of many types of the water birds. On thermal settlers of NLMK and Svobodny Socol plant more than 1000 individuals of several species of birds every winter. Here colonies of birds are located: (*Sterna hirundo* L.), (*Sterna albifrons* Pallas). Such group settlements create favorable conditions for reproduction of a number of species of the not colonial birds using protective properties of a colony for nesting.

Settlers of Svobodny Socol plant – an example of how the geosystem transformed by the person restores the natural functions as habitats of many animal species with age, at the same time continuing to carry out the technogenic functions.

The consumption of river water of NLMK steel factory from 2000 to 2010

Monitoring of waters in the territory of the Lipetsk region is conducted since 1959. Since 1999 the downward tendency of amount of the used fresh water from underground and superficial water sources remains.

From 2000 NLMK was succeeded to reduce considerably the use of water and to reduce negative impact from dumping of sewage. Consumption of river water has decreased by 66 % to 32,9 million m³ a year. At the same time NLMK has reduced the amount of production drains by 79 % to 13,2 million m³ a year, and dumping of the polluting substances with industrial drains to 2,4 thousand tons/year (80 %).

In 2009 the upgrade of system of turnover water supply of combine has been complete. NLMK has completely stopped dumping of production sewage into the river. At the same time consumption of river water has decreased by 3 times.

In 2010 water consumption of NLMK from the river has constituted 21,8 million cubic meters. With start-up of new objects the water amount in turnover of the entity has grown to 1,9 billion cubic meters. At the same time the water consumption from the river has decreased to 21,4 million cubic meters.

Lipetsk treatment facilities and their role in the river water protection

Treatment facilities of the city of Lipetsk are located on the left river bank of Voronezh, on the area of 179,6 hectares. Till 2009 a prime vendor of the polluting substances was NLMK. High concentration of heavy metals in water systems led to sharp violation of an ecological situation. Treatment facilities processed sewage of coke-chemical production; domain production; rolling production. When passing drains through treatment facilities there was a mechanical sedimentation of the polluting substances. The dumped water has not been rather purified.

Conclusions

The extent of the impact of the society on ecosystems, in many respects, depends on the extent of industrialization of society. Estimating the impact of the human on the nature it is necessary to consider a time factor for which the damaged ecosystem can be restored. The system can even increase the specific structure as the changes introduced by the human can create conditions for involvement of new associates. Ecosystems in the territory of the cities can possess a larger set of components, than the country. In many aspects it depends on the time factor. We should get used to the thought that there is nothing stronger than the nature. Both the

Ecological effect of reconstruction of treatment facilities

The polluting substance	2008–2009		2014–2015	
	Consumption, mg/l	Output, mg/l	Consumption, mg/l	Output, mg/l
Biological consumption of oxygen	205,1	7,9	265	5,2
suspended matters	265,5	21,5	270	7,6
ammonium nitrogen	25,9	3,6	46,44	0,42
Phosphorus of phosphates	3,0	1,1	3,0	0,15

In 2000 the first stage reconstruction of the integrated treatment facilities begun. Investments into nature protection actions have increased almost by 6 times. It resulted in reducing specific emissions by 15,5 %, reducing water consumption by 27 % and dumping of industrial waters into the river Voronezh by 29 %. The amount of sewage in 2006 has decreased in comparison with 2005 and has constituted 166,97 million m³.

In 2007 “The Lipetsk station of aeration” has been created. In May, 2009 the station of ultra-violet disinfecting of sewage with a productivity of 220 thousand cubic meters a day has been put into operation. It has given the chance to refuse sodium hypochloride use. This substance kills harmful bacteria, but compounds of chlorine got to the river.

In 2009 NLMK has finished introduction of the circle water supply mode. It resulted in reducing dumpings of the polluting substances and improving the general ecological situation.

On November 13, 2010 in Lipetsk the first start-up complex of city treatment facilities has begun to work. It was the first starting object of the target program of the reconstruction of city treatment facilities adopted for the period of 2009–2013. Reconstruction of a complex of treatment facilities continues. As a result a considerable ecological effect (Table) is gained.

human, and the city systems created by him, are only small part of a global ecosystem of the Earth.

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THE METHOD OF “RESEARCH BASED LEARNING” ON “ABDOMINAL OBESITY”, THE STUDENTS SPECIALTY “GENERAL MEDICINE”

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The article analyzes the learning outcomes of students of medical university by the method of “Research Based Learning”. Students conducted a study of risk factors and components of the metabolic syndrome. Results showed that among people with metabolic syndrome were women, which amounted to $63,93 \pm 6,15\%$ of the number of patients. It was found that the metabolic syndrome is most often found in the age groups 40–49 and 50–59 years ($26,23 \pm 5,63\%$ and $40,98 \pm 6,29\%$ respectively). The leading components of metabolic syndrome among surveyed were obesity and hypertension ($83,61 \pm 4,74\%$). In the structure of hypertension in people with MS prevalent hypertension of the second degree ($66,67 \pm 6,60\%$).

Keywords: Research Based learning, abdominal obesity, metabolic syndrome

At present, the degree of responsibility of higher education institutions for the quality of preparation of graduates of medical considerably increased. European Association for Medical Education, to which join and Karaganda State Medical University (KSMU), the dominant criterion of competitive medical examines the degree of mastery of their skills and manipulation, are directly related to the examination and treatment of patient [5]. Fundamentals of clinical examination of the patient lays on the Department propedeutics of internal diseases, taught in the third year of KSMU. The main objective of propaedeutics Internal Diseases is to train students the method of clinical examination of patients, basic laboratory and instrumental methods of research, semiotics of internal diseases, building syndromic diagnosis. Revealing of leading syndrome, the causes and the circumstances of its origin, the nature of the pathological process is based on the clinical competence of the future doctor [6].

In this regard, at the Department propedeutics of internal diseases introduction to the clinic KSMU alongside traditional teaching methods, use of modern technology to optimize learning and improve the quality of knowledge and practical skills of students. One of these methods is the method of teaching is based on research – Research Based learning (RBL). The priority directions of this method of training is to acquire students research work skills, teamwork skills. Our students annually win prizes in international student scientific forums held in our country and abroad. In solving the problem situations students activated their research and clinical reasoning, improves cognitive process osoveniya quality educational material, the student feels his intellectual consistency.

To carry out studies on RBL topic “Obesity” our technology has been selected due to the fact that the departments of propaedeutics of internal medicine and medical biophysics and informatics research grant has been received on “Correction of metabolic syndrome components biofeedback method in patients with cardiovascular risk patients”. Metabolic syndrome (MS) combines abdominal obesity, arterial hypertension (AH), diabetes mellitus (DM) or impaired glucose tolerance (IGT) and atherogenic dyslipidemia.

Obesity is the recognition by the World Health Organization (WHO) considered as non-infectious epidemic of the time due to its high incidence among the population at high risk of developing cardiovascular disease (CVD) patients early disability and premature mortality. In recent years, the prevalence of obesity has increased significantly in the world that allows us to speak about the “epidemic” of the disease. According to WHO, about 30% of the world’s population are overweight, of which 16,8% – women, and 14,9% – men. The number of obese people, increases progressively every 10 years by 10%. More than 1,4 billion adults and children are overweight or obese, of which 500 million are obese. According to experts, WHO estimates that by 2030 the planet will live 2,2 billion people with excess body mass index (BMI) and obesity 1,1 billion [9]. Given the prevalence of this phenomenon in the XXI century, coined the term «globesity», indicating the mass cases of obesity worldwide [7].

Development of hypertension with obesity is directly related to fluid overload, sodium retention, increased peripheral vascular resistance, hyperactivity of the sympathetic nervous system (SNS) and the renin-angiotensin-aldosterone system (RAAS), overproduction

of leptin and hyperinsulinemia, leading to insulin resistance (IR). Recently it found that hypertension caused by obesity, correlates with increased levels of aldosterone. With obesity are all conditions for the development of endothelial dysfunction, which upsets the balance between the known vasodilator nitric oxide and potent vasoconstrictor endothelin-1. Recognized polygenic essential hypertension, which means the need to review not only as a chronic disease of high blood pressure (BP), but also as a complex set of inter-related hemodynamic, metabolic and neuroendocrine disorders [1–3]. Thus, obesity – a factor in the constellation of metabolic abnormalities that lead to the development of hypertension [8].

Thus, the combination of high blood pressure, abdominal obesity (AO) and AG taking place in the concept of MS is currently in its medical and social significance, due to the high frequency and prevalence of continued growth, closely correlated with the development of cardiovascular events, it is one of the urgent problems of clinical medicine.

In the course of this research the students develop the skills of the clinical examination of the patient, carrying out scientific research skills. In connection with the above theme of this session is relevant and students took an active part in the search of literary material. In advance of the lesson, students were introduced to the theme of employment and worked the scientific literature.

The purpose of training on RBL method – to form students' skills of research, teach methods for diagnosis of metabolic syndrome, learn to identify its major components.

Session Objectives:

- Measure the height, weight, waist volume.
- Calculate the BMI formula Quetelet.
- Measure blood pressure patients studied.
- Determine the level of hypertension in patients studied.
- Determine whether the MS risk factors, namely, dyslipidemia, and hyperglycemia.
- To diagnose the metabolic syndrome in patients.
- Set the leading components of the metabolic syndrome.

Materials and methods of research

The study included patients who were under observation in the clinic № 4 of Karaganda.

Patients with cardiac arrhythmias, cognitive disorders in the study were not included.

All patients had received advised consent to participate in the study. All surveyed were given full information on the ongoing investigation. To carry out this study was approved by the Ethics Committee of KSMU.

Metabolic syndrome was defined based on the IDF 2005 criteria for the year and the recommendations of the experts of All-Russian Scientific Society of Cardiology for the diagnosis and MS Treatment (2009) [4]: the combination of A Waist ≥ 80 cm in women and ≥ 94 cm in men with 2 or more risk factors (triglycerides $\geq 1,7$ mmol/l and high density lipoprotein cholesterol (HDL-C) $< 1,29$ in women, HDL-C $< 1,03$ mmol/l in men, blood pressure $\geq 130/85$ mmHg or taking antihypertensive medications, fasting plasma glucose $\geq 5,6$ mmol/l).

Clinical and instrumental methods of research:

Clinical: definition WC, BMI, blood pressure indicators to the diagnosis of hypertension.

Biochemical: carbohydrate metabolism (fasting glucose, postprandial glucose, glycated hemoglobin, an oral glucose tolerance test); lipid profile (total cholesterol, triglycerides, level density lipoprotein cholesterol (LDL-C), HDL-C).

Results of research and their discussion

A clinical examination of patients with MS, mean age was $52,29 \pm 8,76$ years. Among the surveyed women prevailed ($63,93 \pm 6,15\%$), men were $37,71 \pm 6,21\%$ among patients with MS. Analysis of the age structure of those surveyed indicated that metabolic disorders the most frequent in the age groups 40–49 and 50–59 years ($26,23 \pm 5,63\%$ and $40,98 \pm 6,29\%$ respectively).

According to literature data, the frequency of occurrence of the metabolic syndrome is not the same in connection with various diagnostic criteria for MS. Thus, according to one MS prevalence among Europeans 40–55 varies from 7,0 to 36,0% for males and 5,0 to 22,0% in women. There are other data for Denmark, where the incidence of MS among men and women over 60 years the incidence of MS is 38,0 and 22,0% according to WHO criteria, 1999. The prevalence of MS by IDF criteria in Singapore was 20,2% and in India – 25,8%. In the Asian region the smallest number of people with MS found in China, and the largest – in Turkey, with a predominance of women among them. In general, according to the literature MS prevalence increases with age, with the highest occurrence in older than 45 years.

Analysis of the occurrence of the metabolic syndrome components revealed a high degree of cardiovascular risk in patients. Thus, all patients had abdominal obesity. The average A Waist of the surveyed was $108 \pm 17,41$ cm. Waist men amounted to $116,54 \pm 12,11$ cm in women – $102,24 \pm 16,24$ cm.

Average body weight surveyed and the average BMI values were 98 ($84,6–107,4$) kg and $38,94 \pm 7,61$ kg/m², respectively. Obesity was found in 43 patients ($70,49 \pm 5,84\%$), among which the first degree of obesity were 22 people ($51,16 \pm 7,62\%$), the second – 18 ($41,86 \pm 7,52\%$), the third – 3 ($6,97 \pm 3,88\%$). Gender differences in the

distribution of the degree of obesity among the examined has not been established.

As blood pressure normal blood pressure were $6,56 \pm 3,17\%$ surveyed, high normal blood pressure – $9,83 \pm 3,81\%$. At $83,61 \pm 4,74\%$ of surveyed individuals found hypertension, the average duration of which was $9,47 \pm 3,38$ years. Mean dynamic pressure in surveyed was $136,69 \pm 12,54$ mmHg.

AG first degree is set at $21,57 \pm 5,76\%$ of study participants, hypertension of the second degree – in $66,67 \pm 6,60\%$ and third degree – in $11,76 \pm 4,51\%$. Thus, in the structure of hypertension in people with MS prevalent hypertension of the second degree.

According to the literature most frequently occurring component of the metabolic syndrome is also hypertension, which occurs between 43 and 77%.

Disorders of lipid metabolism were detected in 28 people ($45,90 \pm 6,38\%$). Among those with dyslipidemia hypertriglyceridemia is set at $18,03 \pm 4,92\%$ (11 people) patients, HDL-C reduction occurred in $40,98 \pm 6,29\%$ of cases (25). The mean values of total cholesterol made $9,12 \pm 5,46$ mmol/l, HDL-C – $0,98 \pm 2,11$ mol/l.

Conclusion

The results of our research on the occurrence of various components of MS coincide with literature data. Thus, according to the findings NHANES III the highest prevalence of MS among the components are visceral obesity, hypertension, and hyperglycemia, and the remaining components of the MS were less common. It is known that dysglycemia is one of the most common and dangerous components of MS, increasing the risk of cardiovascular disease by 5,2 times. In our study of carbohydrate metabolism disorders were 17 people that was $27,86 \pm 5,74\%$ examinees. Among them, IGT is set at 11 people ($18,03 \pm 4,92\%$), type 2 diabetes – in 6 ($9,84 \pm 3,81\%$). The

average fasting glucose among surveyed was $9,16 \pm 4,52$ mmol/l. The average values of C-peptide, cortisol levels were within normal limits. There was a hyperinsulinemia in $27,45 \pm 6,25\%$ surveyed. Averages of fibrinogen amounted to $6,4 \pm 2,5$ g/l. Increased levels of proinflammatory markers in terms of fibrinogen and the C-reactive protein found in $21,57 \pm 5,76\%$ of surveyed patients with metabolic syndrome.

As can be seen from the figure, most frequently used components of the metabolic syndrome were examined arterial hypertension and obesity. According to the literature the frequency of dissemination of MS components is different. However, most authors believe that the major components of the metabolic syndrome are abdominal obesity, and hypertension.

Thus, among people with MS were women, which amounted to $63,93 \pm 6,15\%$ of the number of patients. It was found that the metabolic syndrome is most often found in the age groups 40–49 and 50–59 years ($26,23 \pm 5,63\%$ and $40,98 \pm 6,29\%$ respectively). The leading components of MS among surveyed were obesity and hypertension ($83,61 \pm 4,74\%$). In the structure of hypertension in people with MS prevalent hypertension of the second degree ($66,67 \pm 6,60\%$).

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UNKNOWN FACTORS OF TYPE 2 DIABETES REMISSION AFTER METABOLIC SURGERY

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Type 1 and type 2 diabetes are characterized by progressive β -cell failure. Bariatric surgery leads to near complete resolution of type 2 diabetes (T2DM). The underlying mechanisms, however, remain unclear. The CD4 and CD8 cells play distinct pathogenic roles mediating type 1 diabetes. This clinical trial includes 40 patients with T2DM who underwent Roux-en-Y gastric bypass from 2009 to 2016. Duration of diabetes was $3 \pm 0,5$ years. Blood glucose and glycosylated haemoglobin were $9,1 \pm 0,5$ mmol/l and $7,1 \pm 0,2\%$, respectively. A part of the small bowel was taken for the histochemical examination. We report the preliminary postoperative follow-up data of $16,9 \pm 3,4$ months. Blood glucose and glycosylated haemoglobin were $5,8 \pm 0,3$ mmol/l and $5,9 \pm 0,2\%$, respectively. The histochemical exam emphasized the presence of a chronic inflammatory infiltrate in the lamina propria mostly constituted of CD4 and CD8 T lymphocytes. Both type 1 and type 2 diabetes can have a common pathogenic mechanism.

Keywords: gastric bypass, diabetes mellitus, inflammatory infiltrate

Nowadays obesity is a major medical and social problem, reaching high epidemic rates on a global scale, with more than 300 million obese people, medical costs representing 2–7% from the total health expenses in developed countries [4]. According to the World Health Organization, obesity is now ranked on the second position of lethality, being preceded only by smoking [5]: over 220 000 people die every year in Europe and over 300 000 in the US [2]. During 1986–2000 the prevalence of BMI > 30 kg/m² doubled, BMI ≥ 40 kg/m² increased four times and super obesity with BMI ≥ 50 kg/m² increased five times [6]. BMI was established as an independent risk factor for premature mortality [7].

The danger of morbid obesity depends on associated comorbidities that lead to decreased ability to work, disability and increased mortality in young people [3]. People suffering from morbid obesity carry major risk for the development of multiple comorbidities, such as type 2 diabetes (T2DM), arterial hypertension, hyperlipidemia, coronary artery pathology, obstructive sleep apnea, gastroesophageal reflux and hiatal hernia [20].

Metabolic disorders do not depend only on the excessive presence of adipose tissue, but also on its repartition, risk being increased in android distribution because of perivisceral deposition [22]. Associated factors such as obesity, hypertension, dyslipidemia, impaired glucose tolerance or type II diabetes and hyperuricemia make up the metabolic syndrome or "X syndrome", inducing atherosclerotic risk factors due to the increase of tissue insulin resistance [2]. Multiple studies have found that

the degree of obesity increases the risk of type II diabetes, particularly abdominal obesity [8]. This risk depends on the pathophysiological mechanisms that induce diminished insulin sensitivity, secondary decrease of B-cell function, and accordingly, hyperglycemia (glucotoxic) induction [9].

Insulin resistance is involved in the polycystic ovarian syndrome and non-alcoholic hepatic steatosis [9]. Recent studies have shown that obesity is associated with increased incidence and mortality through various types of cancer, which are directly correlated with body mass index. Obesity is not only linked with the incidence of cancer, but also affects survival and recurrence among those diagnosed [25].

Excessive storage of subcutaneous and visceral fat have a negative impact in determining the pulmonary mechanical restriction through ascension of the diaphragm and functional limitation of thorax, altering the compensatory mechanism of ventilation-perfusion followed by increasing pulmonary blood volume, creating prerequisites for the installation of congestive heart failure with hypoxemia, hypercapnia and compensatory hyperglobulia [10].

No less important are the psychological repercussions caused by social, familiar and conjugal discrimination, limited exercise and movement [11]. Cohabitation with the professional psychosocial stress is deficient, which is why its impact on health and quality of life is particularly [1]. Increased morbidity and mortality rates are registered in socially isolated persons, with high psychological morbidity among people lacking social support [12].

A high incidence of comorbidities and premature deaths are often determined, most frequently in patients with morbid obesity [11]. The mortality rates for people between 25–40 years who suffer from morbid obesity, is twelve times higher than for those with normal weight [3].

For a long time it was considered that obesity is an inevitable condition which does not affect health and can be solved by dietary and discipline [13]. Currently this concept has been rejected, being established that severe obesity is a lethal disease that cause worsening of existing pathologies and shortens life [11].

Most authors believe that the diversity of food behaviour in obese people is a direct cause of relapse [14]. Even an intensive program of lifestyle modification leads to modest weight loss [15]. Programs using very low calorie diets result in a loss of 15–25% by weight after six months. However, the results are modest after a long period after the intervention: 9% weight loss after one year and 5% after four years [15]. Dietary and medical treatment, practicing physical exercises, improving food behaviour are ineffective in more than 95%, requiring the approach of alternative methods of treatment [7].

Currently, bariatric surgery is the only solution capable of inducing substantial loss of body mass and reducing comorbidities [17]. There are multiple alternative methods of treatment, a high diversity of algorithms for surgeons and the decisions of patients become more and more risky [16]. It has been widely established that surgery is the only modern therapeutic solution in patients subjected to “caloric chronic poisoning” [17].

Materials and methods of research

The prospective study includes clinical examination and laboratory data of 122 patients with morbid obesity and metabolic disorders undergoing gastric bypass surgery between 2009–2016 at the Department of Surgery of “Sf. Arhanghel Mihail” Hospital of State University of Medicine and Pharmacy “Nicolae Testemitanu” and CSF “Galaxia”. Selection of patients took place according to the NIH Consensus Conference guidelines (1991) criteria, with the presence of body mass index equal to or greater than 40 kg/m² or equal to and greater than 35 kg/m² in the presence of comorbidities. From the general group, 15 patients with BMI < 35 kg/m² and type 2 diabetes were submitted to gastric bypass. Patients were interviewed and investigated 1, 3, 6, 9, 12, 24, 36 and 60 months postoperatively.

Surgical methods

Open gastric bypass was performed by the retrocolic and antegastric route with 50–150 cm of biliopancreatic limb and 70–250 cm of alimentary limb. The pouch about 30 ml was created by stapling the stomach using

a TA-90-4,8 B linear stapler. Gastrojejunostomy was created using hand-sewn technique with an anastomosis of 0,8–1,2 cm in diameter. Absence of leak was evaluated applying methylene blue solution through nasogastric tube. The mesenteric defect was closed with 2/0 continuous nonabsorbable suture to prevent development of internal hernias. Abdominal cavity drainage and nasogastric tube installation were mandatory.

Among patients with type 2 diabetes and BMI < 35 kg/m² the length of biliopancreatic loop was 100–150 cm.

Laboratory methods

Laboratory studies evaluated complete blood count and blood chemistry tests. To assess metabolic disorders, the lipid profile, carbohydrate metabolism tests, markers of systemic inflammation and hormonal status were taken. In order to emphasize carbohydrate metabolism disorders, impaired fasting glucose, glucose tolerance test, glycated haemoglobin, C-peptide concentration and serum insulin levels were performed.

Histochemical examination

In 42 cases (34,4%) from the overall study group, a segment of the small bowel was taken at a distance of 50–150 cm from the Treitz ligament for histological examination, and in 31 cases (73,8%) histochemical examination was performed.

Anthropometric data

There were studied weight loss, Body Mass Index (BMI), percentage of excess body weight loss (% EWL), percentage of excess body mass index loss (% EBMIL):

- BMI = weight/height²;
- % EWL (percentage of excess weight lost) = [(initial weight – current weight)/(initial weight – ideal weight)]·100;
- % EBMIL (percent of excess BMI loss) = 100 – [(current BMI – 25/IMC initially – 25)·100].

Evaluation of results

There were assessed the incidence, remission, improvement of type 2 diabetes, as well as the evolution of lipid metabolism parameters.

According to ADA recommendations (American Diabetes Association), the criteria to appreciate the status of type 2 diabetes are: complete remission, fasting glucose < 5,6 mmol/l (< 100 mg/dl) and HbA1c < 6,0%; incomplete remission, fasting glucose ≥ 5,7 ≤ 6,9 mmol/l (100–125 mg/dl) and/or HbA1c ≥ 6,0 to 6,4% over the year, in the absence of oral antidiabetic or insulin therapy. Clinical improvement was defined by the reduction of HbA1c (> 1%) and fasting glucose (> 25 mg/dl), or by reducing the dose of administered drug. These criteria were assessed during 24 months after the intervention. Terms of reference were < 5,2 mmol/l for cholesterol (< 200 mg/dl) and < 1,7 mmol/l (< 150 mg/dl) for triglycerides.

Statistical methods

The statistical processing of the obtained data was performed using Microsoft® Excel software. To assess the difference between the compared values Student T-test was used. In this writing are discussed the data with not less than 95% accuracy (p < 0,05).

Statistical dependence between the qualitative parameters was presented using contingency tables, and to verify the hypothesis of independence between rows and

columns Chi-square (χ^2) criteria was used. P value < 0,05 was considered statistically significant.

Results of research and their discussion

From the total study group, 39 (31,9%) were men, 83 (68,1%) were women. Male/female ratio was 1:2. Age limit was between 19–68 years, with an average of $40,4 \pm 0,9$ years. Body weight ranged between 81 and 245 kg, with an average of $124,9 \pm 2,6$ kg. Body mass index was in the limits of 28,7 and $75,6 \text{ kg/m}^2$, with a mean of $44,4 \pm 0,8 \text{ kg/m}^2$. According to body mass index, patients were divided into the following groups: BMI < 35 kg/m^2 , BMI – 35–39,9, BMI – 40–49,9 and BMI $\geq 50 \text{ kg/m}^2$ (Table 1).

Weight loss

From the whole group of patients, 86 (70,4%) of them have been monitored 12 months after the intervention, 46 patients (37,7%) 3 years postoperatively and 13 patients (10,6%) 5 years postoperatively. The dynamics of weight loss were higher in the first three months after the intervention, %EWL being of $37,6 \pm 1,2$, which represents over 50% of weight loss registered one year postoperatively. Body weight after 12 months was $83,7 \pm 1,9$ kg, %EWL – $64,4 \pm 1,7$, %EBMIL – $82,4 \pm 3$, and registered BMI was $29,6 \pm 0,6 \text{ kg/m}^2$. After three years, %EWL and %EBMIL were $64,3 \pm 2,4$ and $82,5 \pm 3,6$ respectively, with a BMI of $29,1 \pm 0,7 \text{ kg/m}^2$. Five years after the intervention, recorded %EWL, EBMIL % and BMI were: $64,4 \pm 4,9$; $78,3 \pm 5,7$ and $29,8 \pm 1,4 \text{ kg/m}^2$ respectively. Twelve months postoperatively, %EWL was lower in the group of patients with super obe-

sity (BMI $\geq 50 \text{ kg/m}^2$) – $56 \pm 4,1$ compared to the group with morbid obesity (BMI-40 to 49,9) – $63,2 \pm 2$, but without a significant statistical difference ($p > 0,05$). Weight loss was higher in the group of patients with class II obesity (BMI – 35 to 39,9) – $72 \pm 4,3$ compared to the group with super obesity ($p < 0,05$). In the group of patients with BMI < 35 kg/m^2 , %EWL was $68,9 \pm 6,6$, weight loss being similar to the group of patients with class II obesity ($p > 0,05$). For patients with BMI $\geq 60 \text{ kg/m}^2$ ($n = 3$), %EWL was $45,3 \pm 14,1$ twelve months postoperatively, in two cases being 19,52 and 48,34 respectively, which implies potentially reduced effectiveness of this procedure in this case (Table 2). Thus, in similar cases we have proposed the fitting of gastric bypass on 250 cm alimentary loop, but the results are premature.

Lipid profile

From the total study group, elevated cholesterol levels were found in 55 cases (45,8%), the average being $6,3 \pm 0,1 \text{ mmol/l}$ and hypertriglyceridemia in 44 cases (36%), with an average of $2,7 \pm 0,3 \text{ mmol/l}$. Pre-operative values of low-density cholesterol (LDL) were $4,5 \pm 0,1 \text{ mmol/l}$, and the parameters of high-density cholesterol (HDL) were $0,86 \pm 0,04 \text{ mmol/l}$ respectively.

Postoperatively registered cholesterol values were $4,2 \pm 0,1 \text{ mmol/l}$ ($p < 0,001$), triglycerides $1,2 \pm 0,1 \text{ mmol/l}$ ($p < 0,001$), and recorded parameters for LDL and HDL were $3 \pm 0,3 \text{ mmol/l}$ ($p < 0,001$) and $1,1 \pm 0,5 \text{ mmol/l}$ respectively ($p < 0,01$), which shows a significant statistical difference compared to initial parameters (Fig. 1).

Table 1

Characteristic of lots

Variables	BMI < 35 ($n = 15$)	BMI $\geq 35 < 39,9$ ($n = 30$)	BMI 40–49,9 ($n = 48$)	BMI ≥ 50 ($n = 29$)
Age (years)	$45,6 \pm 2,6^\ddagger$	$38,4 \pm 1,8^\ddagger$	$41,1 \pm 1,6^\ddagger$	$40,3 \pm 1,9$
M/F	8/7	7/23	13/35	11/18
Weight (kg)	$96,9 \pm 2,4^\ddagger$	$102,5 \pm 2,1^\ddagger$	$126 \pm 2,1^\ddagger$	$162,7 \pm 5,4$
BMI (kg/m^2)	$32,2 \pm 0,6^\ddagger$	$37,3 \pm 0,3^\ddagger$	$44,8 \pm 0,4^\ddagger$	$57,7 \pm 1,2$
Cholesterol ($n = 55$) (mmol/l)	$7 \pm 0,6^\ddagger$	$6,0 \pm 0,1^\ddagger$	$6,3 \pm 0,1^\ddagger$	$6,3 \pm 0,2$
Triglycerides ($n = 44$) (mmol/l)	$4,6 \pm 2,1^\ddagger$	$2,9 \pm 0,41^\ddagger$	$2,4 \pm 0,1^\ddagger$	$2,2 \pm 0,1$
Basal glycemia ($n = 40$) (mmol/l)	$11,9 \pm 1,4^\#$	$9,0 \pm 2,3^\ddagger$	$8,3 \pm 0,4^\ddagger$	$7,7 \pm 0,5$
HbA1c (%)	$8,3 \pm 0,5^\#$	$6,7 \pm 0,41^\ddagger$	$6,5 \pm 0,2^\ddagger$	$6,7 \pm 0,2$
C peptide (ng/mL)	$2,8 \pm 0,2^\ddagger$	$5 \pm 1,51^\ddagger$	$4,1 \pm 0,4^\ddagger$	$3,4 \pm 0,2$
Serum insulin ($\mu\text{U/mL}$)	$26,4 \pm 11,3^\ddagger$	$13,1 \pm 8,2^\ddagger$	$31 \pm 6,4^\#$	$9,5 \pm 4,9$

Note. Comparative values of the last columns with the previous ones: ‡ – $p < 0,001$; $^\#$ – $p < 0,051$; ‡ – $p > 0,05$.

Table 2

Weight loss

Variables	BMI < 35	BMI ≥ 35 < 39,9	BMI 40–49,9	BMI ≤ 50
Weight (kg)	72 ± 2,6†	72,1 ± 3,3†	83,9 ± 1,9*	101,7 ± 5,4
BMI (kg/m ²)	24,8 ± 0,8†	26,4 ± 1,2†	29,7 ± 0,5†	36,1 ± 1,5
% EWL	68,9 ± 6,6‡	72 ± 4,3#	63,2 ± 2‡	56 ± 4,1
% EBMIL	109,3 ± 15,7#	97,9 ± 7,2†	76,6 ± 2,5#	64,8 ± 4,5

Note. Comparative values of the last columns with the previous ones: * – $p < 0,01$; † – $p < 0,001$; # – $p < 0,05$; ‡ – $p > 0,05$.

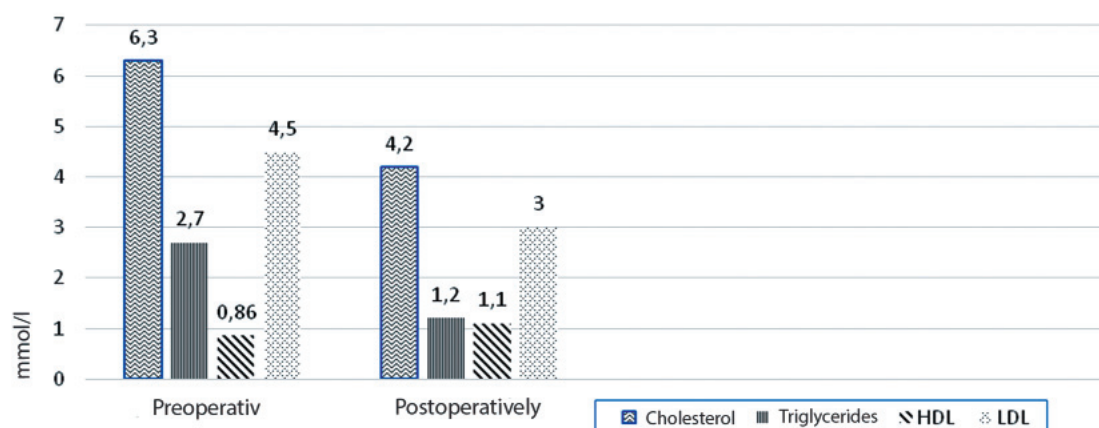


Fig. 1. Evolution of lipid metabolism parameters

Glucose homeostasis

All the cases showed the improvement of laboratory parameters with a significant statistical difference of fasting glucose and HbA1c. Start of glycemic control occurred in the majority of cases three months after the intervention. Registered data of carbohydrate metabolism parameters in the general group were: 1 month – glycemia $6,7 \pm 0,3$ mmol/l, HbA1c – $6,5 \pm 0,2\%$; 3 months – glycemia $6,4 \pm 0,3$ mmol/l, HbA1c – $5,9 \pm 0,2\%$; 6 months – glycemia $6,0 \pm 0,3$ mmol/l, HbA1c – $5,7 \pm 0,2\%$; 9 months – glycemia $5,9 \pm 0,3$ mmol/l, HbA1c – $5,5 \pm 0,2\%$ and 12 months – glycemia $5,8 \pm 0,3$ mmol/l, HbA1c – $5,9 \pm 0,2\%$.

Twenty-four months postoperatively, targeted parameters were: glycemia – $5,6 \pm 0,03$ mmol/l, HbA1c – $5,9 \pm 0,4\%$. From the total group of 40 (100%) patients with disturbances of glucose homeostasis, remission occurred in 39 (97,5%) cases and only in one case improving glucose metabolism was registered, without oral anti-diabetic administration. Complete remission was recorded in 21 (52,5%) cases, being evaluated 12 months postoperatively.

From the total group of 40 patients with type 2 diabetes, 15 (37,5%) patients had BMI < 35 kg/m² (28,7 to 34,7), with an average of $32,2 \pm 0,6$ kg/m². Body weight ranged from 84 to 112 kg, averaging $96,9 \pm 2,4$ kg. Duration of diabetes in this group was between 1–12 years, with an average of $3 \pm 0,5$ years. All the patients were receiving hypoglycemic drug, two of them insulin.

Preoperative fasting glycemia was in the limits of 6,4 and 21,37 mmol/l with an average of $11,9 \pm 1,4$ mmol/l and recorded limits of HbA1c were situated between 6,14 and 10,48%, with an average of $8,3 \pm 0,5\%$. In all the cases it was found the endocrine function of the B-pancreas by evaluating the C-peptide and seric insulin levels that were $2,8 \pm 0,2$ ng/mL and $26,4 \pm 11,3$ μU/mL respectively (Table 1).

Postoperative results were spectacular: at one month, glycemia – $7,3 \pm 0,5$ mmol/l, HbA1c – $6,9 \pm 0,4\%$; three months, glycemia – $6,5 \pm 0,5$ mmol/l, HbA1c – $6,2 \pm 0,3\%$; at six months, glycemia – $6,9 \pm 0,7$ mmol/l, HbA1c – $6 \pm 0,3\%$; at nine months, glycemia – $6,5 \pm 0,3$ mmol/l, HbA1c – $5,9 \pm 0,4\%$; at 12 months, glycemia – $5,9 \pm 0,4$ mmol/l, HbA1c – $6 \pm 0,1\%$ (Fig. 2).

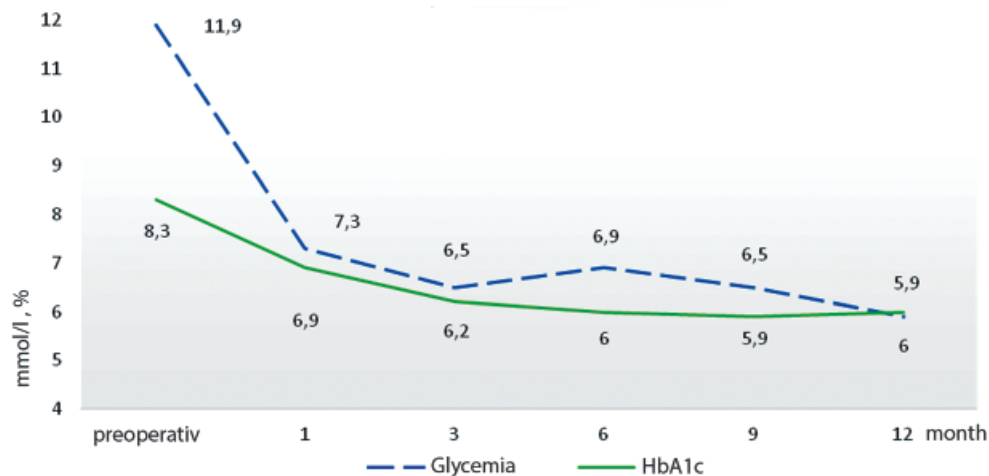


Fig. 2. Evolution of glycemic parameters (BMI < 35 kg/m²)

Thus, remission occurred in all the cases (100%), including non-obese patients ($n = 2$) (BMI < 30 kg/m²), with significant statistical difference ($p < 0,001$), the results being similar to the group of patients with morbid obesity (BMI ≥ 35 kg/m²) in postoperative remission of type 2 diabetes ($p > 0,05$). In all the cases, medical treatment was suspended in the first postoperative days.

Histochemical examination results

Data analysis of histological examination revealed the small intestine with preserved histological structure and the presence of a rich chronic inflammatory infiltrate in corium which consisted of T lymphocytic elements, diffuse and nodular predominantly in patients with type 2 diabetes.

Histochemical examination revealed the presence of CD20: positive in nodular lymphoid aggregates and in rare cells scattered in diffuse inflammatory infiltrate. CD68: positive in macrophages corium frequencies. CD4/CD8 ratio was 1/2–8. From the total 31 patients this picture was present in 11 cases out of 14 investigated patients with diabetes compared to 2 patients with similar histochemical picture from the rest of the group ($X^2 = 14,072$; $p < 0,005$).

Discussions

Patients with morbid obesity (BMI > 35 kg/m²) carry a major risk of developing multiple medical comorbidities, including diabetes, hypertension, hyperlipidemia, coronary artery disease, sleep apnea, gastroesophageal reflux

and hiatal hernia [20]. The rate of obesity is increasing worldwide, as the number of bariatric procedures. These interventions lead to significant decrease in body mass, but also prevent comorbidities related to obesity, improving the quality of life and reducing the risk of premature death [21].

Among many bariatric procedures, gastric bypass was shown to be the most common intervention performed in patients suffering from morbid obesity [21]. The percentage of excessive weight loss (% EWL) at five years may reach in the limits of 60–70%, with long-term continuity [20]. These data correspond with the results of our study. However, it shows the reduced efficacy of this procedure in patients with BMI > 60 kg/m², described in other writings [24], which may require a procedure of increased malabsorption, such as long loop gastric bypass or biliopancreatic diversion.

However, the practice of these interventions can result into the installation of potentially dangerous metabolic disorders. In our study, we implemented gastric bypass on long alimentary loop (250 cm), but the results are premature. Thus, choosing a safe and effective procedure in the case of a super obese patient remains the dilemma of the surgeon as well as of the anesthesiologist team. Researchers are in the process of finding the ideal surgical procedure, with a minimum rate of complications that would lead to sufficient weight loss, thus increasing the expectancy and improving the quality of life [23].

Recent studies showed the profound impact of bariatric surgery on improving clinical

manifestations of type 2 diabetes in obese patients [27]. Two procedures, gastric bypass and the biliopancreatic diversion are the most effective approaches in the treatment of diabetes, in comparison with other procedures, and they lead to normal concentration of serum glucose, insulin and glycated haemoglobin in 80-100% of the obese patients [19]. Buchwald et al., on a systematic study and analysis of bariatric interventions of English publication conducted between 1990 and 2006, showed improvement or complete remission of diabetes in 87% of patients, and failure in diabetes remission or its improvement were justified by the duration and preoperative severity of the disease [21]. This remarkable effect can reduce the installation of possible complications, especially of the cardiovascular system [25].

The decrease of peripheral resistance to insulin and improvement of non-alcoholic hepatic steatosis associated with body weight loss is believed to cause the remission of type 2 diabetes. On the other hand, despite the regain of body mass, the presence of a considerable improvement suggests that there are other mechanisms that affect the glycaemic control in the long-term data, such as alteration of gastrointestinal hormones function and disruptions in brain gut axis induced by anatomical change of digestive tract after surgery [26]. However, despite certain results showing the improve of glucose homeostasis in most patients with type 2 diabetes after gastric bypass, the responsible mechanisms for its improvement remain uncertain [21].

An accepted theory of the rapid improvement of glucose homeostasis after gastric bypass is the exaggerated release of insulin tropic hormones, gastric inhibitory polypeptide (GIP) and glucagon-like peptide-1 (GLP-1) being primarily targeted [21]. Improvement of residual beta cell function may be observed in a short period after the intervention and increase over time, probably due to increased incretin effect and reduced glucotoxicity. According to a hypothesis, proximal small intestine bypass would reduce the release of some unknown factors of intestinal segment having inhibitory action on beta cells. It is suggested that the contact exclusion of food and duodenum may be due to a decreased or absent response of one or more duodenal hormones that function as inhibitors of incretin insulin tropic agents, hormones known as anti-incretin [28].

Currently there are two most reliable competing theories in diabetes remission after bariatric interventions: the theory of proximal jejunum (foregut theory) and the theory of terminal

ileum (hindgut theory) [18]. The first provides inhibition of "putative" signals that are responsible for inducing insulin resistance or difficult controlling of glucose metabolism, the consequence being the exaggerated release of insulin tropic hormone, especially the GIP. The cause of the improvement of glucose metabolism in terminal ileum theory is the exaggerated bowel transit of undigested food which induce "L" cell stimulation with active GLP-1 release.

However, remission of type 2 diabetes is common also for restrictive interventions that do not lead to the exclusion from transit of the duodenum and incipient jejunum.

Some recent studies on post-mortem extracted pancreas in patients with type 1 diabetes show the same histochemical picture present in our study [29]. Type 1 diabetes is an immune-mediated disease emerging from the selective destruction of pancreatic beta cells due to infiltration of the islets of Langerhans cells of the immune system. A rich inflammatory infiltrate in lymphocytes is observed in pancreatic islets. Thus, it is suggested that the cause of type 1 diabetes is the invasion of lymphocytes in the pancreatic islets, predominantly CD8 cytotoxic T-cells, triggering an autoimmune inflammatory process characterized by reversing the CD4/CD8 ratio. The infiltrate ("insulitis") consists mainly of CD8+ T-cells, plus a variable number of CD4+ T-cells and macrophages. CD4+ cells are present in all the patients' islets, but less abundant than CD68+ or CD8+ cells. Natural cells "killer" were rarely found in the islets, even in advanced inflammatory processes. This means that both CD8+ cytotoxic cells and macrophages contribute to beta cell death during initiation of inflammatory process. CD20+ cells are present in a small number in the early phase of inflammation, increasing during the advancing of the process [29].

These data are similar to the histochemical examination of our study. Thus, both type 1 and type 2 diabetes may have the same pathogenic mechanism in origin, the difference being only the action on the "target" cells. In our view, the inflammatory autoimmune process at the level of jejunal mucosa could be the unknown anti-incretin factor responsible for the jam of the incretin area with perturbation of insulin tropic hormones responsible for glucose homeostasis. Thus, the start of autoimmune inflammatory process in the small bowel could be caused by chronic ingested food substance capable of inducing autoimmune inflammatory reactions in some susceptible individuals. If we consider this theory, then we could explain the common mechanism of diabetes remission for

all the bariatric interventions, both restrictive and derivative.

Remission of diabetes after restrictive interventions appears to be due to the severe decrease of small bowel contact with the concerned "allergen" food substance and in case of derivative interventions – the exclusion of contact with incretin area. Meanwhile, superior remission of biliopancreatic diversion in comparison with gastric bypass could be caused not by a more pronounced malabsorption, but rather the exclusion from the transit of a significant segment of the small bowel. These data are confirmed by higher postoperative results in the appearance of diabetes remission after mini-gastric bypass intervention, which provides for the exclusion from the transit of over 200 cm of small intestine [30].

By implementing the gastric bypass on biliopancreatic loop of 100–150 cm in our study, in patients with BMI < 35 kg/m² and type 2 diabetes, the achieved remission rate was 100%, inclusively in the case of two patients being insulin dependent. These data show the efficacy of the intervention given to patients with mild obesity (30–35 kg/m²) as well as its potential for non-obese patients ($n = 2$) (BMI < 30 kg/m²) in postoperative remission of type 2 diabetes.

Conclusions

This study has shown that gastric bypass surgery is effective in the treatment of morbid obesity and metabolic syndrome. In super obesity patients, the results are encouraging but still require optimization of biliopancreatic and food loop length. Promising, lasting results are obtained in the surgical treatment of type 2 diabetes regardless of BMI. Both type 1 diabetes and type 2 diabetes can have a common pathogenic mechanism.

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MORPHOLOGICAL CHANGES IN THE SKIN OF GUINEA PIGS IN LOCAL EXPOSURE TO ULTRAVIOLET IRRADIATION

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The study identified that the development of UV erythema (1 MED) in guinea pigs was characterized by inflammatory and degenerative changes in the skin, reaching the highest degree of severity on the 3rd day after the exposure. The detected injuries were characterized by morphological changes in the dermo-epidermal junction, leukocyte infiltration in the epidermis and dermis, destruction of collagen and elastic fibers. The development of apoptotic keratinocytes, i.e. sunburn cells, was one of the most specific morphological alterations occurring in the skin of guinea pigs when exposed to ultraviolet irradiation. Proliferative, hyperplastic and degenerative changes, as well as dystrophic ones persisted in the skin within the post-erythema period (the 8th day). Morphometric studies confirmed visual histological changes in the skin.

Keywords: skin, morphological changes, morphometry, ultraviolet irradiation

Ultraviolet (UV) irradiation reaching the Earth's surface mainly consists of UV-A range and a small amount of UV-B spectrum. The skin undergoes direct damage when exposed to ultraviolet irradiation (UV) [8, 9]. Excessive UV irradiation results in the development of a severe response involving all components of the skin [3, 8, 9]. Major changes in the skin caused by medium wave UV-B rays are observed in the epidermis. UV-B rays are responsible for the formation of burns, which in turn can subsequently cause skin cancer. Long-wave UV-A rays penetrate into the dermis, causing photo-aging and also play an indirect role in carcinogenesis [8, 9]. In this regard, it is important to provide a research on morpho-functional changes in the skin under the impact of UV-A and UV-B rays. Morphometric methods are an integral part of microscopic studies, giving a possibility to render an objective evaluation of the morphofunctional state of histological structures and identify the patterns of abnormal, compensatory and regenerative alterations [1, 3, 4].

The purpose of the study: to determine the pattern of morphological and morphometric changes in the skin of guinea pigs exposed to local UV irradiation.

Materials and methods of research

The study involved 30 albino guinea pigs weighing 400–500 g. Erythema was caused by an exposure to irradiation in 1 minimal erythema dose (1 MED) of a shaved skin site using a mercury quartz irradiator OKN-11-M (UV rays A and B), placed at a distance of 10 cm from the animal, lasting for 2 minutes. In addition, the skin was shielded by a round plate with five holes with a diameter of 6 mm. The extent of the reaction was evaluated within 2, 4 hours, 3 days following the exposure until erythema disappearance in points for each spot: 0 points – no

erythema, 1 point – distinct redness, 2 points – intense erythema. Then we summarized the intensity of 5 spots. The extent of the damaging effect was assessed by the intensity and duration of erythema reaction [7]. Control group consisted of intact guinea pigs. To investigate morphological pattern of changes in the skin after local ultraviolet irradiation the animals were decapitated under general anesthesia (sodium thiopental 60 mg/kg) at different stages of the trial (2 hours, 4 hours, 3 days, 8 days). Animal housing and experiments on them have been carried out in compliance with the requirements of international principles of the «European Convention for the protection of Vertebrate Animals Used for Experimental and other Scientific Purposes» (Strasbourg, 1985) and «General Ethic Rules for Conducting Experiments on Animals», approved by the First National Congress on bioethics (Kiev, 2001).

Skin pieces were fixed in 10% neutral formalin with further excision of pieces of about 4 mm thick. The material was subjected to spirit processing and paraffin casting which was then sectioned in pieces of 5–6 µm thick. Survey specimens stained with hematoxylin and eosin were used to assess the overall state of the tissues under investigation. Weigert's elastic stain with fuchselin followed by Van Gieson's counterstain with picro-fuchsin was used to identify and differentiate the structures of the connective tissue [5, 6]. Morphometric study involved the evaluation of the following criteria: sunburn cells, leukocyte infiltration of the dermis and epidermis, changes in the collagen and elastic fibers, dermo-epidermal activity [1, 10].

Specimens, stained by histological and histochemical methods, and morphometric indices were studied using Olympus BX-41 microscope with Olympus DP-Soft software (Version 3:1) and Microsoft Excel [2].

Results of research and their discussion

Local exposure to UV irradiation resulted in the development of erythema in all the guinea pigs. In 2 hours after the exposure the total erythema score amounted for 4,8 points. The maximum severity was registered in 4 hours after the exposure when the overall intensity of 5 spots increased to 9,2 points. On the 3rd day the overall intensity of erythema was severe,

comprising 7,7 points, with a subsequent gradual decrease and disappearance on the 8th day.

Histological study of the skin in intact animals showed typical features of organ structure. Morphological study showed disruptions of histological structure of guinea pigs' skin on the 8th day after the exposure to UV irradiation.

Thus, **2 hours** following the exposure histological changes were found to be minimal and characterized by slight exudative changes in the form of mild congestion and margination of leukocytes in the lumen as well as by the signs of dermo-epidermal activity.

Consequently, the integrity of the dermo-epidermal junction was preserved in all the specimens; however, the basal and spinous layers of the epidermis were shown to contain small foci of optically empty transudate in the intercellular spaces with separation of epidermal cells (spongiosis) and loss of cellular connectivity (acantholysis), which resulted in the formation of vacuolization loci in the region of dermo-epidermal junction.

Mean value of dermo-epidermal activity within this period of the trial comprised $0,33 \pm 0,51$, but it was not conclusively different from the indices identified in intact animals (Table).

Reticular layer of the dermis was formed by extensive fuchsinophilic bundles of collagen fibers arranged parallel to and at an angle to the skin surface, and their accompanying network of elastic fibers.

In 4 hours following the exposure to UV irradiation the skin was found to undergo discirculatory changes, morphologically manifested by severe congestion with swelling of the endothelium and edema of the derma, intercellular edema of the epidermis with loss of intercellular connections, vacuolization of the tissue in the region of dermo-epidermal junction and leukocyte infiltration of the derma.

Structural components of the skin underwent alternative changes, morphologically manifested by vacuolar degeneration and the development of apoptotically changed epidermal cells (sunburn cells) as a result of UV damage to nuclear DNA [8, 9], disappearance of epidermal macrophages, mild changes in collagen and elastic fibers of the dermis (swelling, enlargement and disruption).

Morphometric study showed that the number of sunburn cells significantly varied and comprised (1 ± 0) per 1 mm^2 . The study did not reveal any signs of leukocyte infiltration in the epidermis. Quantitative analysis also showed that the mean value of dermal leukocytes amounted for $0,5 \pm 0,54$, with the rate of changes in collagen and elastic fibers comprising $0,16 \pm 0,40$ and $0,33 \pm 0,51$ respectively. The index of dermo-epidermal activity constituted $0,5 \pm 0,54$. However, these morphometric indices of histological specimens were not conclusively different from the indices found in intact guinea pigs (Table).

Morphometric indices of changes in the skin of guinea pigs exposed to UV irradiation within different periods of the trial

Indices	Intact animals	Animals exposed to UV irradiation			
		2 hours	4 hours	3 rd day	8 th day
Sunburn cells	0	0	$1 \pm 0^{* \#}$	$1,33 \pm 0,51^{* \#}$	$0^{\wedge \square}$
Epidermal leukocytes	0	0	0	$0,5 \pm 0,54$	$0,5 \pm 0,54$
Dermal leukocytes	0	0	$0,5 \pm 0,54$	$1,33 \pm 0,57^{* \# \wedge}$	$0,5 \pm 0,54^{\square}$
Changes in collagen fibers	0	0	$0,16 \pm 0,40$	$0,83 \pm 0,40^{*}$	$1 \pm 0^{*}$
Changes in elastic fibers	0	0	$0,33 \pm 0,51$	$1 \pm 0^{*}$	$1 \pm 0^{*}$
Dermo-epidermal activity	0	$0,33 \pm 0,51$	$0,5 \pm 0,54$	$1,5 \pm 0,54^{* \# \wedge}$	0^{\square}

Note :

* – accuracy of the differences as compared to intact animals ($P \leq 0,05$);

– accuracy of the differences as compared to the indices within the period of 2 hours ($P \leq 0,05$);

^ – accuracy of the differences as compared to the indices within the period of 4 hours ($P \leq 0,05$);

□ – accuracy of the differences as compared to the indices within the period of 3 days ($P \leq 0,05$).

On the 3rd day of the trial the skin was found to undergo significant histological changes. The epidermis slightly thickened due to an increase in the number of the rows of spinous cell layer to 2 or 3. The majority of epidermal cells of the spinous layer were shown to have signs of vacuolar degeneration; in all the specimens they included numerous sunburn cells, i.e. with pyknotic nuclei and eosinophilic cytoplasm. The latter were arranged singly and in groups of 3 to 4 in 2 specimens. Basal keratinocytes were located close to each other, with intensely basophilic nuclei of mainly vertical orientation. The specimens were also shown to have numerous mitoses. Epidermal macrophages were not detected. The stratum corneum was thickened, with areas containing surviving cells with nuclei (parakeratosis). The epidermis contained foci of small clusters of leukocytes in half of the specimens. All the specimens had signs of dermo-epidermal activity with the formation of areas of vacuolization and mild disintegrative changes in the dermo-epidermal junction in 3 specimens.

Swelling of the dermis persisted and consequently, collagen and elastic fibers, making up its structure, appeared dissociated. Collagen fibers were swollen and unevenly fuchsinophilic. Elastic fibers were thickened with sites of disruption. As opposed to the previous period, dermal vessels had lesser severity of congestion and dissociation of endothelial cells which line them. Regions around the vessels and accessory organs of the skin were filled with infiltrates of lymphocytes, macrophages, small number of tissue basophils and neutrophils slightly more frequently as compared to the previous period.

Morphometric data confirmed visual histological changes in the skin. Thus, average number of sunburn cells comprised $1,33 \pm 0,5$ per 1 mm^2 , which was significantly higher than in intact animals. Significant differences (an increase) between the intact and irradiated animals were also observed for such indices as the number of dermal leukocytes ($1,33 \pm 0,57$), degeneration of collagen and elastic fibers ($0,83 \pm 0,40$ and 1 ± 0), dermal-epidermal activity ($1,5 \pm 0,54$). Furthermore, the number of dermal leukocytes increased relative to the previous period (4 hours) by 2,6 times, dermo-epidermal activity rose relative to the previous periods (2 and 4 hours) by 4,5 and 3 times, respectively. Mean value of epidermal leukocytes ($0,5 \pm 0,54$) did not significantly change as compared with the normal range (Table).

On the 8th day of the trial (at the time of erythema disappearance) the study determined

that exudative stage of inflammation changed to proliferative one. Microscopic examination of animals' skin specimens showed thickening of the epidermal layer at the cost of the spinous, granular and horny layers. Increased proliferative activity of basal keratinocytes caused the development of hyperplastic changes in the epidermis, associated with degenerative alteration of epidermal cells and dyskeratosis. Moreover, the skin underwent a decrease in the severity of leukocytic and an increase in lymphomacrophageal infiltration of the dermis. The intensity of swelling of the dermis decreased as compared to the previous period, with a more consolidated arrangement of connective tissue fibers. Increased proliferative and synthetic activity of fibroblasts promoted collagenization of the dermis, changes in the content and structure of elastic fibers. Unevenly fuchsinophilic collagen and elastic fibers were thickened, the latter being focally disrupted.

Morphometric examination at this period of the trial detected neither sunburn cells nor degeneration of the dermo-epidermal junction, which was confirmed by a significant difference as compared with previous periods of the study. Leukocyte infiltration in the dermis ($0,5 \pm 0,54$) was reduced by 2,6 times in comparison to the 3rd day. Leukocyte infiltration in the epidermis also comprised $0,5 \pm 0,54$, but was not significantly different from those of intact animals. Severe disruptions of collagen (1 ± 0) and elastic fibers (0 ± 1) persisted with their mean values exceeding the norm (Table).

Thus, exposure to UV irradiation caused inflammatory and degenerative changes in guinea pigs' skin, which was morphologically manifested by alterations in dermo-epidermal junction, leukocyte infiltration in the epidermis and dermis, destruction of collagen and elastic fibers. The development of apoptotic keratinocytes, i.e. sunburn cells, was one of the most specific morphological alterations occurring in the skin of guinea pigs when exposed to ultraviolet irradiation.

Conclusion

1. Development of UV erythema (1 MED) in guinea pigs was shown to be characterized by inflammatory and degenerative changes in the skin reaching its maximum severity on the 3rd day after irradiation.

• the study showed dyscirculatory changes accompanied by vacuolization in the dermo-epidermal junction within the early period following the exposure to UV irradiation (in 2 and 4 hours). In 4 hours after the exposure

histological changes increased, which was accompanied by leukocyte infiltration of the dermis and slight changes in collagen and elastic fibers of the dermis. The specimens were also found to contain altered apoptotic keratinocytes (sunburn cells), which number significantly increased as confirmed by morphometric studies.

• on the third day of the trial the skin was shown to contain numerous sunburn cells, signs of dermo-epidermal activity, severe leukocyte infiltration of the dermis, destruction of collagen and elastic fibers, as confirmed by morphometric study of histological specimens.

2. Within post-erythema period (the 8th day) proliferative, hyperplastic, degenerative and dystrophic changes in the skin persisted, as confirmed by morphometric data (which identified disruptions in the structure of collagen and elastic fibers).

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ESPECIALLY THE CONTENT OF ESSENTIAL SUBSTANCES IN THE BODY OF MODERN SCHOOLBOYS

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Modern children aged from 12 to 17 years often have various health problems [1]. One of the main factors leading to aggravation is nutrition [2]. Primarily, nutrition can influence the parameters of antioxidant status of the child organism [3]. The aim of the study was to investigate the antioxidant status of urban and rural schoolchildren, and their actual nutrition. Antioxidant status was analyzed studying the content of vitamins A, E in schoolchildren biological media, using the fluorometry method, the content of vitamin C, using the visual titration method. The received data testifies that vitamins A, E, ascorbic acid, copper, chromium, ferrum deficiency. That is why it is necessary to correct redox equilibrium parameters developing methodological and organizational approaches to the optimization of urban and rural schoolchildren nutritional status.

Keywords: antioxidant status, actual nutrition diet, oxidative stress

Materials and methods of research

The investigation included the study of especially the content of essential substances in the body of urban ($n = 250$) and rural ($n = 200$) schoolchildren. Each group was divided into two age subgroups – schoolchildren aged from 12 to 14 years ($n = 150$ among urban and $n = 100$ among rural schoolchildren) and learners aged from 15 to 17 years ($n = 100$ among urban and $n = 100$ among rural schoolchildren). The study was conducted in accordance with the ethic standards, covered by the World Medical Association's Declaration of Helsinki (Seoul, 2008), in particular, informative consents of the parents of the schoolchildren were received. The present study was also approved by the local ethic committee of the SBEI of HPE OrSMU of the Ministry of Health of Russia. The quantitative content of ascorbic acid in morning urine was identified by the visual titration method using the oxidation-reduction reaction with Tillman's reagent (2,6-dichloroindophenol sodium derivative). Total protein level was identified with the help of the method, based on biuret test; albumen level, with the help of colorimetric method with bromocresol green (BCG) in acidic media. Total cholesterol level (TC) and high-density lipoprotein cholesterol (HDL cholesterol) level were identified using direct enzymatic colorimetric method with cholesterol esterase and peroxidase. Triglyceride level (TGs) was identified with the help of enzymatic colorimetric method with glycerophosphoric oxidase; low-density lipoprotein cholesterol (LDL cholesterol), using Friedewald formula (1972).

Results of research and their discussion

All in all, while evaluating the condition of antioxidant defense we need to take into account that it is characterized by the low level of lipid antioxidant factor – content of vitamins A, E in blood serum, which protect fatty acids from peroxidation in plasma and membrane structures (especially tocopherol) [12]. The urban schoolchildren experience fat-soluble vitamins deficiency in a greater degree than the rural schoolchildren. The content of retinol in blood serum of the urban schoolchildren aged from 12 to 14 years was 26,7% lower than the physiological norm, aged from 15 to 17 years – 20,0% lower than the physiological norm; it is 1,3 times lower than in the rural schoolchildren (Table 1). The content of tocopherol in blood serum of the urban learners aged from 12 to 14 years was $6,98 \pm 0,25$ mcg/hour that is 12,8% lower than the physiological norm, aged from 15 to 17 years – $7,22 \pm 0,17$ mcg/hour and 9,8% lower than the physiological norm. As for the rural learners, the content of tocopherol $7,46 \pm 0,09$ mcg/hour in 12–14 years age group and $7,22 \pm 0,08$ mcg/hour in 15–17 years age group, that is respectively 6,8 and 9,8% lower than the physiological norm.

Table 1
Content of vitamins A, E, C in urban and rural schoolchildren

Age group, years		Vitamins		
		A	E	C
		Physiological norm		
		0,3–0,7 mcg/ml	8–12 mcg/ml	0,7–1,0 mg/hour
12–14	urban	$0,22 \pm 0,01$	$6,98 \pm 0,16$	$0,724 \pm 0,01$
	rural	$0,28 \pm 0,01^*$	$7,46 \pm 0,09^*$	$0,596 \pm 0,02^*$
15–17	urban	$0,24 \pm 0,01$	$7,22 \pm 0,17$	$0,713 \pm 0,01$
	rural	$0,27 \pm 0,01^*$	$7,22 \pm 0,08$	$0,615 \pm 0,01^*$

Note. * $p \leq 0,05$ while comparing the data of urban and rural schoolchildren inside each age group.

The received data about the content of fat-soluble vitamins in the blood of the urban and rural learners show the unstable balance of antioxidant defense, forming oxidative stress, which can lead to nucleic acids, proteins and lipids damage. A positive predisposing factor of oxidation-reduction balance formation in the urban schoolchildren is considered to be a level of ascorbic acid ($0,724 \pm 0,01$ mg/hour in the learners, aged from 12 to 14 years and $0,713 \pm 0,01$ mg/hour in the learners, aged from 15 to 17 years, physiological norm of this age group is 0,700–1,000 mg/hour). This acid is a hydrophilic nonenzymatic antioxidant, which has a strongly pronounced restoring capacity and is oxidized to dehydrogenated form due to 2 electrons and 2 protons recoil (Table 2). At the same time, the level of ascorbic acid in rural schoolchildren appeared to be lower than the physiological norm minimum limit. In learners aged from 12 to 14 years it was $0,596 \pm 0,02$ mg/hour, that is 14,8% lower than the physiological norm, and in learners aged from 15 to 17 years – $0,615 \pm 0,01$ mg/hour and 12,1% correspondingly. The higher content of vitamin C in urban schoolchildren compared to rural ones can also be the cause of higher antioxidant defense power of learners, living in urban areas. Moreover, physiological level of ascorbic acid in urban learners provides ROS direct reduction as well as recovery of tocopherol oxidized forms caused by neutralization of membrane lipids free radicals. Under that logic, decreased content of vitamin C on the back of tocopherol deficiency in the rural children can contribute to the developing oxidative stress in the organism.

Antioxidant defense system of the organism is one of the main constituent parts of its adaptive function and a multicomponent cluster of different antiradical mechanisms [13]. Evidently, many biochemical processes, aimed at organism adaptation to exogenous factors

need energy stored in ATP. These biochemical processes may be synthesis of complex chemical compounds from simpler ones (anabolism reaction), muscle activity (mechanical work), transmembrane potential production, active transport across biological membranes. It is known that riboflavin is necessary for full tissue respiration, during which the main energy resource of ATP cell is synthesized. Riboflavin is found in prosthetic groups of flavin mononucleotide coenzymes and flavin adenine dinucleotide (FAD), also oxidase and reductase; performs redox reactions during cell oxidation. Taking into account that B vitamins can influence antioxidant status processes, it was stated that in the urban and rural schoolchildren of any age riboflavin content was 8,9–11,9% lower than physiological norm. But in the rural children aged from 15 to 17 years renal excretion of this vitamin was $14,2 \pm 0,24$ mcg/hour, i.e. lower limit of normal (Table 2).

Considering the fact that antioxidant defense of organism includes SOD, catalase, peroxidase and other enzymes, it becomes clear that amino acid exchange disorder or amino acid deficiency can affect synthesis of these enzymes. Stated that schoolchildren had sufficient level of protein (it was $75,6 \pm 2,09$ – $77,2 \pm 1,9$ g/l in the urban children and $75,1 \pm 4,44$ – $76,6 \pm 4,05$ g/l in the rural children). Higher level of albumin was found in 45–51,8% of the urban learners and 4–14,7% of the rural ones, considering that average member of protein in the urban learners was 9,6–32,5% higher than in the rural ones. Albumin deficiency was found only in 16% of the rural schoolchildren, aged from 12 to 14 years. Nevertheless, studied learners had the risk of amino acid metabolism disorders, presented by aneurine and pyridoxine deficiency, which lead to enzyme synthesis disorder, taking part in antioxidant defense. Stated that only the rural

Table 2
Content of B vitamins in urban and rural schoolchildren

Age groups, years		Vitamin		
		B1	B2	B6
		Physiological norm		
		15–35 mcg/hour	14–30 mcg/hour	40–60 mcg/hour
12–14	urban	$20,42 \pm 0,49$	$12,34 \pm 0,37$	$41,11 \pm 0,80$
	rural	$12,58 \pm 0,25^*$	$13,68 \pm 0,32^*$	$37,92 \pm 0,57^*$
15–17	urban	$21,3 \pm 0,39$	$12,76 \pm 0,41$	$40,33 \pm 0,64$
	rural	$13,19 \pm 0,2^*$	$14,2 \pm 0,24^*$	$37,4 \pm 0,37^*$

Note. * $p \leq 0,05$ while comparing the data of urban and rural schoolchildren inside each age group.

schoolchildren had aneurine deficiency. In the children of 12–14 years it was 16,1% lower than the physiological norm ($12,58 \pm 0,25$ mcg/hour), in the children of 15–17 years – 12,1% lower ($13,19 \pm 0,20$ mcg/hour) (Table 2). Pyridoxine deficiency in the rural learners aged from 12 to 14 years was 94,8% of the physiological norm, in the learners aged from 15 to 17 years – 93,5%. The tendency to decrease of aneurine level was identified in the organism of the rural schoolchildren compared to the urban learners of any age. Aneurine content in the urban schoolchildren of 12–14 years was $20,42 \pm 0,49$ and $12,58 \pm 0,25$ mcg/hour in the rural ones ($p \leq 0,05$); in the urban learners of 15–17 years – $21,3 \pm 0,39$ mcg/hour and in the rural ones – $13,19 \pm 0,2$ mcg/hour ($p \leq 0,05$). As for pyridoxine content in the organism of urban and rural schoolchildren, the same pattern occurred. The level of riboflavin content, on the contrary, showed its growth in the rural learners compared to the urban ones ($12,34 \pm 0,37$ mcg/hour in the urban children of

12–14 years and $12,76 \pm 0,41$ mcg/hour in the rural ones, $p \leq 0,05$; $13,68 \pm 0,32$ mcg/hour in the urban children of 15–17 years and $14,2 \pm 0,24$ mcg/hour in the rural ones, $p \leq 0,05$).

It is important to say that from 78,3 to 93,1% of urban schoolchildren and from 44 to 55,9% of rural ones have higher level of low density lipoproteins; from 51,7 to 69,6% of urban and from 91,2 to 92% of rural learners have increased level of total cholesterol. Besides, the additional factor of atherogenecity in the urban schoolchildren was the fact that 91,3–93,1% of them had increased level of triacyglyceride, but this index was 14,8 and 17,1% lower in the rural learners aged from 15 to 17 years and from 12 to 14 years respectively. At the same time, decreased level of high density lipoproteins was stated in 45% of urban learners and 42–47% of rural learners. The increased level of this index was indicated in the urban learners and it was 22–49% higher than in the rural ones.

Table 3

Content of vitamins and micronutrients in the daily diet of schoolchildren

Name of micro-nutrient	Age groups					
	12–14 years			15–17 years		
	urban	rural	physiological norm ¹	urban	rural	physiological norm ¹
Vitamin, mcg						
Vitamin A,	$100 \pm 2,0$	$200 \pm 4,0^*$	600	$220,0 \pm 5,0$	$170,0 \pm 3,0^*$	1000
Vitamin B1	$2,7 \pm 0,3$	$1,4 \pm 0,1^*$	1,3	$0,92 \pm 0,2$	$0,81 \pm 0,1$	1,3–1,5
Vitamin B2	$2,1 \pm 0,1$	$1,1 \pm 0,1^*$	1,5	$0,44 \pm 0,08$	$0,65 \pm 0,09^*$	1,5–1,8
Vitamin C	$59,1 \pm 13,8$	$63,1 \pm 12,3^*$	60–70	$99,4 \pm 24,8$	$89,6 \pm 21,0$	70–90
Vitamin B6	$1,2 \pm 0,1$	$0,9 \pm 0,1^*$	1,6–1,7	$0,87 \pm 0,14$	$0,99 \pm 0,15$	1,6–2
Vitamin E	$4,9 \pm 0,7$	$3,4 \pm 0,6^*$	12,0	$5,1 \pm 2,3$	$4,4 \pm 1,1$	15,0
Macro- and micronutrient						
Calcium, mg	$613,3 \pm 87,0$	$577,0 \pm 83,9$	1200	$314,3 \pm 45,6$	$273,2 \pm 43,4$	1200
Magnesium, mg	$347,0 \pm 44,8$	$250,1 \pm 21,8^*$	300	$171,1 \pm 19,8$	$166,8 \pm 20,6$	400
Phosphorus, mg	$1178,4 \pm 213,9$	$1152,5 \pm 112$	1200	$766,7 \pm 77,9$	$673,03 \pm 85$	1200
Potassium, mg	$1499,8 \pm 175,5$	$1343,0 \pm 164$	1500	$1505,8 \pm 233,4$	$1482,9 \pm 237$	2500
Sodium, mg	$544,6 \pm 47,3$	$441,5 \pm 56,1^*$	1100	$401,5 \pm 55,3$	$399,2 \pm 49,2$	1300
Chloride, mg	$625,8 \pm 75,2$	$603,9 \pm 72,2$	1900	$617,3 \pm 88,1$	$594,5 \pm 79,5$	2300
Ferrum, mg	$19,3 \pm 3,5$	$20,4 \pm 3,5$	15,00	$14,6 \pm 3,3$	$13,7 \pm 2,1$	18,0
Zinc, mg	$7,18 \pm 0,6$	$6,31 \pm 0,9$	12,00	$5,8 \pm 0,9$	$4,76 \pm 0,8$	12,0
Iodine, mg	$0,44 \pm 0,19$	$0,23 \pm 0,13$	0,130	$0,13 \pm 0,07$	$0,15 \pm 0,09$	0,15
Copper, mg	$0,6 \pm 0,02$	$0,4 \pm 0,01^*$	0,80	$0,3 \pm 0,02$	$0,2 \pm 0,03^*$	1,00
Selenium, mg	$0,23 \pm 0,05$	$0,12 \pm 0,04^*$	0,04	$0,45 \pm 0,06$	$0,34 \pm 0,02^*$	0,05
Chromium, mg	$12,4 \pm 5,4$	$9,3 \pm 2,7$	25,0	$21,0 \pm 3,8$	$17,8 \pm 3,5$	35,0
Fluorine, mg	$2,6 \pm 0,5$	$1,6 \pm 0,2^*$	4,00	$2,2 \pm 0,3$	$1,5 \pm 0,2^*$	4,00

Notes:

* $p \leq 0,05$ while comparing the data of urban and rural schoolchildren inside each age group;

¹physiological norm of vitamin, macro- and microelement intake of a learner.

The analysis of daily diet of schoolchildren showed that the rural children had more deficient diet (especially in A and E vitamins) than the urban ones (Table 3). Vitamin A deficiency was 83,3% from the physiological norm in the urban learners and 66,7% in the rural learners of 12–14 years; in the urban and rural learners of 15–17 years it was 90% and 17% respectively. Vitamin E deficiency was 59,2% in the urban schoolchildren and 71,7% in the rural ones aged from 12 to 14 years; in the urban and rural schoolchildren aged from 15 to 17 years it was 66 and 70,7% respectively. The content of ascorbic acid in daily diet of either urban or rural schoolchildren was within the limits of physiological norm.

Nevertheless, in the daily diet of urban and rural learners the deficiency of zinc and chromium intake was stated. Zinc deficiency in the urban and rural children was 68 and 60,7% respectively; chromium deficiency – 87,3 and 74%. Besides, their function can be twofold depending on their concentration. Copper, as an inducer of caeruloplasmin protecting cells from lipid peroxides, can serve as an antioxidant and, at the same time, like nickel and chromium, it can induce lipid peroxidation, i.e. copper has dose-dependent effect [28]. The same can be said about ferrum ions [29]. The analysis of daily diet of schoolchildren showed that ferrum intake was 69,2% in the urban schoolchildren and 58,3% in the rural ones; daily copper intake was 71,4 and 42,9% which testifies to the risk of these microelements deficiency. Other very important macro- and microelements, which provide human homeostasis and maintain oxidation-reduction balance, are calcium, phosphorus, sodium, chloride and magnesium. In daily diet of rural schoolchildren calcium deficiency was higher than in the urban ones (33,8 and 41,8% from the physiological norm respectively). Deficiency of phosphorus, sodium and chloride was also higher in the rural learners. Deviations from the physiological norm of phosphorus intake was 79,9% in the urban schoolchildren and 61,5% in the rural ones, sodium intake – 74,5 and 61,4%, chloride intake – 68,5 and 61,6% respectively. The level of magnesium intake was 16,7% low in the urban learners of 12–14 years, in urban and rural learners of 15–17 years it was 57,2 and 53,8% low respectively.

Conclusion

It was stated that urban schoolchildren compared to rural ones aged from 12 to 14 years and from 15 to 17 years have higher content of free radical oxidation products,

which is confirmed by exceeded level of the intensity of fast burst in 4,3 and 5,9 times, and the rate of ROS production 4,4–5,7 times higher that is confirmed by the maximum luminosity data. The low level of lipid antioxidant factor – content of vitamins A, E in blood serum was also stated.

A positive predisposing factor of oxidation-reduction balance formation in the urban schoolchildren is considered to be a level of ascorbic acid ($0,724 \pm 0,01$ mg/hour in the learners, aged from 12 to 14 years and $0,713 \pm 0,01$ mg/hour in the learners, aged from 15 to 17 years, physiological norm of this age group is 0,700–1,000 mg/hour). The level of ascorbic acid in rural schoolchildren appeared to be lower than the physiological norm minimum limit. In learners aged from 12 to 14 years it was $0,596 \pm 0,02$ mg/hour, that is 14,8% lower than the physiological norm, and in learners aged from 15 to 17 years – $0,615 \pm 0,01$ mg/hour and 12,1% correspondingly.

In the urban and rural schoolchildren of any age riboflavin content was 8,9–11,9% lower than physiological norm, but in the rural children aged from 15 to 17 years renal excretion of this vitamin was $14,2 \pm 0,24$ mcg/hour. Schoolchildren had sufficient level of protein (it was $75,6 \pm 2,09$ – $77,2 \pm 1,9$ g/l in the urban children and $75,1 \pm 4,44$ – $76,6 \pm 4,05$ g/l in the rural children). Albumin deficiency was found only in 16% of the rural schoolchildren, aged from 12 to 14 years. Only the rural schoolchildren had aneurine deficiency, in the children of 12–14 years it was 16,1% lower than the physiological norm ($12,58 \pm 0,25$ mcg/hour), in the children of 15–17 years – 12,1% lower ($13,19 \pm 0,20$ mcg/hour). Pyridoxine deficiency in the rural learners aged from 12 to 14 years was 94,8% of the physiological norm, in the learners aged from 15 to 17 years – 93,5%. From 78,3 to 93,1% of urban schoolchildren and from 44 to 55,9% of rural ones have higher level of low density lipoproteins; from 51,7 to 69,6% of urban and from 91,2 to 92% of rural learners have increased level of total cholesterol.

Besides, the additional factor of atherogenicity in the urban schoolchildren was the fact that 91,3–93,1% of them had increased level of triacyglyceride, but this index was 14,8 and 17,1% lower in the rural learners aged from 15 to 17 years and from 12 to 14 years respectively. Vitamin A deficiency was 83,3% from the physiological norm in the urban learners and 66,7% in the rural learners of 12–14 years; in the urban and rural learners

of 15–17 years it was 90 and 17% respectively. Vitamin E deficiency was 59,2% in the urban schoolchildren and 71,7% in the rural ones aged from 12 to 14 years; in the urban and rural schoolchildren aged from 15 to 17 years it was 66 and 70,7% respectively. The content of ascorbic acid in daily diet of either urban or rural schoolchildren was within the limits of physiological norm. In the daily diet of urban and rural learners, the deficiency of zinc and chromium intake was stated. Zinc deficiency in the urban and rural children was 68 and 60,7% respectively; chromium deficiency – 87,3 and 74%. Calcium deficiency in the rural children was higher than in the urban ones (33,8 and 41,8% from the physiological norm respectively).

To sum up, considering the received data about the antioxidant status and its forming factors, it is necessary to correct redox equilibrium parameters developing methodological and organizational approaches to the optimization of the urban and rural schoolchildren nutritional status.

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THE ISSUE OF EARLY CONGENITAL SYPHILIS MORBIDITY

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The authors provide an overview of the literature on the incidence of syphilis during pregnancy and the incidence of early congenital syphilis in different countries. The risk factors for congenital syphilis were determined: low-income families, the onset of sexual life earlier than at 17 years, pregnancy at the age of 14 years and earlier, syphilis and other STIs in the anamnesis, the HIV-positive partner, stillbirth in anamnesis. The authors note that late therapy of pregnant women, with syphilis increases the number of miscarriage cases, stillbirth and birth of a child with syphilis. The modern preventive technologies must be implemented among the actions aimed to reduce the incidence of congenital syphilis in the Russian Federation.

Keywords: epidemiology, early congenital syphilis incidence

The health condition of mother and child is an actual problem for world health care. According to WHO experts, the damage caused by congenital syphilis is still underestimated, because of 270 000 cases recorded worldwide annually. Annual natal loses (460 000 per year) are closely connected to this infection due to miscarriage. Syphilis is a possible cause of 270 000 annual low weight children birth and 270 000 annual premature births (WHO, 2004) [1].

A review of researches (carried out in 70–80s of XX century) released by S.K. Hira et al. (1990) demonstrated a wide range of seropositive among pregnant women attending antenatal clinics – from 0,03 % in Scotland to 16,0 % in Brazil [16]. In WHO database of STIs prevalence and incidence researches the proportion of seropositive among pregnant women is as follows: in Africa – from 0,2 % (Burkina Faso) to 8,4 % (South Africa); in America – from 0,09 % (Guatemala) and 5,8 % – (Haiti); in Southeast Asia – from 0,8 % (Indonesia) to 2,5 % (Bangladesh); Europe from 1,5 % (Finland) to 1,7 % (Azerbaijan); in the Western Pacific – from 0,1 % (the Republic of Korea) to 7,1 % (Papua New Guinea). However, WHO experts believe that data from published studies has a number of drawbacks, including the lack of data from many countries, the predominant inclusion of the urban population and women attending antenatal clinics, also the small samples, as a result the data of seropositive among pregnant is underestimated [1].

According to J. Valderrama et al. (2004) syphilis morbidity among pregnant women is in Peru 3,1 %, 6,2 % in Paraguay; the incidence of congenital syphilis – 1,4 per 1,000 new-born in El. Salvador, 12,0 per 1,000 new-born in Honduras [20]. Kwiek J.J. et al. (2008) diagnosed syphilis in 198 (5 %) cases among 3824 Malawi women on the third trimester of pregnancy. Researchers point to the need

to increase prenatal screening for syphilis all pregnant, researchers identify factors that influence the incidence of congenital syphilis: an underestimation of this problem, politicians, policy-makers, inadequate access to antenatal care and screening, discrimination surrounding the disease, sexually transmitted infections [17]. C.S. Rodrigues et al. (2004) while examining 3047 pregnant women in Brazil discovered syphilis in 1,7 %. The authors identify the incidence of risk factors for congenital syphilis: family income below one minimum wage; sexual initiation to 17 years, pregnancy before the age of 14; syphilis and other STIs or stillbirth in past medical history; HIV-positive partner. The authors note that only 43,0 % of women had six or more prenatal visits, and only 3,0 % had one serological screening for syphilis during the first trimester of pregnancy and re-screening test during the third trimester. [18] Epidemic of congenital syphilis in Baltimore took place against the backdrop of a sharp decline in the incidence of syphilis in the United States. The maximum incidence rate of congenital syphilis in the entire country (107 cases per 100 thousand. New-born) was recorded in 1991. By 1996, the incidence of congenital syphilis in the United States decreased by 72,0 % and amounted to 30 cases per 100 thousand new-born. In 1996, the incidence of congenital syphilis in Baltimore, was nearly 10 times more the national rate. In 1996, the incidence of congenital syphilis among African Americans in Baltimore and in the whole country amounted to 564 and 128 cases per 100 thousand new-born respectively. Clearly pronounced association among the incidence of congenital syphilis and race suggests the existence of certain factors (such as quality of health care), which could contribute to the development of the epidemic, mainly affecting the black population [2].

D.A. Gust et al. (2002) analyzed 14,627 cases of congenital syphilis in the United States, including 760 stillbirths, noted that, despite the decline in the incidence of congenital syphilis, the rate between mortality and incidence of congenital syphilis remained unchanged. This allowed the authors to conclude that the mortality associated with syphilis would continue to be an important issue of national health care [15].

During the period from 1993 to 1997, the time of maximum growth in the incidence of syphilis in Russia: in the Urals, Siberia and the Far East the incidence of syphilis among pregnant women increased 10,9 times, and their share amounted to 7,8 % of the total women with this diagnosis. The number of children with congenital syphilis in the region during this period increased from 33 to 268 cases (an increase of 8,1 times) [4]. The researchers note that one of the negative trends in the epidemiology of syphilis between pregnant women is the prevalence in this group early latent syphilis. So, during the pilot project held in Russia on surveillance for the registration of cases of congenital syphilis it was found that women, who gave birth to children with congenital syphilis, in 78,0 % of cases early latent syphilis was diagnosed.

Since 1999, in Russia there has been a decline in the incidence of congenital syphilis. So in 1999, 743 cases of congenital syphilis were reported, in 2002 – 619, in 2003 – 506, in 2013 – 131. But even isolated cases of congenital syphilis are the extraordinary phenomena for public health, because the due time diagnosis and treatment of infected pregnant possible to prevent fetal infection [19].

The ongoing registration of cases of congenital syphilis is the mark of the medical care quality for the pregnant women, the state of public health and the indicator reflecting the level of cooperation between obstetricians and gynecologists, dermatologists, pediatricians, and the effectiveness of the disease control activities [10]. According to the authors, among pregnant women with syphilis, untreated or inadequately treated, there is a high incidence of fetal death or stillbirth [14]. Delay of the therapy leads to inadequate, late treatment and hence increases the possibility of fetal infection, increases the probability of miscarriage, stillbirth and birth of a child with a syphilitic infection [9].

Thus, the current epidemiological situation dictates the need for urgent and effective prevention of syphilis among pregnant women and newborns.

Currently there are drastic socio-economic changes worldwide, as well as in Russia, that result in the emergence of new nuclear groups, such as refugees, immigrants, the unemployed and vulnerable groups, including orphans and children deprived of parental care, which requires the development of new indicator values for analysis and adequate preventive measures, as well as the development and introduction of modern medical technologies [6, 7, 11, 12].

So, to improve the quality in industrial systems in 1931. V. Shihart proposed the scientific method, which he called a cycle plan – do – check – act (PDCA). The researchers believe that the improvement of the quality approaches have to be designed through a planning change (plan) the fulfillment of the plans (do) evaluation of the effect (check) and wide introduction in practice (act). The effectiveness of these approaches in the clinical practice was proved by many researchers [3, 8, 9, 13].

The analysis of published data shows that, despite of the numerous studies devoted to the problem of syphilis, they deal mainly tendencies of dynamics and structure of morbidity. At the same time the comparative studies, taking into account social change and geographical features of patients' living and modern organizational strategies of prevention and control measures at the level of the federal subject needed to stabilize the epidemic. Research in this regard is of the socio-economic importance.

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COMPREHENSIVE STUDY OF MUSCLES OF EXTERNAL VAGINAL SPHINCTER AFTER VAGINAL BIRTH

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The aim of the study was to investigate the effect of giving birth vaginally in the functional state of the external sphincter of the vagina. A complex (ultrasound, vaginotenzometricheskoe, electromyographic) study of the function of the external sphincter of the vagina in 82 women who underwent normal vaginal delivery path (main group) and 64 with the lack of parity (control group). The results of a comprehensive study of revealed violations of the structure and anatomy in 36 (44%), decreased strength in 38 (46%), sensitivity, 34 (44%) in women after undergoing a normal delivery. The efficacy of a complex functional examination of the state of the vaginal sphincter after giving birth vaginally. Early diagnosis of disorders of the vaginal sphincter function may enable an early start of rehabilitation therapy and rehabilitation of disorders of the vaginal sphincter after childbirth.

Keywords: ultrasound diagnosis, vaginotenzometria, sensitivity, vaginal sphincter

In recent time, there is an increase in the frequency of diagnostics of a genital prolapse, which firmly hold the 3rd place in the structure of the indications for surgery in women of reproductive age. [1, 2]. "Rejuvenation" of insolvency of the pelvic floor muscles is today one of the most urgent problems of modern gynecology, has medical and social significance [2, 3, 4]. One of the earliest symptoms, indicates the beginning of prolapse of pelvic organs, is a "gaping pudendal cleft" that occurs due to a defect of musculo-fascial structures of the pelvic floor [10, 11]. Gaping pudendal cleft develops after birth, due to loss of a fulcrum (center of the crotch) and divergence of levator muscles, when damaged m.bulbospongiosus (obturator muscle of the lower third of the vagina), performs the function of circuit vaginal sphincter [4, 11]. Vaginal sphincter has a complex regulation mechanism that is characterized by its ability as an arbitrary (volitional) and involuntary (tonic) contraction [5]. Tonic contraction sphincter promotes closeness of the genital slit, but it can be supplemented and arbitrary (volitional) contraction at maximum contraction. The combination of tonic and forceful contractions observed during orgasm, which leads to the formation of "orgasmic cuff" [9]. The amount of tissue injury crotch according to various authors ranges from 3,9 to 67%, and not necessarily those injuries are diagnosed, and their further part remain undiagnosed [13]. Despite the large number of methods of surgical treatment of genital prolapse (there are more than 300) [1, 10], scientific papers devoted to the problem of failure diagnosis, and especially failure of the pelvic floor muscles, to date, very little. Available publications superficially reflect the problem of violations of the vaginal sphincter function.

On the one hand – it is the lack of objective methods and the technical complexity of; other low efficiency and the impossibility of objective assessment. Existing imaging techniques for today: – computer and magnetic resonance tomography; clinical – finger stretching levator muscle, scale L.J. McKenzie, S.A. Carson, crotch index; Laboratory: Molecular Genetics, immunohistochemistry, the definition of the content of estrogen, elastin, fibulin, matrix metalloproteinases, solving many of the problems, is still not able to answer all the questions of development and formation of genital prolapse. In proctology in the selection of patients for surgical treatment for incontinence is widely used "gold (triple) standard" survey, including the sensitivity of determination, strength and ultrasonography of the sphincter of the rectum. This technique has not found its application in gynecology. The current diagnostic methods in gynecology are not able to objectively assess the condition of the vaginal sphincter than likely due to the high incidence of recurrence and complications (60%) in women after surgical treatment for prolapse of internal genital organs [4, 5, 9, 13].

Purpose of the study. To determine the functional state of the external sphincter of the vagina before and after giving vaginal birth.

Materials and methods of research

We observed 146 women, 82 – underwent a year ago, a normal delivery (study group) and 64 – primigravidae (control group). Inclusion criteria were: a history of some term normal vaginal birth; exceptions: a birth trauma diagnosed with genital tract and external genitalia. Analysis of clinical and anamnestic data revealed that these groups of women according to age and body weight were comparable. The examination included: pan-clinical (medical history, bimanual vaginal examination); functional – inspection of the external genitalia at rest and

during straining, determine the sensitivity of the external genitalia; special – vaginotenzometric and ultrasound studies. The women at the time of the survey revealed no congenital and acquired diseases, traumatic injuries and diseases of the genital organs. Functional diagnostics of the external sphincter of the vagina was performed by three methods: the sensitivity of the determination of tissue included in the birth canal (the vulva), the definition of bulbocavernosus reflex; evaluation of power cuts sphincter of the vagina by computer vaginotenzometric research. Anatomy and muscle structure was determined by ultrasonographic examination. The sensitivity of the vulva agencies (large and small labia, clitoris) was determined by touch, pressure, pain and application. The results were evaluated as follows: the rate is reduced – (hypoesthesia), increased (hyperesthesia). Research of contractive force of sphincter of the lower third of the vagina, the main component of the external sphincter of the vagina, performed by computer vaginotenzometric study (CWTI). The method involves a device that allows to measure the force and a computer program to calculate the degree of failure of the vaginal sphincter. The device comprises a strain gauge, which allows to measure the effect type (tonic, strong-willed, maximum), and reduce the duration of the obturator muscles of the vagina [3, 6, 7, 8, 12]. Ultrasonography was performed ultrasound scanner ACCUVIX MEDISON firms with multifrequent vaginal probe, which allows to identify violations of the anatomy and defects in the structure of the vaginal sphincter. The results were compared with data obtained by V.I. Krasnopol'skiy et al. [11]. Based on the sensitivity of the results, gauge and ultrasound studies determined the functional state of the vaginal sphincter.

The information processed by a computer program “BIOSTATIKA” by descriptive statistics. The differences between the compared values recognized significant at ($p < 0,05$).

Results of research and their discussion

The sensitivity of the touch on the area of the external genitalia in the study group was normal in 46 (56 %), decreased in 34 (41,4 %), increased in 2 (2,4 %) in the control group,

respectively, 58 (90,6 %); 6 (9,4 %) hyperesthesia not revealed. The sensitivity in the labia minora was normal in 39 (47,5 %), decreased in 42 (51,2 %), increased in 1 (1,2 %) in the control group did not reveal violations. Felt pressure on the area of the labia majora 80 (97,5 %) women, weakly 2 (2,4 %) did not hyperesthesia was not detected in the control group, the sensitivity disturbances. Bulbocavernosny reflex (30 % of healthy women, this reflex is absent) was not detected in 31 (37,8 %), quickly led to a reduction of the anal sphincter muscles in 12 (14,6 %), weakened by 39 (47,5 %) women, in the control group, respectively, 16 (25 %); 20 (31,2 %); 28 (43,7 %). Functional status of the genital slit test alone showed no hiatus in 24 (29,2 %), dehiscence alone in 26 (31,7 %), straining in 32 (39 %) women in the control group, respectively: 56 (87,5 %); 5 (7,8 %); 3 (4,6 %).

Vaginotenzometric study of contractile ability in the study group showed: normal contractive force was observed in 38 (46,3 %), reducing the I-st degree in 32 (39 %), II-nd in 12 (14,6 %) women in the control group strength of contractions were normal. Comparison of the results of vaginotenzometric studies with clinical data obtained in determining the sensitivity and bulbocavernosus reflex revealed dependence of the degree of power failure cuts from clinical data. The results are shown in Table 1.

The results of the vaginotenzometric study of contractive force showed that vaginal sphincter deficiency depends on the severity of clinical manifestations, expressed in the contraction of the anal reflex and sensitivity of external genitalia tissues.

Table 1

The dependence of the degree of clinical manifestations of contraction failure of obturator muscles of the vagina

The nature of complaints	Lack of contraction power of obturator muscles of the vagina		
	Normal (<i>n</i> = 38)	I st degree (<i>n</i> = 32)	II-th degree (<i>n</i> = 12)
Genital sensitivity:			
– normal	30 (78,9 %)	23 (71,8 %)	6 (50 %)
– hyposthesia	6 (15,7 %)	6 (18,7 %)	4 (33,3 %)
– hyperesthesia	2 (5,26 %)	2 (6,2 %)	2 (16,6 %)
Bulbocavernosus reflex:			
– alive	35 (92,1 %)	29 (90,6 %)	9 (75 %)
– reduced	23 (7,89 %)	3 (9,37 %)	3 (25 %)

Table 2

Indicator	Lack of contractive force of obturator muscles of the vagina			
	Normal (n = 38)	I-st degree (n = 32)	II-st degree (n = 12)	Control group (n = 64)
Height of tendon center of the perineum, mm	12,1 ± 0,47	8,71 ± 0,25	5,73 ± 0,37	12,8 ± 0,35
Diastasis between the legs of obturator muscle mm	0,52 ± 0,52	1,35 ± 0,67	2,41 ± 0,34	–
Obturator muscle width at the level of the vaginal sphincter, mm	10,7 ± 0,23	7,52 ± 0,43	4,89 ± 0,54	14,3 ± 0,26

Ultrasonographic study of the state of the anatomy and structure of the obturator muscles of the vagina revealed that 36 (44%) of women of the main group there was a discrepancy of muscular structures of the pelvic floor anatomy normal. After birth in the study group revealed asymmetry position tendon center of the perineum in 45% of cases; uneven contours of muscle bundles in 26% of cases; hyperechoic inclusions in the muscles and intermuscular spaces in 23% of cases; the number of combinations was at 2,36 cases per woman. On the echogram women identified: reducing the height of the perineum tendinous center in 62 (75,6%); narrowing of the vaginal obturator muscle in 58 (70,7%); diastasis between the legs muscles in 46 (56%) women, the total number of combinations was at 2,43 cases per woman. In the control group ultrasonographic parameters of height, width, diastase comply with the norm, which was confirmed in clinical studies and have absent gaping vagina entrance.

Thus, despite the absence of visible deformations on the skin of the perineum, as well as in the area of the external genitalia, cracks and fractures in women after normal delivery vaginally, at ultrasonography were determined: changes in anatomy and muscle structure, reducing power cuts obturator vaginal muscles during computer vaginotenzometric study. Comparative results and echographic studies vaginotenzometric women of both groups are shown in Table 2.

Comparative evaluation of the results of the ultrasound scan and computer vaginotenzometric studies revealed dependence of the force on the muscle contractions of the structure and anatomy of the muscle. Detection by ultrasound in the obturator vaginal muscles after birth vaginally reduce the height, width and appearance of diastase, can be regarded as a hidden risk factor, inevitably leading to a decrease in strength of the external sphincter contractions of the vagina.

Thus, the birth vaginally can reduce the sensitivity of the external genitalia, disrupt the anatomy and structure of the obturator muscles of the vagina, force reductions obturator muscles of the lower third of the vagina, contributing to the development of vaginal sphincter deficiency. The resulting labor violations anatomy and muscle structure, lead to a change of height, width

and appearance of diastasis, which contributes to the further development of the development of irreversible changes, the loss of function of the obturator vaginal sphincter.

Conclusions

Carrying out complex study of the state of an external sphincter of the vagina after giving birth vaginally revealed a decrease in organ sensitivity, a part of the vulva, "hidden" anatomical changes in the anatomy and structure of the muscles of the perineum, the degree of failure of contractive force of vaginal sphincter at the stage of disorders of pelvic organs. Timely initiation of rehabilitation therapy and rehabilitation of the pelvic floor muscles in women after giving birth vaginally helps to prevent failure of the pelvic floor muscles in the future.

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THE FORMATION OF A SET OF INFORMATIVE FEATURES BASED ON THE FUNCTIONAL RELATIONSHIPS BETWEEN THE DATA STRUCTURE FIELD OBSERVATIONS

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The methods of forming the set of informative features – tuple linguistic variables to solve diagnostic tasks in a decision support system diagnostic decision making in medicine. It is proposed to use the parameters of the approximating polynomials, algebraic and logical functions, correlations and criteria exploration of clustering for the formation of a variety of signs and calculation of informativeness based on rank sorting. Formulate the paradigm of the formation of each alternative node of the hierarchical decision tree differential diagnostic private sets of informative indicators.

Keywords: informativeness, approximately polynomial, differential diagnosis, method of hierarchies, tuple linguistic variable

Modern medical service of the population based on the information and computer technologies to support various stages of treatment and diagnostic process [6]. The development of the theoretical basis and software tools of artificial intelligence for solving tasks of classification and pattern recognition, forecasting led to the creation of various specialized automated systems of support of acceptance diagnostic solutions (ASSADS) for the tasks of clinical medicine and training of health workers [1, 2, 6, 16].

Design specialized ASSADS in medicine is based on the formation of adequate and effective knowledge base on the basis of decisive diagnostic rules synthesized and tested on clinically confirmed material, each element of which is characterized by a certain multiple of the recorded monitored and managed characteristics of the biological object or process. The problem of forming the set of informative features is important because the quality of its resolution depends on the efficiency of further diagnosis, as with the use and without the use of automated ASSADS.

From a medical point of view, the formation of extensive information, many signs bear semantic load as the formation of the tuple linguistic variables for the symptoms of a particular disease or condition of the body.

Feature build ASSADS for clinical medicine is the use in real conditions small amounts of training and examination (control) of samples of research results state of the biological object or process. Necessary and sufficient conditions imposed on the volume of the investigated material from the point of view of classical evidence-based medicine almost unrealizable in terms of the analysis of open

systems (which are objects), vagueness and inaccuracies of recorded data in conditions of uncertainty. In addition, the same system of signs may have an acceptable informative for solving a recognition task and a completely unsuitable for another [13].

Formation tuple linguistic variables (many informative features) is a subject of many studies, fundamental of which are the work of G.S. Foreheads (e.g. [10]). Consider a number of methods of forming a tuple (as previously studied and proposed by the authors) based on the methodologies: the analytic hierarchy process (ordering is based on has go obtained grades – weights), regression analysis and self-organization of structural-parametric identification of mathematical models of the method of group accounting of arguments, or logical functions (identified, for example, logic algorithms, artificial neural networks [5]).

In the beginning of the study the characteristics set non-formalized way, with the help of experts (the Delphi technique or the fuzzy Delphi method) [7], recommended for the analysis of biomedical information due to its registration) or forcibly, taking into account the personal experience and knowledge of the researcher and analysis of specialized literature.

Then, it is proposed to apply the following, proven in practice methods and algorithms [8, 9]: Full – exhaustive of various combinations of signs to achieve acceptable diagnostic effect, Add – sequentially adds features; Del – sequential elimination of symptoms until disappearance of the previous diagnostic effect; AddDel – the simultaneous execution of the procedures of the algorithms Add and Del; Prob – for each attribute are determined by weight and then applied the procedure of

the above algorithms; fractal analysis applied to the tensor data (e.g., diagnosis of Parkinson's disease); Grad is the same as algorithm AddDel, but the inclusion and exclusion of indicators in the resulting lot is not "one", and "complex".

(Note that as features are directly measured and latent or integral, as the latter can be used indicators of system organization whose application is considered in [3, 4]).

These algorithms analyze the characteristics of the data structure, which is suggested to use the coefficients of pair correlation and/or the distance to the cluster centers. In this case, it is recommended to apply criteria – quality indicators [7]: Given index, indices of density, total Giprobium, the index of the Davis – Bouldin. I.e., a small volume of the sample applied these algorithms and indicators of the quality of a certain value, the generated sets of linguistic variables consisting of specific symptoms. In this case, the researcher specifies the "freedom of choice decision-making" – the number of sets from which to exam the sample according to the external criteria retained are the most informative.

If the implementation of exploratory cluster analysis is impossible, it is proposed that a simple and semantically transparent method in the final set of linguistic variables retained those characteristics that have the least correlation with the left and the highest with "discarded".

For deciding on the inclusion of symptom information, many are encouraged to use the methodology of decision making T.L. Saaty [14]. Create a matrix of preference of the elements of W , which elements to indices i and j differ by 9 degrees (the sign of i is preferable than attribute j): $w_{i,j} = 1$ – equal preference, $w_{i,j} = 2$ – the low degree of preference, $w_{i,j} = 3$ – medium preference, $w_{i,j} = 4$ – a preference above average, $w_{i,j} = 5$ – moderately strong preference, $w_{i,j} = 6$ – a strong preference, $w_{i,j} = 7$ – very strong (obvious) preference, $w_{i,j} = 8$ – a very, very strong preference, absolute preference, $w_{i,j} = 9$ – absolute preference.

Analysis of the matrix allows conversion of the matrix to group the signs by clusters of preference with the IJ-conversion. Is a permutation of the row I with row J in the matrix of modified preferences so that around the main diagonal of the clustered matrix elements with the highest values. The stop condition of the process of permutation acts achieve the mini-

mum sum-of-products of the element values of the modified preference matrix W^* the distance of this element from the main diagonal according to the formula:

$$\left(\sum_{i=1}^N \sum_{j=1}^N (w_{i,j}^* \cdot |j-i|) \right) \rightarrow \min, \quad (1)$$

where $w_{i,j}^* = \begin{cases} w_{i,j}, & \text{for } i < j; \\ 10 - w_{i,j}, & \text{for } i > j; \end{cases}$ N – the number of analysed characteristics before selection.

The degree of preference are proposed to determine by way of order signs on ranks of informativeness in descending order. The rank of informativeness metric for SPDR diagnostic character proposed to determine one way (or all – given the known algorithms of decision making on several alternative two).

Method 1. – By the maximum gradient of the functional differences (MGR) with or without taking into account latent integral indicator of systemic organization of functional States (proposed and approved by school A.V. Zavyalov – [3]);

Method 2. By analysing the structure and the parameters of the approximating polynomial Gabor [15].

Method 3. By analysing the structure and analysis of Boolean functions obtained by applying the algorithms and software logic, artificial neural networks [5].

Method 4. In terms of clustering quality [7].

In the first proposed method, for each alternative class is the matrix of pair connectivity (for example, the absolute value of the Pearson correlation coefficient) between variables, whose elements equal zero, if the calculated value is less than a certain threshold level. Classes for characteristics that are candidates for inclusion in the informative tuple linguistic variables are determined by the number of links – $Ks_i^{w_0}$ and $Ks_i^{w_1}$ and calculated differences

(gradients) $G_i = |Ks_i^{w_0} - Ks_i^{w_1}|$, for which the signs of i in descending order the Ks_i . For the ordered set of indicators are the ranks Rn_i by the formula:

$$Rn_i = \begin{cases} N, & \text{for } i = 1; \\ Rn_i - 1, & \text{for } (i \neq 1) \& (G_i \neq G_{i-1}); \\ Rn_i, & \text{for } (i \neq 1) \& (G_i = G_{i-1}). \end{cases} \quad (2)$$

The vector $\{Rn\}$ is the matrix of preferences W , the values of the elements of which are calculated in accordance with the gradation proposed by T.L. Saaty (presented earlier) or cognitology or automatically – by the formula

$$w_{i,j} = \begin{cases} \left[\frac{9 \cdot x + \max x - 9 \cdot \min x}{\max x - \min x} \right], & \text{for } i < j ; \\ 1 - \frac{9 \cdot x + \max x - 9 \cdot \min x}{\max x - \min x}, & \text{for } i > j , \end{cases} \quad (3)$$

where $x = |Rn_i - Rn_j|$; $\max x = \max_i |Rn_i - Rn_j|$;

$\min x = \min_i |Rn_i - Rn_j|$; $w_{i,i} = 9$.

The second method of forming a matrix of preferences of information content of signs involves the use of the approximating polynomial Gabor – formula (4), since the increase in the degree of the polynomial the accuracy of the approximation, they approximated the function increases and then decreases – this allows you to apply a polynomial in the self-organizing algorithms of the group method of accounting arguments (GMDH) [11, 12]. Note that the GMDH allows handling samples of small volume and building the Gabor polynomial at the interpolation nodes, the number of which is smaller than the maximum degree of the polynomial.

$$Y(Z) = A_0 + \sum_{k=1}^L \left(A_k \cdot \prod_{i=1}^N z_i^{p_{i,k}} \right), \quad (4)$$

where $Z = \{z_1, z_2, \dots, z_N\}$ – a lot of arguments; $Y(Z)$ is the response function (approximant); L is the number of terms in the polynomial; A_k – the identified model parameter; N is the number of arguments

The information content of the indicator of the set $\{X\}$ is proposed to define the following methods:

1 method – based nonlinear discriminant functions identified for class w_1 and w_0 (“ill” –

“not ill”, “condition 1” – “condition 2” – i.e., assumes a binary hierarchical decision tree). According to the recommendations of [6] for a class w_0 sets the value of the response function that lies in the range $(-1 \pm e)$ and having

a uniform distribution $\left(e = \frac{1}{N_0 + N_1} \right)$, where

N_0, N_1 – volume training samples for class w_0 and w_1 , respectively). Similarly formed response for a class w_1 in the range $(1 \pm e)$ of the formula (4) and using the orthogonal algorithm GMDH is the structural-parametric identification of a polynomial (4).

Next, we determine the share of influence of each term in formula in each class:

$$V_k^{w_{0/1}} = \frac{A_k^{w_{0/1}} \cdot \prod_{i=1}^N x_i^{p_{i,k,w_{0/1}}}}{\sum_{j=1}^L \left(A_j^{w_{0/1}} \cdot \prod_{i=1}^N x_i^{p_{i,j,w_{0/1}}} \right)}, \quad (5)$$

where the operator (\overline{ZZ}) – represents the modal value of ZZ .

Then, for each argument included in the k -th term is calculated the weight of multipliers by the formula

$$M_{i,k}^{w_{0/1}} = \frac{|p_{i,k,w_{0/1}}| \cdot |\ln(\overline{x_i})|}{\sum_j^N |p_{i,j,w_{0/1}}| \cdot |\ln(\overline{x_i})|}. \quad (6)$$

In the end, determines the value of additive-multiplicative effect of indicator x_i on the response function (according to the parameters of the discriminant approximant) for each alternative class, according to the formula

$$AM_{x_i}^{w_{0/1}} = 1 - \prod_{k=1}^L (1 - V_k^{w_{0/1}} \cdot M_{i,k}^{w_{0/1}}). \quad (7)$$

Introduces a relative error of “difference” $\varepsilon < 0,5$ (recommended of $0,01 \leq \varepsilon < 0,1$) and recalculated the values of the multiplicative effects in $[AM_{x_i}^{w_{0/1}}, \varepsilon]$ by the formula (8):

$$[AM_{x_i}^{w_{0/1}}, \varepsilon] = \begin{cases} AM_{x_j}^{w_{0/1}}, & \text{if } (1 - \varepsilon) \cdot AM_{x_j}^{w_{0/1}} < AM_{x_i}^{w_{0/1}} \leq (1 + \varepsilon) \cdot AM_{x_j}^{w_{0/1}}; \quad j = \overline{1, N}, j \neq i. \\ AM_{x_i}^{w_{0/1}}, & \text{otherwise,} \end{cases} \quad (8)$$

Next, for each class (w_1 and w_0) signs (linguistic variables) out in descending order of values of $[AM_{x_i}^{w_0}, \varepsilon]$. In the end, are formed two-tuple of signs for classes: $\{X^{w_0}\}$ and $\{X^{w_1}\}$. According to the obtained tuples by applying the formula (2), replacing G_i for $[AM_{x_i}^{w_0}, \varepsilon]$ generated two sets of ranks Rn^{w_0} and Rn^{w_1} .

By Rn^{w_0} and Rn^{w_1} finalized many informative features according to a specific researcher volume $NI \leq N$ consisting of elements $XI_j = (x_j / Inf(x_j)) / j = \overline{1, NI}$, which are imported from the original set $\{X\}$ according to Rn^{w_0} and Rn^{w_1} in descending order by serial connection in descending order of ranks. In case of alternative situations inclusions apply one of the following: «handcontol» (knowledge and experience of the researcher), Monte-Carlo, or by reducing the magnitude of ε , and repeat the procedure of ranking.

The information content of sign $Inf(x_j)$ proposes is determined by the formula

$$Inf(x_j) = \frac{\max(Rn_{x_j}^{w_0}, Rn_{x_j}^{w_1})}{\max_{j=1, NI}(\max(Rn_{x_j}^{w_0}, Rn_{x_j}^{w_1}))}, \quad (9)$$

where $Rn_{x_j}^{w_0}, Rn_{x_j}^{w_1}$ – value of rank metric x_j in w_0 and w_1 , respectively.

2 method of forming the set of informative indicators, and the calculation of $Inf(x_j)$, based on preliminary identification of the approximating polynomial Gabor (4) for each indicator from the initial set $\{X\}$. In this case, the identification procedure is repeated N times for each class w_0 and w_1 , sequentially forming the set $\{Z\} = \{X\} - x_j$ and responses $Y(Z) = x_j$.

As a result, generated many approximants for alternative classes:

$$\{App\}_{M_0}^{w_0} \text{ and } \{App\}_{M_1}^{w_1}$$

$$(M_0 \leq N, M_1 \leq N, M_0 \neq 0, M_1 \neq 0).$$

It should be noted that approximate with values of coefficient of determination less than a certain researcher thresholds in further analysis is not involved. If the result of selection produced an empty lot approximants, it consistently returned approximant with the highest values of determination coefficients. The minimum amount many approximateness “freedom of choice” (the recommended value of 3 to 7).

Next, for each alternative class formed matrix $(ApX)_{M_0, N}^{w_0}$ and $(ApX)_{M_1, N}^{w_1}$, the number of rows which are equal, respectively, M_0 and M_1 , number of columns – number of indicators the set $\{X\}$, the value of the element matrices are calculated using formulas similar to (5)–(8). On the resulting matrices to form two vectors $(SapX)_N^{w_0}$ and $(SapX)_N^{w_1}$ (for each class), the values of which are calculated by formulas (10):

$$\begin{aligned} SapX_i^{w_0} &= \max_j \left((ApX)_{j,i}^{w_0} \right) \times \\ &\times \sum_{j=1}^{M_0} \left((ApX)_{j,i}^{w_0} \right) / i = \overline{1, N}, j = \overline{1, M_0}; \\ SapX_i^{w_1} &= \max_j \left((ApX)_{j,i}^{w_1} \right) \times \\ &\times \sum_{j=1}^{M_1} \left((ApX)_{j,i}^{w_1} \right) / i = \overline{1, N}, j = \overline{1, M_1}. \end{aligned} \quad (10)$$

For each class (w_1 and w_0) indicators x_i are sorted in descending order of values of $[SapX_i^{w_0/w_1}, \varepsilon]$. Thus, a formed two-tuple of indices for alternative classes: $\{X^{w_0}\}$ and $\{X^{w_1}\}$.

The job ε , the formation of tuples, and further application of formula (2), the formation of many informative features $XI_j = (x_j / Inf(x_j)) / j = \overline{1, NI}$ and calculating the information content is then the same as discussed in method 1 procedures.

In method 3 linguistic variables take values “true” (“1”) or false (0). With a certain accuracy (diagnostic performance in medical applications), the approximant of the response is represented by the formula (11) (indices and variables have counterparts in (2)).

$$YB(ZB) = \bigcup_L^{k=1} \left(\bigcap_N^{i=1} (zb) \right), \quad (11)$$

where $f_i(zb) \in \{zb, \bar{z}, 1\}$; $zb \in \{ZB\}$ – logic exception.

For possible applications of the approaches described in method 1 and method 2 from (11) to proceed to the analogue of the polynomial Gabor $YB^*(ZB^*)$ for Boolean functions in the

form of formula (12), based on analogues of arithmetic operations logical functions.

$$YB^*(ZB^*) = 1 - \prod_{i=1}^N (1 - zb_i^*)^{p_k},$$

$$p_k = \{0, 1\}, zb_i^* = \{0, 1\}. \quad (12)$$

Then apply formula (5) to (10) and conclusions from the consequences.

Method 4 proposes to implement the ordering of attributes (linguistic variables) with the subsequent calculation of grades, the inclusion in an informative tuple and the calculation of informativeness similar to the previously discussed methods on the basis of hyperobject H (and/or index density PD), considered in [7], conducting exploratory clustering procedure by calculating the value of changes in the quality of clustering dH_{x_j} as the exception from consideration of the analyzed characteristic by the formula

$$dH_{x_j} = \frac{\sqrt{\left[\left(\det(R_{w_0, \{X\}})\right)^2 + \left(\det(R_{w_1, \{X\}})\right)^2\right]} - \sqrt{\left[\left(\det(R_{w_0, \{X\} - x_j})\right)^2 + \left(\det(R_{w_1, \{X\} - x_j})\right)^2\right]}}{\sqrt{\left[\left(\det(R_{w_0, \{X\}})\right)^2 + \left(\det(R_{w_1, \{X\}})\right)^2\right]}}, \quad (13)$$

where $R_{w_0, \{X\}}; R_{w_1, \{X\}}$ – is a covariance matrix into the corresponding classes w_0 and w_1 in the initial set $\{X\}$; $R_{w_0, \{X\} - x_j}; R_{w_1, \{X\} - x_j}$ – is the correlation matrix of the classes w_0 and w_1 the set $\{\{X\} - x_j\}$ (excluded sign x_j ; $\det(\quad)$ – compute the determinant of the matrix.

Under covariance matrices here are the matrices calculated by the formulas

$$R_{w_0, \{X\}} = \frac{1}{N_0} \cdot \sum_{i=1}^{N_0} (x_{w_0, i} - v_{w_0}) \cdot (x_{w_0, i} - v_{w_0})^T;$$

$$R_{w_1, \{X\}} = \frac{1}{N_1} \cdot \sum_{i=1}^{N_1} (x_{w_1, i} - v_{w_1}) \cdot (x_{w_1, i} - v_{w_1})^T,$$

where N_0, N_1 – is the number of objects in classes w_0 and w_1 , respectively; $x_{w_0, i}, x_{w_1, i}$ – coordinate vector of the i -th object in the respective clusters; v_{w_0}, v_{w_1} – vectors of coordinates of the centers of the classes w_0 and w_1 .

Note that dH_{x_j} can take both positive and negative values – the latter option means that after breeding the quality of the classification according to the General hyperonym H deteriorated.

The disadvantage of this method is the analysis of exception characteristic as a single representative, rather than together with some other tuples. Procedure complete enumeration of different variants of demand in this case, large computational resources are usually, with negligible loss of diagnostic quality (or lack thereof) in the end.

In conclusion, we note that:

1. In the proposed methods, the information content characteristic is determined for each “branching” of the tree of decision-making about the object or process alternative classes. Thus, from the paradigm definition, equal informative tuples linguistic variables for the full set of alternative classes (and, subsequently, the synthesis

of diagnostic rules), it is proposed to move to the paradigm of determining the informational content of the basis for each hierarchy, differential division.

2. If in the formula (2) to move from $zb_i^* = \{0, 1\}$ go to $zb_i^* =]0, 1]$, then the binary characteristic value, go to the interval estimates of the characteristic values of membership functions in fuzzy sets or functions of belief in the theory of decision-making.

Thus, in the course of the study developed a new nonparametric methods of formation of informative tuples describing observable and/or controllable signs (linguistic variables) of the biological object (recorded, calculated, and latent, in numeric and logical metrics), which allows in conditions of semi-structured imprecise data necessary for the synthesis of diagnostic decision rules knowledge bases decision support systems in various segments of the automation of intellectual activities of decision makers on the basis of modern computer and information technologies.

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INFLUENCE OF CONSTANT MAGNETS ON THE ORBITAL ANGULAR MOMENTUM

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The purpose of the article – the study of the effect of magnetic fields on the atoms of different natural elements. When making an atom in a magnetic field, the precession (change movement). This article will consider the introduction of an atom in two external magnetic fields of opposite poles.

Keywords: magnetic moment of the magnet, the precession, the pole, the atom, the induction field, the electron

Phenomena in which the momentum of the movement of the body is changing due to the influence of the magnetic field is called a magnet. Since the substance is in an external magnetic field, its magnetic permeability less than unity, the magnetic induction field in the material is less than the magnetic induction of the external field [1]. Therefore, to be considered one of the magnetomechanical phenomena – the precession of the magnetic moments in a magnetic field (Fig. 1)

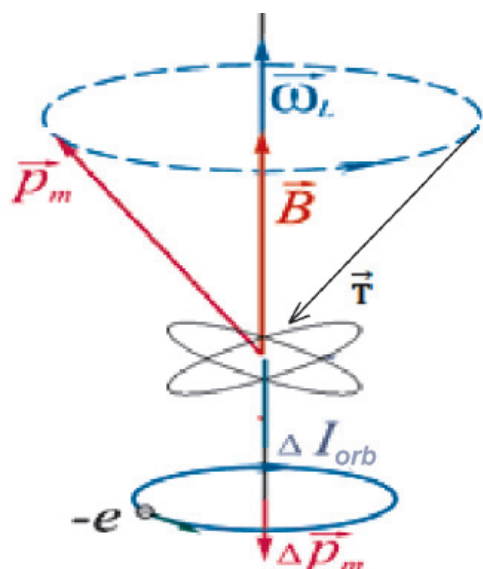


Fig. 1. The precession of the magnetic field

Suppose that an electron in an atom moves in a circular orbit, the plane of which is perpendicular to the vector of the magnetic field. Action on the electron Lorentz force will reduce the force of attraction of the electron to the nucleus. The centripetal force will be equal to the difference between the Coulomb force of attraction of the electron to the nucleus, and the Lorentz force [2]. As a result, change the angular velocity of the electron motion in a circular orbit. It will be different from that which

the electron had in the absence of an external magnetic field. If an external alternating magnetic field (current generators), the change in the angular velocity of the electron motion occurs during growth of the magnetic field that is brought atom. The increase in the magnetic field acting on the atom, there is a finite time. Thus there is an induction eddy electric field acting on the electron in an atom. The intensity of this field is tangential to the electron orbit [3]. At an arbitrary location of the electron orbit with respect to the magnetic induction vector, orbital magnetic moment of the electron makes an angle α with the direction of the magnetic field. In this case, the orbit to precess around the direction of the induction vector. This means that the orbital vector perpendicular to the orbital plane, keeping unchanged the angle of inclination α to the pitch direction is rotated around the induction of an angular velocity different from the initial one. Such rotation of the vector around the direction of the magnetic induction at a constant angle α is called the Larmor precession. The influence of magnetic field on the orbit of the electron is reflected in the Larmor theorem: the only result of the influence of magnetic field on the electron orbit in an atom is the precession of the orbit of the vector and an angular velocity around the axis passing through the nucleus of an atom and parallel to the vector of the magnetic field [4]. Precession motion orbit leads to an additional current orbital and the corresponding induced orbital magnetic moment. Changed the orbital vector is directed opposite to the vector of magnetic induction. Thus, the electron orbits atom by an external magnetic field perform a precessional motion, which is equivalent to a circular current.

Estimated effect of external magnetic fields on the ground

When making material in a magnetic field with induction \vec{B} on an electron moving in the

direction of the orbital vector, torque acts on the part of the magnetic field \vec{M} :

$$\vec{T} = \vec{P}_{\text{magn}} \times \vec{B}, \quad (1)$$

where \vec{P}_{magn} – orbital vector;

$$\vec{P}_{\text{magn}} = g\vec{L}_e, \quad (2)$$

where g – gyromagnetic ratio. The ratio P of the electron charge to its mass; \vec{L}_e – moment of the electron pulse

$$g = \frac{1,6 \cdot 10^{-19}}{9,1 \cdot 10^{-31}} = 175 \cdot 10^{-9} \frac{\text{Kl}}{\text{Kg}}. \quad (3)$$

Such orbital vector under the influence of the magnetic moment will move in a circle about the magnitude of the magnetic induction, thus already created process. If the static magnetic field magnetic flux density 2,6 T (with respect to two back-directed magnets), to make a substance with the same gyromagnetic ratio, the magnetic moments will precess around the magnetic induction vector at an angular velocity:

$$\begin{aligned} \omega &= g \cdot B = 175 \cdot 10^{-9} \cdot 2,6 = \\ &= 455 \cdot 10^{-9} \text{ Kl} \cdot \text{T/kg} = \text{s}^{-1}; \end{aligned} \quad (4)$$

$$\text{Kl} \cdot \text{T/kg} = \text{A} \cdot \text{c Kg}/(\text{A} \cdot \text{s}^2)/\text{kg} = \text{s}^{-1}.$$

Precession of the orbital angular momentum of an electron in an atom manifests the appearance of additional orbital current directed opposite to the current I :

$$\Delta I_{\text{orb}} = e \frac{\omega}{2\pi} = 728 \cdot 10^{-28} \text{ A}. \quad (5)$$

At this point, additional current generates additional traffic [5]. In this case – the anti direction of the magnetic induction of the orbital magnetic moment:

$$\Delta \vec{P}_{\text{magn}} = -\Delta I_{\text{orb}} \cdot S = -S \cdot 728 \cdot 10^{-28} \text{ A}, \quad (6)$$

where S – area of the projection of the electron orbit in the plane.

Experimental section

The study was conducted under standard conditions. The object of the experience of taking the wet loam, soil category – 2. With a certain distance, the magnetic field effect on the loam. The total number of experimental tests for each distance – 40 pieces, except for the fifth position. There were five such provisions. In the first position of no change is happening because of the lack of a magnetic field.

Second position – this position is close to the targeted one another eponymous poles (Fig. 2). The result of this arrangement, the ground will be more cohesive

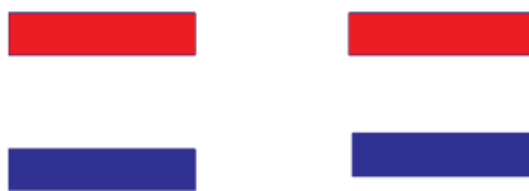


Fig. 2. Second position

Third position – this is the position of the proximity of opposite magnets

The result of this arrangement will be a multitude of adhesion primer in the arrangement of the magnets, not strange in places lack magnets cohesive soil does not occur. Fourth position – the position of the large distance between the permanent magnets (Fig. 3). With this arrangement proved the inadvisability of any installation of magnets. And the result of this will be the greatest concentration of soil.

The fifth position – a position of the optimal arrangement of the magnets, as loam becomes the most fragile (Fig. 4).

$$Dm = 0.7 \cdot \text{length}; (22 \times 5 \times 9). \quad (7)$$

If the magnet will have a length, a width and a height of 22,5 and 9 mm, respectively, the distance between magnets should be approximately Dm seventh of the length of the magnet.



Fig. 3. Third position and Fourth position

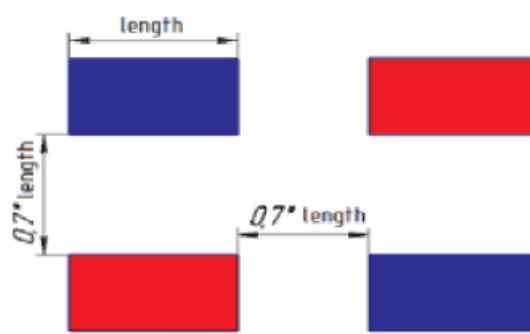


Fig. 4. A position of the optimal arrangement of the magnets

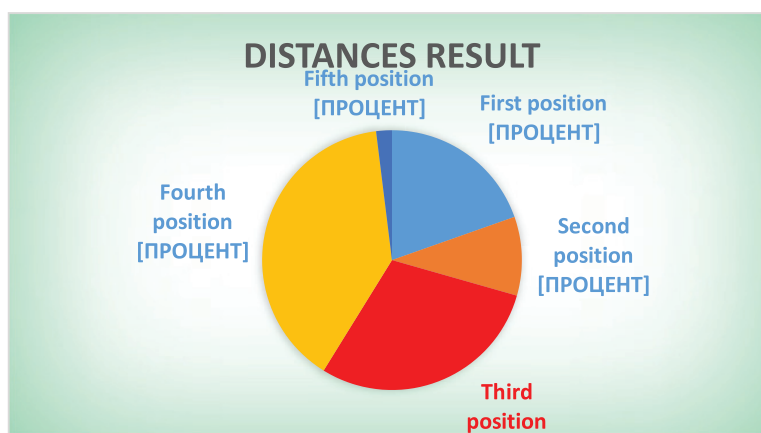


Fig. 5. Diagram of the results of experimentation. % – the percentage of adhering soil relative to the total volume

Thus, these studies have shown the effectiveness of magnets in the correct placement of the panel.

And in general, it proved experimental way, the theory of the precession of the magnetic moments in a magnetic field. Such an arrangement is appropriate and effective in the field of cleaning. As a result of charting studies (Fig. 5).

Conclusions: With the use of magnetic elements can achieve many effects,

thereby producing completely new action with the soil.

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NONTANGENTIAL SUMMABILITY OF CONJUGATE FOURIER SERIES

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We consider the linear means of the conjugate Fourier series of integrable 2π -periodic function $f(y)$, generated by summing infinite sequence $\lambda(h)$. For the positive values of h , and any x , the behavior of λ -means is investigated, when a point (y, h) tends to $(x, 0)$ within the fixed "corner" area $\Gamma(x)$. In the case of the summation sequences, decreasing quickly enough, the estimates of strong and weak type of corresponding maximal operators are obtained. We establish the convergence of λ -means to the conjugate function, when (y, h) tends to $(x, 0)$ along the paths within $\Gamma(x)$. An important special case of received statements is a non-tangential convergence of λ -means for summation methods of exponential type. Results include classical case of Poisson-Abel means.

Keywords: conjugate series; estimates of the weak and strong type; non-tangential summability

Formulation of the problem

Denote $Q = [-\pi, \pi]$; let $L^p = L^p(Q)$ be Lebesgue class of 2π -periodic functions of a real variable, for which

$$\|f\|_p = \left(\int_Q |f(x)|^p dx \right)^{1/p} < \infty, \quad p \geq 1,$$

set $L = L(Q) = L^1(Q)$. Let

$$\lambda = \{\lambda_k(h), \quad k = 0, 1, \dots; \lambda_0(h) = 1\} \quad (1)$$

be an arbitrary sequence infinite, generally speaking, determined by values of parameter $h > 0$. In this paper we study the behavior of λ -means

$$\tilde{U}_h(f) = \tilde{U}(f, y; \lambda, h) = -i \sum_{k=-\infty}^{\infty} (\operatorname{sgn} k) \lambda_{|k|}(h) c_k(f) \exp(iky), \quad (2)$$

of conjugate Fourier series

$$-i \sum_{k=-\infty}^{\infty} (\operatorname{sgn} k) c_k(f) \exp(iky); \quad c_k(f) = \frac{1}{2\pi} \int_{-\pi}^{\pi} f(t) \exp(-ikt) dt, \quad k = 0, \pm 1, \pm 2, \dots; \quad (3)$$

when $(y, h) \rightarrow (x, +0)$ along the paths within

$$\Gamma_d(x) = \left\{ (y, h) \mid y \in [-\pi, \pi], \quad 0 < h < 1, \quad \frac{|y-x|}{h} \leq d \right\}, \quad d = \text{const}, \quad d > 0$$

(tending along non-tangential paths). We generalize and strengthen some of the results of [3, 4, 5].

Maximal operators

Denote

$$f^* = f^*(x) = \sup_{\eta > 0} \frac{1}{\eta} \int_{x-\eta}^{x+\eta} |f(t)| dt; \quad \tilde{f}^* = \tilde{f}^*(x) = \sup_{\eta > 0} \left| \int_{|\eta| \leq \pi} \frac{f(x+t)}{2 \operatorname{tg} \frac{t}{2}} dt \right|; \quad (3)$$

f^* and \tilde{f}^* are defined ([1], vol. 1, p. 60, 401–402, 442, 443) for every $f \in L$; moreover, in this case there is almost everywhere a conjugate function

$$\tilde{f}(x) = -\frac{1}{\pi} \lim_{\eta \rightarrow +0} \int_{|\eta| \leq \pi} f(x+t) \operatorname{ctg} \frac{t}{2} dt.$$

In accordance with λ -means (2), introduced above, we define maximal operator

$$\tilde{U}_*(f) = \tilde{U}_*(f, x; \lambda) = \sup_{(y, h) \in \Gamma_d(x)} |\tilde{U}(f, y; \lambda, h)|. \quad (4)$$

For each $h > 0$ denote $m = \left\lfloor \frac{1}{2dh} \right\rfloor$. The basis of the results of the behavior of means (2) is the following statement.

Theorem 1. Let the sequence (1) decreases so rapidly that

$$N|\lambda_N(h)| + N^2|\Delta\lambda_N(h)| = o(1), \quad N \rightarrow \infty, \quad (5)$$

and

$$\sum_{k=1}^{\infty} \frac{k(k+m)}{m} |\Delta^2 \lambda_k(h)| \leq C_\lambda. \quad (6)$$

Then, for all $f \in L(Q)$ the estimate

$$\tilde{U}_*(f, x; \lambda) \leq C_\lambda (f^*(x) + \tilde{f}^*(x)) \quad (7)$$

holds.

Here and below C will represent constants, which depend only on clearly specified indexes.

Auxiliary assertion

Consider ([2], vol. 1, pp. 86, 153) the conjugate Dirichlet kernel

$$\tilde{D}_k(t) = \sum_{v=1}^k \sin vt = \frac{1}{2 \operatorname{tg} \frac{1}{2} t} - \frac{\cos\left(k + \frac{1}{2}\right)t}{2 \sin \frac{1}{2} t}$$

and the conjugate Fejer kernel

$$\tilde{F}_k(t) = \frac{1}{k+1} \sum_{v=0}^k \tilde{D}_v(t) = \frac{1}{2 \operatorname{tg} \frac{1}{2} t} - \tilde{F}_k(t), \quad (8)$$

where $\tilde{F}_k(t) = \frac{\cos(k+1)t}{2(k+1) \sin^2 \frac{1}{2} t}$; $k = 0, 1, \dots$;

$$\tilde{D}_0(t) = \tilde{F}_1(t) = 0.$$

Lemma. For all $k = 0, 1, \dots$ and $(y, h) \in \Gamma_d(x)$ the estimate

$$\left| \int_{-\pi}^{\pi} f(t) \tilde{F}_k(y-t) dt \right| \leq C \left(1 + \frac{k}{m} \right) (f^*(x) + \tilde{f}^*(x)) \quad (9)$$

holds.

Proof. Let's start with a few comments. At $k = 0$ the left side of (9) vanishes, so consider $k = 1, 2, \dots$

If $(y, h) \in \Gamma_d(x)$, then, obviously, $|y-t| \geq |x-t| - dh$. Hence, for x and t , such that $|x-t| \geq \frac{1}{m} \geq 2dh$, the estimate

$$|y-t| \geq \frac{1}{2} |x-t| \quad (10)$$

is valid. Indeed, (10) follows from inequality $|y-t| \geq |x-t| - dh \geq \frac{1}{2} |x-t|$ for all $(y, h) \in \Gamma_d(x)$. Then, by definitions (8), the estimates

$$|\tilde{F}_k(t)| \leq Ck; \quad |t| \leq \pi;$$

$$|\tilde{F}_k(t)| \leq C \frac{1}{kt^2}; \quad 0 < |t| \leq \pi \quad (11)$$

hold.

Assume firstly $k \leq m$ and obtain the relation (9). By (11) we have

$$\begin{aligned} \left| \int_{-\pi}^{\pi} f(t) \tilde{F}_k(y-t) dt \right| &= \left| \int_{x-\pi}^{x+\pi} f(t) \tilde{F}_k(y-t) dt \right| = \left| \int_{|x-t| \leq \pi} f(t) \tilde{F}_k(y-t) dt \right| \leq C \left(k \int_{|x-t| \leq \frac{1}{k}} |f(t)| dt + \right. \\ &\quad \left. + \int_{\frac{1}{k} \leq |x-t| \leq \pi} f(t) \operatorname{ctg} \frac{y-t}{2} dt \right) + \int_{\frac{1}{k} \leq |x-t| \leq \pi} |f(t)| \cdot |\tilde{F}_k(y-t)| dt = \\ &= C (J_1(x, k) + J_2(x, k) + J_3(x, k)). \end{aligned} \quad (12)$$

It is obvious that

$$J_1(x, k) \leq f^*(x). \quad (13)$$

Further,

$$J_2(x, k) = \left| \int_{\frac{1}{k} \leq |x-t| \leq \pi} f(t) \operatorname{ctg} \frac{x-t}{2} dt + \int_{\frac{1}{k} \leq |x-t| \leq \pi} f(t) \frac{\sin \frac{x-y}{2}}{\sin \frac{x-t}{2} \sin \frac{y-t}{2}} dt \right|.$$

Taking into account (10), we have

$$|J_2(x, k)| \leq C \left(\tilde{f}^*(x+h) \int_{\frac{1}{k} \leq |x-t| \leq \pi} |f(t)| \frac{1}{(x-t)^2} dt \right).$$

Here

$$\int_{\frac{1}{k} \leq |x-t| \leq \pi} |f(t)| \frac{1}{(x-t)^2} dt \leq Ck \sum_{j=1}^S \frac{k}{(2^{j-1})^2} \int_{\frac{2^{j-1}}{k} \leq t \leq \frac{2^j}{k}} |f(x+t)| dt \leq Ck f^*(x),$$

if a positive integer S chosen from the condition

$$\frac{2^{S-1}}{k} \leq \pi < \frac{2^S}{k}.$$

Hence

$$|J_2(x, k)| \leq C \left(\tilde{f}^*(x) + \frac{k}{m} f^*(x) \right) \leq C (\tilde{f}^*(x) + f^*(x)). \quad (14)$$

Finally, in view of (10) and (11)

$$J_3(x, k) \leq C f^*(x). \quad (15)$$

Now, according to (12)–(15), the estimate (9) is valid at all $k \leq m$. Consider now the case of $k > m$. By (11) we have

$$\begin{aligned} \left| \int_{-\pi}^{\pi} f(t) \tilde{F}_k(y-t) dt \right| &\leq C \left(\int_{|x-t| \leq 1/m} |f(t)| k dt + \left| \int_{\frac{1}{m} \leq |x-t| \leq \pi} f(t) \operatorname{ctg} \frac{y-t}{2} dt \right| + \right. \\ &\left. + \int_{\frac{1}{m} \leq |x-t| \leq \pi} |f(t)| \left| \tilde{F}_k(y-t) \right| dt \right) = C \left(\frac{k}{m} J_1(x, m) + J_2(x, m) + I(x, k, m) \right). \end{aligned} \quad (16)$$

According to (13) and (14) we obtain

$$J_1(x, m) \leq f^*(x); \quad |J_2(x, m)| \leq C (\tilde{f}^*(x) + f^*(x)).$$

Further, in view of (11) and (10)

$$I(x, k, m) \leq C \frac{m}{k} f^*(x) \leq C f^*(x).$$

It follows now from (16) that

$$\left| \int_{-\pi}^{\pi} f(t) \tilde{F}_k(y-t) dt \right| \leq C \left(1 + \frac{k}{m} \right) (\tilde{f}^*(x) + f^*(x))$$

for all $k > m$.

Thus, the estimate (9) is valid for all $k = 1, 2, \dots$, and lemma is proved.

Proof of Theorem 1

Applying (3), Abel transform twice ([2], vol. 1, p. 15), the obvious estimate $|\tilde{D}_N(t)| \leq N$, $N = 1, 2, \dots$, and (11), we obtain for (2)

$$\begin{aligned} |\tilde{U}(f, y; \lambda, h)| &= \left| \lim_{N \rightarrow +\infty} \frac{1}{\pi} \int_{-\pi}^{\pi} f(t) \left\{ \sum_{k=1}^N \lambda_k(h) \sin k(y-t) \right\} dt \right| = \\ &= \frac{1}{\pi} \left| \lim_{N \rightarrow +\infty} \left\{ \lambda_N(h) \int_{-\pi}^{\pi} f(t) \tilde{D}_N(y-t) dt + N \Delta \lambda_{N-1}(h) \int_{-\pi}^{\pi} f(t) \tilde{F}_{N-1}(y-t) dt + \right. \right. \\ &\quad \left. \left. + \sum_{k=1}^{N-2} (k+1) \Delta^2 \lambda_k(h) \int_{-\pi}^{\pi} f(t) \tilde{F}_k(y-t) dt \right\} \right| \leq C \lim_{N \rightarrow +\infty} \left\{ N |\lambda_N(h)| + \right. \\ &\quad \left. + N^2 |\Delta \lambda_N(h)| \int_{-\pi}^{\pi} |f(t)| dt + \sum_{k=1}^{N-2} (k+1) |\Delta^2 \lambda_k(h)| \cdot \left| \int_{-\pi}^{\pi} f(t) \tilde{F}_k(y-t) dt \right| \right\}. \end{aligned}$$

According to (5) and (9) we have

$$\begin{aligned} |\tilde{U}(f, y; \lambda, h)| &\leq C \sum_{k=1}^{\infty} (k+1) |\Delta^2 \lambda_k(h)| \cdot \left| \int_{-\pi}^{\pi} f(t) \tilde{F}_k(y-t) dt \right| \leq \\ &\leq C (\tilde{f}^*(x) + f^*(x)) \sum_{k=1}^{\infty} |\Delta^2 \lambda_k(h)| \cdot k \left(1 + \frac{k}{m} \right), \end{aligned}$$

and, because of the condition (19), we obtain the assertion (7).

Estimates of the weak and strong type

Theorem 2. Under the conditions of Theorem 1 the estimates of weak type

$$\mu \{x \in Q | \tilde{U}_*(f, x; \lambda) > \varsigma > 0\} \leq C_{p, \lambda} \left(\frac{\|f\|_p}{\varsigma} \right)^p, \quad p \geq 1$$

and strong type

$$\begin{aligned} \|\tilde{U}_*(f)\|_p &\leq C_{p, \lambda} \|f\|_p, \quad p > 1; \\ \|\tilde{U}_*(f)\| &\leq C_{\lambda} (1 + \|f(\ln^+ |f|)\|); \\ \|\tilde{U}_*(f)\|_p &\leq C_{p, \lambda} \|f\|, \quad 0 < p < 1 \end{aligned}$$

are valid.

The assertion follows from Theorem 1 and the corresponding estimates of weak and strong type for (3); see ([2], vol.1, pp. 58–59, 404).

Non-tangential summability

Theorem 3. If the sequence (1) satisfies to the conditions (5), (6) and

$$\lim_{h \rightarrow 0} \lambda_k(h) = 1, \quad k = 0, 1, \dots, \quad (17)$$

then the relation

$$\lim_{\substack{(y, h) \rightarrow (x, 0) \\ (y, h) \in \Gamma_b(x)}} \tilde{U}(f, y; \lambda, h) = \tilde{f}(x) \quad (18)$$

holds almost everywhere for each $f \in L(Q)$.

The relations (18) follows from the weak type estimates (theorem 2) and condition (17) by the standard method ([2], vol. 2, pp. 464–465).

Piecewise convex summation methods

It noted in [3–5] (cf. [2], p. 476–478) that under the condition (5) every piecewise-convex sequence (1) satisfies the condition

$$\sum_{k=1}^{\infty} k |\Delta^2 \lambda_k(h)| \leq C_{\lambda}.$$

By virtue of piecewise convexity of sequence (1), the second finite differences $\Delta^2 \lambda_k(h)$ retain the sign; suppose for definiteness, it will be a plus sign at all sufficiently large k (depending, generally speaking, from h), namely $k \geq \tau(m)$, where $\tau = \tau(m)$ – some positive integer,

$$\tau = \tau(m) = \tau(m, \lambda) \leq m. \quad (20)$$

The sum (6) does not exceed

$$C_\lambda \left(\sum_{k=1}^{\infty} k |\Delta^2 \lambda_k(h)| + \sum_{k=m}^{\infty} \frac{k^2}{m} |\Delta^2 \lambda_k(h)| \right). \quad (21)$$

In the second sum of (21) all $\Delta^2 \lambda_k(h)$ are positive by (20); applying twice Abel transform, we have

$$\begin{aligned} \sum_{k=m}^{\infty} |\Delta^2 \lambda_k(h)| \frac{k^2}{m} &= \frac{1}{m} \sum_{k=m}^{\infty} k^2 \cdot \Delta^2 \lambda_k(h) = \frac{1}{m} \left(m^2 \Delta^2 \lambda_m(h) + k \sum_{k=m+1}^{\infty} (2k-1) \cdot \Delta \lambda_k(h) \right) = \\ &= m \Delta^2 \lambda_m(h) + \frac{2m+1}{m} \Delta \lambda_{m+1}(h) + \frac{1}{m} \sum_{k=m+2}^{\infty} \lambda_k(h). \end{aligned}$$

Thus, under conditions (5) and

$$\frac{1}{m} \sum_{k=m+2}^{\infty} |\lambda_k(h)| \leq C_\lambda, \quad (22)$$

the assertions of Theorems 2 and 3 are valid for each piecewise-convex sequence (1).

Exponential summation methods

Summation methods

$$\lambda_0(h) = 1, \quad \lambda_k(h) = \lambda(x, h)|_{x=k}, \quad k = 1, 2, \dots, \text{ where } \lambda(x, h) = \exp(-h\varphi(x))$$

were studied in [3–4] in the case of “radial” convergence; in particular, it was given the condition of piecewise convexity of sequence $\{\lambda_k(h)\}$. In this paper we consider

$$\lambda(x, h) = \exp(-hx^\alpha), \quad \alpha \geq 1$$

It is easy to show that this function is a piecewise-convex; verify now the satisfiability of condition (22). We have

$$\frac{1}{m} \sum_{k=m+2}^{\infty} |\lambda_k(h)| \leq \frac{1}{m} \int_0^{\infty} \exp(-hx^\alpha) dx = \frac{1}{\alpha m} h^{-\frac{1}{\alpha}} \int_0^{\infty} t^{\frac{1}{\alpha}-1} \exp(-t) dt \leq C_\alpha h^{1-\frac{1}{\alpha}} \Gamma\left(\frac{1}{\alpha}\right), \quad (23)$$

where $\Gamma = \Gamma\left(\frac{1}{\alpha}\right)$ is Euler gamma function.

For $\alpha \geq 1$ the right side of (23) does not exceed a constant that depends only on α . Thus, Theorems 2 and 3 are valid for exponential summation methods $\lambda_k(h) = \exp(-hk^\alpha)$, $\alpha \geq 1$; for $\alpha = 1$ we have classical Poisson-Abel means.

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MODELING OF BUSINESS PROCESSES

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The article is devoted to the issues of business process modeling. The article describes the plan of business process methodology. It provides a brief analysis of the modern methodologies of modeling business processes, such as SADT, IDEF family of standards and algorithmic languages. The article describes the main types of methodologies for modeling and analysis of business processes, the steps and categories business processes, the concept of the business model and objectives of business processes' modeling. It shows key indicators for assessing the effectiveness of business processes. The article describes integration means of various simulation methods on the example of the software – ARIS, and also powerful and flexible means of visual modeling are described, which supports the full life cycle of software systems using the unified modeling language UML – Enterprise Architect.

Keywords: modeling and automation, SADT, the methodology of describing business processes, business analysis model, notation ARIS eEPC, Enterprise Architect (EA)

Methodology of business processes description. In any business company there are a certain number of business processes that employees perform. These include the purchase and sale, management and productive processes, records management, and others. Automation of existing processes improves the increase of the efficiency [8].

Any activity of the company is made up of specific work performed by the employees. Each work consists of a set of steps. And if at the stage of a young business every employee performs work – the formalization implies that the main action of the employee is described and he performs it according to this description. Of course, it is a question of describing business processes. The task is –to create regular management at first. And you can use a variety of tools and methodologies, from simple block diagram of the process to IDEF0 and ARIS, training which takes more than one week. Optimization may be carried out with the processes description [1].

Modeling and automation of business processes are the key to the successful operation of the company. Professional modeling of business processes depends on the success of the enterprise. Description of business processes optimizes all enterprise segments, excluding internal disturbances and the human factor. Model of business processes based on UML for business process automation optimizes all enterprise segments. Using UML allows to model business processes and system design and to display organizational structure of the enterprise.

Business process – is the series of works, the hierarchy of interrelated functional activities whose ultimate goal is the production of a product or its components. Business process is characterized by the

implementation of its technology, its place within the overall business system, as well as providing the process: automation tools, equipment, machinery, etc [3].

Business process – a logical, sequential, interrelated set of activities that consume resources, creates value and displays the result. The international standard ISO 9000: 2000 adopted the term “process”, but at the moment these terms may be considered as synonyms. Modeling of business processes – is an effective means of finding ways to optimize the activity of the company, which allows to determine how the company works in general and how to organize activities at each workplace.

Methodologies for the description of business processes – is a set of ways in which the objects of the real world (the activity of the organization) and the relationships between them are represented as models.

Any methodology (method) consists of three main components:

1. Theoretical basis.
2. Description of the steps required to obtain the desired result.
3. Recommendations for the use either alone or as part of a group of techniques.

Description of business processes carried out for the purpose of further analysis and restructuring. The aim of the reorganization may be the introduction of information systems, reducing costs, improving customer service, the creation of job and work instructions, etc., and a detailed description of the process itself is of no value. Business process reengineering – it is the fundamental rethinking and radical redesign of business processes to achieve maximum efficiency of production, financial and economic activities, the appropriate organizational and administrative and regulatory documents. Business engineering includes

modeling of business processes (design model, its analysis, the development model), and the development and implementation of the plan of transition to the “as it is supposed to”.

The basis of many modern methodologies for business process modeling composed methodology of SADT (Structured Analysis and Design Technique – a method of structural analysis and design), a family of IDEF standards (Icam DEFinition, where Icam – is Integrated Computer-Aided Manufacturing) and algorithmic languages.

The main types of business process modeling and methodologies analysis:

1. Business Process Modeling. The most widely used methodology for describing of business processes – IDEF0 standard. Models in IDEF0 notation designed for high-level description of the company's business in the functional aspect.

2. Work Flow Modeling description. IDEF3 standard is intended to describe the work flow and is close to the algorithmic methods of constructing block diagrams.

3. Data Flow Modeling description. Notation DFD (Data Flow Diagramming) allows you to reflect the sequence of works carried out during the process, and the flow of information circulating between these works.

4. Following classes may be marked with respect to the preparation of product added value and services or processes.

5. Basic business processes (such as marketing, production, delivery and after-sales service products).

6. Supporting business processes do not add value to the product, but increase its value (financial support for activities, staffing, legal support, administration, security, delivery of components, repair and maintenance, etc.).

7. Business process management.

Business model – is a formalized (graphical, tabular, text, character) description of business processes. The main field of application of business models – is the re-engineering of business processes.

Modeling aims of business processes are generally formulated as follows:

1. To provide understanding of the organization structure and dynamics of the processes occurring in it.

2. To provide understanding of current challenges of organization and opportunities to solve them.

3. To make sure that customers, users and developers understand the organization's goals and objectives.

4. To establish a base for the formation of software requirements that automates business

processes of the organization (software requirements are formed on the basis of the business model).

An important element of business process models are the business rules or the rules of the subject area. Typical business rules are corporate policy and state laws. Business rules are usually formulated in a separate document and can be reflected in the models.

Decomposition in a general sense – is a method to replace the solution of a great problem solving a series of smaller tasks, splitting the object into its component parts under fixed criterion.

Almost decomposition is used for detailing of business models.

Stages of business processes description:

1. Determining the purpose of description.

2. Description of the environment, the definition of the inputs and outputs of a business processes, the construction of IDEF0-diagrams.

3. Description of the functional structure (process steps), IDEF3-construction diagrams.

4. Description of flows (material, information, financial) process, DFD-construction diagrams.

5. The construction process of the organizational structure (departments, participants, responsible).

There are following categories of business – processes:

- 1) processes to ensure product release;
- 2) planning and management processes;
- 3) resource processes;
- 4) conversion processes.

The main indicators of the effectiveness evaluation of business-processes include:

- 1) the number of a given quality produced and paid for products for a certain period of time;

- 2) the number of consumer products;

- 3) the number of common operations that must be performed in the production process for a certain period of time;

- 4) the cost of production costs;

- 5) the length of a typical operations;

- 6) investment in product manufacture.

The methodology (notation) creating a model (description) business processes means a series of ways in which real-world objects and the relationships between them, which are represented as models. For each object and relationships are characterized by a number of parameters, or attributes that reflect the characteristics direct of real object (object number, title, description, duration of implementation (for functions, cost, etc.).

Method IDEF3 designed to simulate the performance of a sequence of actions and the relationship between them in the process. IDEF3 models can be used to drill IDEF0 functional blocks without decomposition diagrams. IDEF3 method allows to decompose the effect several times, to provide documentation of the alternative process streams in a single model.

DFD. The purpose of this article – is to show how each process converts its inputs into outputs. It may reflect not only information but also the material flow. The main components of data flow diagrams are:

1) external entities (material object or individual is a source or receiver of information, such as customers, employees, suppliers, customers, locations);

2) system and subsystem (subsystem for work with physical persons);

3) processes (converting input data into output streams in accordance with a certain algorithm, physically it may be, for example, division organization (department), performs input processing and issuing documents reporting program implemented in hardware logic device, etc.);

4) data storage media (abstract storage devices);

5) data streams (in the diagram-arrows).

The first step in constructing the hierarchy of DFD is to build context diagrams. Usually in the design relatively simple system built only context diagram with a star topology, the center of which is the so-called main process, coupled with the receivers and sources of information. Each process in the DFD can be detailed using DFD, or (if the process elementary) specification. Specifications are the descriptions of the tasks of algorithms, which execute the process. Specification languages can range from a structured natural language or pseudocode to visual modeling languages.

ARIS. The current trend is the integration of a variety of modeling techniques, which manifests itself in the form of the creation of integrated modeling tools. One such tool is a software product, called ARIS (Architecture of Integrated Information Systems), developed by the German company IDS Scheer. To construct these models' types both own ARIS modeling methods are used, and various well-known methods and languages of modeling, in particular UML.

UML contains the extension mechanisms for adaptation specific modeling language to the specific requirements of the developer without having to modify the metamodel. The presence of mechanisms to expand dis-

tinguishes of UML modeling tools from such as IDEF0, IDEF1X, IDEF3, DFD, because arbitrary interpretation of the semantics of model elements is not allowed. UML language is also used in the method of business process modeling, technology is part of Rational Unified Process (RUP) of IBM Rational Software company. This method is aimed primarily at creating a basis for the formation of the software requirements, provides the construction of two basic models: a business process model (Business Use Case Model) and Business Analysis Model [4].

Modeling process can begin with any of models' types. The basic business model ARIS – eEPC (extended Event-driven Process Chain, is an extended chain of model processes). ARIS eEPC notation is an extension of IDEF3notation. Business process in the notation of eEPC is a stream of consistent performed work (procedures, functions), arranged in order of their performance. The actual duration of the procedures in eEPC is not visually recognized. To get the information about the actual duration of the processes it is necessary to use other description tools, for example, MS Project.

The models in ARIS are diagrams, elements of which are a variety of objects – “function”, “events”, “structural units”, “documents”, etc. Connections of certain types can be made between certain types of objects (“perform”, “make a decision”, “should be informed about the results”, etc.). Each object corresponds to a specific set of attributes that allow you to enter additional information about a particular object.

The main objects of eEPC notation:

1. Function. It is used to describe the functions (procedures, work) performed by departments / employees of the company. Each function must be initiated by the event and must be terminated by an event; each function cannot include more than one arrow, “triggering” the function and leave more than one direction, describing the completion of the function.

2. Event. It is used to describe real events that affect the performance of functions.

3. Organizational unit. For example, management or department.

4. Document. It reflects the real media, such as paper documents.

5. The application system.

6. Information cluster. Characterized by a set of entities and relationships between them.

7. Communication between objects. The type of relationship between objects, for example, activation of the function some event.

8. Logical operator. The operator “AND”, “OR” or exclusive “OR” allows us to describe the process of branching.

If you create a model in eEPC it indicates only the sequence of procedures, and does not care about the reflection control documents and obtained information, models will have a low value in terms of analysis and future reference.

To store the models in ARIS an object database is used, and for each project you create a new database. There are various functions for database administration, for example, access control. The database consists of a hierarchical storage models. ARIS supports methodological filter mechanism, allowing the user to use only a certain set of schemas and objects. The development of such agreements requires considerable time and highly skilled professionals. If the project with used ARIS starts without a detailed study of such agreements, the probability of creating business process models is very high, which is not respond to these questions.

The main types of business processes' modeling and analysis of methodologies:

1. Business Process Modeling. The most widely used methodology for describing business processes – IDEF0 standard. Models in IDEF0 notation designed for high-level description of the company's business in the functional aspect.

2. Description of work flow (Work Flow Modeling). IDEF3 standard is intended to describe the workflow and is close to the algorithmic methods of constructing block diagrams.

3. Description of data streams (Data Flow Modeling). Notation DFD (Data Flow Diagramming), allows you to reflect the sequence of works carried out during the process, and the flow of information circulating between these works.

4. Other methodology [5, 6, 7].

Practice has shown that the standard IDEF0 should be used in projects for the description and optimization of local business processes, in small projects experts are more involved and make decisions, and top-level executives involved for decision making in a minimum.

The steps for development of automated systems (AS) include the formation of the AU to the requirements of the development of AC concept, requirements specification, preliminary design, technical design, working documentation commissioning, and support for the AU.

Models can be linked between each others. In UML this relationship is called a trace and can be used in any software project, without regard for the subject area, the area of decisions, etc. UML class diagram allows you to denote rela-

tionships between classes and their instances. They are needed, for example, to simulate the application area. This small study is trying to answer this question – show this relationship in the code. Unified Modeling Language (UML) is a visual modeling language designed for the development of domain models and software systems of different classes. UML can be used in any development process, at all stages of the development of software systems. UML is used to create models in all subject areas. For the construction of the main stages of activity diagram UML can be used by the business process.

There is a powerful and flexible means of visual modeling that supports the full life cycle of software systems using the Unified Modeling Language (UML) – Enterprise Architect (EA) – is a product of the Australian company Sparx Systems. EA is also called visual modeling platform.

Enterprise Architect (EA) allows you to:

1. To create UML model elements.
2. To place these items on the charts.
3. To define relationships between elements.
4. To document by the model and the elements.
5. To generate the code for the software being developed.
6. To import codes in various languages, including VB, Java, C++, etc. (More than 10 languages).
7. To create different templates and domain system models.
8. To support the tracing of domain models to system models.

Distribution of EA comes as an executable file (easetupfull.exe). Files created in EA projects have EAP extension. Together with EA comes demo EAExample.EAP, and empty EANew.eap project.

There are different versions of EA (<http://www.sparxsystems.com/>), for example: Corporate, Professional, and Desktop.

Today there are quite a lot of optimization methods of business processes – from simple to complex. The main condition for the success of technological optimization – is the existence of a model or process scheme. When optimizing the organization it is recommended to use the formula proven by the experience, including strict sequence of the following steps:

1. The description of the organization model “as is”.
2. The analysis of the “as is” model.
3. The development of a “getting all right” model.
4. Development of a migration plan from the state “as is” in a state of “getting all right”.

5. The introduction of changes and building of a model organization “just right”.

To build a better business processes and organizational structure a developed strategy is required. In modern management to analyze and optimize the activities it is recommended to use business processes' models that schematically represent them [9].

Business Processes' Modeling is performed by the following methods:

Flow Chart Diagram (work flow diagram) – a graphical representation of a method in which the process operation data, process equipment, etc. are represented by special symbols. The method is used to display the logical process work flows. The main advantage of this method is its flexibility. The process can be represented in many ways.

Data Flow Diagram – data flow diagram or DFD is used to transmit display information (data) from one operation to another process. DFD describes the relationship of operations at the expense of information and data. This method is the basis of structural analysis processes as It allows us to decompose the process into logical levels. Each process can be broken down into subprocesses with higher levels of detail. The use of DFD reflect only allows the flow of information, but not the materials flow. Data flow diagram shows how the information in and out of the process steps which change the information, where the information is stored in the process and so forth.

Role Activity Diagram (role diagram) is used to simulate the process from the perspective of individual roles, roles, groups, and roles in the process of interaction. The role is an abstract element of the process that performs any organizational function. The diagram shows the roles of the degree of “responsibility” for the process and its operation, as well as the roles of the interaction.

IDEF (Integrated Definition for Function Modeling) – is a set of methods for describing different aspects of business process (IDEF0, IDEF1, IDEF1X, IDEF2, IDEF3, IDEF4, IDEF5). These methods are based on the methodology SADT (Structured Analysis and Design Technique). For business processes' modeling most commonly is used IDEF0 and IDEF3 methods [2].

In conclusion, the article is written about the applicability to carry out the analysis and optimization of the activity for organization using the models of business processes and business process modeling. We provided a brief analysis of the modern methodologies of modeling business processes, such as SADT, IDEF family of standards and algorithmic languages. The article describes the main types of methodologies for modeling and analysis of business processes, the steps and categories business processes, the concept of the business model and objectives of business processes' modeling are very actual nowadays. We also mentioned about the integration means of various simulation methods on the example of the software – ARIS, and also powerful and flexible means of visual modeling are described, which supports the full life cycle of software systems using the unified modeling language UML – Enterprise Architect.

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ADVANCED COMPOSITE CONSTRUCTION MATERIALS, FILLED WITH BASALT

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Predstavleny the results of research of building materials filled with basalt. On the basis of experiment it was shown that the basaltic component allows you to increase the carrying capacity of the product at work in compression and bending. The experiment showed that the Flexural strength in the initial period of hardening of samples containing 2,5% of basalt fibers with a length of 0,5 cm greater than the strength of control sample, upon further curing, the strength values differ slightly. Test results show that the introduction of basalt filler increases the strength of the samples. The possibility of using basalt aggregates in combination with traditional astringent cement. The resulting research shows that the introduction of finely ground basalt dust as a mineral filler it is possible to obtain building materials of high strength.

Keywords: cement, basalt, experiment, Flexural strength, concrete, construction

Advantages of basalt filler

One of the most promising trends in the construction industry is the creation of new materials, including concrete with the addition of basalt, with high strength under compression, bending and tension. On the basis of basalt fibers can be obtained heat-insulating, sound-absorbing, moisture-proof and high-strength composites have the low cost [1–4].

The structure of the concrete using basalt fibers is close to the structure of ferrocement with reinforcement of steel mesh. However, basaltine has higher strength and deformability, as basalt reinforcing it provides a higher dispersion degree of stone reinforcing, and the basalt has higher strength (1800–2500 MPa) than steel mesh.

In addition, basaltine can carry large elastic deformations because basalt fiber tensile plastic deformation has not, and elasticity greater than that of steel. During hardening of cement stone formed aggressive environment, which destroys the surface of the fibers, forming a shell. The fiber strength is reduced by 10%, but the resulting shells of the bonding strength of the stone and fiber increases, so the strength of the structure itself increases.

When using thick fibers (more than 100 microns), their strength is not changed. Made from rocks, basalt fiber does not react with salts or dyes, therefore, concrete mixtures with the addition of fibers can be used in construction of marine structures, and in architectural and decorative concrete. In pavement, the fiber protects the concrete and rebar from the penetration of de-icing salts and aggressive substances, and increases the residual strength and resistance to freezing-thawing increases the surface roughness.

The use of quality concrete with special additives, including monofilament reinforcement provides resistance to temperature extremes, protecting against faults, cracks and exfoliation of the surface, eliminates plastic shrinkage cracks, increases the durability of the surface, edge and seam, as well as resistance to abrasion and impact, provides an early compressive strength, that is strength, which becomes normal concrete only after 28 days.

The main features of basaltine is the ability to endure large strains in the elastic state, as well as its high durability in all types of tense States. Armed with these properties, the relative deformation of the cement stone without cracking reaches 0,7–0,9%. This deformation in the 35–45 times greater than the ultimate state of non-reinforced cement, by eliminating the basalt fiber of the influence of stress concentration where there are places weakened structural defects of cement, there is a significant increase of deformability and strength.

Research of possibility of application of basalt in building construction

Tests have shown that the use of coarse basalt fibers most effectively in the construction in which the clamps are set according to design requirements. When these indicators achieved 100% reduction in the consumption of steel for transverse reinforcement. The experiment confirmed the possibility of using continuous basalt fibers and coarse fibers as reinforcement in concrete mixtures for construction. The smaller the diameter of basalt fiber, the greater the reduction in strength in a cement environment.

Strength in compression samples with different content of basalt filler

Composition	Compressive strength, R , MPa			
	3 day	14 day	28 day	after 20 frost cycles
Cement	30,1	32,0	40,2	40,8
Cement + sand + 2,5 % finely ground basaltic component	39,0	40,0	45,0	45,5
Cement + sand + 5 % finely ground basaltic component	28,0	29,0	39,0	38,9

We have conducted an experimental study of the impact of fine basalt filler on the strength of the samples [5]. Comparative results of determination of compressive strength (R_{com}) experimental samples of the cement composites of different composition are given in Table. Samples of the compositions were tested for resistance to frost. One cycle was 3–4h of freezing and thawing. The compressive strength was determined after 20 frost cycles.

The data show (Table):

- in comparison with standard (control) sample, the highest compressive strength of samples of composite materials containing 2,5 % finely ground basalt ($R = 45\text{M MPa}$);
- after 20 cycles of freezing and thawing durability of the experimental samples almost fell.

The resulting research shows that the introduction of finely ground basalt wool (basalt dust) as mineral filler, it is possible to obtain building materials of high strength.

The authors conducted a study of compositions with crushed basalt wool of different length to study its effect on the strength characteristics of the compositions. We investigated the properties of composite materials filled with inorganic matrix in the form of crushed

basalt wool and basalt fiber. We used the following materials: Portland cement grade 300 and above; siliceous component: Wolski standard sand with a fineness modulus of 2,1; basalt component: crushed basalt wool and basalt fiber with a fiber length of 0,5 and 2 cm. Basalt filler was injected in an amount of 2,5 % and 5 % by weight of cement.

The amount of water was determined from the ratio of $T_o/T_S = 0,4$ mm. Materials compositions are dosed out by weight. For the purpose of uniform fine distribution of the filler was carried out mechanical activation of cement with sand and basalt filler in a ball mill for 2 h. Composition prepared by mixing materials in a laboratory mixer. The tests were carried out on samples of cement stone $4 \times 4 \times 16$ cm. All samples were mixed according GOST [5]. After the first day, the samples were resalable and steamed for 12 hours. Testing of samples was performed after storage under normal conditions (temperature $20 \pm 2^\circ\text{C}$, humidity 100 %) for 7–28 days.

As a counterpart served as a control sample, composed of cement, sand and water. Comparative results of changes of bending strength of composite materials of different composition is shown in Fig. 1, 2.

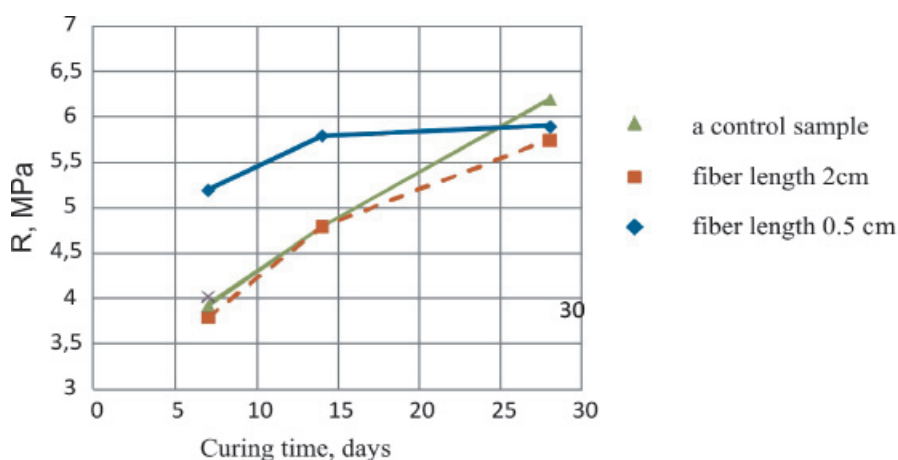


Fig. 1. The change in the strength of samples in bending containing 2,5 % basalt

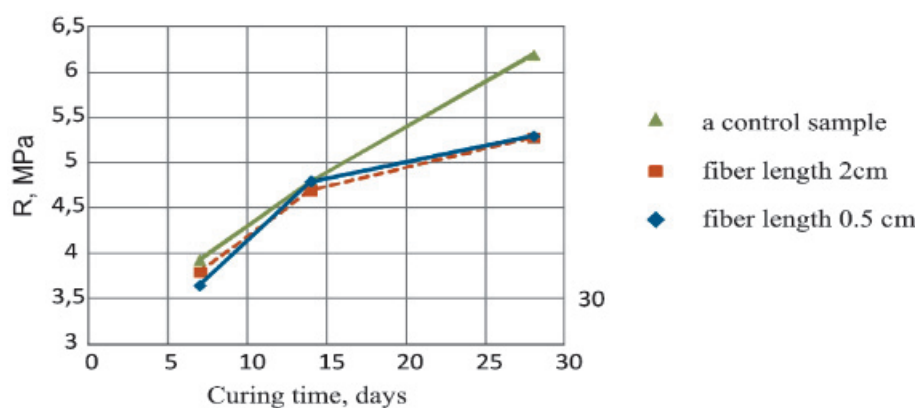


Fig. 2. The change in the strength of samples in bending containing 5 % basalt

Analysis of experimental data showed that the Flexural strength in the initial period of hardening (7 days) in samples containing a 2,5 % basalt wool length 0,5 cm greater than the strength of control sample, with a further hardening (28 days) strength values vary slightly. The introduction of the filler length of 5 cm leads to a decrease in bending strength in comparison with the control sample (Fig. 2).

Flexural strength at 7 days for samples containing 5 % basalt wool length 0,5 and 2 cm below the strength of the control sample, with a further hardening (28 days) strength values significantly lower than control sample. The long fibers are difficult to distribute evenly in the composition, so further development of the technology of introduction of basalt fibers.

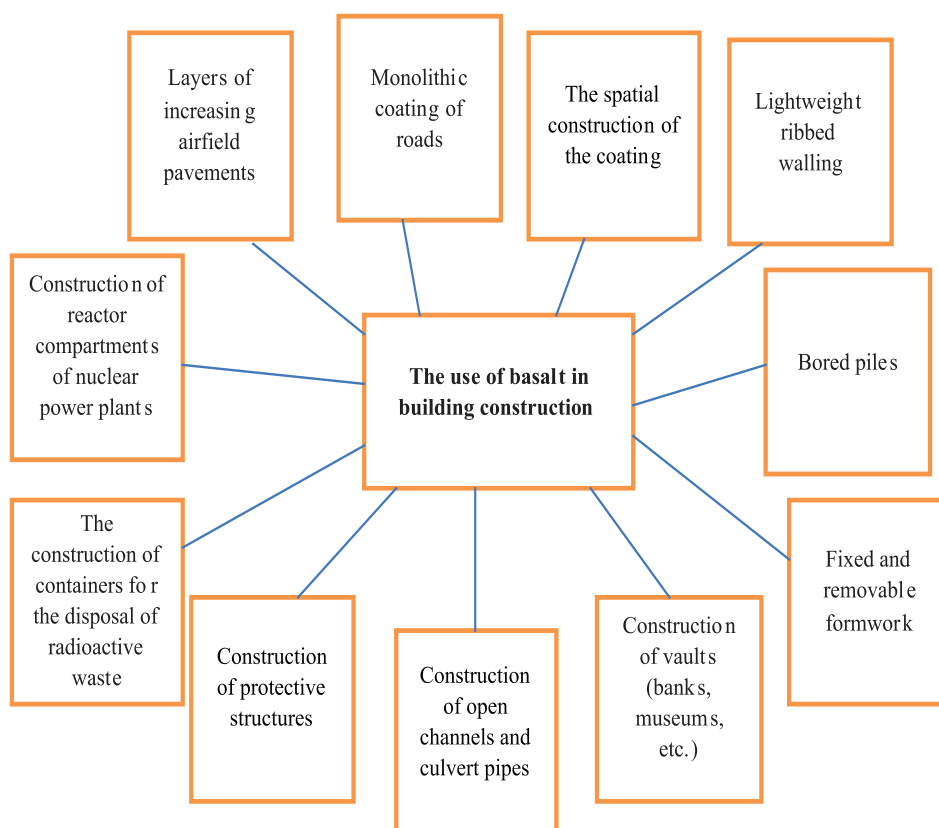


Fig. 3. Basalt in modern concrete structures

The scope of application of concrete filled with basalt

The application of new materials based on basalt fibers (Fig. 3):

- in structures, which are increased requirements for stiffness and fracture toughness;
- in buildings experiencing the impact and alternating loads;
- in thin-walled structures and structures with complex geometric shapes;
- in the reinforcement of the most intense sites of structures;
- structures transverse reinforcement which is mainly intended for the perception of mounting and transportation of loads;
- in structures, which are increased requirements for frost resistance, water resistance, durability and resistance to thermal shock.

In addition, effective use of concrete with the inclusion of basalt in the centrifuged tubes, in road construction and the supports of the contact networks in concrete water channels, fireproof structures, earthquake-resistant houses and military buildings, runways of airports, high speed roads, industrial floors in shops where heavy equipment is installed.

We recommend the use of concrete with basalt for internal reinforcement of tunnels and channels, strengthening of the slopes, repair and reconstruction of structures, coating of metal surfaces of steel structures.

Conclusion

Studies have shown the following:

- greater breadth of application of basalt in various industries and particularly in buildings made of concrete;
- the use of basalt aggregates in combination with traditional astringent cement;
- a significant effect of the type and length of basalt filler on the physico-technical properties of concrete; however, long fibers more difficult to distribute evenly in the composition;
- with the introduction of finely ground basalt wool basalt dust as a mineral filler it is possible to obtain building materials of high strength.

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GEOGRAPHIC INFORMATION SYSTEMS AS A TOOL OF OPTIMIZATION OF MEDICINAL MAINTENANCE OF THE POPULATION AND MEDICAL INSTITUTIONS ANALGESIC DRUGS

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This article considers the possibility of using geographic information systems to optimize drug provision of medical organizations and the population analgesic drugs. The system will be developed on a client-server architecture based on using map services. These services provide an interactive map that will indicate the location of the medical and pharmaceutical organizations, as well as places of residence of patients in need of pain relief. Based on these data, the road map will be constructed, reflecting the availability of pain therapy. It is further contemplated implementation the data processing unit using a random pattern to form a timber for drugs needs.

Keywords: Geographic Information System, analgesic drugs, drug provision

The problem of pain should be recognized as a global priority for public health, because the adequate treatment of pain is a right of every human being, and the duty of any health care system to ensure it [2]. Currently, most of the federal funding for health care is on the computerization of the industry. In 2011, it was approved by the concept of creating a unified state health information system (USHIS) in health care [6]. Also as part of the Strategy of drug provision of the population of the Russian Federation for the period till 2025 and the plan of its implementation, namely in the framework of solving the problem 3 "Ensuring the safety, efficacy and quality of drugs for medical use", provides the formation of a unified information system in the field of drug supply [5]. Informatization process is aimed at improving management efficiency in the health, quality of care and awareness of specialists and population [4]. One way to improve the level of information of any industry is the creation of (GIS) Geographic Information Systems.

Geographic information system – information system providing data collection, storage, processing, access, display, and dissemination of spatial-coordinated data. GIS are designed to solve scientific and applied problems of inventory, analysis, assessment, modeling, forecasting, and environmental management and territorial organization of society [1].

GIS has the following subsystems:

1. The data processing subsystem that collects carries out pre-processing and data entry.

2. Data storage and analysis subsystem, organizing spatial data analysis for the purpose of sampling, updating and editing.

3. Subsystem manipulation (use) of the data and analysis, which performs different tasks on the basis of these data, and separates them includes, sets parameters and constraints, and performs modeling functions.

4. Subsystem management and output, which displays the entire database or a part of it in a table, chart or map form.

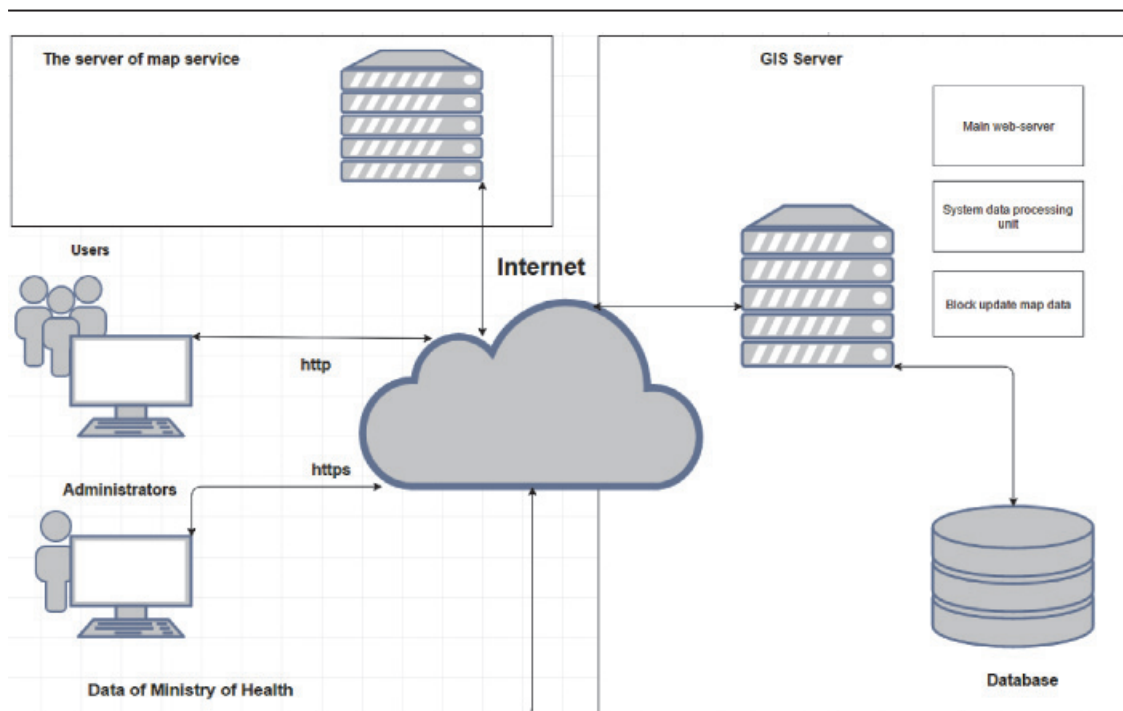
Used at the time of GIS to support management decision-making in health care are both independent systems and subsystems into larger.

The GIS is used to optimize health and health management (including medical institutions and pharmacies); spatio-temporal distribution of the forecast demographic and health characteristics of the population and the epidemiological situation; improve the quality and accessibility of medical services; the links between health outcomes and environmental factors, and other more specific tasks (personal monitoring and forecasting activities, etc.).

In this article we will examine the possibility of the use of GIS in the optimization of medicinal maintenance of the population and medical institutions analgesic drugs.

In our view, to ensure the availability of anesthesia to the entire population, you must create a system of organization providing funds for anesthesia, including the following tasks:

- Formation of assortment and adequate planning needs in medicines used to relieve pain (including narcotic drugs and psychotropic drugs).



GIS Scheme for the optimization of medicinal maintenance

- The inclusion of medications for the relief of pain in the regulated lists, including minimum range of medicines required for medical care, the list of vital and essential drugs list of drugs, the sale of which may be carried out by medical organizations that have a license for pharmaceutical activity, and their separate subdivisions (outpatient clinics, medical assistant and obstetric units, centers (offices) general (family) practice), located in rural areas, where there is no pharmacy organizations.

- Development of the range of drugs to form the home kit of patients in need of pain relief, etc.

- Creation of an extensive, covering the whole territory of the system cabinets pain therapy and outreach nursing service.

To solve these problems, the development of GIS is supposed to the client-server architecture based on using map services. These services provide an interactive map that will indicate the location of the medical and pharmaceutical organizations, and also places of residence of patients in need of pain relief. Figure shows a diagram of the system.

The system is designed to collect and process data, such as coordinates of the medical and pharmaceutical organizations,

information on residues of medicines, information on medicines sold, data on patients who need pain relief, information on transport accessibility of medical and pharmaceutical organizations.

Data entry is performed only once when creating a system based on Ministry of Health data. Then, the addition of data and its support up to date is performed by the operator of the system, with the right to transfer and data changes. Map data update is performed automatically based on information received from the map service servers.

For the formation of assortment and planning drugs demand is supposed to implement the data processing unit. Based on these data are implemented algorithms for machine learning, for example, an algorithm using a random forest model [3]. The result of machine learning algorithms will be a forecast of a target value, which depends on the amount of data and their current status. The accuracy of prediction is achieved by pretreatment of data, quality of learning algorithm and test the results of his work (methods of cross-validation).

Predicted value (which may be the number of drugs required in medical institutions, the intensity at regions of diseases, the need

for medicines, etc.) are displayed on the client side of the system are displayed on the interactive map. On the basis of these values is based plan for drugs, and there is a rapid response to possible deviations from the plan.

Based on the coordinates of the medical and pharmaceutical organizations is expected to build a road map of the region, which will display the availability of medical and pharmaceutical care. Optimization of the roadmap is executed in the data processing unit, and is achieved by implementation of the algorithm for solving the transport task. Transport task allows you to get the best plan for the delivery of drugs at a certain time and place with a minimum total of manpower, material and financial resources costs [7].

Thus, the introduction of practical health care like GIS will improve the availability of pain therapy, particularly in remote, inaccessible and rural areas.

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MATHEMATIC MODELING OF ENVIRONMENT BY INORGANIC DUST DURING THE THERMAL PREPARATION AND AGGLOMERATION OF PHOSPHORITIC RAW MATERIAL

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In this paper with the aim of quantitative evaluation of atmosphere pollution by inorganic dust have used Pasquille-Gifford empiric model. That model allows prediction of the degree of atmospheric air pollution at different emission capacities and to obtain the data on the distribution of polluting spray and determine the zones of danger for human beings. Two- and three-dimensional schedules of distribution of inorganic dust from department of thermal preparation and agglomeration of phosphorites in a ground layer of the atmosphere are presented in the article. The analysis of the obtained data allows evaluation of the degree of the atmospheric pollution by emissions of the industrial phosphorite processing enterprise and gives the opportunity to predict the pollution of surface air at various degrees of intensity of the inorganic dust emissions.

Keywords: mathematic modeling, evaluation, atmosphere, pollution, environment, inorganic dust, phosphorites, emission, thermal preparation, agglomeration, phosphoritic raw material, ground layer

Results of ecological researches unambiguously demonstrate that pollution of the ground atmosphere – the most powerful, permanent factor of impact on the person and environment. Atmospheric air has unlimited capacity and plays a role of the most mobile, chemically aggressive and pervasive agent of interaction near a surface of components of the biosphere, the hydrosphere and a lithosphere.

Therefore, the problem of pollution of the atmosphere toxic gases and identification of spatial structure of distribution of the centers of pollution, establishment of sources of harmful effects is one of the most important problems of ecology of the atmosphere.

The researches executed by many authors [1–9] proved that a number of atmospheric pollutants are transferred by air masses to long distances.

Studying of these processes in an explicit form by the organization of direct measurements is represented difficult. The sources of the polluting substances participating in transfer are emissions of industrial centers which form technogenic biogeochemical provinces, considerable by the sizes, with abnormally increased level of presence of the polluting substances at objects,

Now there are many various models which describe distribution of emissions of the polluting substances in the atmosphere. The majority of models finally are reduced to any analytical expressions or numerical decisions which allow to calculate fields of concentration of emissions depending on various factors, such as parameters of a source of emissions, weather conditions, etc.

Creation of the computer programs based on; mathematical models, allows to simplify considerably calculations of fields of concentration and therefore is necessary for a prediction of environmental pollution by emissions of harmful substances in the atmosphere. The models used abroad are based on Gaussian model of distribution of emissions, and as calculation of initial rise use the simple formulas based on experimental data. In the Republic of Kazakhstan for research of distribution of emissions OND-86 technique which is the normative document accepted in 1986 is used. This technique allows to predict adequately distribution of ground concentration of emissions in some conditions corresponding to rather steady condition of the atmosphere. This technique allows to predict adequately distribution of ground concentration of emissions in some conditions corresponding to rather unstable condition of the atmosphere [10].

Materials and methods of research

In work the dust forming at the enterprise for production of phosphorus as a result of processes – shattering, sorting, thermal preparation, package materials of transportation was used atmosphere [11]. For carrying out calculations we have used the data on technical characteristics of the emission sources and averaged value of polluting substances emissions capacity of the enterprise in the conditions of its actual operation. Calculations were made by means of universal integrated suite MATLAB [12].

Results of research and their discussion

The phosphorus' factories in Republic Kazakhstan are working on the phosphoritic rawes that contain not more phosphoric oxide (about 20% P_2O_5) and another components.

The technological process production of yellow phosphorus is foreseen preliminary preparation of raw: breaking up, classification, drying, the thermal's preparation of phosphorus, agglomeration. During the transportation and thermal's destroying of phosphorite at the same time with gas components forms considerable quantity of dust. This dust has mechanical's origin and has a great size of part.

It is important that independently of method of chemical preparing phosphorus of raw materials take place the same processes – destroying of carbonates, hydrocarbonates, phase transformations. The furnace gases at exit from the furnace contain from 5 to 120 g/m³ of polydisperse dust. The dust is connected [10] with three basic processes occurring in phosphorus furnace: the interaction at high temperatures of raw materials between itself and with reducing agent, evaporation of oxides and sublimation of fusible components, a mechanical breaking of mix material during their transportation in batchers.

On phosphorus enterprise of Kazakhstan formation of dust is the result of the processes – crushing, the sorting, the thermal preparation, the transportation batch materials (phosphorite, agglomerate, quartzite, coke) for the electrothermal treatment to the yellow phosphorus. These dusts are not needed in blending and simply make up the deficit fraction 0,5–0 mm in agglomix. Besides that they have in their structure P₂O₅ and a combustible carbon. Therefore these dusts can be used as additives that harden agglomerate. Basic harmful emissions are dust of phosphorite, quartzite, coke, agglomerate, compounds of phosphorite and fluorine. Dusts of phosphorite, quartzite and coke thrown out to atmosphere together with dust of mix material, including dioxide of silicon under 20 %, identify as inorganic dust including SiO₂.

The studies of real ecological situations on the basis of the data of control of the man-induced changes of the environment present one of the main tasks of engineering-ecological analysis of natural – technical geosystem.

At present there is no generally accepted method of evaluation of impact on the environment which allows characterization of an enterprise construction project as well as an enterprise activity in the period of operation. An unbiased evaluation of the system state rests on the group of indices, having a different physical nature and basing on different methods of measurements and control.

With the aim of quantitative evaluation of atmosphere pollution with inorganic dust we

have used Pasquille-Gifford empiric model based on the assumption of constant interference-free point source of a definite capacity having homogeneous characteristics of atmospheric dispersion. This model is based upon the conception of concentration of admixture emitted by a constant point source into atmosphere as of a stream with vertical Gaussian distributions and transverse to wind:

$$q(x, y, z) = \frac{Q}{2\pi\sigma_y(x)\sigma_z(x)u} \cdot f_f f_w \cdot \exp\left(-\frac{y^2}{2\sigma_y^2(x)}\right) \times \left[\exp\left(-\frac{(z-h)^2}{2\sigma_z^2(x)}\right) + \exp\left(-\frac{(z+h)^2}{2\sigma_z^2(x)}\right) \right],$$

where q – admixture concentration in the given point of space, mg/m³; x, y, z – Cartesian coordinates, axis z – up; axis x – downwind; Q – source of emission capacity, g/c; $\sigma_y(x)$ and $\sigma_z(x)$ – vertical and transverse dispersions of admixture cloud; u – wind velocity averaged for the layer of mixing, m/c; f_f and f_w – deduction for cloud depletion at the expense of dry deposition of admixture and its scavenging effective altitude of the source (i.e. altitude with consideration of the original rise of the overheated stream); h – effective height of a source, m.

Exponents sum in this formula corresponds to the ground surface not absorbing the admixture, in case of absolute absorption exponents the difference is observed.

The main content of the model is presented by numerous summarizing experimental data, specific functions $\sigma_y(x)$ and $\sigma_z(x)$ and expressions for h, f_f and f_w .

Actually sources of emission are not exactly point sources, but for the purposes of simplification of mathematical description it is possible to assume they are. The nature of specification of the chosen model allows taking into consideration the peculiarities of local meteorological conditions and calculate the distribution of the pollutants concentration in current meteorological conditions at various values of emission capacity [3, 4].

Fig. 1 and 2 demonstrates two- and three-dimensional spatial dispersion of inorganic dust in the atmosphere. Emission source point corresponds to the coordinates $x = 0, y = 0$. It is shown that the inorganic dust spray is distributed over the whole territory adjacent to the plant gradually decreasing with the distance from the source of emission down to 0,35 fractions of maximum permissible discharge (MPD) at the range of 20 km.

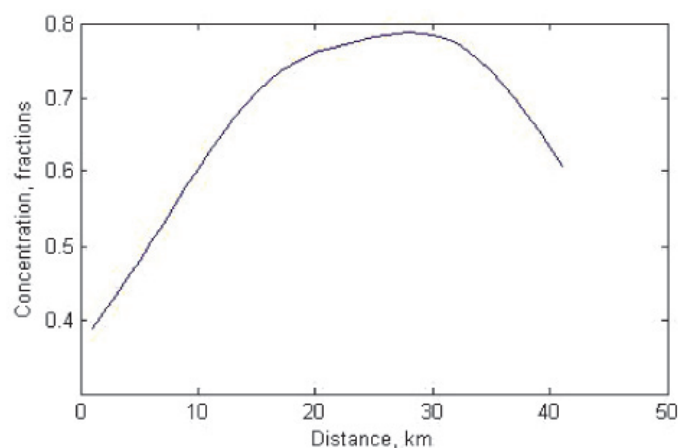


Fig. 1. Two-dimensional dispersion of inorganic dust from department of thermal preparation and agglomeration of phosphorites in the atmosphere

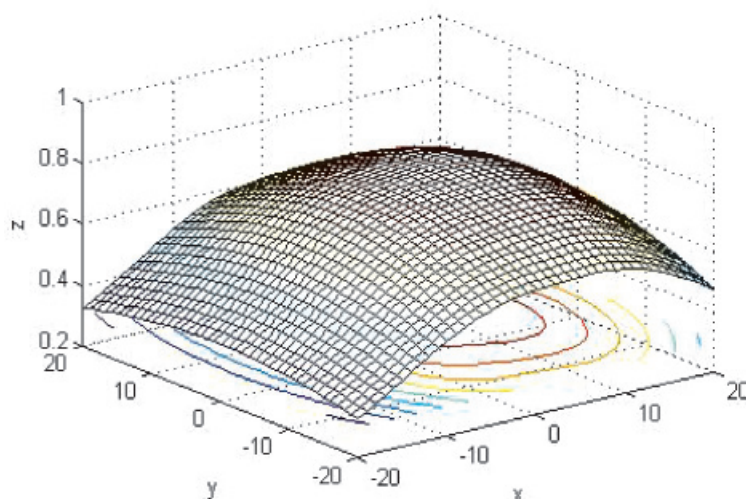


Fig. 2. Three-dimensional emission of the inorganic dust from department of thermal preparation of phosphorites in the atmosphere. Axes x and y – distances, kms; axis z – concentration, fractions of MPD. Conventional point source of emission corresponds to coordinates $x = 0, y = 0$

The model allows prediction of the degree of atmospheric air pollution at different emission capacities and to obtain the data on the distribution of polluting spray and determine the zones of danger for human beings. Calculations for the emission capacity in the outlet of the conventional source equaling to 37,8 fractions of MPD demonstrated, that in the situation, close to calm at the distance up to 13 km the spray concentration exceeds MPD and in the residential area makes 0,75 fractions of MPD (Fig. 3). The department of agglomeration of phosphorites is throwing up in atmosphere smaller amount of inorganic dust by comparing with department of thermal's of raw materials. Fig. 3 and 4 show that emission of the inorganic dust from agglomeration's department in the atmosphere in circumstance be

throwing up 7,0 MPD is decrease from 0,14 to 0,11 MPD at the distance 20 km.

Thus, the presented results of the calculation of the inorganic dust in the atmosphere using the empiric model of Pasquille-Gifford allows prediction the distribution of inorganic dust concentration within the area, i.e. allows to single out the sites of the contaminated area.

Conclusion

The analysis of the obtained data allows evaluation of the degree of the atmospheric pollution by emissions of the industrial phosphorite processing enterprise and gives the opportunity to predict the pollution of surface air at various degrees of intensity of the inorganic dust and other polluting agents emissions.

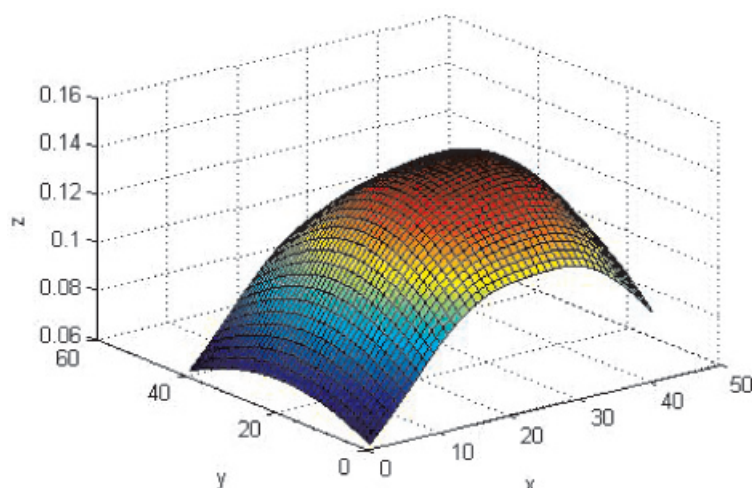


Fig. 3. Three-dimensional emission of the inorganic dust from agglomeration's department in the atmosphere. Axes x and y – distances, kms; axis z – concentration, fractions of MPD. Conventional point source of emission corresponds to coordinates $x = 25, y = 25$

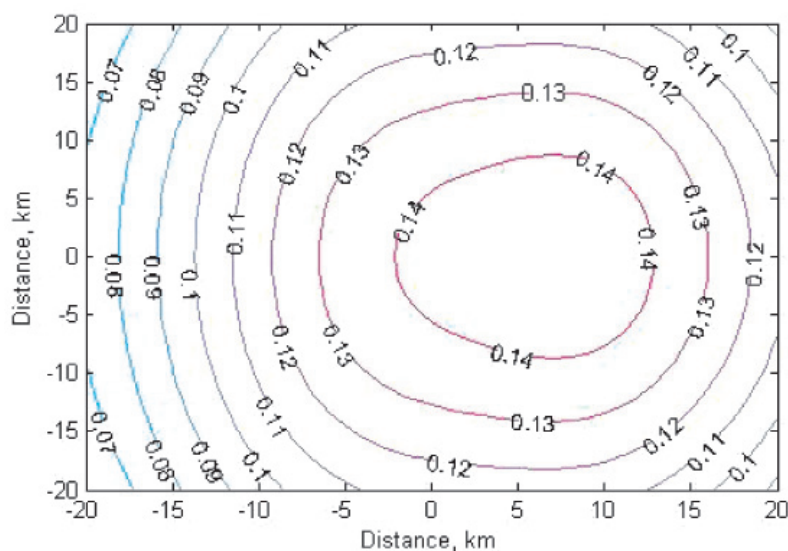


Fig. 4. Two-dimensional emission of the inorganic dust from agglomeration's department in the atmosphere with the indication of areas of danger. On the curves the values of dimensionless total concentration of dust in the fractions of MPD are shown

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THE FACTOR OF NOISE POLLUTION IN THE ORGANIZATION OF THE REST AREAS

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The present work is devoted to the assessment of noise pollution in the residential quarter, located in Bolshoye Savino in city of Perm from aircraft Municipal Airport. The authors conducted a quantitative and qualitative assessment of the acoustic characteristics of the noise source, represented by flying over an aircraft, by theoretical calculations and by the computer simulation and optimization, in accordance with current Russian sanitary regulation for noise. Conducted evaluation of existing sound levels at the objects of protection. Exceeded regulatory allowable values of the expected sound levels at the objects of protection. Developed science-based list of activities for the noise protection of the surveyed objects based on the effectiveness of sound proofing. The design of a special noise-reducing hiding areas recreation area in the study area.

Keywords: noise characteristics, sources of noise, aircraft, computer simulation, noise protection

The present work is devoted to the assessment of noise pollution in the residential district, Bolshoye Savino in Perm aircraft from the city airport. Considered noise regime of the territory of the recreation area.

Purpose of the study

Establishing compliance with the acoustic conditions of stay of people in areas recreation areas located in the area of noise impact of air transport. The goal is achieved by means of the following tasks:

1. Identification of the main sources of noise affecting persons on the territory of the recreation area of the neighborhood.
2. Analytical review of the existing Russian system of sanitary, technical and construction standardization in the field of sound proofing and confirmation of the justification of the applicability of these rules of acceptable noise for local objects.
3. Comparison of analytical results with current Russian sanitary norms of acceptable noise in the territory of the inspected object and detecting deviations from them.
4. Develop a list and focus on practical recommendations for sound insulation in case of exceeding the norms of allowable noise.

Materials and methods of research

The task of creating an acoustically safe environment of location of population in residential areas of noise protection measures was decided on the basis of system approach. Analytical studies were carried out using the methods of applied acoustics, mathematical statistics and computer simulation.

Results of research and their discussion

According to the SN 2.2.4/2.1.8.562-96 "Noise at workplaces, in residential and public buildings and residential areas" [3] and BNR 23-03-2003 "noise Protection" of the updated version 2011 [4] the calculation and assessment of traffic noise shall be as the maximum L_{Amax} sound levels (in dBA) and the equivalent sound levels L_{Aeqv} (in dBA) created in our case aviation source close to residential areas.

Rationing is set for regulated intervals daytime. Regulated time intervals are 16 hours of day time (from 7-00 to 23-00). The main source of noise presented individual aircraft that are flying in the zone of the airport in Perm

In the evaluation of community noise to sanitary and hygienic requirements are governed by the maximum permissible noise levels at rest areas. In Table 1 given the criteria for the regulation of noise on areas and rest areas [3].

Table 1

Normalized levels of SN 2.2.4/2.1.8.562-96 (Table 3) [3] for protected areas recreation facilities

The location of the estimated point	Time	The sound levels and equivalent sound levels L_{Aeqv} dB(A)	Maximum sound levels, L_{Amax} dB(A)
Recreation area on the territory of microdistricts and groups of houses	daytime (7:00 to 23:00)	45	60

Prediction of the noise regime of the studied objects of protection is reduced to the calculation of sound levels in them on the basis of acoustic characteristics of the source L_p , subject to the laws of distribution of external noise in the surrounding development the study area. As data input for the acoustic calculation of the accepted value of the measured levels of sound characteristics of sound sources L_p .

The above relation is implemented in the form of a special PC program. With its help estimation, the forecast and the visualization of the noise regime of the investigated objects of protection. The estimated models are presented in the form of maps of sound fields in the following way. The scheme (3D model [1, 2]) of the study area shows the sources of noise and objects of protection are placed in a Cartesian coordinate system. By calculation and using the results of the instrumental field measurements to determine the levels of the sound source.

In the second stage estimation the noise regime in the study area carried out the theoretical calculation and subsequent visualization of sound fields indicating the numerical values of the expected sound levels in the most typical design points that were selected:

– the facade of a residential building № 2 at 2 m from the facade of the building on the

second and fifth floor at a height of 6 and 17 m from ground level);

– on-site residential development at a height of 1,5 m from ground level.

The estimated model is presented in the form of maps of sound fields in Fig. 1. Evaluation and review of the noise regime in the study area taking into account the effect of aircraft noise in “shelter” are presented below in Tables 1–7.

From Fig. 1 shows that the expected maximum levels of external noise in the protected area are compared to 71,0 dBA.

Estimation of a noise mode in the “shelter”

In the shelter children’s play and recreation facilities, adopted a pergola of steel frame with cladding made of organic glass (Plexiglas Soudstop) density 1190 kg/m³ thickness of 25 mm. Its space planning solution represented in Fig. 2. Calculation of airborne sound insulation of enclosing structures made of monolithic organic glass (Plexiglas Soudstop) density 1190 kg/m³ 25 mm thick and is graphically presented in Fig. 2. In all calculation methods are taken from [5].

The calculation of expected sound insulation of the shelter Plexiglas Soudstop $h = 25$ mm, surface mass of material $m = 29,7$ kg/m²:

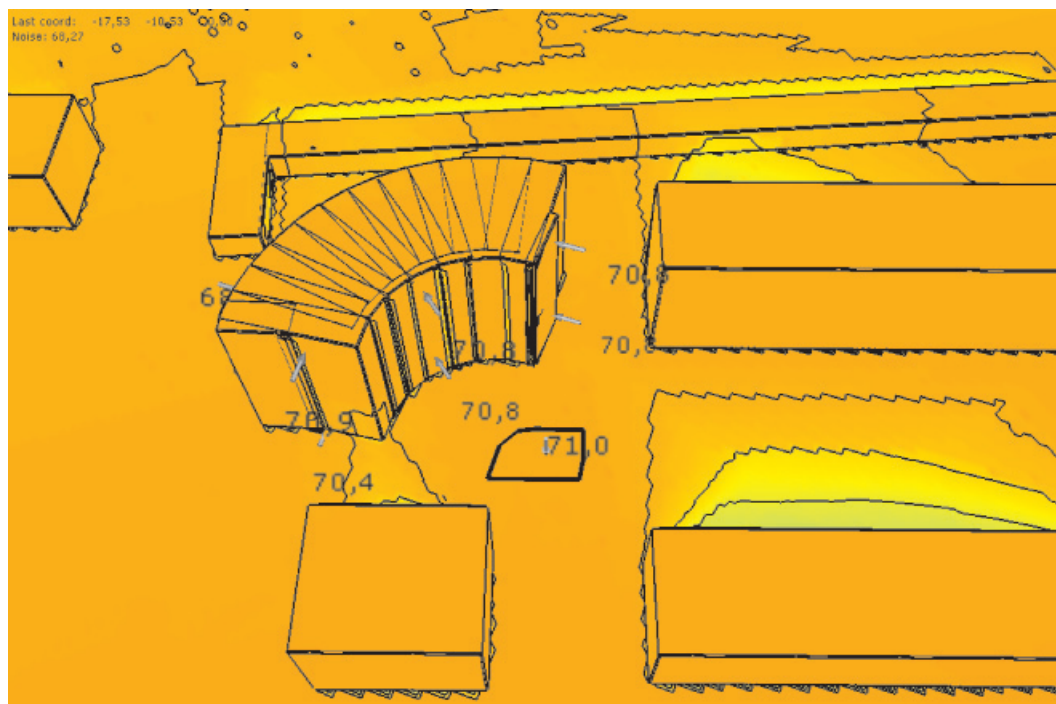


Fig. 1. Map of the sound fields of the study area



bridged. From point To cut down conducted the VA with a slope of 4,5 dB per octave, from point C up held cut a CD with a rise of 7,5 dB per octave. Received broken line $ABCD$ represents the frequency characteristic of airborne sound insulation of a single layer of Plexiglas Soudstop surface density $m_1 = 25 \text{ kg/m}^2$.

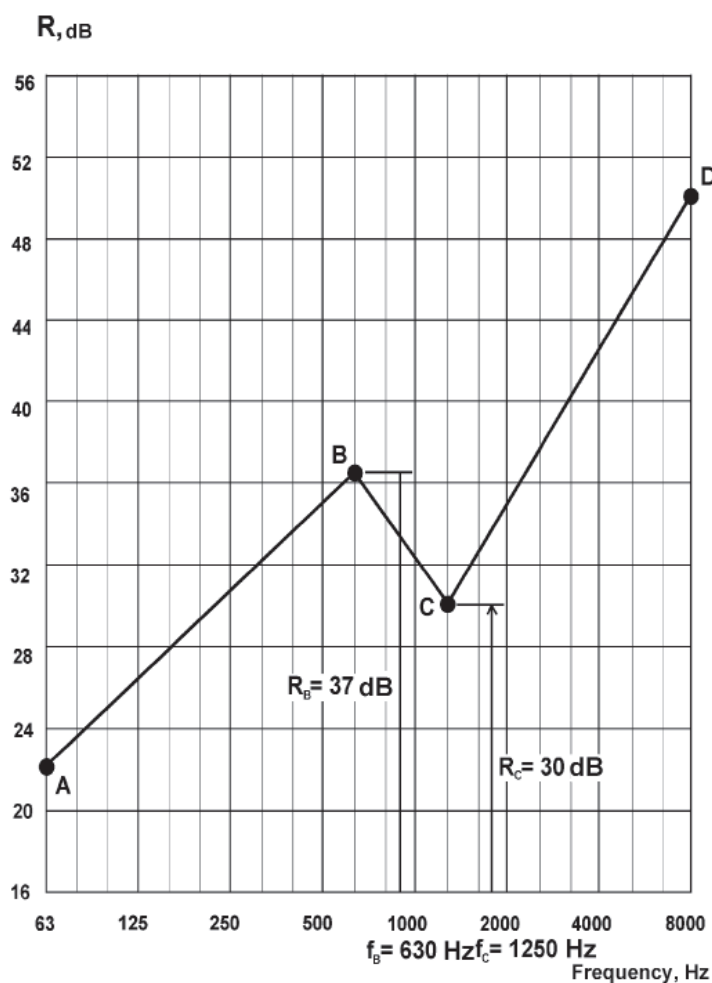


Fig. 3. Calculation of airborne sound insulation of enclosing structures made of organic glass (Plexiglas Soudstop) density 1190 kg/m³ 25 mm

The calculation of expected sound-proofing sliding doors at the entrances to the shelter Plexiglas Soudstop $h = 15$ mm, surface mass of material $m = 17,8$ kg/m².

Built the frequency characteristics of airborne sound insulation one Plexiglas Soudstop. Found the coordinates of the points B and C at the Table 11 [5]: $f_B = 17000/15 = 1133$ Hz; take the next teractive 1250 Hz. $R_B = 37$ dB; $f_C = 34000/15 = 2266$ Hz; take the next teractive 2500 Hz. $R_C = 30$ dB. Plotted on a graph (Fig.4) the points B and C and then bridged. From point To cut down conducted the VA with a slope of 4,5 dB per octave, from point C up held cut a CD with a rise of 7,5 dB per octave. Received broken line ABCD represents the frequency characteristic of airborne sound insulation of a single layer of Plexiglas Soudstop surface density $m_1 = 15$ kg/m².

The acoustic effectiveness of sliding doors

Calculation of acoustic efficiency of the installation of doors in the shelter of Plexiglas Soudstop 15 mm thick carried out ras follows.

1. Taken during a full door opening for entry and exit of people – 20 minutes during the hour in the daytime.

2. It is known that the sum of the two noise levels for a larger correction 0 dB when the difference between folding levels more than 20 dB. In our case, the equivalent noise level in front of the door to the shelter 71 dBA, and the acoustic performance of the door of Plexiglas Soudstop 15 mm or 24,3 dB (see Table 3).

3. Calculation of equivalent (by energy) of the noise level in the entrance vestibule of the shelter after the passage of the door (closed 40 minutes – acoustic efficiency of

24,3 dB and open a 20 – minute acoustic performance – 0 dBA) will carry out in a known manner, applied acoustics.

4. Calculation of noise passed through the door open for 20 minutes during the hour accord-

ing to known methods applied acoustics gave the result 66,2 dB. Consequently the acoustic efficiency of application of sliding doors open 20 minutes during the hours of operation will be:

$$71 \text{ dBA} - 66,2 \text{ dB} = 4,8 \text{ dB}.$$

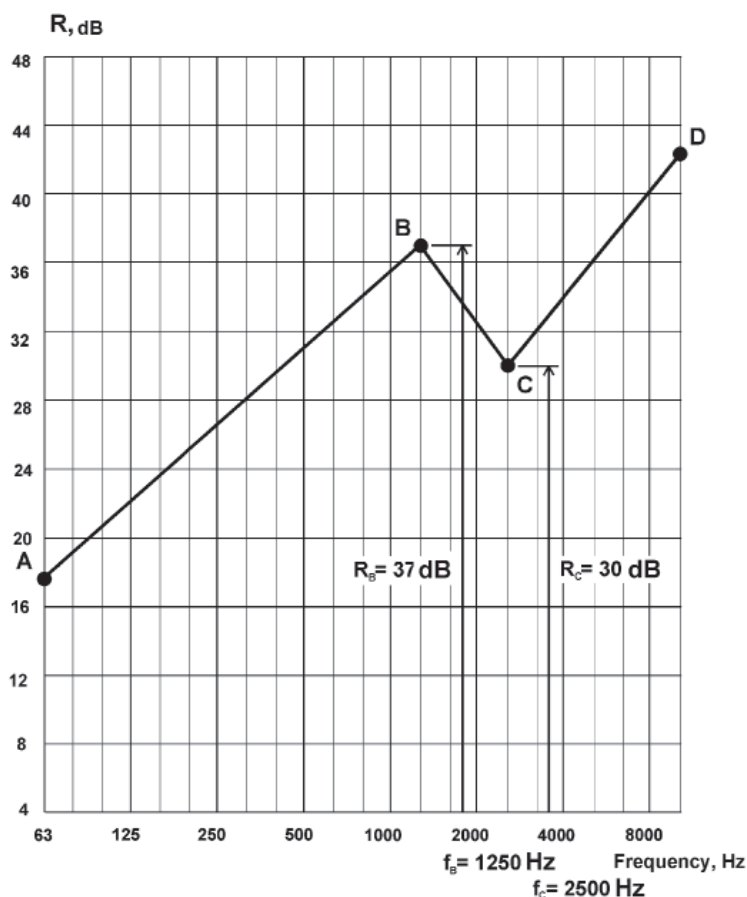


Fig. 4. Calculation of airborne sound insulation of enclosing structures made of organic glass (Plexiglas Soudstop) density 1190 kg/m³ 15 mm

Table 2

The calculation of the average (RCP) sound insulation of external enclosing structures made of organic glass for the designed “shelter”

Num- ber	Shelter	Sound levels in dB, in octave bands with geometric mean frequencies, Hz								L_A , dBA
		63	125	250	500	1000	2000	4000	8000	
1	Plexiglas Soudstop 25 mm	22	26,5	31	35,5	32,5	35	42,5	50	34,8

Table 3

The calculation of the average (RCP) sound insulation sliding door made of organic glass for the designed “shelter”

Num- ber	Door	Sound levels in dB, in octave bands with geometric mean frequencies, Hz								L_A , dBA
		63	125	250	500	1000	2000	4000	8000	
1	Plexiglas Soudstop 15 mm	17,5	22	26,5	31	35,5	32,5	35	42,5	24,3

Table 4

The desired soundproofing (R_{req}) enclosure designed for the shelter from the street to the platform

Number	Value	Geometric mean frequency octave bands, Hz							
		63	125	250	500	1000	2000	4000	8000
1	L_p	–	62,4	60,4	61,3	54,3	46,1	–	–
2	L_d	–	57	49	44	40	37	–	–
3	B_0	–	1	1	1	1	1	–	–
4	V_N	–	235,6	235,6	235,6	235,6	235,6	–	–
5	B_{1000}^N	–	157,1	157,1	157,1	157,1	157,1	–	–
6	μ	–	0,75	0,7	0,8	1	1,4	–	–
7	B_N	–	117,8	110,0	125,7	157,1	219,9	–	–
8	V_I	–	30,3	30,3	30,3	30,3	30,3	–	–
9	B_{1000}^I	–	20,2	20,2	20,2	20,2	20,2	–	–
10	μ	–	0,75	0,7	0,8	1	1,4	–	–
11	B_I	–	15,1	14,1	16,2	20,2	28,3	–	–
12	S_i	–	14,4	14,4	14,4	14,4	14,4	–	–
13	S_0	–	1	1	1	1	1	–	–
14	m	–	2	2	2	2	2	–	–
15	R_{req}	–	–6,5	0,1	4,8	–0,1	–8,3	–	–

Table 5

Average soundproofing of enclosing structures for the design of the vestibule of the shelter with an open doorway the size of 1,0 by 1,85 m

Number of the room	Value
R_1	34,8
R_2	4,8
S_1	39,30
S_2	1,85
R_{mid}	18,2

Conclusions

1. The acoustic effectiveness of the decision of the shelter (Fig. 2) is determined by the following factors: – Input nodes in the shelter are equipped with vestibules, where the front surface of the sound energy takes place not less than 90°.

– The parameter determining the effectiveness of shelter is the surface density of organic glass (Plexiglas Soudstop – 1190 kg/m³) thickness of 25 mm the Geometry of the premises of

the shelter and its volume will affect the acoustic performance is not significantly.

2. Octave sound levels in the shelter exceeds the sanitary standard at a frequency of 500 Hz, 0,9 dB, respectively (see Table. 7 p. 8). In accordance with the provisions of applied acoustics, exceeding in the spectrum allowed in 3 octaves up to 3 dB, in the absence of exceeding the corrected sound level in dBA (in our case in room 45 dBA expected levels consists of 43,5 dBA.

3. Total equivalent corrected level of sound on a scale of A shelter is 43,5 dBA, which exceeds the norm corrected permissible sound levels for recreation facilities on the territory of microdistricts and groups of apartment houses, component of 45 dB. Equivalent sound level in the territory of 57,3 dBA, it follows that the noise-reducing efficiency of the shelter is 13,8 dB.

4. As an additional option to achieve the norms of a device sliding tambour doors at the entrance to the shelter that will be opened for pass of people within 20 minutes of the hours of operation. This event will have an efficiency of 4,8 dB. Doors are made of Plexiglas Soudstop single thickness of 15 mm.

Table 6

The required sound insulation (R_{req}) of the external protecting designs for designed “shelter” from the platform to “shelter”

Number	Value	Geometric mean frequency octave bands, Hz							
		63	125	250	500	1000	2000	4000	8000
1	V	–	235,6	235,6	235,6	235,6	235,6	–	–
2	μ	–	0,75	0,7	0,8	1	1,4	–	–
3	B_{1000}	–	11,8	11,8	11,8	11,8	11,8	–	–
4	L_N	–	68,6	66,3	67,8	61,8	55	–	–
5	B_I	–	8,8	8,2	9,4	11,8	16,5	–	–
6	S	–	172,8	172,8	172,8	172,8	172,8	–	–
7	L_{more}	–	57	49	44	40	37	–	–
8	k	–	1,25	1,25	1,25	1,25	1,25	–	–
9	R_{req}	–	23,5	29,5	35,5	32,5	27,2	–	–
10	R_{mid}	–	18,2	18,2	18,2	18,2	18,2	–	–
11	ΔR	–	–5,4	–11,4	–17,3	–14,3	–9,1	–	–
12	The sound level inside shelter (p. 7, p. 11)	–	62,4	60,4	61,3	54,3	46,1	–	–

Table 7

Decrease in octava levels of a sound taking into account turns from the street to the platform and “shelter”, changes of sections between entrances and the main rooms of the platform and “shelter”

Number	Link	Geometric mean frequency octave bands, Hz							
		63	125	250	500	1000	2000	4000	8000
1	ΔL_p formula(70) in BNR II-12-77	–	0,93	0,93	0,93	0,93	0,93	–	–
2	Table. 21 in BNR II-12-77	–	7	5	3	3	3	–	–
3	Table. 3 p. 15 – (p. 1 – p. 2)	–	–14,5	–5,9	0,9	–4,0	–12,2	–	–
4	L_N in the shelter after passing through the vestibule Table. 3 p. 2 + p. 3	–	42,5	43,1	44,9	36,0	24,8	–	–
5	The sound level on site Table. 5 p. 4	–	53,8	54,3	53,9	47,3	39,5	–	–
6	L_N in the shelter after passing through the walls and roof p. 5 – Table. 1 p. 1	–	27,3	23,3	18,4	14,8	4,5	–	–
7	Total $L_{shelter}$ p. 4 + p. 6	–	42,7	43,2	44,9	36,0	24,8	–	–
8	Compared to the norm Table. 5 p. 7 – p. 7	–	14,3	5,8	–0,9	4,0	12,2	–	–

Note. In 1 and 2 PL. 7 apply the classical method of calculation of noise reduction developed by E.Y. Yudin, with reference to the formula and the table is not dejstvuyuschego Russia (but relevant on this issue) BNR II-12-77.

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TO THE QUESTION OF THE BANK DEPOSIT: OPINION OF THE EXPERT (ON THE EXAMPLE OF PJSC MAY DAY BANK KRASNODAR)

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Scientific research is directed to identification of problems of civil regulation and protection of the rights of investors of PJSC May Day Bank, causes of failure in review on new circumstances of separate categories of the civil cases which have arisen from legal relationship on a bank deposit agreement courts of law of Krasnodar and Gelendzhik. The analysis of court practice on review of civil cases on new circumstances is carried out. Explanations and legal line items of Resolutions of the Constitutional Court of the Russian Federation, the Resolution of Plenum of the Supreme Court of the Russian Federation, the Resolution of the Krasnodar regional court and the decision of the Gelendzhik city court were considered. Refusal consequences in satisfaction of the declared requirements about review for new circumstances of civil cases of the injured investors of PJSC May Day Bank resulting from a bank deposit agreement are analysed. Regulations of the Resolution of the Constitutional Court of the Russian Federation of October 27, 2015 № 28-P and the Civil code Russian Federation which have been applied in case of permission of the designated requirements by courts of law of Krasnodar and Gelendzhik in other constitutionally – legal sense are researched.

Keywords: material regulations, the analysis of court practice, the Resolution of the Constitutional Court, the Resolution of Plenum of the Supreme Court, courts of law, review on new circumstances, property damage (harm), a bank deposit, banking service, money, the civil defendant

According to the Constitution of the Russian Federation constitutional legal guarantees the cash and non-cash existing in the form of record on the bank account of their owner which by the nature represent the covered by concept of property, obligations requirement to bank resulting from a bank deposit agreement shall be provided.

In 2012 several tens citizens have concluded with Bank Pervomaysky (PJSC) bank deposit agreements – in the building of bank and in the presence of his workers – and in 2013 have tried to withdraw deposits ahead of schedule, but were refused. The prosecutor's office of Krasnodar Krai has reported that the staff of additional office of Bank Pervomaysky (PJSC), among them the director of office, has stolen deposits of 188 citizens on the amount of 387 million rubles, contracts on which have been signed in 2007–2013. It has become clear that bank deposit agreements were signed by the director of additional office Larisa Golodnova who did not have on it powers, and money of investors in cash desk of bank was not placed. At the same time bank, without wishing to be responsible for actions of the workers, I suggested the victims to make a claim to defendants who have already spent the stolen means. Thus, investors have actually lost an opportunity to receive back the money.

However, in August, 2015 the Supreme Court of the Russian Federation has cancelled the decision by which Bank Pervomaysky (PJSC) has been eliminated defendants for the crime committed by his employees. On criminal case, on representation of the deputy attorney general S.G. Kekhlerov. The Supreme

Court of Russia has made the decision that Bank Pervomaysky (PJSC) shall be the civil defendant and the deceived investors have tried to collect the money judicially. But the Gelendzhik city court recognized their agreements insignificant as those did not correspond to a standard form, have been signed by the unauthorized person, and the agreement of a contribution did not certificate entering of money into cash desk. Confirmation of the fact of entering of money into bank, the Constitutional Court of the Russian Federation recognized and I have decided that any documents issued by bank can serve as proofs, and the cash receipt order (which investors did not have "May Day Bank") only one of possible options. The validity of the agreement is also specified by actions of bank, for example acceptance of additional contributions and interest payment. But courts of law and the Supreme Court of the Russian Federation have not wanted to understand in this case, having followed absolutely inadmissible way of formal application of regulations about a bank deposit agreement which as a result has led to the unfair decision. VIP-investors of Bank Pervomaysky (PJSC) in the Constitutional court of the Russian Federation have got chance of review of decisions of the courts about refusal to return them the lost means placed under the overestimated rates under non-standard agreements.

Seven investors of Bank Pervomaysky (PJSC) who signed contracts with bank under the overestimated percent and could not return the money, have appealed to the Constitutional court. The constitutional court of the

Russian Federation has supported investors. On October 27, 2015 the Constitutional Court of the Russian Federation has issued the Decree № 28-P on check of constitutionality of item 1 of Art. 836 of the Civil Code of the Russian Federation according to claims of citizens I.S. Biler, P.A. Guryanov, N.A. Guryanova, S.I. Kaminskaya, A.M. Savenkov, L.I. Savenkova and I.P. Stepanyugina by whom it is established that courts of law, recognizing agreements of bank deposits of citizens with PJSC May Day Bank unconcluded, have misinterpreted the regulations which are been the basis for decisions, including item of 1 St. 836 The civil code of the Russian Federation, having given them other interpretation dispersing from their constitutional and legal sense revealed in the specified Resolution that is the basis for reconsideration of the case taking into account these new circumstances. Also in it the decision it was specified that introduction of funds for a bank account by investors can be proved by any documents issued to them by bank. And if the agreement has been signed from a bank name by the unauthorized person, then it is necessary to consider that for the citizen appropriate authority of the representative can appear from a situation in which he acts. The court has no right to qualify the agreement as insignificant when rationality and conscientiousness of actions of the investor in case of the conclusion of the agreement and transfer of money to the unauthorized employee of bank are not confuted. The constitutional court of the Russian Federation has decided that introduction of funds for a bank account by investors can be proved by any documents issued to it by bank. In such cases the bank shall bear burden of negative consequences, have decided in the Constitutional court of the Russian Federation.

With this decision investors have returned to court of Gelendzhik. But that has considered that the resolution KS is not new circumstance whereas the decision which has come into force can be reviewed only on again opened or new circumstances which list is strictly determined.

According to item 3 of the part 4 of Art. 392 of the Code of civil procedure of the Russian Federation treats new circumstances: recognition by the Constitutional Court of the Russian Federation not corresponding to the Constitution of the Russian Federation of the law applied in specific case on which in connection with decision making the applicant appealed to the Constitutional Court of the Russian Federation. According to Art. 393 of the Code of civil procedure of the Russian Federation review on again opened or new circumstances of resolu-

tions of courts of appeal, cassation or supervising instance by which it is changed or the new court decree is accepted, it is made by the court which has changed the court decree or accepted the new court decree. According to Art. 397 of the Code of civil procedure of the Russian Federation court, having considered the application, idea of review of court decrees on again opened or new circumstances, grants the application and cancels court decrees or refuses their review. The court by consideration of the corresponding statement resolves a question of cancellation or refusal in cancellation of the judgment which has entered into force on the bases determined by article 392 of the Code of civil procedure of the Russian Federation taking into account all circumstances, including execution of a judgment, and regulations of a substantive and procedural law, and the persons participating in the case having the right to file a petition for permission of a question of a possibility of cancellation of the judicial acts which have entered into force in the court which has made these decisions. The private complaint can be made about determinations of trial court about satisfaction (refusal in satisfaction) such statement.

Considering that not only recognition of regulation unconstitutional is the basis for review of court decrees in connection with new circumstances, but also interpretation of regulation the Constitutional Court of the Russian Federation otherwise, than it is made in the challenged judicial act about what it is specified in determination of the Constitutional Court of the Russian Federation of October 18, 2012 to № 1962-0. The legal line item of the Constitutional Court of the Russian Federation concerning interpretation of material regulations of the civil legislation reflects the imminent need for courts of law to reconsider civil cases, from bank deposit agreements on new circumstances, considering private interests of citizens investors as equal participants of the property relations.

Despite solutions of the Constitutional Court of the Russian Federation, cynical violation of the civil laws of investors "Bank May Day" (PJSC) Krasnodarskim regional court and the Gelendzhik city court continues.

So, on December 9, 2015 the Gelendzhik city court (the Judge O.V. Shutkin, P.A. Popov) has rejected statements of investors "May Day Bank" of S. Kaminskaya, and I. Bilera about review on new circumstances of decisions of the Gelendzhik city court of Krasnodar Krai on civil cases № 2-1787/13 and № 2-1516/13 on new circumstances. The private complaint can be made

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Considering that not only recognition of regulation unconstitutional is the basis for review of court decrees in connection with new circumstances, but also interpretation of regulation the Constitutional Court of the Russian Federation otherwise, than it is made in the challenged judicial act about what it is specified in determination of the Constitutional Court of the Russian Federation of October 18, 2012 to № 1962-0. The legal line item of the Constitutional Court of the Russian Federation concerning interpretation of material regulations of the civil legislation reflects the imminent need for courts of law to reconsider civil cases, from bank deposit agreements on new circumstances, considering private interests of citizens investors as equal participants of the property relations.

Despite solutions of the Constitutional Court of the Russian Federation, cynical violation of the civil laws of investors "Bank May Day" (PJSC) Krasnodarskim regional court and the Gelendzhik city court continues.

So, on December 9, 2015 the Gelendzhik city court (the Judge O.V. Shutkin, P.A. Popov) has rejected statements of investors "May Day Bank" of S. Kaminskaya, and I. Bilera about review on new circumstances of decisions of the Gelendzhik city court of Krasnodar Krai on civil cases № 2-1787/13 and № 2-1516/13 on new circumstances. On February 9, 2016 Judicial board on civil cases of the Krasnodar regional court (the judge K.V. Lobodenko) I have refused satisfaction of the private claim of N.A. Guryanova about review on new circumstances of the judicial act of trial court, and now the investor has made the writ of appeal in presidium of regional court. On the similar civil cases which have arisen from a bank deposit agreement, courts of law make unfair decisions. The solution of the Constitutional court is new circumstance for review of civil cases, however courts refuse to investors again and do not recognize the solution of the Constitutional court as new circumstance. The solution of the Constitutional court is obligatory for execution by everything including judges. The sanction of Art. 315 of the criminal code of Russian Federation establishes the list of measures of punishment from a penalty till two years of imprisonment for non-execution of a sentence of court, a judgment or other judicial act.

According to the stated line item, provisions of point 3 of part 4 of article 392 of the Code of civil procedure of the Russian Federation do not interfere with courts according to the statement of the persons which were not taking part

in the constitutional legal proceedings to review on new circumstances the court decrees which have entered into force, but are not performed or performed partially based on decisions Constitutional court of the Russian Federation in which the constitutional and legal sense of these or those standard provisions is revealed.

At the same time, such review cannot be made without proper declaration of will of the interested subjects and accounting of requirements of the industry legislation. Availability of material and procedural prerequisites and obstacles for review of decisions is subject to establishment by court to which competence such review is referred.

The group of injured investors on personal acceptance has transferred in regional prosecutor's office addressed to the prosecutor of Krasnodar Krai the statement for criminal prosecution of the judges passing obviously illegal decisions concerning investors of Bank Pervomaysky (PJSC). Injured investors have specified in the statement for the fact that judges ignore the resolution of the Constitutional Court of the Russian Federation from 10/27/2015 № 28-P and continue to take out judicial acts for benefit of bank. Injured investors of Bank Pervomaysky (PJSC) intend to address to the State Office of Public Prosecutor and the RF IC. Also to the Constitutional Court of the Russian Federation injured investors have directed the notification on illegal actions of judges of Krasnodar Krai. The edition of obviously unfair decisions is legalized arbitrary behavior, and their execution – injustice generation.

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MARKET SEGMENTATION RESULTS OF RESTAURANT SERVICES

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The article deals with the theoretical and practical aspects of marketing research in the restaurant business. Restaurant business seems to be prospective investment sector investment. Nevertheless, it is risky because of the high-level competition. Particularly, authors propose to use marketing research tools in order to segment restaurant service consumers. The specific features of restaurant business marketing research are examined. These features include following stages: desk research (literature study) aimed to identify the existing variants of the restaurant market segmentation; selection and description of special segments using the individual semi-structured interviews method according to the industry experts; detailed consumer segmentation using cluster analysis on the written survey data basis; interpretation of the cluster analysis results based on the industry experts views.

Keywords: marketing research, restaurant services market segmentation

Urgent aims of Russian economy development are its diversification and reduction of the commodity exports dependence, GDP growth maintenance at the expense of non-extractive sectors. In modern economies, developed countries services sector plays a very important role, however, it is traditionally weak point for the Soviet Union and, subsequently, Russia. This leads to a number of negative consequences for the economy of the country, particularly, to meet the demand for services abroad, a tourist attractiveness decrease of the Russian regions. Service business fall into the category of small enterprises often. Therefore, a lack of competence in the effective management of such companies not only leads to a decrease in the quality of customer service, but also adversely affects the development of appropriate small business sector, which does not allow using their full potential in terms of various levels budget replenishment and job creation.

One of the most important service industries is the sphere of public catering. Qualified catering service is one of the essential factors of leisure time organization, contributes to the demand for localization services in Russia, preventing its appreciation abroad.

Effective management of the restaurant business in the conditions of a competitive market requires the setting of marketing activity at the appropriate level. However, the purchasing behavior of the restaurant services consumers and their motives are heterogeneous, so the effective management of the restaurant now requires solving the problem of restaurant services market segmentation, which makes the topic research relevant.

Consumer research was conducted in the fifteen restaurants in an average price category in Yekaterinburg. Their owners gave an agreement to conduct a study. The research was conducted in a single way in all restaurants: ques-

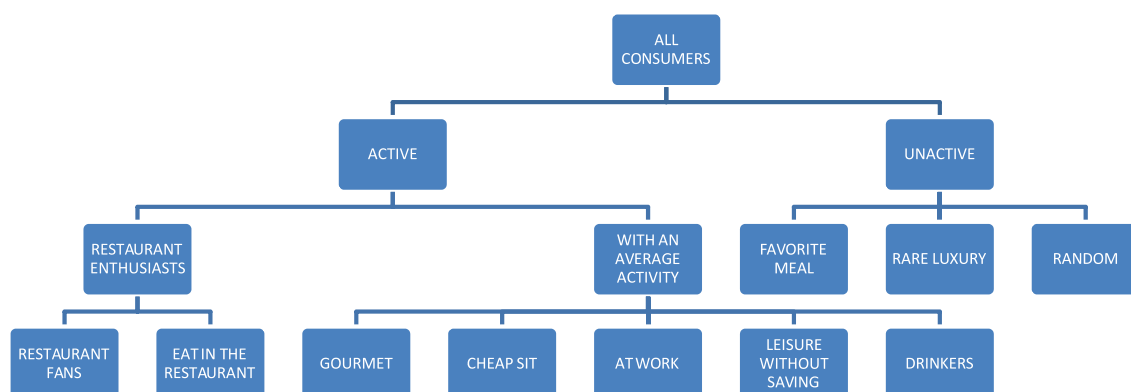
tionnaires and pens were placed sideways on the table, the decision on participation in the study was made by the respondents themselves.

The study received 265 completed questionnaires, 234 of which have been recognized correctly filled in the verification procedure prior to data processing (completely filled and do not contain explicitly information contrary to common sense – that is, for example, when filling out questionnaires inebriated visitors). In the case of significant internal contradictions that profiles were also culled as the purpose of this study was to allocate identifiable relatively homogeneous segments precisely, consumers whose behavior models were settled, and which are capable to tell about their consumer behavior. However, since some visitors consider the research process fun and provide answers lightly, the percentage of rejected questionnaires was substantial.

In accordance to the research plan, individual interviews with seven industry experts (representatives of the restaurant industry) were carried out. As part of the interview, the clustering results interpretation based on the practical experience of industry experts were discussed. Also segmentation bases and special segments were identified, according to industry experts, and could complement the cluster analysis results in terms of the segments identification that are important from the making marketing decisions point of view.

Cluster analysis results interpretation together with the industry experts view allowed to identify the following segments and groups of segments (Figure).

First of all, at the highest level there are two largest segments – “active” and “inactive” users the main feature classification of which is the frequency of restaurant visits (“active” users are those who go to the restaurant at least 1–2 times per month). They also believe that



The segments resulting after clustering results verification of industry experts

they are “well versed in the restaurants” and generally willing to spend more than inactive. They are also generally characterized by a well-established consumer behavior pattern, which is manifested, for example, a clear answer regarding the normal campaign purposes in a restaurant and situations of restaurant services consumption.

“Active” segment, in turn, divided into two smaller segments, very active “fans restaurants” and diverse group of consumers “with an average activity”.

“Restaurant Enthusiasts” are a relatively homogeneous group of wealthy people who enjoy restaurants, due to the variety of situations and motives – from business meetings to the new culinary sensations search. They can afford to go to different restaurants and order expensive dishes.

“Restaurant Enthusiasts” were divided into two groups: “frequent visitors”, the characteristics of which are broadly in line “restaurant fans”, and a special group of “eat in the restaurant” – it includes mainly provided by middle-aged and elder men, who not only actively use restaurants for relaxation. They use it as a substitute for home-made food. In other words, they can afford to eat in restaurants. Note that this does not mean that these individuals do not eat at home, but at least sometimes, they are characterized by the restaurant services consumption in special situation as a simple home-meal replacement.

Consumers “with an average activity” cluster was more heterogeneous.

In particular, the following segments included therein:

1. “Gourmet”. They visit restaurants alone by themselves (often – together as a small group) to try something new; they are fans of new culinary sensations. They haven’t such financial secure as active users.

2. “Cheap sit”. By the consensual respondents opinion of industry experts it is one of the largest segments in the survey. They are people who consider restaurants primarily as an opportunity to communicate in a pleasant atmosphere, and then as an opportunity to enjoy the gastronomic sensations. They often do not order a full meal, and eat 1–2 dishes, they do not tend to eat hearty. Often they are friends, especially girlfriends, or couples who come to talk firstly and pass the time, but not to eat. As a rule, people with secondary (low) income of all ages.

3. “At work”. The relatively narrow consumers segment who use the restaurant mainly due to the work need, for example, for business meetings. Note that the “frequent visitors” also use restaurants in connection with work, but for them it is not the dominant use of the situation.

4. “Leisure without saving”. People with different income levels. They visit restaurants not very often, but regularly and not seek to save. According to industry experts, this segment can be further classified into two more, depending on income level:

- “Rest without saving – secured” – people with middle and high income for whatever reasons, their restaurant visits are not very common; many of them are enough economically simple and could afford more frequent visits.

- “Rest without saving – living beyond their means” – mostly young men, not enough secured, but those looking for to impress. Interviewed experts believe in the existence of this segment and suggest that during questioning its representatives overestimate their income. For this reason, the segment can be “not visible” when clustering.

5. “Drinkers”. It is also narrow segment including people who love to drink beverages in restaurants. We note that the surveys were conducted not in pubs but quite respectable restaurants, so

this “drinkers” segment should not be confused with customers of pubs, taverns, etc. In this case, they are primarily friends especially middle-aged and older men, well-being enough.

We have examined the segments included in the “active” group (Figure). Another spin-off from clustering a group of segments called “inactive”, which reflects the low frequency of visits by representatives of this group of restaurants. Within this group was able to identify the following segments:

- “Favorite meal”. Small segment with an interesting model of consumer behavior, mainly – women with low and middle income, which rarely go to the same restaurant, retaining the loyalty to not only the restaurant but also a particular dish served there. They do not order a full meal. They go to a restaurant with a company, not alone.

- “Rare luxury”. Representatives of this segment are people with middle and low income. They visit restaurants rarely as an opportunity to have a good time. However, they are generally more selective in their spending than the segment “Rest without saving.”

- “Random”. Strictly speaking, it can not be called a market segment, in the sense in which it was considered in the first chapter. This group is characterized by a rare visit of restaurants and not formed, hardly determined preferences, but their profiles were not discarded in the course of preliminary data due to the lack of obvious internal contradictions.

- “The fragmented responses”. Difficult to interpret the clusters formed by respondents who visit restaurants not necessarily rare, but give enough consistent answers (for example, due to negligence or lack of cooperation).

Let us show the segments identified by experts that were obtained through interviews with industry experts (and which are “special” segments from the identification method point of view, the expert survey).

As can be seen from the Table, industry experts could be called a sufficiently large number of slots allocated on different segmentation bases. In conjunction with the segments derived from the analysis of primary data, an extensive restaurant list obtained can be used as a basis of its marketing policy.

The segments of the restaurant market, identified by experts

Base of segmentation	Identified segmentations
According to the situation of use	Banquets (including holidays, “corporate parties”, weddings and so on)
	Business lunches (lunch), breakfast
	Breakfasts
	Sports broadcasts
	Beer drinking
	Romantic evening
	Family hike (with children)
	Meeting with friends (friends)
	Impulse buying
	Live music/entertainment
According to the cuisine	Fans of “understandable” (usual) food
	Lovers of Japanese food (sushi)
	Fans of other ethnic cuisines (by type of cuisine)
According to the social group belonging	Stable elite social groups
	Stable social groups, interest groups / hobbies
According to geography	Market walking distance (local market)
	Short trip Market (walking distance is difficult, but you can quickly get to call or on the road)
	Remote Market (it takes a long time to get to the restaurant)
According to the information search	Active users who use the internet to search for restaurants/offers

Thus, the problems related to the market segmentation and the target segment choice consist part of the marketing activities, known as the marketing plan. The restaurant market segments composition, which was presented above, requires the development of appropriate guidelines for the composition application in the process of catering enterprise marketing planning. In other words, the define of the restaurant planning marketing process with regard to the results of the present study previously obtained is to be done.

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RUNNING AGAINST WIND OR HOMESCHOOLING PERSPECTIVES IN KAZAKHSTAN

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This article provides quantitative research on homeschooling using data collected from three semi-structured interviews with open ended questions. The research findings show that alternative school is growing steadily and becoming a legitimate form of education in Kazakhstan. The article answers the following questions: Is homeschooling just a new fashionable tendency or necessity for people to choose it? Is homeschooling better alternative to a traditional school system in Kazakhstan? Through the analysis of these questions, this article explores the families who choose homeschooling as an alternative education to public schools.

Keywords: homeschooling, alternative homeschooling, traditional homeschooling, homeschooling movement, religious attitudes, parents' excessive care, home education, public schools

Homeschooling is becoming increasingly popular in Kazakhstan and what is it just a new fashionable tendency or necessity for people to choose it? Is homeschooling better alternative to a traditional school system in Kazakhstan? Parents provide several reasons to justify their decision of their having chosen this untraditional way. One of the causes is due to open boarders resulting an access to information. This access to the world experience in turn has changed people's expectations towards school system a lot. About 30 years ago in Kazakhstan it was a crime even to dare thinking of alternatives to traditional school system since it was against the values of USSR, where everybody was regarded as the same and diversities were not accepted at all. As for school system, there were no alternatives to state schools even private ones. Every child used to get a secondary education on a compulsory basis therefore every parent was obliged to provide his or her child with it. The attitude towards school system has changed in the democratic Kazakhstan providing people consideration of other alternatives for various reasons. Parents started to challenge the compulsory school system by looking for other ways to educate their offspring. There are many reasons to support stakeholders' arguments concerning homeschooling and they brought to the following statement. High expectations of parents towards their children's education, religious attitudes and excessive care are the three causes to choose homeschooling as an alternative to traditional school system in Kazakhstan.

In order to understand the phenomenon of homeschooling it is important to give definitions to it. Since homeschooling is widely spread and first started in the USA, it is very important to find the understanding of this

term by Americans as well as by American legislation. Considering that homeschooling is applied in Kazakhstan, it is necessary to give Kazakhstani definition to it too. Concluding with the definition part scholarly understanding of the term is crucial in order to analyze and compare it.

The term "homeschooling" or home education as it was defined in the "Encyclopedia Britannica" means providing education at home instead of sending children to schools or institutions. Speaking more broadly in "Privatizing educational choice: Consequences for parents, schools, and public policy" defined that Homeschooling in the USA is the most privatized form of education where families take responsibility to educate their children. It is usually organized in a such way that the process of children's education is supervised by adults or family members, although often attracting people from outside. As it is seen homeschooling is the process of providing education at home by family members [4].

American supporters of homeschooling movement contributed a lot to emerging of the term homeschooling or home education. Actually it was a long way coupled with restless struggle to make the homeschooling legal and accepted by the society. Cooper and Sureau (2007) in their article "The Politics of Homeschooling New Developments, New Challenges" described that in detail. First, homeschooling community made a comfortable atmosphere for themselves: by constant challenging public policies and their impacts in courts. Second, they applied efforts into not only regulating the existing atmosphere but reminding the Congress and state legislatures about homeschooling society in order to escape discriminatory practices to homeschooled

children. As a result, The United States Supreme Court ruled legal homeschooling in 1972 by recognizing that Amish parents have the right for their children not to attend public schools for religious reasons. The Court also ruled that according to the Constitution of the USA parents have the basic right to “establish a home and bring up children” along with the right to “worship God according to the dictates of [their] own conscience”. The combination of these rights is why, in the United States, the Supreme Court considers homeschooling as a fundamental right (Homeschool facts.com). After that victory the society started to broaden the scope of homeschooling involving other groups of children appealing to admit their needs legal too. Due to such movement it became possible for other children to be the subject of homeschooling. After all homeschooling is the form of education where children are not coerced to attend public or private schools conversely, they can get their education at home [6, 7]. Moreover, other researchers’ analyses suggest that homeschooling has become a popular educational locus in the late 1970s and since then the increased number of the U.S. families have engaged in political and legal action on homeschooling [8]. Additionally, the National Center for Educational Statistics (NCES) showed that the homeschooling rate of students being homeschooled has grown from an estimated 1,7% in 1999 to 2,2% in 2003 [10], and around 2,9% of children, 1,5 million of the school age offspring in 2007 [9].

Homeschooling is banned by the law of Kazakhstan instead of cases with disabled children who cannot attend schools due to their health problems. Disabled children are the subject of the law on homeschooling provided availability of documents certifying their disability.

The experience that homeschooling is banned or not supported by the governments of some countries or it is the subject of constant disagreements has reasonable explanations. The fact is that traditional school system engages a large amount of people and enormous sums are allocated to this field. The perspective that more and more students are lost for the sake of homeschooling is the threat to the traditional system because it is the issue of big money. As Basham, Merrifield, and Hepburn in their article “Homeschooling: From the extreme to the mainstream” argued that homeschooling families spent about 4000\$ a year per one child and the government allocated for public school spending about \$9,644 per child in the USA. As it is seen public spending on

traditional school system is higher more than two times thus homeschooled children save the budget of the USA. If the governments support the strategy of such saving money then the flipside of it is the growth of unemployment rate among people involved into school system which in turn can lead to social instability [3].

Every parent wishes the best fortune to his or her children and it motivates them to look for alternatives to traditional education system. In pursuing their goals they find themselves outside mainstream education. There are many causes leading them to some kind of differentiation but the most widespread are:

The first cause is connected with parents’ high ambitions towards children’s education. This problem exists not only in Kazakhstan but in the USA too. Parents think that one-on-one instruction to their children will guarantee higher academic performance. Ray found that homeschooled children showed better results on SATs and ACTs rather than those from public schools for several years. Preparation to tests requires both instructor’s and child’s attention on the material as well as clear instruction. Homeschooled children have advantage to get focused on the tests preparation and effective usage of class hours in comparison to public school children since one-one-teaching excludes interruptions and various misunderstandings. All these in turn lead to high outcomes and academic scores which can satisfy ambitious parents.

Religious attitudes are the most important aspects while considering homeschooling. Parents’ aspiration to create special atmosphere that is willingness to protect their children from outside influence. Religious attitudes define their strategy not to send children to traditional schools since they believe that tolerance to religion can be provided at home. Further on Cheng in the article: “Does homeschooling or private schooling promote political intolerance? Evidence from a Christian university” demonstrated that according to the US Department of Education parents in the USA choose homeschooling to their children because they want religious and moral teaching for their children. Parents’ religious attitudes push them to homeschooling their children because they intend to provide a lot of religious instruction and environment [5].

Parents’ excessive care intended to protect their children from the impact of the society is another reason for homeschooling. Some parents are taking extra caring to their children and they are afraid of spoiling them by other children. Parents’ assumption that school is the

place where there is a risk to be spoiled by addiction to drugs or HIV disease etc. Basham, Merrifield & Hepburn showed that educating children at home helps to escape negative peers' influence and even control children's interaction with peers [4]. Thus, such measures will contribute to avoid premarital sex, drugs and alcohol usage. Safer learning environment is important due to the fact that some parents are even afraid to send their children to schools because of the accidents connected with shootings of school children. The risk to lose children and safety precautions are the reasons not to send children to public schools, thus, taking an alternative to public schools [2].

Interview findings

The researcher conducted three semi-structured interviews with open ended questions in order to have more explicit data. The questions were focused in such way that helped to answer the research question. All interview participants stated that there should be an alternative to a traditional school system in Kazakhstan. This alternative of choosing education system must be provided not only to parents but to children as well, it means their opinion must be taken into consideration. The participant B emphasized that parents can give a better education to their children than traditional schools where about thirty children in a class are being taught. In addition, she supported one claim of the Thesis Statement by saying parents can keep their children off the negative influence of schools and violence in them. The participant C suggested that homeschooling must be the subject of strict control and the state must be careful about "crazy cases such as religion". The permission to homeschooling must not be provided to such people with religious attitudes.

Conclusion

Homeschooling can be a successful alternative to traditional homeschooling. There are several reasons why people choose alternative to traditional homeschooling. They are tran-

sitioning from traditional way of considering education (just accepting the available choice) to the western way of thinking (getting the best outcome, creating safe and special environment for learning such as religious, relieving parents' worries about children in addition to secondary education). People are thinking not only of getting compulsory education but how this education will be conducted [1]. They are looking for the best option for their children that is not only to provide good education but also to make the time of getting it less troublesome with the accent to the future outcomes.

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CORRECTIVE AND HEALTH-IMPROVING METHOD OF PHYSICAL FITNESS OF PRIMARY SCHOOL CHILDREN WITH SPEECH DISORDERS BY MEANS OF PHYSICAL EDUCATION

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The article deals with the questions of correction of physical development and physical fitness of primary school children with speech disorder by means of basketball. In the article theoretical basis of the sections of the physical training programme developed by the authors which is primarily based on the elements of basketball is introduced; the results of the testing of this programme in terms of a pedagogical experiment are included. It is established that the use of corrective and health-improving exercise programme based on elements of basketball in the process of physical education contributes to the leveling of differences in the motor area of students with speech disorder (SD). The proposed corrective health-improving programme of physical education can increase the level of morphofunctional status and physical fitness of children with SD.

Keywords: health maintenance, limited opportunities, general underdevelopment of speech, morpho-functional indicators, experimental programme, basketball, correction, primary school children, physical fitness

Health condition of children and adolescents is of much concern to specialists: physicians, teachers, psychologists and others. In recent years the number of primary school pupils with functional disabilities and chronic diseases has increased by 92%. About 50% of boys and 75% of girls are not able to cope with physical test norms.

The Ministry of Health (2005) as well as the World Health Organization acclaimed a growing number of children with speech disorder. More than 30% of children at an early age have speech disorder of various extent and severity. The percentage of the first grade pupils who suffer from speech disorder is 20–30%. It is explained by a growth of birth in risk groups, harmful effects of the environment, lack of parental guidance, restrictions of educational opportunities.

It should also be mentioned that therapeutic-teaching diagnostics raised to a higher level and its methods and techniques allow to reveal and diagnose a pathology at early stages.

Specialists from many countries are searching effective programmes of rehabilitation for children with health deviations thus solving the problems of physical restoration, social adaptation, active involvement in life. The task is rather complicated and it requires complex scientific researches, coordinate work of medical specialists, teachers and specialists in physical education and sports.

Those with significant disabilities need special (corrective) teaching. As the object of teaching process the category of such children is various: according to the type of a disorder (mental disorder, speech, visual, hearing impairments), the age, the extent and structure of the leading defect, the cause and the course of

diseases, medical prognosis, the presence of concomitant and secondary diseases, the state of maintaining functions, and other features [4, 6, 7]. More than a half of secondary school pupils need corrective-developing and health-improving physical education [1, 5].

In recent years the number of children with speech disorder (SD) is growing and it tends to the establishment of special corrective schools and supplementary logopedic classes.

As early as the XXI century the idea that SD is the consequence of disorder of the motion of speech organs emerged [6]. Speech disorders are various disruptions of speech of children with normal hearing and intellect but with underdeveloped speech system components. Yet the children with SD have individual peculiarities.

R.E. Levina and her colleagues developed a periodization scheme of SD: from complete inability to speak (the first level of speech development) to extended forms of coherent speech with the elements of phonetic-phonematic and lexico-grammatical underdevelopment (the third level). The shift from one level to another is characterized by an increase of speaking activity, an appearance of new possibilities for speaking. An individual pace of a child's progress depends on the severity of the primary defect and its form.

Speech disorder is one of the defects that essentially influence all aspects of life of a person. Physical education dominates in corrective teaching children with speech disorder because of two reasons: on the one hand, as many authors claim [8, 9], motor analyzer plays great role in the speech development, and, on the other hand, from the very childhood people with speech impediment are physically backward.

It should be mentioned that in many researchers' opinion physical underdevelopment of children with SD is the consequence both of speech impediment and functional backwardness of motor analyzer and imperfect methods of physical education [1, 7, 10]. The analysis of various research works detected the problem of poorly developed methodological techniques in special (corrective) teaching for correction and development of morphofunctional status of children with SD.

A number of research works are dedicated to the study of using methods of physical education for teaching children with SD [1–7, 9]. Generally, exercises for children with SD of the III level are based on standard programme for healthy children with normal physical development.

The educational programme in physical training for pupils of special medical group in secondary schools designed [2, 3, 8] according to the minimum requirements of physical education and the level of physical development of primary school pupils doesn't solve problems of corrective education for pupils with SD of the III level.

High static loads connected with a large amount of studies at school and at home negatively influence the development of primary schoolchildren with SD. At the same time it is stressed that movement is a biological need of a child [1], and this need unfulfilled influences the growth and the development of a child's organism.

Materials and methods of research

In relation to the mentioned drawbacks a search on more effective methods and conditions of rehabilitation of children with SD has been performed. Within the realization of individual approach it is preferable to use individual measurements of primary schoolchildren with the purpose of motivation for physical education, during the process of education as well. The fact that age and sex characteristics are important measurements that influence studying opportunities for pupils with SD, was taken into account. However, the existing secondary school system is mainly based on chronological age of children with SD. At the same time the specificity of physical development of children with SD of the III level, the state of locomotor apparatus, biological maturation and sexual development have an impact on functioning of the organism and is an important criterion of health.

At the beginning of the experiment complex researches on analysis of the dynamics of the major age-related morphological and functional features of primary school children with SD were performed. The idea that motivation for physical activity, the use of the elements of games and team sports [8–10] is one of the effective methods of rehabilitation of children and adults, was taken into consideration. In accordance with this, the aim of the research is an attempt to correct morphofunctional status of children with SD using elements of basketball.

The above mentioned determined the necessity to develop and introduce new programme of recreative training for children and those with SD.

The proposed experimental programme is different as it is based on the course of teaching basketball and mastering the main sports techniques, because it is concerned that the main movement actions are developed at primary school age. The programme includes the following sections:

- a complex of exercises with elements of basketball;
- a complex of active games;
- activities for fine motor skill development;
- exercises for visual impairment prevention;
- coordinating and vestibular training exercises;
- a complex of exercises with elements of gymnastics with a fitball;
- special breathing and speech developing exercises in combination with three-phase rhythm and reciting poem lines.

In the experimental part primary school children with SD who study at special corrective secondary school were involved. The participants of the experiment were divided into experimental and control groups, 24 people in each. Anthropometric and physiological measurements were taken according to standard methods.

For express-evaluation of somatic health of the pupils a complex of five morphological and functional measurements showing the state of organic vigor, stamina level and the incidence of diseases was used [10]. As the suggested measurements are taken in different units the valuation of each figure was formalized with points.

The following measurements (indexes) were calculated:

1. Quetelet index, showed the adequacy of body mass and body height.
2. Robinson index – “combined sensory”, characterized the regulation of cardiovascular system work and characterized somatic work of heart.
3. Skibinski index reflected the property of functioning of respiratory organs and blood circulation and the resistance of body to hypoxia.
4. The level of development of strength, speed and stamina are reflected in V.A. Shavalova's index and indicated functional abilities of cardiorespiratory system.
5. The Ruffier test indicated the level of adaptive reserve of cardiovascular and respiratory system.

The results of the analysis in the groups under study showed that the dynamics of growth of absolute measurement figures in experimental group was much higher in comparison with control group.

These indexes are connected with the level of development of general stamina, aerobic energy-generating abilities and other measurements of physical development and frequency of respiratory diseases.

Results of research and their discussion

The results of the experiment showed that most children from experimental group (EG) improved their physical health: among the studied the number of boys with health condition below the average was 20,8%, the average – 58,3%, higher than average – 20,8%; 80% of girls were at the average level, 20% – below. The figures in control group (CG) are much lower: 79,2% of boys' health condition is below the average level, 20,8% – average;

75 % of girls' health condition is below the average, 25 % – average. The measurements of functional condition of cardiorespiratory system of children in EG improved significantly.

In general the results of the pedagogical experiment prove that physical education in the designed model of teaching process on the basis of experimental teaching programme positively influences the development of speech, improves motor skills, health and develops physical qualities of primary school pupils with SD of the III level.

The designed corrective health-improving physical training programme, based on the differentiation of speech problems and including special exercises effectively corrects disturbed motor activity and improves morphofunctional physical development of children in comparison with the traditional physical training programme.

Conclusion

The results of the research show that the use of the suggested corrective health-improving programme of physical education allows to increase the level of morphofunctional status

and physical development of children with alalia. In general the results of the research show that physical education is an important health-improving factor for children with SD.

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FEATURES OF EDUCATIONAL WORK WITH YOUTH AT THE IRKUTSK NATIONAL RESEARCH TECHNICAL UNIVERSITY

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The article reveals the peculiarities of educational work with young people in the Irkutsk State Technical University (INRTU). The university created the Office for the social, educational and cultural work, which includes the center for educational and cultural work, as well as management of the campus. An active role in the educational process of high school is given to a center of spiritual and moral development. The main objectives of management of educational work is the formation of students' civic position, preserving and increasing moral, cultural and scientific values in the conditions of modern life, the preservation and revival of the traditions of the university; promoting healthy lifestyles, as well as monitoring the performance of management.

Keywords: higher technical education, educational work, Irkutsk National Research Technical University, the center of cultural and educational work, Mineralogical Museum. A.V. Sidorova, INRTU History Museum, Center of spiritual and moral education of the campus, students trade union, council of veterans

Irkutsk Technical University has always prided itself in the strong tradition of educational extracurricular activities. The university created the Office for the social, educational and cultural work, which consisted of centers of educational and cultural work, as well as Campus Management.

The office is headed by provost of academic and social work, professor, B.B. Ponomarev, with his two deputies for educational and cultural work: V.I. Tregubov and T.V. Dashko. The main tasks of management are to develop students' citizenship, preserving and increasing moral, cultural and scientific values in the conditions of modern life, the preservation and revival of the traditions of the university; promoting healthy lifestyles, as well as monitoring the performance of management.

The university, which trains personnel of scientific and technical intelligentsia, leads the active and creative life. Center of cultural and educational work became a place of attraction for talented youth, and in 2003 it united student club and cultural center. By the lead of T.V. Dashko the cultural and mass work raised to unprecedented heights. For her work she was awarded numerous letters of thanks and diplomas of the Minister of Education, the governor, the mayor of Irkutsk for the successful realization of the state youth policy in the university, in the city and in the Irkutsk region.

The fame of the creative teams and entertainment events organized by the center of cultural and educational work, rapidly spreaded out the Irkutsk region. Many ensembles, studios and schools, were born at the University at different times, are known today all over Russia.

Today in the university there are 27 creative teams from different directions and genres, and an assembly hall for 740 seats, equipped with modern sound, lighting and multimedia equipment, it is one of the best concert venues of the city. Polytechnic students live full of the exciting, eventful and memorable events. Among the tasks of the center is not only the organization of leisure of students and support creativity of young people. Directions of its activity are varied: spiritual, moral and aesthetic education, education of patriotism and preservation of traditions.

Many of the technical university holidays became traditional and completed the cultural life of the city. Among these contests: "Miss INRTU", singers "New Wave" festival, "debut INRTU", "Student's spring", "Baikal Ice Music", ballroom dancing "INRTU Cup", "Victory Waltz" national cultures, "University-area peace and harmony" and many others. There aren't other universities in Irkutsk region that can match with Technical University. Every year thousands of people gather together on "Day of Knowledge", hundreds of people come to the "Dedication to students" ceremony, "Alumnus of the Year" and concerts of creative collectives. Also there are cultural and educational projects such as "Youth Philharmonic" (jointly with the Irkutsk regional philharmonic) and "Theatre-university" (in collaboration with Zagurskiy music theatre and Vampilov theatre).

Conducted "Days of Military Glory". Creative collectives of the center regularly perform programs, not only at the university stage, but also at the leading venues in the city and the region.

A variety of student interests contributes to the creation of various clubs and art groups. Fans of heavy metal found a rock club, fans of rap united in the rap movement. Photography club of the University is well known for citizens of Irkutsk.

At 1998, at the university was found a teaching unit "Flibustery", which prepares counselors and educators for children's summer camps. Since 2002, "Flibustery" cooperate with the Irkutsk branch of the Russian Children's Fund. Within the program "Students to children" they come to the children's homes and shelters of Irkutsk with competitions, concerts and educational programs. "Flibustery" also participate in charity events, donations to children from needy families.

The University's pride is a folk theater "Predmestie", which in about 40 years puts great student performances. Manages theater Honored worker of culture L.S. Serikova. The theater has a lot of awards – regional, national, international. Each performance of the team is event for the theatergoers.

Folk traditions are preserved by folk ensemble of Russian songs "Kalina", created in 1997 (leader Irina Dolotova, choreographer Igor Haleev) – laureate and winner of national and international festivals and competitions, owners of the Grand prix of the most prestigious international programs. The "Kalina" repertoire – pop, lyrical Russians' songs, perky ditties and dance, as well as funny and sad Cossack songs. Young enthusiasm of students in bright folk costumes is capable to charge audience energy, fascinate and compel to dance. Great support team provides the Department of Surveying and Geodesy of Subsoil Institute of INRTU under the guidance of professor A.L. Ohotin.

People's vocal ensemble "Sing, friend!" (Head Galina Gilenova) with their first performance was the hallmark of the Technical University. The ensemble is the most traveling team. Italy, Korea, the Czech Republic, Poland, Bulgaria, Belgium – this is not a complete list of countries where the ensemble became the winner and laureate of various competitions.

School of Modern Choreography "Steps" (Head Inna Chernykh) in 2016 will celebrate its 20th anniversary. The repertoire of the leading youth groups in the area of contemporary dance – dance performances, plays and concerts, which were awarded by prizes of the regional, Russian Federation, and also of international level. In 2014, a team of "Steps" was marked in the "Book of the Irkutsk region

of Records" as "the first modern dance team in the region."

The most "noisy" team of INRTU is a studio of ethnic percussion "Etnobit" (head Natalia Vlashevskaya). This is a creative union of people who share an interest in the sounds of ethnic drums and rhythms of the peoples of the world; the staff is young, but very popular, not only in university, but also far beyond. Korea, Vietnam, Turkey, Samara, Chita, Vladivostok, Bayanday, Zalari, Shelekhov, Belorechensk – such is the geography of the collective travel. Wherever "Etnobit" appears the audience fall in love with them. In 2014, the studio was included in the "Book of Records of the Irkutsk Region" for the organization of Music Festival named "Baikal Ice Music".

Performances of the ballroom dance club "Academic" (heads Maxim Skomorovsky and Elmira Kamaldinov) – decoration of the concert programs of the university. In 2007, the team won the special Russian Cup in 2008 – semi-finalist of the championship of Russia, and in May 2009 – the champion of Siberia.

Popular with university students are a school of pantomime and improvisation "Art Graphics" (leader Elena Orlova); Also there many others clubs at INRTU such as Breakdance club (head Stepan Kharitonov), Club of the artistic expression and vocal "Steps"; non-model agency "NET" (Head Net Karpovskaya), pop-jazz band "Jam" (head of Daniel Kleshnin), the vocal group "New Generation" (head of Maxim Chubarov), folk instrumental ensemble "Surprise" (Head Sergey Fukalov), tap studio "tap dancing" (head Dmitry Dorokhin). Also there is a Club of the Funny and Inventive (CFI) – the most massive movement in the university. It has more than 200 members [3].

Creativity of INRTU involve everyone. To the scene, together with the students go teachers, deans, directors of institutes. This creates an extraordinary atmosphere of the university brotherhood and unity.

At our university museums are on demand, they conduct training, scientific, educational, patriotic and cultural mass work.

The Mineral museum of INRTU is well known in Russia/ The richness, diversity and representativeness of the collection of minerals, rocks and minerals in Eastern Siberia. Museum has no equal after the Urals. The museum was established together with the creation of the university in 1930. The collection repeatedly presented at various international and Russian exhibitions. In 1991, the International

Exhibition SUSSEX MINERAL SHOW (United Kingdom), organized by the British Mineralogical Society, dedicated to the mineralogical museum FPI.

A huge contribution to the development of the museum made A.V. Sidorov, whose name is now the museum, and L.D. Vakhromeeva, Honored Worker of Culture of Russia, giving it all her energy and love. In addition, L.D. Vakhromeeva in 1984 organized a scientific-methodical council of university museums at the Council of Rectors of the Irkutsk Region and 10 years successfully supervised his work, passing "baton" in 1994, to the museum of history of the university.

From 1993 to 2014. Mineralogical Museum collection replenished with valuable exhibits: the magnificent minerals from the collection A.J. Tibeliusa, gold nuggets (A.S. Sokolnikova gift to Director of "Golden River", in 1982), tourmalines with Malhanskogo field (gift of V.E. Kushnarev, in 1972). In 2008, after a visit to the university by the Chairman of the Federation Council S.M. Mironov mineralogical museum was donated by the amazing beauty of the Druze amethyst and agate slice, take a worthy place in the exposition.

Central exposition of mineralogical museum presented Chemical classification by E.A. Lazarenko, which presents more than 850 mineral species not only in Siberia, but also around the world. The museum owns a unique exhibits. "Gorka Ural gems" the end of the XIX century, the work of stone-carving artist A.K. Denisov-Uralsky; jade boulder "Saddle Genghis Khan", weighing 1,5 tons; 200 kg geode, made of amethyst crystals (Bolivia); gneiss with super-deep wells 12,065 meters (Kola Peninsula); iron-manganese nodules from the Pacific Ocean bottom depth. 5000 m; Limestone from the summit of Mount Everest – 8,400 m; Druze largest pure crystal rock crystal; amazing education "okeanit" rare mineral from India. At present, the museum collection includes more than 35 thousand pieces.

History Museum INRTU created at September 20, 1985 by order of the rector S.B. Leonov. It is the largest technical museum of history among higher educational institutions of the East-Siberian region. The first head of the museum was V.K. Prokhorov (1985–1992), then the museum was headed by N.N. Azarov (1992–1997), G.E. Lobanov (1997–2003). Since October 2003, appointed director of the museum candidate of history, Assoc., prof. RANS O.A. Goroshchenova, which became in 2014 the Public Council for Culture at the Ministry of Culture and the archives of the Irkutsk

region, and in 2015 of the Scientific Council of the editorial board to create an encyclopedia of the Irkutsk region.

The museum consists of two collections – historical and technical, the latter on their own initiative collected and transferred to the museum of the university graduate, Art. Researcher at the Department of Metrology and then assistant cafes. gemology A.P. Kotlobaev. The funds of the museum's history is stored for more than 12 000 exhibits. Some of them unique, for example, the inventor lamp P.N. Yablochkov (the end of XIX century.), General technical guide "Hutte", theodolites (SAM) of Bamberg (1898) and Repsold (1904), personal belongings, photographs, documents, correspondence, and outstanding teachers of high school graduates.

Guided tours of the development in Irkutsk vocational education to the XVIII century in the museum. to the present, telling about the establishment of faculties, advances in science, sports and culture. The guided tour includes objects campus and university buildings. Very popular thematic and art exhibitions, presentations, meetings with authors, Orthodox lectures.

The museum organizes many cultural and educational activities for young people and students, including 2014 lecture "Russian sanctity", lecture at the library on the history of the city of Irkutsk and the region of the spiritual values of the younger generation. In September 2015 History Museum (O.A. Goroshchenova) participated in the event, the club of young scientists "Alliance" (hands. A. Petrov) "Tour of Irkutsk" with the theme "Hospitals in Irkutsk during the Great Patriotic War 1941–1945), in which more than 200 people attended. In May 2016 the history of the museum, together with the warden in the name of the parish of St. Sergius of Radonezh V. Potapov, patriotic club BM-21 and student trade union committee (S. Anosov) implemented the project "Immortal INRTU regiment". Modern students carried banners with photographs of their peers of the forties of the last century. This project required long preparation, extensive research, financial and human resources, but it turned out to be extremely successful in terms of the education of youth and the creation of new corporate university traditions.

On materials of the Museum of History produced several encyclopedias, such as a "Professor INRTU", "Irkutsk State Technical University, 1930–2000)," From the Naval School Technical University in 1754–2015".

History Museum, in conjunction with the educational television channel INRTU prepared serialized popular-science movie "Big is seen at a distance" (about the rector S.B. Leonov), 6 episodes; "From the Naval School for Technical University", 12 episodes; "Dynasty Field: sow reasonable, good eternal", 6 series. [3].

History Museum of INRTU member of the Association of technical museums of the Russian Federation. In addition, since 1994 he heads the scientific advisory board of university museums at the Council of Rectors of the Irkutsk region by organizing seminars, meetings for employees of museums, advises on all areas of museum work.

In 2000, the decision of the Academic Council of the University and with the blessing of Metropolitan of Irkutsk and Angarsk Vadim in the territory of the campus started orthodox parish of St. Sergius of Radonezh – the torch of Russian spirituality, the saint who protects their studies and students. the arrival of Abbot became Archpriest Eugene Prokhorov invested in its development a lot of strength and energy. Also in the ward are Archpriest Alexei Markarov (since 2007) and Archpriest Vyacheslav Ilyin (from 2014).

The idea of creating the parish belonged to the rector S.B. Leonov. As chairman of the Council of Rectors of the Irkutsk region, Sergey Borisovich paid much attention to learning, life and social problems of students. He dreamed of building an Orthodox church in the campus for the revival of spirituality among students, but died suddenly after a major operation in April 1999, followers of S.B. Leonov in the same year under the direction of Acting Rector Prof. V.V. Nagayeva created a fund to which the University has allocated 100 thousand. Rub. and land for the construction of the temple. With the help of teachers and students of the Faculty of Architecture and the project has been calculated estimates for the construction of the temple was developed [1].

From the earliest days of the arrival, which is located on the ground floor, kitchens on campus, work has begun to attract employees, students and residents of the campus to the orthodox values and the work of the parish. liturgical activities were initiated. Fr. Eugene (Prokhorov) weekend courses for adults and school children were organized, "Gospel Hour", concerts, theatrical performances, lectures and meetings with interesting people. There was a library, which still pleases the readers of various Orthodox literature. In ad-

dition, the parish newspaper "Joy" and the site "Radonezh people" (<http://radonezskiy.narod.ru>) was created.

In 2005, an agreement was signed long-term cooperation between the administration of the university campus and the ROC (the arrival of Venerable. Sergius of Radonezh). Since work on the spiritual and moral education extended to students' hostels. In 2009, the center of spiritual and moral education of Irkutsk National Research Technical University was established. Trustee and spiritual mentor center – the parish, Archpriest Evgeny Prokhorov, director – Olga Mikheyeva. As part of the center successfully work: film club "Kaleidoscope", a youth winter role-ball, playing on historical fencing club of young family "Metamorphosis", a youth psychological theater, thematic round tables, amateur studio, creative competitions, youth site, creative children's studio plastics and movement, a group of early musical development, applied arts circle, the Easter festival Theatre "Dear goodness", early development school, "fontanelles" children's camp counselors school and many others [2].

Technical University has the largest campus in the Irkutsk region. It was built in the 1960s. Today, it is a complex of buildings with a developed infrastructure. In addition to the dormitories in its composition of plant nutrition student, shops, pharmacies, cafes, sports facilities and playgrounds near each dormitory, two health and fitness complex and two stadiums. The dorms are created optimal conditions for the stay of students. In each of them there is a gym, a study room, a recreation room. In 4000 more than 17 students' dormitories. Besides Russian citizens live here about 900 foreign students (from Mongolia, China, Vietnam, Egypt, Turkey, Jordan, Yemen, Congo, Uzbekistan, Tajikistan, Turkmenistan, and Tuva).

In 2003 it was founded the campus management, which management has been entrusted to V.A. Sukhorukov. Active work is conducted on the prevention and prevention of socially negative phenomena, with students engaged experienced psychologists.

Campus activists working across sectors "Santroyka", "Information sector", "Editorial board", "Mass cultural", "Sports sector". During the year, the Student Council with the support of campus management held more than 20 events (more than 150 hostels). The children are actively involved in regional and urban activities "Best hostel of the year", "health week", "Healthy autumn", "Patriots", "Studzima-2012", "Ice Show", "Earth Hour", and others.

Great work with students INRTU leading trade union of students. The trade-union organization of students of the Technical University was founded in the year of establishment of the university – 4 July 1930. Currently, more than 90 % of students are union members (10 688 pers.). Over the past five years, the trade union committee of students at the university has implemented more than 10 large-scale social projects, the fund union organization financial aid in the amount of 5,8 million rubles. About 135 million rubles has been rendered. It was paid to students as scholarships rating. Since 2014 we have been developed such forms of work as the construction team and the student media center. Particular attention is given to secondary vocational education, represented Usolsky Chemical Technology and prospecting technical, Engineering College, as well as working with undergraduates and graduate students of the University. Chairman of the trade union committee of engineering students in 2014, was elected Sergei Anosov, who was previously deputy chairman. It replaced Larisa Potapova, successfully led the union students about 13 years. The trade union committee of students INRTU – a harmonious, well-functioning organization capable of credibly defend the rights of students and qualitatively organize educational work and leisure of students in high school [4].

A lot of attention to the youth of the university council of veterans. This public organiza-

tion is required to complete the connection of generations, youth mentoring, social support and assistance to the elderly. Today it consists of 10 participants of the Great Patriotic War and the 31 workers in the rear. Many of the former soldiers and war workers actively participate in the patriotic upbringing of the younger generation, in the promotion of Russian combat and labor traditions.

Thus, the educational work at the university the multidisciplinary and diverse, organized by professionals and affects various aspects of student life of the university, corresponding 273-FL “On Education in the Russian Federation”, which states that “education – activities aimed at personal development, creating conditions for self-learning and socialization based on socio-cultural, spiritual and moral values, and socially accepted rules and norms of behavior in the interests of the person, the family, society and state” [1].

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TEACHING PRACTICE OF PRE-SERVICE TEACHERS IN THEIR PROFESSIONAL IDENTIFICATION

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This study considers key challenges of primary teacher's training on bachelor level. We described innovative shapes of the future teacher's training process for development of student's self-determination, and enriching their personal experience. Since the first days of training practice is primary condition of becoming future teacher's professional identity. We highlighted in particular the organization of teaching practice for the development of future teacher's professional identity: 1) student's collaboration (graduate and undergraduate students with collegians); 2) continuity throughout the semester; 3) including student teaching assignments in academic classes. Pre-service teacher's professional identification is detailed and complicated as the complexity of the tasks of teaching practice. Our findings also confirm the value of primary teacher's training that combines the educational and practical contexts, as this learning results in student's integrations of theory and practice and reflections on professional identification.

Keywords: teacher, pre-service teacher, practical training, professional identification professional self-determination

The education reform in Russia calls for a new teacher – bearer of humanist values, master of state-of-the-art educational technologies. High heterogeneity of children's community specific for the modern stage of social development involves teacher's tolerance, capacity for recognition of child's problems and search (creation) for adequate means of their resolution. [5]. In our opinion the role of primary school teacher is not only to create facilities for further development and achievement of personhood as an actor of educational activities [6, p. 276] but in the first place to emotionally develop, form positive self-attitude and self-appraisal, assertion, the skill to establish relations with equals in age. E. Erikson called this period "industriousness against the feeling of inferiority" [7, p. 362].

Success of professional training of the would-be teachers is determined by informative choice of the future occupation, adequate understanding of the content of teaching activities, about personal qualities and professional competence they are to master. N.A. Popovanova and M.A. Shadrina showed that significant component of professional competence of the would be teacher is the personal experience of a student which can be formed only by his/her involvement into real professional activities [4, p. 82–88].

The aim of this work is to define more exactly the effect of organization specifics of primary school teachers' practical training on their professional identification.

Methods of research: questioning, semi-structured interviews, analysis of the products of educational and professional activity of students (diaries of educational practice, reflexive reports, creative presentations).

In the first days of academic studies in 2014 and 2015 students – would be teachers were questioned about their ideas about personal qualities important for teaching activities. In students' opinion most important were: *expertise, competence, tolerance, tactfulness, gentleness, organizational skills, authoritative-ness, justice, humaneness, responsibility, decency*. Except for the general humanistic image of a pedagogue students have not idea about the essence of the teaching activities, about requirements imposed by the pedagogical profession upon is bearer. This retards the development of adequate academic motivations of a student and his/her planning of his/her own professional development [3].

The means for a student to gain student individual experience may be implementation of bachelor's applied programs aimed to involve students as early as possible into real teaching activities and create conditions to apprehend these activities. This approach makes possible to work with the student in his/her "zone of proximal development". The experience of interaction with children and future colleagues, experience of teaching activities gained by the students provides linkage of theoretical academic training and real practice. Stage-by-stage nature and mutual involvement in educational process when an event is understood as an execution of completed stage of educational or practical activities makes possible to teach a student to comprehend his/her activities in actual practice [2, p. 56].

For the teaching practice of pre-service teachers to provide for generation of an adequate image of the profession, self-cognition and professional identity of the first-year students its organization should take into account

their age peculiarities and specifics of their social background. In our opinion the teaching training practice is specified by three basic characteristics influencing the molding and development of professional identity of pre-service teachers:

- 1) continuity during the entire session;
- 2) cooperating with students of other years of training and other stages of education;
- 3) including teaching training tasks into the teaching branches of study.

First of all, the teaching practice should be continuing, i.e. to continue for the entire academic year. Continuity of teaching practice provides for the development of student's ability to plan the event commonality with schoolchildren and teachers of the school, mold the feeling of responsibility, makes possible to see the fruit and results of their own activities.

This practice is specific for age and network nature. Students of different years of the bachelor's and master's programs, and students of teacher training college have teaching practice at the same time. Such an approach makes possible the following:

- 1) representativeness of different student ages and degrees of education;
- 2) self-study and peer coaching by mutually solving the tasks of the teaching practice, involvement in joint activities;
- 3) molding the capacity of joint teaching activities.

The third important feature of this practice is its organic integration into the entire system of student's educational activities including the following elements: "classroom discipline" – "teaching practice" – "event" – "research" – "apprehension" – "statement of a question" – "classroom discipline". Certain theoretical knowledge acquired in classroom lessons is appropriated by its verification in actual practice, its discovery and rediscovery in his/her own research activities. Therefore, within the framework of each school subject the students are assigned a task to be fulfilled during the practice reinforcing the acquired knowledge, mastering the application of the knowledge in a real teaching situation. The quality of fulfilled task and the education increment of the student is monitored by the teacher of the subject taught. Along with this execution of tasks in actual practice, involvement in organizing children's vital activities at school poses new questions and problems the student is to answer in the course of theoretical studies.

The tasks of the teaching practice change with the age of the student. In the first term the main task is to – "get the feeling" of the

child and student himself/herself in interaction with the child. This is performed by organizing schoolchildren's free time, arranging active recess, assisting in preparation and holding out-of-class events, in doing homework. Fulfillment of most tasks of the teaching practice in a group makes possible to get "actively" acquainted with group mates and students of other degrees of education providing for on-wards academic, professional and personal communication of better quality. The first active challenge of pedagogical reality provides the student opportunities to get rid of numerous illusions; to get the vision of school not from a student's standpoint, but from the standpoint of a would-be teacher. This specifies his/her own ideas about the teacher's work, about schoolchildren, about his/her own position in the high school reality.

After the first teaching practice session students of the first year 2014 specializing as "Primary education teacher" (Psychology and Pedagogics) were questioned. Their answers to the question about necessary actions of a primary school teacher have been processed by content analysis method and are presented in Table 1.

On the basis of first year practice more than 80 % of students noted that they held out-of-class events, active recesses, psychological studies; 63 % – monitored activities of the teacher, children and their interaction; almost half of students helped fulfill homework during after-school groups, worked with documents, etc. So, the activities of students were fairly diverse and covered various components of teacher's professional activities.

Despite this (as we can see from Table 1) the representation of the students about the activities of primary school teachers is humanistic and fragmented. Representations of students about his profession are still full of doubt. student position yet discipleship, not of teaching and professional (this is indicated by the phrase "reflection" and "analyze...", "hear", "understand") The content of the teacher labor is poorly comprehended.

The task of the second-term practice is to understand a lesson and its external organization; to perform an actual action with a group of children in out-of-class space to harden a student in his pedagogical identity. This provides an idea about pedagogical cooperation and gives a new impetus to student's personal work.

Answering the question about development of competencies in the course of teaching practice considerable part of students noted development of communicative, organizational skills, initiatives, self-consistency and stress

Table 1

Understanding of students – pre-service teachers – about necessary actions of primary school teachers after the first-term teaching practice

Number	Primary school teacher's action	Quantity of students named this teacher's action (2014 survey), %
1	Help a child to solve problems by himself/herself	48,4
2	Listen and hear	48,4
3	Respect the child's opinion and personality	37,1
4	Reflection	37,1
5	disclose talents	35,5
6	Encourage , praise, support	32,3
7	Be an example , the authority	32,3
8	Understand and trust	29,0
9	Give the child an opportunity to find answers by himself/herself, to give freedom of choice to create situations with the right choice.	29,0
10	Motivate, inspire	29,0
11	To engage in dialogue, not to interrupt, ask the right questions	27,4
12	Analyze and teach it to children	24,2
13	Direct on the right path	24,2
14	Work on our mistakes and be able to eliminate them.	19,4
15	Share your experiences	19,4

resistance. A quarter of students noted that they are already capable of applying in actual practice the knowledge of psychology of personality, social psychology and theory of educational activities, i.e. from what they had learnt at classroom courses, and 12 % noted increased interest to further work with schoolchildren, to the teacher's profession. The students also noted their better confidence, self-command, "agitation anxiety when communicating with the class has gone", better attentiveness to children, to each child, 35 % knew more about the life of the class, 8 % noted that acquired knowledge necessary to arrange developing lessons.

There emerged new difficulties which the students did not notice during the practice, but noted them at the end of the academic year: aggressive behavior of the children, mostly boys, failure to handle this – this difficulty was noted by more than one third of the students. About twenty per cent of the students found it difficult to work with children for whom Russian is a non-mother tongue, recorded lack of their competencies in this sphere. This retarded record of difficulties is valuable and may be indicative of inner sophistication of a schoolchild's image and the image of oneself as a person responsible for the changes in this schoolchild.

It is pleasant to note that considerable part of students became aware of the role

of responsibility in teacher's activities. They note that a teacher lays the foundation, basis for the achievement of personhood, that "the future of a child depends on the teacher", that "primary school teacher the second mama". During the second year of studies the number of students thinking that "the profession of a teacher is very responsible" increases, they find development of this quality in themselves. When the students questioned at the end of the 3rd term noted that the teaching practice helps them better understand the children, see vacancy in their knowledge and develop professionally significant qualities.

In the third term the tasks of the previous terms deepen, a student develops a project of his/her own lesson, and makes an attempt to conduct a lesson. The general aim of the teaching practice at this stage of students' life is professional-pedagogical self-identification, making attempt to establish trust relations with a child in out-of-class activities, to observe teacher's activities, making attempts to manage activities of a group of children.

After the third-term practice the same students were again questioned. Their answers to the question about necessary actions of a primary school teacher have been processed by content analysis method and are presented in Table 2.

Table 2

Understanding of students – pre-service teachers – about necessary actions
of primary school teachers after the third-term teaching practice

Num- ber	Primary school teacher's action	Quantity of stu- dents named this teacher's action (2016 survey), %
1	Organize (children, the atmosphere in the classroom, work and children's activities, extracurricular activities, teacher's work)	76,7
2	Give basic knowledge, teach children to learn	63,1
3	educate (impart moral and ethical standards, love of work, art, homeland)	45,3
4	Help a child to solve problems by himself/herself	27,3
5	Motivate, inspire	19,4
6	Give the child an opportunity to find answers by himself/herself, open meth- ods of action.	18,6
7	Be an example, the authority	18,6
8	Respect the child's opinion and personality	13,8
9	Finding the approach to every student	13,8
10	Guide, assist in the vital self-determination	13,8
11	Understand and trust	13,4
12	Share your experiences	13,2
13	disclose talents	9,7
14	Encourage, praise, support	9,7
15	Listen and hear	4,5

As can be seen from Table 2, the students after a continuous network of educational practice for three semesters determine the teacher's work sufficiently specific. This is indicated by the verbs "to organize", "educate", "teach" in leading positions. Reducing the definitions of significance "to listen and hear" and "Help a child to solve problems by himself/herself" may indicate a preference for students – second-year pre-service teachers to master the tools of pedagogical work.

It should be noted that the teaching practice had its effect on the relations of students with university teachers – tutors of the teaching practice: the number of those who did not understand how to fulfill the tasks of the practice almost halved (from 80 to 45 %) about 40 % noted that "it became simpler because they had experience and knew the specific goal of the practice"; many of them recorded joint work with school teachers. We note positive dynamics here. While in the second term only 12 % of students noted trust relations with the teachers, by the results of the 3rd term 25 % of students note that "the teacher trusts us more" and "now we have the understanding that the tutor is always ready to help us". This is very important moment

indicative of integration of students into educational-professional pedagogical community, of creation of event communality and collaboration of teachers and practicing student. From the teacher a student gets basic assistance and acquires skills necessary in the pedagogical sphere. The practicing student observed the teacher, learns from him, analyzes his actions and tries to compare and apply them to him/herself.

By the latest questionnaires the number of students who definitely decided to become teachers grew from 23 to 40 %. Every one of these 40 % in their self-reports when answered about the reasons of their decision note positive role of the teaching practice: describe positive challenge situations in their teaching practice, success situations, and surprise situations.

However, the number of the "hesitant" also increased – c 23 to 35 % of the total number of students. We consider this positive dynamics of development of professional self-comprehension of the would-be teachers. This is indicative of their serious attitude to the choice of the future profession, to the content of pedagogical work, development of reflexive skills which are very important in the teacher's activities [1, p. 310].

During 4–8 terms in teaching practice sessions students traditionally learn and elaborate methods and technologies of the educational process in primary school, gradually developing their own research potential. The tasks of pedagogical identification should be concomitant and cementing their professional instrumentation.

Every stage of teaching practice pays great attention to development of reflexive abilities of the students: there are required not only to describe the events held, to fill the teaching practice diary, but also to answer questions about their own difficulties, methods of their solution, interactions within the students' group, relations with practice tutors, with schoolchildren's parents, with the administration. The term practice form the basis to hold joint students' conferences at which would-be teachers in mini-groups make creative presentations and debate about successes and failures. Important about the conferences is that the conference like the teaching practice is of inter-age and network nature: there is a lot to learn from each other creating a prototype of their own professional community.

The effect of practice-oriented forms of educational work and teaching practice per se on professional molding of pre-service teachers is multidimensional. We can pinpoint the following typical results:

1. Students define more exactly specific knowledge about the profession of a teacher, mold up the problem field to master and develop pedagogical activities.

2. Statement by the students of value-essence questions of pedagogical activities, professional-pedagogical identification, apprehension of one's own capacities in performance of pedagogical activities.

3. Integration into the pedagogical community and culture, development of apprehensive skills, social and professional-pedagogical competencies.

4. Targeting students to learn, to comprehend their own resources and deficiencies as a professional.

5. Group formation, getting acquainted, formation of students' mutual involvement which is an important condition for the personal development of students.

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INDIVIDUAL APPROACH IN TEACHING PROCESS

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This article explores the scientific-methodical aspects of using an individual approach in the process of learning a foreign language. The author analyzed the ways of perfection of the examined process in pedagogical theory and practice. The peculiarities of teaching using an individual approach are revealed, the methods of the development of motivation and the use of various techniques and methods of skill development of students based on the individualization of foreign language teaching are described.

Keywords: foreign language teaching, an individual approach in learning, individualization of learning

An important goal of foreign language teaching is to teach the student to apply their knowledge in everyday life. The motivation in this case is very important, because only well-motivated student is capable of learning efficiently, regardless of the marks it receives for a well-done work, regardless of the opinions of others about himself and his knowledge. A well-motivated student starts to develop a desire to acquire knowledge independently without external pressure and then apply it in practice. But there are not enough students with a high level of motivation, with a desire to independently acquire knowledge. To address this issue we identified the most significant methods to increase motivation of learning a foreign language. We can highlight several factors that increase motivation: students' level of concern about achieving success, positive emotions in the process of learning a foreign language, feeling of success, cognitive interest, positive results, internal and external motivation. Let us look at each of them in more detail.

Thus, the students' level of concern about the quality of teaching and their desire to succeed in learning a foreign language is extremely important. It used to be that concern and stress have a negative impact on educational activity of students, however, the practice of teaching shows that a mild anxiety is beneficial, it mobilizes the student, causing him to make every effort to succeed. Further, the experience of teaching foreign languages show us that the feelings and emotions in the learning process are also of great significance. The amount of effort made in studying depends on how a student feels in the classroom. The teacher should create a favorable atmosphere in class, to create for a student the conditions for success. Enthusiasm allows to achieve high results, and if the learning activity has a positive emotion, it is an additional motivating factor for a new, more intense activities. The feeling of success, according to psychologists [1], also plays a big

role. The more students succeed in learning activities, the more likely they perform new tasks. Even if the risk of failure rises, those students who succeeded in performing their tasks in the past keep trying, and the more often they fail, the less they are willing to risk again, such students often fall into the group of "unmotivated". Therefore, the teacher should apply an individual approach and make the tasks so that they are feasible for each student.

These three factors have a combined impact. Great attention should be paid to the development of cognitive interest of students in learning foreign language. There are two ways of developing this quality. The first is to attract materials from the life of the student, using examples from his own life, the positive reviews of his work in class and his abilities. The second way is to interest – to highlight something new and interesting from a vast amount of materials. Nothing can remain new for a long time, the teacher should manage to use attention reflex in order to teach a student a material during this time and so that this material began to have an independent significance for him. The knowledge of results is a kind of a feedback, which helps students to learn about their successes or failures. Motivation will increase if students know the results of their work, specified information about what needs to be changed or fixed, modified. The positive results particularly encourage and stimulate them. External and internal motivation, taking into account all the above factors, is able to improve the quality of education. External motivation, which has factors of the external world at its basis, expressed in various forms of encouragement: appraisal, praise, threat, result (certificate, medal), shifts to the internal motivation, based on personal desires and needs of students (satisfaction with process and results, the need for self-improvement, desire to learn new things, etc.).

The teacher needs to be aware of the incentives that resonate with the motivational factors and that may stimulate learners. Such incentives include: the incentive of trust, the incentive of interest (for students' tasks to acquire the interesting status, they should be easy to understand for both strong and weak students), the incentive of importance (the teacher should highlight all the important points, pointing to their importance in a particular task), incentive of control (ensures a stimulating learning situation, encouraging students to systematically prepare their tasks, follow all the teacher's instructions, exercises will), incentive of liability (creates a responsible attitude to learning, the teacher can awaken this responsibility assigning the student some responsibilities for group work), incentive of time (the students should be limited in time to develop a "sense of time"). The simultaneous use of incentives makes the learning process interesting, and educational working process – productive. Developing the motivation, the teacher can move from intuitive and random selection of pedagogical techniques to usage of motivational factors in learning activities. Ultimately, students will move from a purely external motivation to internal. Over time, the success of students will provide the teacher a higher internal motivation and, as a result, a steady professional growth. Next, the ways of enhancing internal motivation of students. Exclude awards and prizes for correctly completed tasks, limit them only to assessment and praise. Accustom students to the analysis and comparison of their own results and achievements. The situation of the competition can be switched on to the gaming activities. Try not to impose educational goals, group work with students to develop goals and objectives may prove to be more effective. You must also remember that the penalty for a wrong solution to the problem is extreme and the least effective measure that always causes negative emotions and affects the student's attitude to learning activity. Try to avoid setting time limits where possible, as this not only suppresses creativity, but also prevents the development of internal motivation. You need to ensure that learning activities are in line with not only age-related capabilities, but also have the optimal level of complexity, encourage the manifestation of skills and competence of students. Adjust the level of task complexity, increasing it each time, to give the students the right to choose, without limit-

ing their freedom. It is preferable to select learning tasks with an element of novelty that contributes to the formation of the internal interest in the process of doing them.

For successful academic work in teaching a foreign language it is important to have an idea about the real level of development of independence, motivation, knowledge and skills of students in this subject. The teacher should know and take into account the levels of motivation:

- high – characterized by a high educational activity, the desire to do all the tasks given, appears less dependent on strict requirements and standards while answering questions, such students study with pleasure, they are driven by internal motives;

- intermediate – positive attitude towards school, but the school attracts more on the extra-curricular side, such children feel good at school but often go to school to socialize with friends and students; internal motivation of these students are formed to a lesser degree than students with high level of motivation;

- low – students with low motivation attend school reluctantly, prefer to skip classes, have significant difficulties in learning activities, internal motivation is almost not formed.

Components of a complex process of learning a foreign language is extra-curricular and classroom learning activities. While extra-curricular (home) work is a necessary preparatory stage of the language, classwork is a speech stage that logically concludes the formation of speech skills. The necessity of homework is caused by the formation of skills of independent work and students' preparation for self-education. Often, the home work remains out of sight of researchers, and its importance in the process of learning is underestimated and it has not been given due attention. The reasons of this situation are low efficiency, pedagogical, and psychological errors of organization and control of homework. Typical tasks for homework are still of reproducing nature, aiming on only reinforcing and revising the material learnt in class. Meanwhile, as B. Okon notes [2], depending on the aim the homework can be divided into several groups:

- a) the new knowledge acquisition;
- b) the reinforcement of previously learned material;
- c) the development of skills and abilities;
- d) the development of independence and creativity of students.

As practice shows, the lack of individual approach to teaching student, to the determination of the amount and aim of homework is

an important factor reducing the motivation of doing the homework thoroughly. Homework in this case is not only not beneficial but even harmful. The necessity of an individual approach follows from the very nature of homework, the homework depends entirely on the individual characteristics, abilities, organization and the level of independence of students.

In educational practice, there is the teachers' violation of standards of maximum workload of students. Often teachers simply do not reflect on the diversity of features and capabilities of homework, do not appreciate their role and importance in the field of education and training and give large amounts of homework. However, this approach to homework is not beneficial. It leads to an overload, loss of interest in academic work, and, consequently, to inner opposition to the fact that it needs to be done. And the lack of organized homework leads to the fact that learners fail to do it. "There is often not enough time for the explanation of the homework, it is answered in a hurry. Teachers seldom guide students in the challenges they can face while doing homework, they do not indicate the ways to overcome them. As a result, homework is often uncontrollable and is not very effective", – noted I.P. Podlasiy [5].

There is an issue of monitoring and evaluation of homework. Pedagogical experience teaches us: make sure that when you give homework you will be able to check and evaluate it [8]. The more often and more thoroughly the homework is checked, the more systematically and thoroughly it is done. However, the homework check is not a goal in itself and according to the methodological requirements should not take more than 5–7 minutes. The lack of a variety of forms of control leads to the fact that in such a short period of time, teachers simply do not have time to monitor and evaluate all students. The negative consequences of not checking homework should be expected especially when a student does the work thoroughly, with dedication. "It is also necessary to have an environment where the students never had any doubts about whether they must do homework. Each unprepared homework, with which the student managed to get away, adds to irresponsibility", note the experienced teachers [7].

In addition, the standard errors of the teachers in setting objectives and tasks for students are: substantial inaccuracy and uncertainty of the aim of the assignments, the lack of variability and diversity of tasks, the failure to comply with psycho-pedagogical requirements of homework checking, and the formality of

the approach to the assessment of the answer. Thus, there is a paradoxical contradiction between the increased awareness of the importance of academic work and disregard of the role of homework. Homework is a link that combines education and self-education, "forms the will and the character of students, develop the consistency and accuracy, initiative, ingenuity, strengthens faith in their own power, brings a positive attitude to work" [6].

The most vulnerable area of homework – the organization of feedback. Traditional oral forms of supervision – individual, general and combined questioning have a number of disadvantages and as P. Pidkasistiy says, "using verbal control it is impossible to monitor all students" [4]. Assistive feedback and written surveys also are not a way out, because the teacher must constantly work on the development of linguistic culture and students' thinking, abilities to give a detailed, complete, coherent and reasoned response. In order to resolve the issue of feedback the ideas of E. Passov can be used about giving the students in class the tasks similar to their homework as the way of checking, and that homework should serve as the basis for more difficult types of tasks [3]. If a student prepares homework independently, then a task given by a teacher most likely will not cause difficulties. Thus, it solves the problem of combining the homework checking with the teaching, developing skills and acquisition of new knowledge.

Basic requirements and recommendations for the organization of homework can be formulated on the basis of the above-mentioned drawbacks and shortcomings of its organization. It is, firstly, the integrity of the classes and homework as a unified process of learning and the development of students. Homework, being a supplement and the continuation of the work in class, deepens the knowledge of students and teaches them to think independently, teaches the ability to apply the acquired knowledge, to prepare the task given to him independently and creatively. Secondly, homework must be differentiated and have a feasible size and complexity. It is important that teachers choose appropriate tasks for the students. They should be within their understanding and not take up too much time. The tasks should be differentiated by complexity and amount, and be broken down to the necessary minimum (the standard for "satisfactory"), tasks on "good" and "excellent". The system of exercises done at home allows a student to prepare for the testing. Thus, the tasks are individualized and has a manageable amount and difficulty. Thirdly,

the tasks should be varied, flexible and creative. Fourthly, the clear organization of homework preparation is needed. Assignments must be commented on and the students must have methods for their preparation. Fifthly, homework should be systematically checked and evaluated, but not just for the sake of checking. "The objective is that the questioning was directly involved in teaching, organically joined one of the types of academic work and were not so much for control purposes, but for the development of skills and acquisition of new knowledge" [9]. The above shows that to increase motivation and to organize different types of academic work: homework, class work, extracurricular activities, the engagement of an individual approach is needed.

Home reading can be a very effective method of learning because it is very important to introduce students to cultural values of the nation – native speakers. The use of authentic materials (drawings, texts, sound recordings, etc.) would therefore be of great importance. Acquaintance with the life of other countries occurs mainly through the text and illustrations to it. In the context of new approaches and changes in the methods of teaching foreign language, home reading of literary works of the country of studied language is becoming an important and integral aspect of the learning process. Thus, the concept of "home reading" requires a new interpretation, and its implementation as a substantial component of teaching needs the development of a number of provisions associated with its organization and methodology support. This method is able, on the one hand to provide a more lasting formation of all kinds of communicative competence, on the other hand to solve in the process of learning a foreign language challenges that require special teaching and content-related context. Home reading is one of the types of students' work on a foreign language, which purpose is to impart the skills of conscious reading and understanding without translation reading. It is an additional source of information that will broaden the overall outlook of students, helps the teacher to form their identity. However, both reading and speaking have their own specifics, and each of them has its own peculiar sphere of functioning. Abundant reading to oneself, which is most often carried out in the course of reading at home, gives the option to run through the mind of a student a considerable number of language combinations, grammatical structures and word combinations in a unit of time. This method can help to ensure that reading

turns from educational activity to fun activity, becomes naturally motivated, that the students have formed the habit and need to read literature in a foreign language. At the same time it develops linguistic thinking of the students, helps not only to revise and reinforce the learned lexical material and grammatical structures, but also to increase their potential vocabulary. In addition, the text enables students to be systematically in the atmosphere of a foreign language as inner speech while reading is also a form of communication in the target language (with author, characters), contributing to the formation of strong communicational skills. For the successful organization of students' work on home reading, the teacher should arouse students' interest to the information they can get by reading a particular book. Here you need to take into account individual interests, aptitudes and hobbies. If a student takes more interest in traveling, the teacher can recommend him to read books about travels. For fiction lovers – adapted edition of the works of progressive writers; for those interested in the exact sciences – related publications in the scientific literature or in the press.

To make the reading process really motivated, to avoid a mechanical and mindless repetition, a text analysis can be used. The analysis of the content of the text reflects perceptual and logical-semantic levels of processing information and expressing its understanding. The task for students to analyze the text encourage them to read closely, to pay attention to details and vocabulary. Also, the teacher can use literature, literary translation, as means of positive motivation and development of creative activity of students. At an early stage of language learning, the materials for literary translation may be quatrains, stories and adapted texts. At later stages poems, newspaper articles, works of art can be used. The work on a piece of art consists of several stages: first of all, you need to work with lexical material: semantization of words, each with its own characteristics and difficulties of comprehension; the initial listening of the work performed by the teacher or recorded; testing of the content understanding; discussion of the content of the poem (what thoughts, feelings do you have?); literary-stylistic analysis occupies a special place in the work; the analysis of the representational resources of the language; reading (recitation) of the poem by students; students' literary translation to the Russian language (in verse form); if there is a well-known professional translation we can introduce the students to them.

The work on the poems is very exciting for the students. Poetry teaches us to see the beauty of the world, nature, feelings, and relationships. It has an enormous potential impact on feelings and emotions, develops imagination, increases interest in the subject, enables us to make a foreign language lesson and the academic work aim at motivation.

In terms of learning a foreign language outside the language environment, well-organized understandable reading can give a great psychological effect – give students a sense of progress and success in a foreign language acquisition. It also creates an opportunity to experience reading as a real speech activity in school – mediated communication, literature and culture of the people, the language of whom the students acquire. Such reading requires a deeper consideration, it is able to make the desired changes to the hierarchical structure of motivational sphere of educational activity of students of a foreign language acquisition, to the development of personal qualities of students, because reading “sharpens the intellect and sharpens the senses” [10]. The success in this activity, in particular, depends on how pedagogically and methodologically reasonably will be formulated the functions and tasks of foreign language teaching and the ways of their implementation.

Thus, in teaching a foreign language the teacher must develop the cognitive interest of students, choose adequate didactic objectives and the most effective methods of teaching, great importance should be given to the selection of educational material, using an individual approach.

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MODEL OF DEVELOPMENT OF THE TEACHERS' INNOVATIVE ACTIVITY IN THE PROCESS OF SCHOOL METHODOLOGY ORGANIZATION

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The article describes the characteristic features of the traditional curriculum and innovation as content of teachers' work at school methodology.

Keywords: model, methodical work, the basic needs of the educational process, quality level, self-realization, innovative approach, innovative activity

The real changes in the socio-economic structure of Kazakhstan Republic occur at school, which must be changed to meet the demands of society and the state. In the process of renewal of education it have to create a new type of school, that is the school of future, or the school that will operate in the new millennium. Creation of the school of future is important for leaders and teachers' staff. It helps to solve creative tasks, the solution of which depends on innovation, research work that is able to change the structure, status and purposes of the school.

This type of school solves difficult but doable tasks to realize, and puts all efforts to develop new curricula, programs, practices, contributing to the improvement of the educational process. It can be applied for psycho-pedagogical system, because in its potential it has scientists and educators, trainers, educational programs of school development, basic curriculum, and educational standards. There is a very significant and serious practical experience in secondary school. A theoretical development, which deals with the theory and practice of methodical work of school methodic work, provides guidance for the effective renewal of the education system in situation when rights and responsibility for the outcomes of training, education and development of students are extended.

However, in many researching there isn't enough attention is paid to the most important links in the comprehensive school, that is to the structure, content and forms of methodical work.

Renovations occurring in various fields, including education, affect on methodological work. There is a need of their transition to a qualitatively new level, which meets the new requirements of educational institutions and education authorities. The main purpose of methodical work at the present stage is directly connected with the creation of psycho-pedagogical conditions for the formation and professional growth of psycho-pedagogical workers by identifying their individual characteristics.

Methodical work aimed on development of teachers' professionalism, has positive effect on

the concrete results of the educational process. In this regard, one of the priorities of the methodical work is the management of education quality through the creation of an improving system of students' level of learning. Most changeable is the content of the methodical work, because it includes the theory and teaching methods of the subject, and also it covers the entire range of functional responsibilities of teachers. It requires from them the ability to influence on the development of the pupil's personality, ability to communicate with students' parents, to broaden their education, to know the specifics of each student.

In searching for new forms and methods of increasing of the psychological and pedagogical skill, the constant use of the rich teaching experience in the education system plays a very important role. New organizational forms in development of teachers' professional growth need further study, at the same time their content is closely related to the time needs and interests of the teachers. Successful implementation of the content of the school methodical work contributes to the development of the teacher's professional growth, which has been successfully carried out, provided purposeful management at all levels of training systems and institutions of psycho-pedagogical and methodical service in Kazakhstan Republic schools.

Educational institutions have to provide meaningful and methodical management, to develop a common strategy for the development of psycho-pedagogical creativity of the teacher. The main content of formation of the teachers' innovation activities in the aspect of the organization of the school methodical work is currently represented by traditional and innovative directions. Traditional directions are the questions of improving of the educational and training process. But the innovative ones, which in recent years are reframed (we say technology instead of the methods and techniques) or acquired more importance because of changed social, educational, economic and other conditions.

In order to identify characteristics of teachers' innovative activity in modern conditions, we have identified the characteristics of a traditional educational content and the content of the teachers' innovation activity formation in the process of organization of school methodical work.

At the same time, socio-economic changes taking place in modern society, quite clearly highlighted the crisis of the traditional model of education, ensuring the social need in specialization and functionalization of a man. It should be noted that such orientation of education led to the following negative consequences: violation of the integrity of the human person; averaging and impersonal education, violation of the integrity of the educational process, the prevailing attitude towards the student as an object of teaching impacts; absolutization of the subject-object relationship; weak degree of awareness of teachers and students of educational sense, the restriction of personal and professional growth of teachers, weak demand in thinking and creative educators.

The traditional approach is education oriented on social reality that requires a given amount of knowledge, skills and experience. This education is carried out in the framework of educational and disciplinary model with its strict regulation of the learning process in a rigid curriculum, schedule, programs and manuals, with the same attitude to a student.

The functional approach to the organization of students' activities with no their interests, aptitudes and abilities is mainly dominated in traditional education system. The actions of the teacher are focused on students' mastering their knowledge and skills, but not their individual personal development. In this system, the main criterion of education is formation of a man ready to act in standard situations.

So in the current practice of education it is shown the inadequacy of the principles of traditional education system and demands of modern society to the development of the individual and its cognitive abilities. The real need of practice is such system of education, which is built with taking into account the child's recognizing of its uniqueness, inner freedom, activity, creativity; construction of educational process by integrity of the child's individuality; orientation to the student's individual self-realization, his self-transformation and self-assertion.

In our research, as far as possible, we carried out the comparative analysis of the traditional system of education and the content of forming of the teachers' innovation activities in the process of organization of methodical work at school on the basis of an innovative approach.

In filling of our model the systems of institutions such as educational governments and methodical service agencies, and official staff members of different levels such as education organizers, methodologists, and teachers, are involved.

The model being implemented in secondary schools is a system of interrelated organizational forms and organization which includes historically established experience and research materials. It is confirmed by constantly forming practice of methodical work on the development of professional skills of teachers.

This model is in constant dynamics of its development in dependence of the changes happen in the content of school education, socio-economic conditions, socio-cultural processes, the educational level of working teachers. This model has the next features:

Firstly, the systemic-functional approach leads methodologists and teachers on the objective structure of innovative activity in teaching, synthesis and application of progressive pedagogical experience. In this organization, each component of a system has its own role which provides the interconnection and interdependence between them.

Secondly, the structural-functional model is the basis for the development of the system of teachers' innovation activities that connects the various components.

Thirdly, the quality of these activities should be focused in accordance with professional development of teachers in the interrelated areas.

The conceptual difference between the traditional and the modern model of education leads to a substantial change in the psychopedagogical activity of the teacher.

Thus, we can see the current educational paradigm is oriented on the end result, which is the formation of self-developing, self-regulating, creative personality with its varied knowledge and interest expressions that is able to make responsible decisions in different situations, and is prepared to find their place in a continuously changing world. But the formation of a new type of school is a long and difficult way.

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IDENTIFICATION OF SUICIDE RISK AMONG PUPILS OF 8-11 GRADES

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This article is devoted to the today's urgent problem which is suicide of adolescents. Number of suicides in Kazakhstan has a progressive growth in years. 3735 cases of the finished suicides was established in 2015 compared to 2957 cases in 2014, 3,251 cases in 2013, 3,055 in 2012. School children from 13 to 18 have especial risk for suicide due to their peculiarities of psychological and physical development. According to the literature, every year between 2 and 10% of pupils in vocational education (colleges, vocational schools) have committed suicide attempt. There is evidence that one completed suicide in the age group of 18 years account for 14 suicide attempts. These disappointing figures show the need for early diagnosis of the risk of suicide among schoolchildren of 8–11 grades by assessing the level of anxiety, aggression, frustration and rigidity as one of the key factors in the development of suicidal behavior. This will allow to provide a professional help to pupils who at risk on time and significantly reduce both suicide attempts and completed suicides among adolescents.

Keywords: suicide, suicidal behavior, adolescents, school children, high level, anxiety, aggression, frustration, rigidity, prevention

In recent decades, the problem of suicidal behavior in adolescents and young adults is becoming increasingly important as the rate of suicide among the population of Kazakhstan and other economically developed countries of the world is growing steadily. In 2015, 3735 cases of the finished suicide were registered in Kazakhstan, comparing 2014 year to 2957 deaths due to suicide in 2013 – 3251, in 2012 – 3055 [2].

School children from 13 to 18 have especial risk for suicide due to their peculiarities of psychological and physical development. According to the literature, every year between 2 and 10% of pupils in vocational education (colleges, vocational schools) committed suicide attempt. There is evidence that one completed suicide in the age group of 18 years account for 14 suicide attempts. With increasing age, the figure increases, so one completed suicide already accounts 100 suicide attempts [1].

These disappointing figures show the need for early diagnosis of the risk of suicide among school children of 8–11 grades by assessing the level of anxiety, aggression, frustration and rigidity as one of the key factors in the development of suicidal behavior. This will allow to provide a professional help to pupils who at risk on time and significantly reduce both suicide attempts and completed suicides among adolescents [3].

Tasks: Identification of suicide risk among pupils of 8–11 grades

The object of study: Thematurity of suicidal behavior of schoolchildren aged 13–17.

Subject of research: The emotional state of school children

Methods:

1. “Self-assessment of mental states” Eysenck.

This method allowsto identify the level of anxiety, frustration, aggressionand rigidity [4].

Results of investigation:

Table 1

Comparative indicators of the average values
of the self-assessment of mental states in the 8 th grade

Grade	Anxiety	Frustration	Aggression	Rigidity
8 “A”	7,79	7,95	7,95	4,46
8 “B”	6,4	6	8,4	8,3
8 “C”	5,08	4,16	4,75	2,21
8 “D”	5,15	6,05	6,21	2,69
8 “E”	6,45	5,5	8,40	8,04
8 “F”	5,5	6,66	5,2	6
Averagevalue	5,98	6,05	6,82	5,28

Table 2

Comparative indicators of the average values
of the self-assessment of mental states in the 9, 10, 11th grade

Grade	Anxiety	Frustration	Aggression	Rigidity
9 "A"	6,5	5,5	9,8	10,1
9 "B"	6,1	6,3	8	7,7
9 "C"	5,6	6	8	7,9
9 "D"	3,9	3,2	7,9	4,7
9 "E"	8,6	10	7,4	4,2
10 "A"	8,6	10	7,4	4,2
11 "A"	7,6	8,3	10,3	3,5
Averagevalue	6,7	7,0	8,4	6,0

These tables characterize the self-esteem of mental states and the level of depression of students of 8–11 grades.

Table 1 and Fig. 1 shows that the average values of anxiety, frustration, aggression and rigidity in the 8th grade are in the normal range. Comparing separate classes, it should be noted that the level of anxiety, frustration and aggression in the 8 "A" class were average, which was higher than in the other classes, where these manifestations had been identified, with the exception of 8 "B" and 8 "D" classes, where there was an average level of aggressiveness, as well as rigidity. The average level of frustration was characterized by a decrease in the resistance to failure.

According to Table 2 and Fig. 2 there was revealed that the average self-assessment of mental status among 9, 10, 11 classes were in the normal range, except for the scale of aggressiveness, which had an average of 9 "A" 9 "B" 9 "C" and 11 "A" grades. The

average value of the aggression indicates a decrease in consistency and appearance of small difficulties in communication. In addition, there was an average level of anxiety in the 9 "D" and 10 "A" class, the average level of frustration in the 9 "D", 10 "A" and 11 "A" class, the average level of rigidity in the 9 "A" class, which characterized students for whom is more difficult than for others to change their opinions, beliefs and behaviors.

Among the 105 students of 8th grade middle level of anxiety was observed in 36 students (34,28%), the highest level was observed in 3 children (2,85%). These figures were slightly higher than the results of the 9 classes in which average anxiety was detected in 24 students from 84 people (28,5%), while the highest level was noted in two (2,38%). In the 10–11-x classes medium level of anxiety was seen in 18 people from 40 people (45%) and 1 high level was found (2,5%).

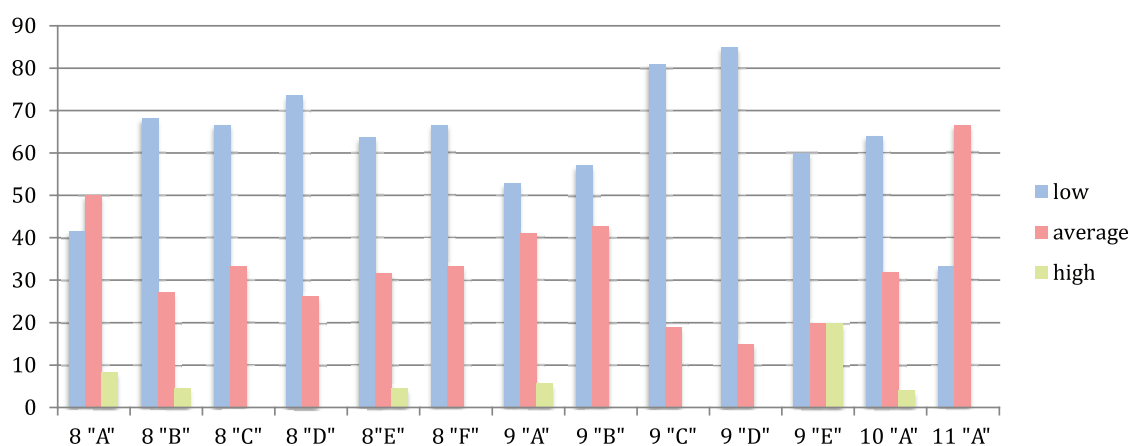


Fig. 1. The percentages of anxiety levels among 8–11

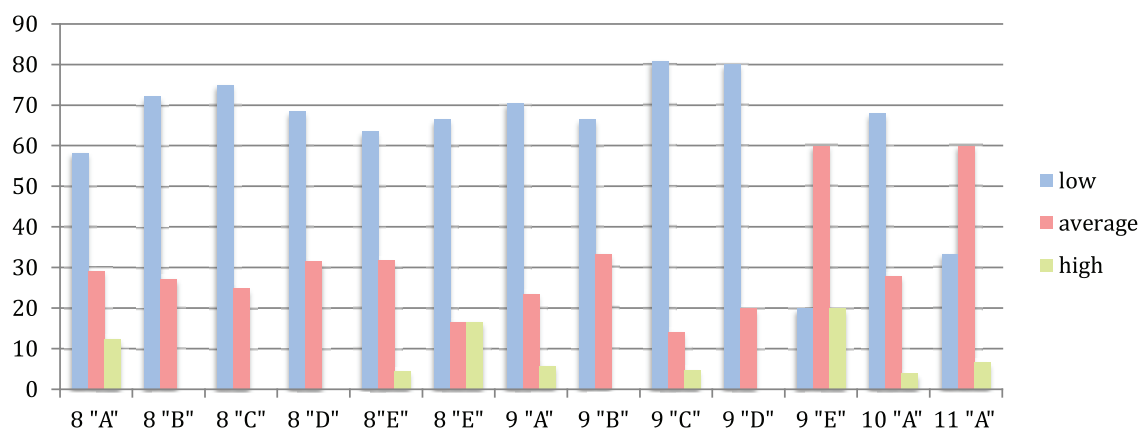


Fig. 2. Percentages of frustration levels among 8–11

On a scale of frustration the average level of frustration was observed in 30 children of 8 th grade from 105 (28,75 %), the highest level in five people (4,7%). In the 9th grade average level of frustration was detected in 21 cases (25 % of 84 ninth-graders), and the highest in three students (3,57%). As for the classes 10 and 11, 40 % (16 out of 40) of children had an average degree of frustration, 2,5 % of high severity.

On a scale of aggressiveness it can be seen that 44,7% of eighth-graders (47 students out of 105), 42,85% of ninth-graders (36 of 84) and 67,5% ten and – eleventh-

grades (27 of 40) had an average level of aggressiveness while the high level of this indicator was detected in 8 people of eighth graders (7,6%), in 10 ninth-graders pupils (11,9%) and in one eleventh-grade pupil (2,5%).

On a scale of rigidity it was found that 44,7% of eighth (47 pupils of 105), 50% of ninth (42 people out of 84) and 60% of ten and – eleventh (24, 40) had an average rigidity, while the high level of this indicator was detected in 5 people from eighth (4,76%), in 4 from ninth (4,76%) and 3 cases in 10, 11 classes (3,5%).

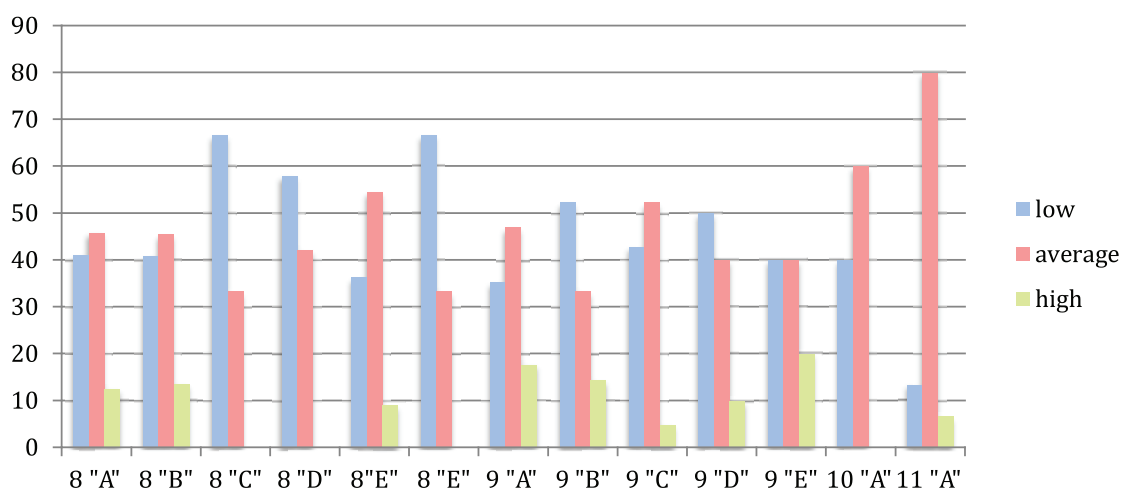


Fig. 3. Percentages of aggression levels among 8–11

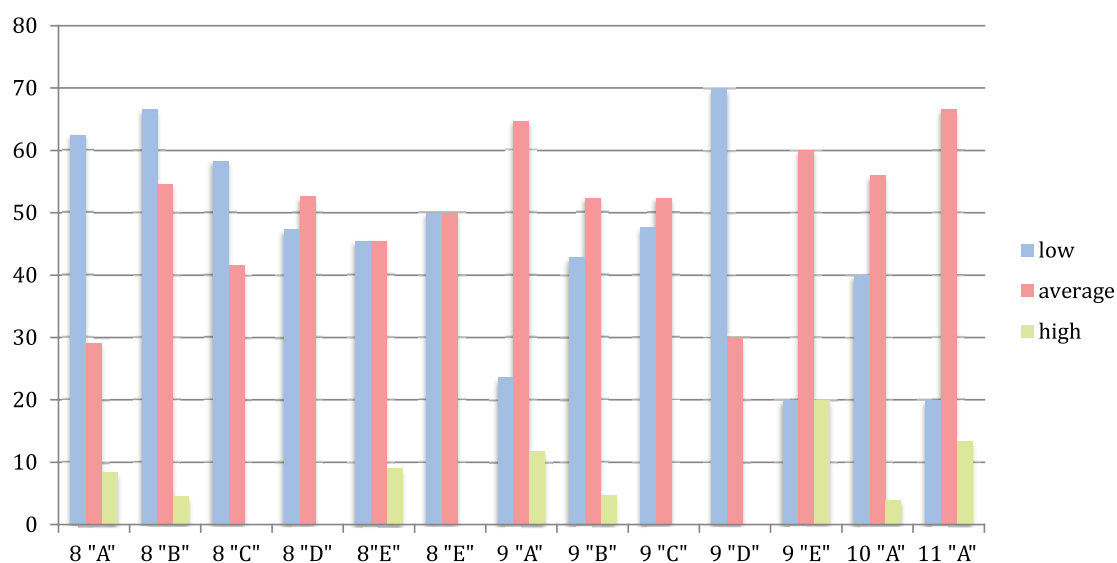


Fig. 4. Percentages of rifidity levels among 8–11

Conclusions

According to the 10, 11 classes indicators, these children had more common average level of anxiety, frustration, aggressiveness and rigidity, followed by indicators of 8 classes and the last 9th classes. On the basis of this study, guidelines for teachers of these classes were designed as prevention of suicidal behavior.

Timely detection of risk factors for suicidal behavior, will prevent not only the suicide attempts among adolescents, but also improve

the psychological condition of the child due to the preventive measures.

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THE USE OF DIFFERENT PSYCHOTHERAPEUTIC TECHNIQUES FOR PANIC ATTACKS

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In this article you will learn the most common psychotherapeutic techniques using in the treatment of panic attacks, which are based on different approaches. Namely: the classic hypnosis, psychoanalysis, systemic family therapy, different ways of relaxation, behavioral therapy, neuro-linguistic programming, methods of suggestion.

Keywords: panic attacks, psychotherapy, psycho-correction, psychotherapy, hypnosis, relaxation, cognitive-behavioral therapy, psychoanalysis, panic, anxiety, fear

According to US research, from 4 to 28 % of people at least once faced with panic attacks in their life. Basically it is a category of people aged from 24 to 60 years, with a predominance of the female population [1]. Panic attacks, in other words, they call panic attacks. Usually they occur in stress and similar situations. The essence of a panic attack is that man for no apparent reason is frightening. He suddenly embraces the inner panic, in which he simply cannot control their thoughts and actions. This condition is accompanied by discomfort in the chest, palpitations, weakness, sweating, a feeling of lack of air, the person becomes cold or hot.

Panic attacks can occur in humans for several reasons. First, it depends on the situation. Often contributes to the aggravation of the closed space. Often the attack begins during the flight on an airplane, riding the subway, or even in the conventional road transport. Man has always sought to avoid circumstances in which the attack was subjected to, but as practice shows, this behavior does not bring the desired results. Even if a person refuses to travel on the subway or elevator, an attack can occur anywhere, such as at the junction for pedestrians.

It is proved that the fear does not disappear, but it becomes a different form, modified, and it occurs to switch to other objects or situations. In this connection, methods for dealing with panic attacks, first of all, are the psychotherapeutic techniques as the main cause of the problem is their own fear of man.

Currently, many techniques used to overcome panic attacks. Some of them are effective, any require modification [2].

Cognitive-behavioral therapy is considered one of the most frequently used techniques in this kind of problems. Its meaning lies in the training of human control over their psychophysiological state with the help of cognitive training, breathing exercises, meditation techniques.

Breathing exercises help to overcome panic attacks by controlling breathing. This process is characterized by its simplicity and efficiency. It helps to cope with hyperventilation, breaking the vicious cycle of vegetative crisis. This principle is based on the decrease in respiratory rate to 4–5 breaths per minute. It is necessary to do as much as possible a deep breath, and, after a short 1–2 second pause – a slow gradual smooth exhale. Thus it is better to close your eyes and instruct your muscles to relax. It is recommended to repeat such breaths at least 15 times.

Another well-known way to get rid of panic attacks – is meditation. Do not confuse it with religion as a meditation – it's just a certain relaxation techniques. Meditation is good because it allows you to deal with the cause of panic attacks. It reduces sensitivity to stress, learn to relax and not to give in to their fears. True positive result is not achieved immediately, and only with regular exercise. Just meditation ensures long-term effect, teaching leave sober mind, strong will, the ability to not be involved in the thoughts and feelings in stressful situations [3].

It should be noted that to cope with suddenly arisen anxiety and panic help exercise or simple physical activities. This method is effective when the problem is the emergence of fears cut out in sedentary work, lack of physical activity, due to malnutrition, disturbances of sleep and wakefulness. After all, panic attacks are directly related to the general state of the body and lifestyle in mind the relationship of mental and physical health. But it is difficult to make a person right to change their behavior towards a healthy lifestyle by starting to engage in sports and abandoning bad habits, so it is best to start with a small meditation and exercise.

Another technique that is often used in the classical practice of psychiatrists, it is hypnosis. Hypnosis session allows you to understand the internal conflicts, which are often the cause

of panic attacks. It should be noted that this method does not always provide long-term outcome, and not all patients it is appropriate, because as we know, only a fraction of people amenable to hypnotic suggestion [4].

Another type of help for panic attacks – is an emotional cleansing technology. It is the repetition of the phrase, “Even though I’m afraid ... I deeply and completely accept myself”. Taking himself as he is with all his fears people working with the cause of their panic attacks.

Also known is a method of switching attention to the objects of the external world. Call a friend, watch a movie comedy, reading comic magazine, pleasant memories can prevent panic attacks or reduce the severity of its course. To do this, find your anchor point which will support during the attack. It may be an ordinary account, singing funny songs, Planning Minister tomorrow, the decision of crossword puzzles for children. The main thing – emerge from their “deep” inner world out, do not go on about psychosomatic disorders [5].

“Paper bag” method is carried out using a paper package, which is applied tightly to the face. It should slowly inhale and exhale into the bag until the attack stops. The method is based on reducing the level of oxygen and increasing carbon dioxide, whereby the gas balance is restored. In the absence at the time of packet attacks, you can use your own hands – folded their boat and started to breathe on a “slow breath – slow exhalation” [6].

“Viewer” method is to monitor your panic attacks as if from outside. The observed phenomenon should be recorded on paper.

The result of this behavior becomes devaluation fears, addiction to them, getting to know their true nature.

Visualization method allows images to present a look of fear and anxiety. The created image is necessary to “destroy” in any way – to burn in the fire, rinse ocean waters, to turn the

image of fear in the cloud that disappears over the horizon.

For the method of “Spiral” is necessary to determine the source of the alarm, to present it as an image. Then transfer the sense of fear in the energy flow, which moves in a spiral. Determine the direction of energy flow: clockwise against it, you need to change the movement of the opposite and watch the new stream until it is the feeling of psychological comfort [7].

When psychotherapy of panic attacks, please note that specific recommendations on how people can help themselves during the attack, are often ineffective or low effective therefore necessary recommendations developed in the course of psychotherapeutic work with the particular patient. The use of psychotherapeutic techniques for panic attacks in the early stages can achieve quick relief state.

Particular attention should be paid to the fact that the main aim of psychotherapy is to help the patient in recognizing the causes and sufficient efficacy of the treatment can only be achieved by a combination of medication and psychotherapy.

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FORMING ATTENTION OF STUDENTS OF NON-PSYCHOLOGICAL SPECIALITIES IN THE PROCESS OF PROFESSIONAL EDUCATION

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Attention is not a simple psychological category. It forms a personal picture of the world and is responsible for how wide and deep it is. It is the degree of development of attention that the success and effectivity of education process depend on. The author believes that the formed properties of attention define personal successful professional work and are the basis for individual perfection and self-development. This article considers aspects of activating students' attention in the pedagogical space. This work reveals the importance of concentration for successful professional activities. We give specific examples of realization of the stated problems in the course of preparation of students of non-psychological specialties.

Keywords: psychic cognitive processes, attention, high school, students, activation attention methods

The problem of attention today is the most studied one, and at the same time it generates the most discussions in the modern psychology of cognitive processes. It is connected with the fact that attention can make changes in any mental process which ensures human selective mental activity. Almost all areas of psychology inevitably led to the problem of attention and attempted to describe the range of phenomena which lied behind that concept trying to uncover its mechanisms. It is attention (as a basis for enhancing memory and thinking) that is in charge of the successful learning process and professional activities. One of the main and most important features of attention is that it cannot be regarded as an independent mental process. It is necessary to note such an important feature of attention: it characterizes the dynamics of any mental process and is the factor that provides a selective flow of both a simple and complex psychic activity.

Each of the psychology directions, both modern, and classical, analyzed manifestations of attention by trying to explain and open the mechanism of its action. According to I.M. Sechenov, the attention has a reflex character. The school of the theory of establishment headed by the Georgian psychologist D.I. Uznadze considers that personal selective activity is the cornerstone of attention. I.P. Pavlov notes connection of this phenomenon with emergence of the centers of excitement as a result of a special orientation reflex. According to A.A. Ukhtomskiy, the physiological basis of attention is the dominant [1–3]. There are also enough methods of studying attention. M. Podper distinguishes three main directions: the techniques focused on research of various characteristics of executive and cognitive activity; the techniques which are based on the analysis of subjective experiences; the

techniques which are aimed at studying communications of conscious experience with neutral mechanisms. In turn, Y.B. Dormashev and V.Y. Romanov [5] divide all the techniques into selective information (hearing and watching) and directed to studying the distribution of attention (proof test of various authors, Shulte, Shulte-Gorbova and Shulte-Gorbova-Satori's tables); as well as techniques of full reproduction and precontrol, registration of eye movement, physiological correlates of attention.

A.F. Anoufrieve, S.N. Kostromina consider the problem of attention in the process of formation of the person; S.D. Zabramnaya believes attention is the basis of psycho-pedagogical diagnosis of mental development; Y.L. Kolominskiy, A.A. Panko, A.A. Osipova, E.I. Rogov – the basis of psychological readiness for school. E.J. Brunner's works [1] analyze particular indicators of attention of Arts Students aged 17–25 years old. However, at the present stage the problem of technical university students' attention is considered insufficiently. Therefore, the aim of this article is to summarize the experience of searching ways to activating bachelor students' attention in the process of professional technical training.

Materials and methods of research

Currently, there are a lot of systems, which are aimed at the further human development and disclosure of the human potential. But the most important and fundamental element is improvement and activation of attention itself. Thus, in the system of "the eightfold path", or "the precious ladder" the main stages of self-realization and improvement include:

- the right views based on the "noble truths";
- the correct determination expressed in readiness to exploit;
- the right speech with honesty, sincerity and kindness as a nucleus;
- the correct behavior, consisting of observing the "golden rule of ethics" (doing no harm);

- the correct way of life, which is peaceful, honest and pure;
- the right effort, including self-education, self-bringing-up and self-control;
- the proper attention based on the active vigilance of consciousness;
- the right concentration, suggesting the correct methods of contemplation and meditation.

Thus, from the listed above it is clear that attention crowns “the eightfold path”, and on the other hand, it is the basis of concentration, without which creative thinking [3] and, therefore, human evolution are impossible to happen.

The acquisition of the knowledge of the concentration requires not only training, but also balance. It is connected with the fact that attention is implemented in two aspects of life: the one we experience through the five senses and the other that exists in our inner world. K.D. Ushinsky wrote that attention is precisely the door through which penetrates everything that enters into the human soul from the outside world.

It is essential to intensify attention in learning the outside world – the macrocosm, but it is even more important to know your own universe – a microcosm.

The processes of cognitive activity – memory, thinking, imagination, creativity – are impossible without a high degree of developed attention. In our opinion, attention determines personal success of professional work. With a high concentration a person reaches a top position in business, arts, or any other occupation. Considering the mechanism of concentration, we can note that the currently conducted research is aimed to explain the action of this phenomenon. Some scholars emphasize the role of the frontal areas of the brain in the selection of information, while the others have found specific neurons, called “attention neurons”. In our opinion, with the high concentration of attention on your inner world these neurons allow you to enter information in the form of words into the central nervous system and cause specific and predictable changes in the muscular-skeletal system. In this case, the words run through the brain and rush to it. We believe that such a process can be used to make significant changes with the help of concentration in the central nervous system, muscles and skeleton, and this is achieved by means of micro-movements, micro-feelings and sensual images that appear as a result of receiving information. As a result, we think there is the following mechanism: previously closed cell structures in the motor areas of the cerebral cortex of the brain are released. The effect is that the neighboring regions of the brain result in releasing the earlier blocked mental and sensory capabilities. Our understanding and awareness of ourselves as a microcosm are modified and extended.

According to the principle of the A.A. Ukhtomskiy’s dominant, attention ensures availability of a piece with increased nervous excitability in the cerebral cortex of the brain area at any given moment, and this piece rules over the rest of the cerebral cortex. As a result, the concentration of the human consciousness on certain objects and phenomena is carried out. The research by N. Sviderskiy, Doctor of Medicine, has shown that when such excitement affects the upper right hemisphere and diagonally joins the excited region of the lower areas of the left hemisphere, there appears an altered state of consciousness, which gives the possibility to increase one’s creative potential by entering the space of the noosphere. New creative features that contribute to emergence of global discoveries and inventions are becoming a reality [3].

In addition, we confess that the presence of the dominant phenomena helps create a fundamentally new method of training which needs some following conditions for its realization. Students must realize, in the first place, the need for the cognitive process and form in their mind the need of the infinite desire for new knowledge. Second, they have to realize the vital importance of obtaining knowledge not so much for themselves, but transferring it to people around. Third, students should understand and implement into life the unconditional servicing of the obtained knowledge to the objectives of spiritual and moral transformation of the world. And finally, the three conditions listed above will be actually implemented only if the fourth condition – the transformation of teaching space into the space of love – is fulfilled. Implementation of these conditions will fully provide the driving forces of evolution – Love and Creativity.

Thus, the changes relate to the physical, mental, emotional and spiritual areas of our being. At high concentration of attention, words, ideas and images can serve as a means of spiritual and physical enslavement, but with the right attitude they will contribute to our self-realization and self-improvement. This concentration makes it possible to move to the next stage of development – concentration and contemplation which allow a person to comprehend the deep essence of things. It is through the directed training of concentration that it may be possible to fill our mind not automatically, but purposefully and eliminate the possibility of “recording” and “playing” disharmony. Consequently, the concentration of attention improves the person, and as a result, – the surrounding world.

The next stage of concentration – thinking – is the inner work of thought, connecting the comprehended inner world and the outer life into a whole. And this attention focus not only teaches, but also transforms the Universe, giving a person peace, joy, wisdom, inner strength and introducing to it images of the inspired harmony – beauty.

As a result of this self-realization on the basis of concentration of attention, consciousness is expanded, the soul is opened, deep penetration into oneself takes place, communication becomes infinite, and finally the vital goal is realized [4].

The foregoing underscores the importance of creating and mastering skills of focus training and intensifying attention in the course of educational activities of a young man – a college student who is in a state of formation of readiness for professional work. However, attention is poorly regulated while teaching and training. Targeted psychological exercises and methods of activation of educational activity in the course of training can significantly improve the performance of engineering students, whose leading and decisive thinking is known to be of an abstract and logical kind, and the intellectual level – high enough.

Results of research and their discussion

In the course of our research work in the Psychology classes students were asked to perform exercises that promoted imaginative visualization, random visual attention and concentration. First of all, the focus allowed to create vivid images of the “diamond in the sun”, “lightning in the mountains”, “Northern Lights in the ice”, etc., which contributed to the development of creative thinking and perception. With eyes closed, images of objects were

presented on the basis of activation of all the senses: focusing on the subject, students had to mentally represent not only its visual image, but also taste it, hear its sound, touch by touch, smell the smell. That allowed them to use all the channels of sensation, concentrate on the subject and contribute to its lasting memorization.

In order to develop student's attention Schulte's tables and their modifications were also used. The students get acquainted with the methodology of training effectiveness, sustainability and attention, and for homework they were asked to do some exercises to improve attention during the two weeks before the next session. An example of a students' work is presented in Tables 1 and 2. Particular emphasis in the homework was on the analysis of the results depending on the psycho-physiological state.

Summing up the results of the executed exercises for improvement of attention, the student notes: "During the experiences it was established that eventually results changed and there were, in my opinion, some objective reasons to that. First, the quality of experiences was influenced by the surrounding situation (whether it was noisy or not indoors, whether I was distracted or not). The more experiences

I did, the more tables I remembered (a short-term storing). And at last, the quality of the experiences was also influenced by a physiological condition of my body, which is: when I did not sleep enough or was strongly tired, the time of doing the experience was much longer than when I was in a vigorous state".

We have accumulated numerous techniques of intensifying attention in our practice. So, when the Crimea joined Russia, the Russian language was introduced to the educational university space for all the specialties. It was the biggest problem for technical students. To improve the digestibility of the material and the optimal time, we used specially organized workshops that intensified the students' attention and increased the success of teaching the Russian language.

In order to increase concentration for better perception of the educational material some psychological techniques and special exercises were used. The teaching experience has shown that application of such techniques largely increased the interest in the studied themes and led to the emergence of positive emotions, as well as reduced the psychological barrier between the students and the teacher and raised the empathy level [5].

Table 1

An example of the training attention task performance according to Shulte's table

Day/Time	1	2	3	4	5	6	7	8	9	10
T1 (c)	32	30	31	43	31	30	34	32	30	34
T2 (c)	31	28	30	40	29	288	39	29	30	28
T3 (c)	37	36	31	42	40	36	40	35	35	37
T4 (c)	41	40	41	38	34	40	36	39	41	40
T5 (c)	40	43	42	40	37	42	40	42	40	40
Efficiency	36.2	35.4	35	40.6	34.2	35.2	35.8	35.4	35.2	35.8
Entry into work	0.83	0.85	0.87	1,05	0.9	0.85	0.94	0.9	0.85	0.94
Stability	1,12	1,17	1,12	0.93	0.99	1,13	1,12	1,1	1,17	1,13

Table 2

An example of the training attention task performance according to Shulte-Gorbov's table

Day/Time	1	2	3	4	5	6	7	8	9	10
T1 (c)	50	48	45	51	50	49	52	48	49	52
T2 (c)	40	41	40	38	37	40	38	42	40	37
T3 (m c)	2 56	2 58	2 50	2 53	2 50	2 53	3 00	2 50	2 53	2 50
Tp (c)	86	89	81	84	83	93	90	80	93	81

Table 3

The terms that are identical in Russian and Sanskrit

Russian	Sanskrit	Russian	Sanskrit
тятья	тата	богато	багута
мама	мата	двери	двара
брат	б्रата	дорога	дорога
четыре	чатура	чашка	чашка
десять	даса	юшка	юшика

On the basis of the specially developed system of questions and exercises the teacher prepared students for the required conclusions and generalizations and thereby enhanced their educational opportunities. For example, in the study of the topic “The Place of the Russian Language among the Other Languages of the World”, it was reported that the Russian language, as well as many other European languages, is derived from the original Indo-European language. The glossary of terms that are identical in Russian and Sanskrit enhanced the concentration. An example is shown in Table 3. As a result, students recorded the dictionary with a great interest and were surprised by sheer coincidence of the two seemingly distant and different languages.

In the study of the Russian language grammar, each rule was followed by examples which had been carefully chosen. One of the main principles of selecting the examples was an increase of students’ attention to terms that illustrate the rules. From the experience we know that if examples follow one another in rows separated by commas, the list of them quickly lowers attention. Only the first few examples are actively perceived and the rest scatter attention. Instead of the lowercase we applied a new recording system, which used the block system working on the principle of recording eastern hieroglyphic writing, when the object of attention gets multiple terms. The examples were recorded in blocks of two words.

A joint reading of the examples which followed in a certain rhythm and, if possible, in rhyme, was a highly effective technique which enhanced the attention and activity of students in class. A similar effect was achieved when the examples were built on contrasts. The contrast created a voltage potential difference between the two opposing terms. Such a terminological contrast contributed to the emotional stress and activation of attention.

Another technique for amplification of concentration was used in the study of the

topic “Numerals”: the quantitative row (one, two, three, and four ... a thousand ... a million... a billion... ended with the word “googol”. Most of the students were puzzled with the meaning of this concept, vaguely realizing that this number is very large. When they were explained that a googol is equal to 10^{100} and it is the largest number, and that there are no stars, galaxies, elementary particles enough to accumulate even one googol in the universe, the students expressed the opposite emotional evaluation. Some did not believe the fact and expressed a doubt; the others admired the largest number. In both cases there was an increase of attention to the studied material. We achieved the same goal when after studying the conversational topic “Greetings” the students were offered to read and translate the text “How Who Welcomes” about various customary greetings (often strange and unusual for us) among different peoples of the world. The comparison of those greeting customs was accompanied by students’ emotional judgments and activation of cognitive activity.

One of the psychological methods of increasing attention to English classes was returning to the same subject with a constant gain from lesson to lesson. So at the beginning of the first semester in order to emphasize the importance of learning languages, we cited a proverb, “A man who knows 5 languages, is worth 5 people” and explained the true meaning of the phrase. In the next class we spoke about a man who knew 15 languages, reached the worldwide recognition and was full of material prosperity. It seemed you could not dream of nothing else, but in the third lesson the students were asked to read a text about a man who knew 200 languages. The students worked on that text with the utmost concentration.

When recording the theme dictionary of legal terms, the words were lined up as a chain of terms logically subordinate to a detective story from the commission of a crime to the punishment of the criminal. At the same time specific

violations of the law, such as theft, bribery, etc. were mentioned. As a rule, students closely followed the development of the detective story, expressed their views on what was happening, and i.e. were actively involved in learning the legal vocabulary in English.

Students' particular interest was shown to the theme "Students' Leisure". That conversational topic affected their direct interests and hobbies, such as literature, music, arts. Therefore, future specialists, bachelors and masters enthusiastically answered questions about their favorite literary genres, books, writers, and even more – about music, music genres, musicians and musical groups. The peak concentration was observed when they wrote their favorite musical groups on the blackboard in English. The students were delighted: the teacher was interested in their favorite things; they were interested in the lesson and motivated to study the subject. In addition, this technique helps overcome the psychological barrier between students and instructors. The experience shows that paradoxical questions and linguistic tasks also contribute to the active attention.

Conclusion

Summarizing the above we conclude that the teacher performs as an active facilitator of searching and finding something new and

previously unknown. Therefore, a teacher-researcher, a teacher-creator working on the efficiency of the educational process can always find some psychological techniques, methods and forms of activation of cognitive activity which will lead to concentration of technical university students' attention. Through the organization of training activities, based on the increased attention, teachers can manage to directly affect the mental and spiritual development of students, the formation of their cognitive interests, making them a powerful incentive to moral and intellectual improvement. Of course, this topic is a good field for further research.

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OLYMPISM HISTORY

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Value of studying of history of physical culture, sport and an Olympism consists in need of the deep, comprehensive analysis of regularities of development of the specified phenomena in view of globalization of sport and attention of all countries of the world to problems of a healthy lifestyle. Since ancient times development of sport contacted development of military science that predetermined specifics of many Olympic sports. The science of the sports and Olympic law, at a stage of formation had to pay special attention to history that will be reflected in its development as complex sphere of law.

Keywords: sport history, Olympic Games, competitive spirit, athletes, physical culture, Olympic law

Now sport becomes the instrument of political struggle, meanwhile of its main subjects are people. The Olympic Games which history is inseparably linked with statehood history are considered as the most democratic competitions. As far as we know today, the concept of the Olympic Games returns to the sphere of public consciousness by the outstanding Italian statesman of Renaissance Mateo Palmiyeri (1405–1475) in one of his political debatable works written about 1450. Politicians of the Italian city-states in polemic with the church and feudal authorities sought to refer to ideas of a classical antiquity [1].

Much in more details from the point of view of medicine and pedagogics Iyeronom Merkurialis in the work “Art Gymnastics” was engaged in the Olympic Games. The main contents of his book are under construction on memories of ancient physical culture. Petrus Faber in the issue “Agonistikon” published in Paris in 1592 also refers to the Olympic Games of ancient time. Both of these authors according to the approach inherited from the Middle Ages acted as opponents of competitions and supporters of application of antique gymnastics for esthetic education of the nobility. At the same time they sharply protested against the gymnastics turned into a subject of any competitions of wider character.

It is necessary to carry to pioneers of an Olympism also the lawyer Johannes Akvill who in 1516 organized “demonstration Olympic performances” in Baden. Hans Saks scooped the main ideas of the poetic works from history of the Olympic Games of ancient times (1494–1576). In the verses he, in our opinion, mistakenly claimed, as fencing originates from panhellenic games [2]. At the same time G. Saks correctly noted that participants of the Olympic Games competed naked and rubbed a body with oil. His statement deserves

attention that the Greek competitions were much more esthetic than the Roman. G. Saks emphasized that as an award to participants of wrestling served not money, but a wreath.

The idea of an Olympism in its bourgeois interpretation for the first time was put forward by the English playwright Thomas Kidd (1544–1590). Putting in theater separate fascinating scenes from history of the Olympic sports activity, he sought for accusation of public defects of the era, and also delicacy of the nobility.

The royal prosecutor Robert Dover (1575–1652) with assistance of James I organized in 1604 in Barton – on – Hese a series of the competitions which received the name “Olympic Games”. These games, probably, were connected with fight against Puritanism and reflected needs of the bourgeoisified England for “human sport”.

These competitions were held annually for a Trinity. Thus, they were connected with ancient traditions of physical culture of the English people. The fact that unlike competitions of antiquity all irrespective of a floor and class accessory could participate in them deserves attention. Games, lasting several days, consisted of competitions of athletes, fighters and horsemen and came to the end with hunting, dancing festivals and frying of a bull. Besides physical, spiritual competitions (chess, singing, music) were organized. The “English Olympic Games” revived within national traditions kept wide popularity also after Robert Dover’s death. These competitions held with many breaks within nearly hundred years eventually were stopped under pressing of puritans.

The world of antique games also inspires neohumanists. Friedrich Schiller (1759–1805) paid special attention to the idea of an Olympism in the letters devoted to questions of esthetic education. However he puts in the forefront istmiysky games.

Russo forces Emil to run and jump that "he had though some concept about the Olympic Games". Almost along with emergence of its novel treatise "Emil, or About Education" (1762) the Englishman Dzhilbert Vest (1703–1756), according to the available data, was the first to develop history of the Olympic Games in a form of the doctoral dissertation. In an epilog to this he dreamed of revival of idea of an Olympism and regretted that the games organized once by Dover indulge in oblivion [3] more and more.

Since the second half of the 17th century, fight for liquidation of social privileges and in the field of physical culture was developed. However prejudices concerning competitions kept strongly. At the same time undertakings of philanthropists in a sports field were from the very beginning based on traditions of national games and one of the main numbers of the Olympic Games – pentathlons. In the spirit of the Olympic Games they organized various local competitions (moreover as it was already mentioned, many philanthropists dreamed of revival of the ancient Olympic Games). To say about the growing authority of ideas of an Olympism is also the fact that the patron Beysdofa the duke Leopold Friedrich built in the manor in Dessau the platform for carrying out competitions and annually on the occasion of birthday of the wife arranged festivals according to the program of the ancient Olympic Games (1772–1779) there.

The monopolies which appeared in the second half of the 19th century led not only to emergence of the main contradictions of the period of imperialism. At the same time as means of public self-regulation also opposite tendencies to elimination of these contradictions were designated. Huge development of automobiles and communications accelerated an exchange of cultural values. The role of the international public organizations, the World industrial and trade Fairs, international fairs, the world congresses of figures of literature and art, festivals [4] considerably increased in this process.

There were international organizations urged to facilitate cooperation between the people: The international Red Cross (1863) for assistance to the victims of war and natural disasters; I (1864) and II Internatsionala (1889) for unity of the international labor movement; The Inter-parliamentary union (1889) for coordination of activity of legislature; The International bureau of the world (1891) for unity of the pacifistic associations operating worldwide. Also attempts of creation various Esperantist and feministic organizations began.

Since last decade the 19th century as opposed to isolation of gymnastics and "gentlemen's" sport to the forefront in development of physical culture there was already pronounced "record" direction of the sports movement of which comparison on the basis of high requirements of force, dexterity, endurance, speed, physical and spiritual abilities of athletes was characteristic. Simplifying, one may say, a little that together with monopolistic associations sport also went out of the certain countries. Attempts of creation of the international federations of oarsmen, skaters and horsemen, and also carrying out the first international competitions, continental and world championships on boxing, soccer and fencing testify to it. However the first international meetings, the European championships and the world which organization was obviously caused by economic interests were held on the basis of especially subjective reasons [5].

For consolidation of sports life and coordination of competitions there were necessary: a uniform organization which is above the international federations and such competitions which would cover all sports, periodically repeated and during which the achieved results would be fixed. As an external framework for this purpose the Olympic tradition recovered in the 19th century thanks to an ellinofilstvo which almost arose. Its' idealized system of norms contained is also a possibility of cooperation with forces seeking for establishment of the frictionless international relations.

Since that, pioneers of the Olympic Movement aspired from the very beginning to that the feeling of admiration of monuments and a cult of ancient physical culture which arose among intellectuals would capture also those who played sports and who was despised by bourgeois public opinion of that era. At the same time, referring to peaceful character of the ancient Olympic Games, they wanted to provide the ideological content of modern sports activity by means of amateur rules. According to this approach, the one who seeks to lift the moral and spiritual qualities, and also the work performed on calling on the same level of perfection what he tries to obtain in any kind of sport by means of the record results approaches an ideal of the athlete most.

Thanks to achievements of science about physical culture, to initiatives of organizational character and undertakings in competitions France at the end of the 19th century became the spiritual center of the international sports life. Thereof the French sports and sports movement not only embodied tendencies to

the international integration, but also stronger and stronger felt influence of the internal socio-political contradictions inherent in France.

In 1880 the group of republican liberal headed by the baron Pierre de Coubertin establishes National league of physical training. The League set as the initial purpose creation by means of broad organizing work, construction of sports constructions and printing promotion of the sports movement covering all population of France, system of the school physical training extending to all pupils. Soon after that, in 1884, supporters of the monarchist Bulanzhe to whom monasteries of the emperor haunted created the counterorganization under the name "Union of Societies of Physical Training and Military Preparation". Bulanzhista denied the right for existence of the sports associations organized on a voluntary basis. As for teaching physical culture and other sports work at schools, they wanted to replace them with the militarized physical training, to enter basic elements of training of infantrymen and cavalrymen into the program.

Coubertin who is honored as the father of the Olympic Movement of modern times supported those who saw that the mushtra kills the physical culture based on a voluntary basis in that fight. Therefore he supported sports profiling of the physical training which is based on the advanced principles of pedagogics made the demand of revival of emulative spirit in sport. By means of special organizational creation of sports associations both in educational institutions, and out of their Coubertin sought for education of youth in the spirit of ideas of the bourgeois republic.

At the same time the principles to which Coubertin's group adhered in the basis differed also from formalistic ideas of physical training of heads of that time of the French education system. These principles could be realized only as a result of broad social and political fight. So kubertenovets arrived at idea of need of carrying out such international competitions in which France as the country playing the defining role in cultural life of Europe could take part without damage to the authority. At the same time, using the attractive and mobilizing force of athletic fields, they wanted to prove, as in the conditions of liberalism it is possible to bring up fighting, healthy youth.

Sport came to the new level of a competitive spirit, staginess and profitability thanks to an Olympism and creation of the International Olympic Committee (IOC) in 1894. At the same time the first international sports associations appeared even earlier. In particular, the

international associations on separate sides of sport (The Wimbledon tennis club – with 1877, the International federation of swimming – since 1908, etc.) which appeared before the IOC also became the prerequisite for revival of the Olympic global Movement.

The statistics and geography of the summer Olympic Games impresses: The 1st took place in 1896 in Athens and accepted 311 athletes, the 2nd took place in 1900 in Paris and accepted 1330 athletes, the 3rd took place in 1904 in St. Louis and accepted 625 athletes, 4-esostoyalis in 1908 in London and accepted 2034 athletes, the 5th took place in 1912 in Stockholm and accepted 2541 athletes, the 7th [6] took place in 1920 in Antwerp and accepted 2606 athletes, the 8th took place in 1924 in Paris and accepted 3092 athletes, the 9th took place in 1928 in Amsterdam and accepted 3014 athletes, the 10th took place in 1932 in Los Angeles and accepted 1048 athletes, 11-esostoyalis in 1936 in Berlin and accepted 4066 athletes, the 14th took place in 1948 and accepted 4099 athletes, 15-esostoyalis in 1952 and accepted 4925 athletes, the 16th took place in 1956 in Melbourne and accepted 3184 athletes, the 17th took place in 1960 in Rome and accepted 5348 athletes, the 18th took place in 1964 in Tokyo and accepted 5140 athletes, The 19th took place in 1968 in Mexico City and accepted 5531 athletes, the 20th took place in 1972 and accepted 7147 athletes, the 21st took place in 1976 in Montreal and accepted 6189 athletes, the 22nd took place in 1980 in Moscow and accepted 5503 athletes, the 23rd took place in 1984 in Los Angeles and accepted 7078 athletes, the 24th took place in 1988 in Seoul and accepted 9421 athletes, the 25th took place in 1992 in Barcelona and accepted 9366 athletes, 26-esostoyalis in 1996 in Atlanta and accepted 10700 athletes, the 27th took place in 2000 in Sydney and accepted about 11000 athletes, the 28th took place in 2004 in Athens and accepted about 11000 athletes, the 29th took place in 2008 in Beijing and accepted about 12000 athletes, the 30th took place in 2012 in London and accepted 10956 athletes [7].

The statistics and geography of the Winter Olympic Games are more modest: The 1st took place in 1924 in Shamoní and accepted 258 athletes, the 2nd took place in 1928 in Saint-Moritz and accepted 464 athletes, the 3rd took place in 1932 in Lake Placid and accepted 252 athletes, the 4th took place in 1936 in Garmish-Partenkirchena and accepted 646 athletes, the 5th took place in 1948 in Saint-Moritz and accepted 669 athletes, the 6th took place in 1952

in Oslo and accepted 694 athletes, the 7th took place in 1956 in Cortina d'Ampezzo and accepted 821 athletes, the 8th took place in 1960 in Squaw Valley and accepted 665 athletes, the 9th took place in 1964 in Innsbruck and accepted 1091 athletes, the 10th took place in 1968 in Grenoble and accepted 1158 athletes, the 11th took place in 1972 in Sapporo and accepted 1006 athletes, the 12th took place in 1976 in Innsbruck and accepted 1123 athletes, the 13th took place in 1980 in Lake Placid and accepted 1072 athletes, the 14th took place in 1984 in Sarajevo and accepted 1274 athletes, The 15th took place in 1988 in Calgary and accepted 1423 athletes, the 16th took place in 1992 in Albertville and accepted 1801 athletes, the 17th took place in 1994 in Lillehammer and accepted 1988 athletes, the 18th took place in 1998 in Nagano and accepted 2339 athletes, the 19th took place in 2002 in Salt Lake City and accepted 2399 athletes, the 20th took place in 2006 in Turin and accepted 2633 athletes, the 21st took place in 2010 in Vancouver and accepted 2574 athletes, the 22nd took place in 2014 in Sochi and accepted 2800 athletes [8].

As we see, growth of popularity of the Olympic Games is obvious in what a merit of the IOC and National Olympic Committees. It is pleasant that physically disabled people are also involved in an Olympism. So, the summer Paralympic Games are held since 1960, and winter – since 1976.

Pays attention and formation of the international worker (since 1913) and student's (since 1923) the movements.

In general, formation of an Olympism is accompanied by a number of difficulties: racial discrimination, politicization, commercialization, dope, terrorism, choice of the cities, etc. The Olympism, certainly, is not free from common problems of the international relations, policy.

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VISION OF THE FUTURE AND VALUES OF UNIVERSITY STUDENTS

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The authors observe the features of ideas about the future and life values of a number of students of the Central Federal District universities. It was found out that a significant part of the students have positive, but fragmented ideas about their future. In addition, most of the students are inherent in crisis of personal and group identity, that means they do not know what they want and do not structure their lives. When projecting their future students are mostly standing on the paternalistic positions. Sex differences are revealed. In particular, it is noted that values such as family, health, love are more common for girls. The values of young men are associated with well-paid job and career. On the other hand, some similarities in the life values of young people are indicated, such as education and material well-being. The career and job are terminal values for the boys, and, at the same time, are instrumental values for girls. Authors made the conclusion that the acceleration of the social process involves the students in assimilating new values, and it requires developing new methods of influence on the person and applying new technologies in the learning process. Accordingly, it is important to create new educational programs, textbooks and methodological researches.

Keywords: students, university, values, interests, needs, terminal and instrumental values

To improve the competitiveness of our country in the modern world it is necessary to strengthen the training of bachelors and masters in Russian universities. The modernization of the economy and the future of our state is up to students who are currently studying. Their knowledge, skills and abilities received within the period of study will effect on how seriously they will concern to their future profession, family and country. Even now, it is important to carry out systematical sociological studies aimed at exploring students' ideas about their future. In addition, it is necessary to analyze their values, interests, and needs already formed. Not by chance, M. Porter noted that "the potential of the country's wealth is unlimited, since it is determined not so much by the presence of material resources, but by the new ideas and values" [6].

Empirical base of research

A survey of students of the following universities has been held:

- Russian Academy of National Economy and Public Administration under the President of the Russian Federation (RA-NEaPA, Orlov branch).
- Yaroslavl State Pedagogical University named after K.D. Ushinsky (YSPU).
- Rybinsk State Aviation Technological University (RSATU).

Quota sampling $n = 336$. Quota variables: university, sex, family structure. The sampling is balanced by sex – 184 male and 152 female. Sampling error is 5,8%, that is in the normal range, and the confidence interval or the probability of sampling error determination is 94,2%.

Secondary data analysis is based on:

- Materials of the Russian Federal Service of State Statistics;
- Results of sociological surveys conducted by VTsIOM (The All-Russian Public Opinion Research Center), Public Opinion Foundation (FOM), the Institute of Sociology RAS (Russian Academy of Sciences).

Materials and methods of research

When interpreting the survey data, the authors relied on futurological approach (D. Bell, A. Toffler), post-materialist values concept (R. Inglehart), postmodern approach (M. Foucault, P. Bourdieu), phenomenological concept (E. Goffman, A. Schütz), One-Dimensional Man theory (H. Marcuse), social constructionism approach (P. Berger, T. Luckmann), liquid modernity conception (Z. Bauman).

Authors' hypothesis

In the context of postmodernism students have changed the content of their values and the mechanism of their development. The part of young people, which is successfully adapting to new permanent challenges, threats, risks, is the one, whose values contribute to accelerated self-development, i.e., those who inherent such values as rationality, assertiveness, persistence in achieving goals.

Results of research and their discussion

As noted by Stephen Lyng, modern society is "walking along the edge", i.e., it generates risks [4]. Accordingly, the person needs to be able to properly assess and take risks in order to be able to adapt successfully. To do so universities should generate the appropriate skills among the students within their working programs. First, students should have the skills of their future projection in the short, medium and long term.

The first set of questions, the answers to which we need to analyze is "For how long in advance you can plan your future?" And "For how long are you able to imagine your

future clearly?”. The respondents’ answers to the first question are distributed as follows: for many years (over 10 years) – the future can be planned by 6% of the surveyed students; for the next 5 years – the future can be planned by 8% of respondents; for a period of next one or two years – the future can be planned by the majority of respondents – 40; 36% of respondents can not imagine what will happen even in the next few months, while the remaining respondents (10%) have found it difficult to answer this question.

The respondents’ answers to a question about the clear image of their future are distributed as follows: the own future can be seen clearly for no more than one day – 7% of respondents; it can be projected for the coming weeks – 11; 24% of the students clearly imagine their future for the coming months; a bit more, 37% of the students can clearly imagine their future; for the next 3–5 years – 8%; and for 6–10 years – 6; 10% of respondents have found this question difficult to answer; option “for more than 10 years” has not been chosen by anyone.

Thus, it can be stated that today’s university students do not build long-term plans for the future and cannot clearly imagine it for such a long time.

The next question is aimed at identifying whether respondents plan their life in general in advance, forecast it, or live it as they live. 22% of the respondents generally do not build plans for the future; 10% of the surveyed students believe that their lives can be hardly changed; 37% claim to know what will happen with them in the next two or three years, but not more; 23% of respondents believe that their life can change significantly after a few years; 8% have found the question difficult to answer. On this basis, we can say that in general, students have some ideas about their future life, but not for a long term ahead, these ideas are not very stable and certain, that, in fact, confirms the results of the questions analyzed above.

The next question, the answer to which we have to analyze, is aimed at trying to figure out what percentage of the surveyed students wish to work in the specialty after graduation.

Slightly less than half of the surveyed students – 47% – said that by the end of their studying they plan to continue their education as masters’ degree or to obtain their second higher education. 32% indicated that their professional activities will not be associated with the knowledge gained at the university, and only 21% of respondents said they plan to get a job in their specialty.

Another set of questions is devoted to clarify the areas of life, to achieve success in which the students are going to focus all their efforts

in the coming years; respondents have been asked to choose up to three answers from a list.

Most of the surveyed students – 79% – are ready to concentrate all their efforts in the study; professional skills will play an important role in the future for 24% of respondents; 35% of students are going to devote their efforts in the coming years to the creating and strengthening the family or to the education of children, if there are any already; 14% of respondents in the future will focus their attention on the creative, social and political activities; spiritual self-improvement will be an important part of life in the future for 29% of students; physical and health self-improvements have been chosen by 24% of students; leisure, vacations, traveling and entertainment will be an important part of life for 27% of respondents; and 33% of the participants of the research will be deeply in their professional career.

Based on this, we can say that education, professional career and family are the main priorities for the closest students’ future.

The next question was aimed at trying to figure out what are the goals of the respondents and their families when the conversation goes about the lifestyle, and the answers to this question are as follows: the goal for 9% of the respondents and their families is the bar “to survive, albeit at a primitive level of existence”; the majority – 53% of respondents want to live simply not worse than the majority of families in their city/area; 25% of the surveyed students want to live better than the rest of the families in the city/area; the goal for 8% of respondents is the same level of life as the one for an average family in Western Europe; and only 5% are aimed at a life that is better than the level of the average Western European family. Thus, most of the students and their families do not set themselves ambitious goals; they just want to live not worse, than the people that surround them.

The next set of studied questions is aimed at getting to know, if the respondents plan to change their place of residence. Most of them – 59% prefer to stay in the city in which they live now, 12% of the surveyed young people would like to move to another city in Russia, 7% are going to move to another country, and 22% have found it difficult to answer this question.

As it is known, the basic values are formed in humans by the age of 18–20 [2].

Therefore, we further studied the hierarchy of values of students, using the classical Rokeach’s methodology [5].

“Health”, “interesting job” and “love” prevail in the hierarchy of terminal values. The young men put “job” on the first place, for girls

it is "love". "Wealthy life" is an important value, both for girls and for boys, and this trend does not depend on the age of respondents, nor from the university or from the city in which it is located.

What disturbs is that "having good and true friends" takes only the 14th position in the hierarchy of terminal values. Not by chance, that Alvin Toffler wrote that the relationship between people become short-term, modern society creates a personality similar to disposable objects [7].

"Education" and the "joy of life" prevail in the hierarchy of instrumental values.

The obtained data confirms the opinion of the American sociologist Ronald Inglehart about the displacement of the gravity center in favor of a "post-materialistic values": self-development, quality of life, health [3].

Unfortunately such instrumental value, as "efficiency in the affairs" takes only the 17th place in the hierarchy.

It is not by chance that a number of scientists have noted that a significant part of the primary economic socialization of students is limited; as a result, most students are not adapted to life in the rapidly changing social reality [8].

For this reason, further we have studied the respondents' opinion about the quality, knowledge and skills, which are necessary for modern man to adapt successfully to a rapidly changing social reality. It was found out that only 13% indicated that "prudence" (ability to adequately assess the risks) is important for a modern man. A significant part of respondents (52%) believes that it is mostly important to be "sociable" and to have "the ability to acquire useful contacts". Even worse with such an ability as a "long-term planning". Only 11% believe that it is important for the modern man. 12% indicate that it is important to be able to implement the "short-term planning". Characteristically, that such important qualities of the person as "rationalism", "assertiveness", "perseverance in achieving objectives" are identified by those students who have an idea about their long-term forecasting, and an action plan for the future. Noteworthy is the fact that the total share of such respondents in the overall mass of students (6%) is insignificant.

Conclusion

Thus, the research shows that most of the modern university students do not build long-term plans for the future and can not imagine it clearly in the long term perspective. In general, students have the fragmentary ideas about their future life. Most of the respondents do not have the skills of forecasting for the short, medium and especially long term. 85% of respondents are satisfied with life in general. 77%

of respondents believe that the improvement of life in the region depends on the regional and municipal authorities. 89% of respondents rely on support from the state, which, in their opinion, should create all the conditions for a decent quality and standard of living. The young men main values are associated with well-paid job and career. The values of young men are associated with well-paid job and career. On the other hand, some similarities in the life values of young people are indicated, such as education and material well-being. The career and job are terminal values for the boys, and, at the same time, instrumental values for girls. Major part of the surveyed students is confident in their closest future (up to 1 year), but, unfortunately, does not believe in its long-term future (over 5 years). Moreover, they do not have the certain level of knowledge, abilities and skills, which is necessary for the successful adaptation to the new rapidly changing environment.

As noted by the Spanish sociologist Izaskun Artegui, modern youth is getting mature in the period of the "second modernity" and a variety of identities [1]. It is no coincidence that most of the surveyed are inherent in crisis of personal and group identity, that means they do not know what they want and do not structure their lives. Moreover, they do not have clear goals, values, interests, and they even do not try to form them in an active way.

The acceleration of the social process involves the students in assimilating new values, and it requires developing new methods of influence on the person and applying new technologies in the learning process. Accordingly, it is important to create new educational programs, textbooks and methodological researches.

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THE INFLUENCE OF THE LEVEL OF MATERIAL WELL-BEING OF THE FAMILY ON TOLERANCE OF SENIOR PUPILS

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The results of a sociological study of the relationship between material well-being of the family and the degree of tolerance of senior pupils. According to the survey found out that teenagers from families with a high level of material wealth adhere to a tolerant position than respondents from families with financial difficulties. Students in families where there are financial problems, in most cases, have a negative attitude towards people of other ethnicity. The low level of material well-being of the family affects the degree of tolerance of senior pupils. It can be argued that families with low income to educate intolerant teenager.

Keywords: tolerance, material prosperity, family, multiculturalism

Currently, the issue of interethnic relations, perceptions and stereotypes about people of other nationalities is relevant. For Russia – a multinational state – it's always been important [5]. There is a possibility that the level of subjective well-being affects the well against the indigenous to migrants. Economic development is interrelated with social capital of individuals [2]. Perhaps people are happy with their financial situation, are more inclined to respond positively to people from other countries and regions. So, after all, does financial situation influence the relationship between migrants and indigenous residents, and if so, how? We will try to consider the link between the material support of the family and the level of tolerance of senior pupils in the sample schools of the city of Krasnoyarsk.

This study aims to test the hypothesis that families with a high level of material well-being raise a tolerant teen, in contrast to families experiencing financial difficulties. I identify several reasons for putting forward this hypothesis. The first of these is the desire of people with a low level of material well-being to accuse anyone of its insolvency. People of other nationalities take jobs, thus competing with the local population, than add, according to the second, even more problems in so difficult a life. The increase in the number of labor migrants with temporary registration, occurs mainly in large industrial centers, where businesses interested in cheap labor [1].

The second basis for extension of the hypothesis is the fact that citizens experiencing problems material component, are more vulnerable to acquire prejudices and stereotypes [4]. According to the results of comparative sociological studies conducted in Krasnoyarsk in 2015, it also became known that the greatest number of negative stereotypes is precisely the idea that migrants take jobs. Moreover, in children the conviction that higher than the

parents. The second position is the view that migrants are bad for the host environment [3].

In 2015 in the city of Krasnoyarsk were conducted sociological survey of schoolchildren aged 14–18 years on the issue of interethnic relations, with the aim of determining the factors influencing the level of tolerance. In total the survey was attended by 264 students from seven schools in the city.

In this article we will try to assess the impact of level of material security of the family on the attitude of respondents to other nationalities.

To assess the level of material support we offered respondents the question: Rate the level of material security of your family:

a) we can afford as many expensive acquisition (high level of material well-being of the family);

b) we buy all the necessary things sometimes can afford expensive acquisition (the average level of material well-being);

c) we can afford only the necessities of life food and other things (below average);

d) we don't even have enough for the necessities of life things (low level of material well-being of the family).

The study showed, in the category of "high level of material well-being of the family" consisted of 18% of the surveyed students, the average level was the most numerous of – 54%, lower than the average level of 23%, a low level of material well-being – 5%.

To assess attitudes to representatives of other nationality we asked respondents the question: What feelings do you experience when communicating with a person of another nationality and offered a set of answers – the negative feelings of "irritation", "distrust", positive feelings "interest", "respect", the lack of fixing the attention on the nationality of the "Nothing special" and the ambivalent "it depends on the nationality". The results of the study are shown in Table.

The relationship between level of tolerance and the material support of the family.

The level of material well-being of the family	The type of the relation to representatives of other nationalities (% of the total number of respondents)					
	irritation	distrust	interest	respect	Nothing special	it depends on the nationality
High	0	9	27	8	30	26
Average	6	17	50	13	10	4,3
Below average	10	6,4	35	6,4	16	26
Low	13	30	13	0	0	44

Table shows the relationship between the material status of the family and relations of the senior schoolchildren to the representatives of other nationalities. We see that the majority of students have positive setup – interest in relation to a person of another nationality. However, this interest is significantly higher among students from middle-income families than adolescents from families with high and low levels of income. This can be explained by the fact that adolescents from families with average incomes – more dynamic, I hope to change or improve their situation, therefore, more interested in the social environment, comparing themselves and others. These same respondents more than others feel respect towards representatives of other nationalities.

Adolescents from families with high incomes more self-sufficient, so they have to a lesser extent, underdeveloped social interest, they are not focused on social comparison. Among them, most of those who do not tend to pay attention to the national factor in building relationships.

Adolescents from families with a low level of material well-being often subconscious fear of negative social comparisons or have limited range of interests, so they have the lowest rates of interest to people of other nationalities.

This confirms the hypothesis expressed by S.V. Golunov about the relationship of economic status and social capital of the individual [2].

The second position among all respondents is ambivalent “nothing special”. In our

opinion, this is the most healthy. Mature position is not recorded on the person’s nationality in relations with him. However, we see that the prevalence of this setting is expressed in adolescents from families with high economic standard, and to a lesser extent – adolescents from families with a low level. This again confirms our hypothesis of a lower social maturity of adolescents from families with low financial status.

Examine the table in more detail. We see that the number of respondents experiencing irritation towards migrants increases from families with high cash income to families with low material prosperity. Students living in families with high incomes, do not feel irritation towards migrants, while the number of respondents from families with financial difficulties who answered “irritation” – the highest of all groups.

A growing number of adolescents who are treated with mistrust of the migrants identified in the last group – “low level of material well-being”. And less distrust experienced by the representatives of the level, which is below average. Consequently, the levels are relatively close to material support showed opposite results. Families with a high level of material well-being also showed a low number of results to “distrust” towards the migrants. So, teenagers from wealthy families almost do not feel mistrust to migrants from the “near abroad”.

The highest number of survey indicators of the respondents “respect” to the question of the relation to migrants, were recorded by representatives of high and middle levels of

material well-being. That is, older students, brought up in affluent families, the respect of migrants. In contrast, students who took their families to the low level of material well-being, the results of the table show no respect to people of other nationality.

Respondents from affluent families do not consider migrant special. Students from families with low incomes to the question "Your attitude to migrants" did not use the answer "nothing special". This may mean that they are not indifferent. Based on the above, this concern is manifested in the negative attitude towards migrants.

As shown by the last column of Table, for representatives of the low level of material well-being important nationality when dealing with people.

Conclusions

If you analyze all the information obtained, we can conclude that students in families where there are financial problems, in most cases, have a negative attitude towards people of other ethnicity. The low level of material well-being of the family affects the degree of tolerance of senior pupils. It can

be argued that families with low income to educate intolerant teenager.

In contrast, adolescents whose families do not experience the difficulties of a material order, more tolerant. Here, apparently, the principle of "I'm safe – you're safe".

The level of tolerance is reduced from affluent families to families experiencing financial difficulties. Thus, the hypothesis about the influence of the level of material well-being of the family on tolerance of senior pupils at the example of a survey conducted in six schools of Krasnoyarsk, confirmed.

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VIOLENCE AND AGGRESSION IN THE LIFE OF CONTEMPORARY RUSSIAN TEENAGERS

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This article discusses a problem highly relevant for today's Russian reality – that of violence and cruelty and the attitude towards these social phenomena in the teenage environment. It shows the scale of corporal punishment practice and considers some consequences of ill-treatment of children. Taking senior teenagers from a major industrial mega polis as an example, the article traces destructive tendencies in the system of their social relations and activities as regards proliferation of acts of violence and tolerance towards aggressive manifestations. It reveals some gender-based specifics of Russian teenagers' views on aggression and their attitude towards violence. It is shown in the article that in modern setup aggression and violence become one of the major factors in the young generation's socialization that determine the specifics of perception of reality by adolescents, enhancing their getting used to violence, hindering the possibility of identifying different types of aggression and increasing tolerance to violent acts.

Keywords: violence, aggression, teenagers, young generation's socialization, view on aggression, attitude towards aggression

Of late, visible changes of destructive nature are observed in children's (teenagers') subculture: growth of cruelty and envy; rudeness and harassment of teenagers by their peers become habitual, if not every day phenomena.

Although violence and readiness for it have always been in existence, yet parameters of violence changed, especially in today's children and teens:

- total lack of sense of adequacy, therefore even those who are down on the ground are beaten up;

- it is not concealment of the acts of cruelty, but their highlighting in the public with follow-up comments that is becoming the order of the day;

- growth of violence, including murders, committed not only under the influence of alcohol or drugs, but also as a result of stupefying virtual reality;

- teenagers commit murders because they “feel gloomy at heart” or because they “want to try it once to see what it's like”.

Abundance of violence instances in the family, at school, in mass media which children and teenagers face and are unable to process and understand, are the causes for aggression, as well as that of inability of teenagers to express themselves in a constructive way.

According to modern western researchers, every four weeks, at least once, one out of four children in elementary school, and one out of ten in middle school are being bullied by their peers [2]. As for Russia, in our schools the peak of bullying falls particularly on adolescence. And the cause of harassment and violence on the part of peers is, primarily, teenager's appearance, financial status of his family,

nationality and, in some instances, school performance (too high or too low) [2].

However, even inside the family, among near and dear adults, many children and adolescents do not find protection and understanding. An eminent Russian schooler I.S. Kon noted in his latest book “To slap or not to slap?” that spanking supporters among our modern countrymen can be seen not only among adults but even among adolescents [4] which contributes to the widespread practice of corporal punishment. Moreover, the former victims, the so-called “slapped children”, when grown up, often justify violence, showing the conviction that beating “was for a valid reason”, “served me right”, and “was deserved”. Thus, appealing to their own experience, they are sure that spanking is quite “legitimate”, and since it didn't harm them, it will not harm, be it necessary, their children.

Upon the whole, according to the results of studies made by different authors, occurrence of violence cases against children is from 3 to 30% [5]. The viewpoint that in Russia nowadays there are no parents who punish their children physically, was supported only by 2% of participants of the survey carried out by the Public Opinion Foundation in 2008 [4]. The fact is that for many contemporary Russian parents still there is typical perception of a child as the one being their private property with regard to which they “can do whatever they want”, up to torture that is interpreted as “to teach the mind to reason”.

In particular, one of our studies, initiated by the above mentioned book by I.S. Kon, with participation of 116 parents of elementary school pupils and adolescents of secondary

schools of Nizhny Novgorod (67 mothers and 49 fathers) showed that the majority (about 71 %) consider spanking as extraordinary yet sometimes forced and appropriate measure in child's upbringing ("spanking is necessary only for misdeeds, if deserved"; "sometimes nothing but spanking brings the child to sense", etc.), while only about 16 % are categorically against it.

According to a large-scale analytical study with regard to the consequences of children's corporal punishment, carried out by E. Gershoff [8, 9], the negative effect of these "upbringing practices" is as follows: in respect of children's subsequent aggression – 100 % of cases; regarding victimization – 100 %, mental health of young generation – 100 % of cases; in terms of criminal and antisocial behavior of adolescents – 92 %, regarding obedience – 60 % of cases. In other words, contrary to the expectations of adults, corporal punishment can increase aggressive and antisocial behavior of adolescents, contribute to its consolidation.

Of course, we should not forget that today's children and teenagers experience violence of a different kind, directed against the highest humanistic values, such as kindness, altruism, mutual understanding, humanity, compassion, rejoicing in the good; contemporary social reality is practically devoid of these human values [1; 7 and others], many children and teenagers fail to get to know them. According to the just remark made by V.S. Zhuravlev, aggression as a social phenomenon is nowadays becoming one of the factors of the young generation's socialization, enabling an individual to absorb values and behavior models necessary for successful functioning in the modern Russian society [3].

Materials and methods of research

In our opinion, all facts described in scientific literature cannot but influence adolescent community. In particular, the question arises: what ideas about aggression and violence are prevalent in the adolescent subculture and what is its attitude towards the most common forms of aggressive behavior? We would like to clarify that our research interest was related to identifying the place and specifics of aggressive manifestations and violence in the relations system of adolescent subculture, their acceptability from the viewpoint of adolescents themselves and their ability to identify different types of aggression. Taking into account the data presented in psychological studies, we have formulated the following hypotheses:

1. Violence and aggression occupy one of the central positions in the system of social relations and activities of today's teenagers, while the attitude to violence and aggression acts is rather loyal and tolerant bordering on their positive perceptions.

2. Ideas about aggressive manifestations and attitude of adolescents to violence may have some gender-based specifics.

Our research was of ascertaining nature and was conducted using a number of methods including: content-analysis of anecdotes popular among teenagers; selective observations and questionnaire surveys of pupils. Senior teenagers – students of class 8 of several secondary schools in the city of Nizhny Novgorod numbering 120 students, including 60 girls and 60 boys, were participating as subjects in the said research.

Results of research and their discussion

It may be noted that our study of the contents of anecdotes, common in the adolescent environment, was aimed at determining aggressive tendencies and was not undertaken accidentally. Anecdotes belong to the genre of the so-called grass-root folklore and are very popular among today's teenagers. They are created outside the pressure of censorship and official culture, outside of "permitted-not permitted" framework and rather grotesquely but quite adequately reflect unembellished social reality. In the course of our research we suggested to teenagers to write down anonymously their most favorite anecdotes without any restrictions in themes and vocabulary. In the end, we collected 287 anecdotes that were subsequently analyzed in the following way:

1) topics of anecdotes (spheres of reality most attractive to teenagers);

2) favorite characters (heroes, their roles, inclination towards aggression), on the basis of which the conclusion was drawn about spheres of life most important to teenagers and the values with which they live.

Thus, as shown by the content analysis, aggressive themes were present in more than half of our collected anecdotes, namely, 61,3 % of the total. The typical stories – ridicule and humiliation of the weak, insulting the handicapped, homosexuals, people of a different nationality, exploitation of one person by another, of "stupid, naïve" by "smart, resourceful, arrogant", and also sexist and heterosexist subtext of black humor. Aggressive personages in teenagers' favorite anecdotes most often are males (peers, students, "Russian males", heroes of mass-media and political leaders) and in rare cases animals. At the same time the victims in most anecdotes, as a rule, were women, stigmatized individuals and people of different nationalities including those with status of migrant workers, less often – animals, children or heroes younger than the aggressor. As for the form of aggression, verbal aggression prevailed in the content of analyzed anecdotes. Indirect expression was also seen rather often, which means that aggression expressed by grass-root

folklore in the adolescent environment is not so much of direct and frank character, but it takes disguised, veiled form.

Besides, the following gender-based specifics were found in anecdotes preferred by today's teenagers. Thus, physical aggression and the theme of exploitation of man by man were typical mainly for stories submitted by boys whereas girls' stories mostly contained themes pertaining to verbal aggression, and stories with elements of disguised aggression were met more often than in boys' stories.

Therefore, summing up the results of content analysis, we can state the fact that cruelty, violence and aggression are rather typical subjects of favorite anecdotes of contemporary Russian teenagers.

Also, in the process of the research we were particularly interested in such a form of children's subculture as games activities, namely: character, theme and content of games preferred by adolescents.

According to indigenous experts, distribution of computer games has reached incredibly high share among today's adolescents. The games may take practically all free time of teenagers – up to 6–8 hours per day [6]. Similar tendency was fixed by us in our research as well wherein it was discovered that various computer games are in the highest demand with our subjects, as they are favored by 64% of teenagers, among them 38% being boys and 26% – girls. To this end, it is worth noting that today's youths are very actively using pertinent gaming slang (“demo”, “user”, “pers”, “hybrid”, “quest”, etc.).

It is interesting to know that, according to teenagers themselves, the appeal of computer games is due to the fact that they enable one “to have fun”, “to rest”, “to shake up”, “escape from things unpleasant”, and also “to shoot”, “to fight evil”, “to get a win over freaks” (in the sense to kill, to destroy them), “to overcome”, “to test oneself”, etc.

As a rule, game themes of computer games preferred by teenagers are very limited and similar to each other. The vast majority of them are rather aggressive kinds of the so-called “horror stories”, “shooters”, “walkers”, “fights” where central stage occupy “bloody showdowns” and annihilation of an enemy (“Battle of the Kings”, “Lord of the Rings: Battle for Middle Earth”, “The Game of the Thrones”, “Gothic”, “World of Tanks”, etc.). But it is worth mentioning, however, that the above games mostly attract boys who also add to the above list racing games and sports (“football”, “hockey”, “pool”, “tennis”, etc.). Among preferred com-

puter games of the girls along with “The Game of the Thrones” and “Gothic” are more harmless, at first glance, flash-type games such as “Designer”, “Barbie”, “Hairstylist”, “Beauty Saloon”, as well as a leader in popularity – different variations of games like “Farm”.

It is significant that only in very rare cases a favorite theme of contemporary teenagers' computer games is puzzles, logic games, strategy games, like “Monopoly”, “Civilization” etc., i.e. during leisure time virtual violence and brutality, as well as beauty industry (in case of girls) prevailed over intellectual needs of adolescents.

Gambling card games penetration into teenagers' environment, preferred by about 37% of our subjects, is slightly lagging behind PC games, as well as that of fortune-telling games (e.g., Tarot cards), popular mainly among girls.

At the same time, the results obtained by us give a convincing proof that in the present teenagers' environment outdoor games and sports collective games that were favorably played by their peers some 25–30 years ago have practically completely disappeared (the former ones found no mention in the answers at all while the latter were mentioned by three teenagers only out of 120 subjects). In other words, as becomes evident from our research, we can see the fact of impoverishment and dehumanization of modern teenagers' game preferences, among which a significant place is occupied by games of aggressive character, and that, in its turn, allows to speak about the increased interest of young generation in acts of violence and cruelty.

Taking this fact into account, we tried to study typical ideas of today's teenagers regarding aggression, and got the following results.

Thus, answering a question “What is cruelty and violence?” our subjects demonstrated a rather ambiguous perception of these phenomena, giving them absolutely different definitions, namely: “it is evil” (28% of girls and 18% boys); “a typical trait of our time” (23% of boys); “something to be reckoned with” (18% of girls and 7% boys); “moral ugliness” (13% of girls); “part of human nature” (32% of boys); “necessity for survival” (3% of boys and 7% girls); “murder” (43% of girls and 40% boys); “spanking” (52% of girls and 35% boys); “crime” (22% of boys and 13% girls); “power over people” (18% of boys and 13% girls); “cruelty is a response to cruelty” (18% of girls and 10% boys); “violence is cool” (18% of boys).

As it may be seen from the responses, perceptions of teens about violence are differing,

on the whole, by ambivalence, generalization on the one hand, and at the same time, by concrete details, on the other hand, and, in a number of cases, are also supplemented by a rather loyal attitude. The latter is testified by tendency to view violence as an integral part of life and even as something taken for granted that results into subsequent tolerance towards it on the part of some teenagers.

No less interesting and important data has been collected by us from the responses to the question: "Where violence and aggression find manifestation?" The analysis of the data showed that in the opinion of today's teenagers, violence has taken up rather significant proportions as it is seen not only "on the screen" (45 % of girls and 37 % boys) and "at war" (63 % of boys and 52 % girls) but also "in the company of peers" (27 % of boys and 20 % girls), "at school" (33 % of girls and 22 % boys), "at sport events" (30 % of boys), "on a date" (13 % of girls), "in the Army" (20 % of boys), "in the family" (15 % of boys and 10 % girls), and also "with regard to animals" (10 % of girls). It should be noted that there are some differences in the responses of girls and boys which are caused by specifics of differentiated gender-based socialization. As it is known, sports and the Army, mentioned only by boys, are the main institutions for building up masculinity, and they really are much more relevant to the experience of male adolescents. In their turn, specifics of female socialization lead to the fact that since childhood girls are oriented on the sphere of interpersonal relations, including those of intimate nature, as well as on care for others. Therefore, it is no accident that deliberating upon possible instances of violence, it were the girls who made references to dating and attitude towards animals.

It is also worth mentioning that while analyzing teenagers' responses we met often enough the opinion that it is quite unrealistic to single out any concrete spheres of aggression manifestation since all human life consists of violence. In particular, this opinion was shared by 30 % of boys and 38 % of girls. In other words, in the teenage environment there is a notion of aggression as an integral part of human life, which was typical for about a third of our subjects. At the same time, it is important to emphasize that mainly, talking about violence, today's teenagers exhibit sensitivity primarily to acts of direct physical aggression, whereas, they remain loyal and insensitive to manifestations of psychological violence and verbal aggression,

and hence are quite vulnerable for both the position of a potential "victim" of such a veiled, unidentified by them violence, and the position of a potential "aggressor". On the whole, only 10 % of our respondents' answers had a mention of threat, intimidation and abuse.

As for possible reasons for violence, according to contemporary Russian teenagers, these include the following factors: stress and tension (48 % of boys and 37 % girls); wars and rampant terrorism (43 % of boys and 30 % girls); quarrels and conflicts (37 % of girls and 27 % boys); difficulties in life (27 % of boys and 22 % girls); example from outside (20 % girls and 20 % boys); anger and wrath (22 % of boys and 20 % girls); defense against threat (20 % of girls and 15 % boys); lust for power (20 % of boys and 15 % girls); genes (13 % girls and 10 % boys); bad manners (13 % of girls). At the same time, answering the question: "How can aggression be avoided?" the vast majority of our subjects claimed that it was absolutely unrealistic. We believe that such attitude of acceptance and tolerance to violence acts is quite demonstrative and can be viewed as a kind of setting of the perception of social reality, according to which teenagers practically rule out the possibility of changing current social situation, taking violence for granted and as inevitable. Only in several cases, and mainly boys, tried to make concrete proposals, including: lifting moratorium on death penalty (11 % of subjects); ability to communicate and availability of friends (8 % of subjects); no bad examples (13 % of subjects); attainments of self-control and self-regulation of behavior (15 % of subjects).

Very interesting, in our opinion, were responses to the question: "How often you yourself were subjected to violence? And of what kind?" In particular, analyzing the adolescents' judgments, we paid attention to the fact that, despite acknowledging the ubiquity of aggression and impossibility to avoid it, many of our respondents still think that they personally were "never abused" (27 % of boys and 37 % girls). Of course, it is difficult to imagine and admit that in front of us are children, who have never been abused and forced to act against their interests and aspirations, who have never sacrificed their needs to meet expectations of others and who have never faced threats and humiliation and who have never been physically punished. That means that a major part of our respondents lacks even the most basic sensitivity to acts of cruelty and violence. We suppose that these results once again confirm our idea that many teenagers, regrettably, are

unable to identify aggression, in any case, excluding physical impact.

However, at the same time, some subjects are quite aware that they occasionally find themselves in a position of a victim. They are “scolded by teachers” (55 % of boys and 43 % girls), “sometimes hurt by peers” (20 % of boys and 33 % girls), “insulted by parents” (23 % of boys and 27 % girls) and are even subjected to corporal punishment (18 % of boys and 5 % girls). However, as a rule, in such situations adolescents react to violence by fighting back (57 % of boys and 23 % girls); resort to physical force (35 % of boys and 5 % girls); try to get away from interactions, avoid contact (13 % of boys and 28 % girls); use means of verbal aggression (12 % of boys and 30 % girls).

Thus, summarizing results of our questionnaire survey of teenagers, we would like to note that perception of aggression as quite inevitable and typical aspect of modern life is characteristic for our respondents in general, and on the basis of such view an idea is formed among them that it is impossible to get rid of violence, so they gradually tend to lose their own sensitivity towards various acts of aggression, especially the indirect one not manifesting itself physically.

Besides, summing up the results of our study, we can unequivocally state that the hypotheses as formulated by us have been confirmed. This means that social phenomena of violence and aggression are becoming one of the significant factors of young generation's

socialization in modern Russian society, setting up corresponding values and patterns of behavior, which in turn, puts on the agenda development of measures and means for preventing violence in the adolescent environment.

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NEOLOGISMS AND BORROWINGS IN THE MODERN GERMAN LANGUAGE

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Every language is like any other complex system constantly developing and changing, so it is very essential, especially for the translator in his professional activities, not to miss all the trends of a language. Many modern linguistics and philology researchers focus on the evolvement of so-called "live" speaking, its common use and daily expression. Simplicity of speech, emotionality, concreteness, vividness and imagery, all these qualities are inherent in the modern spoken language. We pay attention to such topics as vocabulary borrowings and neologisms as they have a major role in the development and change of the lexical structure of the language. We have defined the terms, informed about tendencies of neologisms appearance, and as a result, we affected the sphere of borrowings extension in the German language. Nowadays, changes in society led to the loosening of traditional norms of literary language. And this is reflected not only in the increase of speech errors among people who speak the language, but it also has a huge impact on changing the vocabulary. Now linguists have an increased attention to the study of a modern spoken language, as well as neologisms and borrowings, as they influence the language vocabulary. This is due to the fact that the study of this problem began only in the twentieth century. The object of our study is modern vocabulary of the German language. The subject of our study is the problem of lexical stratification of language, the peculiarities of the vocabulary of spoken language, the sources and reasons of the use of this vocabulary.

Keywords: neologisms, borrowings, German language, "live" speaking, lexical structure, language

There is a view according to which "seismographs" of cultural development act young people, creative elite, so called the peripheral group. These particular micro-society are most sensitive to changes and trends of the time, and in some ways, they are themselves the engines of communicative development.

The formation of this vocabulary is very flexible in time. Famous linguists of the English language M.D. Kuznets and Y.M. Skrebnev wrote that over the time, some "witty" words and phrases lose their originality and became ordinary, trivial expressions [3, p. 93]. Some of them are elements of "avuncular" forms of everyday speech, while others get a shade stylistic neutrality: Wolkenkratzer means "a skyscraper", Senior means "retired", Fuchs means "a first year student", Stubenhocker means "a couch potato". Today slang and many colloquial expressions may appear unusual innovation, but after a short time these words can become a normative vocabulary, as a language is involved in a continuous process of change.

The fate of neologisms and slang in a language life differs. Some of them are widely used and versatile. Others live like a short spark: being bright signs appearing at a certain time or stage in the society development, they become obsolete and disused.

According to E.V. Rosen, these words are one-day words, the words with "no future", and they can be kept in historians and sociologists' memory as "the words-witnesses of the age" [5, p. 8].

The words – witnesses of the age on colloquial level are the most visible in the language

of young speakers. This gives us the reason to believe these characteristic features of neologisms and slang such as mobility, the relevance of these phenomena and the transience of change, in contrast to the standard of constancy in the vocabulary. In most cases slang and neologisms are created by young generation and they are "distinguishing features", a kind of sociolectal markers [6, p. 121–123].

The main trend in the field of neology are English borrowings in the German language. The current language situation is the result of attraction towards Anglicism, due to the fact that English performs the function of the global language. In many types of text, such as brochures, sports magazines, modern music or fashion publications, texts using the discourse of avant-garde art etc., it is difficult at first glance to determine what language is spoken or written in English or German.

One of the main motivations for borrowing is the need to name absolutely new things: Scanner Browser, Software. Borrowings that have no absolute equivalents belong to the sphere of mass culture of the 20th century (Pop-Ikon, Brit-Pop – "britisch pop, Retro-Popper-Look – "pop appearance in the style of 80-ies").

The success of Anglicism is that none of the notions in the German language cannot cover the wide concept which expresses Anglicism without mentioning connotations. For example: a user is "a man who occasionally uses drugs, but who is not addicted to". This example shows the reasons for the success of many Anglicism because German alternatives

cannot replace the easy and short nomination offered in the English language.

The Anglo-Americanisms, developing the lexical fund of the German language, intertwined with the peculiarities of the inner vocabulary. Words-hybrids, formed as a result of foreign language and German component, facilitate a foreign word penetrating into the German language system. Novelty of any foreign word can be removed partially if the native German speakers know any structural similarity of appropriate signs, derivational form is clear and previously known words with the same etymological plans can be associated with the new words. For example, *die Tellerwascher*-Story is "a story in which low-wage worker got rich", *der Nebenchecker* is a "neighbor", *der Soundtempel* is "disco".

Anglicism is exposed in the language of morphological assimilation, i.e. foreign words adapted to German spelling, the noun is assigned a gender, and they are capitalized. This contributes to the fact that the word quickly enters the vocabulary of the German language. Modern German language abounds with English borrowings, but today it is no longer able to assimilate the entire flow of new words. The "younger" borrowed the notation [5, p. 10], the more it differs from German words and earlier borrowings.

Anglo-American borrowings primarily act as a factor of external lexical development fund, but at the same time the lasts are intertwined with the specific features of the vocabulary of the German language, updating it. The question of the origin and classification of new words is directly linked with the concept of norms as a form of language existence. When a new word or a new value is appeared, borrowed or formed, there is a need to assess language phenomena in terms of norms or, on the contrary, deviation from the norm.

The dynamic nature of the vocabulary makes us search for dynamic criteria of normativity. New types of verbal behavior do not fit the traditional patterns of communication, so the recognition of the multidimensional existence of rules reflects our understanding of real language use. The norm becomes broad and significant variation can be conceded. But many linguists refuse the approval of the "unity of norms" where it should be mentioned a complex of rules and their variation.

According to Y.M. Skrebneva neoplasm is a mistake that legalized by common use [7, p. 140]. In any language environment, there is an intuitive idea of right or wrong. One variant cannot be admitted "right" or "wrong" ac-

cording to language or esthetic features. All the matter is socially-cultural people roles or community. The prestige and language use influence of their and norms are proportional to this role.

A word from another language, firstly used in the language is perceived by native speakers as unusual, as deviation from traditional norms. The language for a speaker is modern (or close to it in time) speech forms, the actual meaning of words. A person organizes the language as a ready mechanism and he or she doesn't pay attention to those phenomena which led to the appearance or disappearance of certain elements of the language system.

According to M.M. Makovsky, a similar approach to language is not quite right and too narrow. He believes that some words, especially borrowed, indicate the development of human culture. The change and development of the meaning of these words, especially as they transit from one language to another, reflect the customs, traditions, morals and ways of thinking of a person or a whole nation [4, p. 11].

In modern German we face different types of the vocabulary renewals of the German language, therefore, with different words:

1. The word first appeared in German in the last 30–40 years, the so-called *Neuworter* ("actually neologisms", or "neologisms of the first order"). This vocabulary is new in form and meaning (e.g., *verb simsen* for the transmission of SMS-messages);

2. Words appeared within an indicated period of time on the basis of pre-existing words, i.e. words composed of known words and affixes in new combinations such as word-formative models. This is so-called *Neupragungen* (neoplasms), the words are only partially new, for example: *Internet Cafe*);

English borrowings exist in almost all spheres of human activity, but in the first place in this list the following:

– Advertising. Willingly we use in ads British and American definitions to promote unfamiliar way of life and, in some way to immerse their clients in a different culture. Thus, people buy happily *Conditioner*, *Lotion*, *Snacks*, *Shorts*. Everyone is familiar with such advertising vocabulary as *Corporate Identity*, *Slogans*, *Marketing*, *Message*, *Promotion*, *Image*, etc.

– Technique. The Internet and the computer world leave its marks. For Example: *Mouse*, *E-Mail*, *Online*, *Provider*. Previously the German language had technical terms from other fields of technology: *Airbag*, *Display*, *Playstation*, *Gameboy*, *Joystick*, etc.

– Sport. There are many typical of American sports in this sphere with their corresponding concepts, which can help athletes and fans to understand each other, lightening their communication. Such words are Match, Fan, Penalty, Cross, Freestyle, Finish, Badminton, Sprint, Team, Handicap.

Also, there are other sources of Anglicisms in the media such as Feature, Pay-TV, Motion, Primetime, Print, Slow, Entertainer in the beauty industry – Foundation, Fluid, Eyeliner, Strip, Cover, fashion, Fashion, Dress, Look, Top, Boots. In areas connected with computers, computer science, occupy the first place in this list. Palmtop, handheld, upgrade and scrollen are a few more examples of Anglicisms used in this domain.

If we look carefully at this issue, we can conclude that initially, when the computer industry was born, the programmers tried to use the German terms. Why did Rechner turn into a Computer, Speicher into Memory, and Bildlaufleiste into the Scrollbar?

The German language in all spheres of modern public life (from basic shopping to the most complex of sciences) is replaced by a huge number of English words, and sometimes it is even displaced by them. Linguists see the danger in this progress of borrowing, as the German language can lose its expressiveness, distinctiveness and emotionality, and perhaps even the future. Approximately 450 of scientists and experts-philologists specialize in the problem of new words formation and foreign words in the German language Institute in Mannheim. At that, they want to clarify the history of foreign words in the German language and the role of media and advertising in the appearance of new words

Since 1997, annually the Society awards the title “the Falsificator of the German language” to a person who uses many English words that its content ceased to be intelligible to listeners. It can be well-known businessmen, cultural figures or politicians. The assumption of such title always makes a sensation in society. In 1999 this title was given to Ludewig Joachim, Manager of the German Railways. He ordered to rename at the railway stations Auskunftsburo Service Point, Fahrkartenschalter Ticket Counter, and Bahnhofstoilette now called Mc-Clean [3, pp. 7–8].

For each new release the newspaper Companies schedules a list of those firms that disfigure German. These lists are repub-

lished by other newspapers, announced on radio and TV. No one wants to get to such a list, as it means material losses. Many newspapers and magazines throughout Germany (the same newspaper that abuse of Anglicism) wrote about society activities. People create a negative attitude to foreign language passion, forming public opinion. Even the telephone company sends the invoices to its clients in the German language. The Society follows the principle: “constant dropping wears away a stone”. And this policy achieves results.

However, they do not aim to eliminate all Anglo-Americanisms from German language, because it is impossible to isolate language from foreign borrowings completely. Undoubtedly English is the international language of science. But the Anglo-American borrowings in such a large amount (which is now observed in German language) can erase cultural and linguistic identity of the German language.

Thus, they focus attention on the problem of “Denglisch”. Denglisch (DEUTSCH + ENGLISCH) is the “new” German language, became, unfortunately, a familiar reality in Germany.

It turns out that today a foreigner have to learn English to learn German. The words “invented” by speakers of German, so called “pseudo-anglicism” (anglisierende Bildungen, Scheinentlehnungen, Pseudoanglizismen or Scheinanglizismen) arouse the interest of the Germans. The fact that in the English language some of these words are not generally used and many of them are used in other meaning. In any case, for many Englishmen and Americans visiting Germany, such words and expressions are unintelligible and therefore cause confusion [2, p. 46].

Members of the Society have developed a special program to solve this problem. The main goal of the program is reduce the use of the Anglo-American borrowings in the German language, and in all areas of life the German society: in journalism, radio and television, legislative, scientific, technical texts, the language of advertising and everyday communication between people.

Still, scientists-linguists promised to develop some criteria that allow to reduce the consumption of the Anglo-American vocabulary in the German language. Moreover, in their opinion, this process will take not a year or two, but a much longer period.

However, the first attempt was immediately turned into reality. So, the Society "German language" has already issued so-called "Anglizismenliste". This dictionary, which contains 5,085 units, is designed by people and for people. The main idea of it is that the speaker or writer could easily find Anglo-American borrowings in German equivalent and decide which of the words (German or English) to use in speech or writing.

In conclusion it can be mentioned that the problem of the "new" modern language reached the state level: politics and public figures actively participate in discussions about the current situation in the country along with professional linguists and philologists. Nowadays in Germany Anglicism is banned in business (and society for the protection of the German language, as well as many popular magazines and newspapers follow the public statements of officials, regularly "punishing" offenders, they are called today in Germany "Wortpanscher"), and every German product must be provided with instruction in their native language.

"To preserve the national language of Germany" is the slogan of uniting German society today. First and foremost, defenders

of the national language aim to protect the German language from the domination of neologisms and borrowings, particularly from America and the English-speaking countries. But, nevertheless, English words continue to reign in the German language. Now cannot do without such words as Future, Results or Freedom. Sometimes English words are used with mistakes, more often they sound comical, and almost always dissonant.

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