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STRUCTURE AND LOGICAL ORGANIZATION OF CURRENT STUDIES IN TRACK AND FIELD SPORTS

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Annotation. *Purpose:* to develop a system of assessment and prediction of technical skill athletes-athletes. *Material:* the study involved 450 athletes qualifications. *Results:* in the process of preparing members of the Ukrainian national team implemented a system of assessment of mental state. It includes: a set of informative indicators biomechanical laws and their changes; biomechanical model of motor actions; technology operational biomechanical modeling, changes in the functional state of the viscoelastic properties of skeletal muscle vestibulomotor system and speed-force readiness, evaluation and prediction of physical condition of athletes qualified. And complex pedagogical tests and scorecards. For the evaluation of the functional state of the autonomic nervous, cardiovascular system, external respiration system by analyzing the electrocardiogram, heart rate variability, the definition of autonomic balance, state of the myocardium, cardiac arrhythmias, spirometric studies, system performance evaluation of the athlete in extreme conditions by identifying the type and properties of temperament, level of personal anxiety and psychological evaluation reliability athletes. *Conclusions:* the structure and logical organization of modern studies of different primary focus, based on the assessment of technical skills, physical fitness, functional and mental state of highly skilled athletes. **Keywords:** structure, logical organization, athletics, technical skill, physical condition, mental condition.

Introduction

Current level of track and field development, cardinal changes occurring in this sports event, expansion of sports calendar attract closer attention of specialists to different constituents of preparation process [6, 9 – 11, 15]. Ukrainian athletes have become winners and prizewinners of the Olympics and the World championships in this sports event on numerous occasions. However, due to various factors of external and internal character, sports performances have begun to decrease drastically. This has necessitated utilization of the present-day scientific achievements for sports practice demands, for search for the ways of gaining victories under the given conditions and for picking national teams of Ukraine for participation in major competitions. Sports result in track and field is directly dependent on qualitative management of athletes' preparation, and includes rational structure and content of macro-, meso- and microcycles, ratio and distribution of training means within structural units, efficient organization and holding of centralized educational and training camps, well-balanced system of nutrition, provision of recovery services, regular measures aimed at estimation of various aspects of athletes' fitness [7].

Complex scientific and methodical provision of top level athletes represents the most significant factor for improvement of the preparation efficiency of national track and field team of Ukraine [7, 8]. Its efficient realization is impossible without clear-cut structure and logical organization of current scientific studies in track and field sport. Latin "structura" means well-ordered formation. Structure is considered as the means of element organization and the character of link between them [[phtt://www.onlinedics.ru/slovar/fil/s/struktura.html](http://www.onlinedics.ru/slovar/fil/s/struktura.html)]. Pressing character of study is determined by increase of the efficiency of complex control and prediction of competitive activity results, system of athletes' selection to national track and field teams, which necessitates clear-cut realization of structure and logical organization of studies in track and field, based upon objective criteria of athlete body functional state, physical, technical and mental fitness.

Studies were conducted in accordance with "Summary plan of scientific and research activities in the sphere of physical culture and sport for 2001-2005" of the State Committee of Youth Policy, Sport and Tourism of Ukraine in theme 1.4.7. "Improvement of technical skills of track and field jumpers in the process of long-term preparation" (№ of st. registration 0101U006316); "Summary plan of scientific and research activities in the sphere of physical culture and sport for 2006-2010" of the Ministry of Ukraine in Family Affairs, Youth and Sport in theme 2.1.4. "Improvement of athletic training of track and field athletes at the stages of long-term preparation" (№ of st. registration 0106U010769); "Summary plan of scientific and research activities in the sphere of physical culture and sport for 2011-2015 of the Ministry of Education and Science, Youth and Sport of Ukraine in theme 2.2. "Theoretico-methodical bases of top level athletes' preparation under conditions of professionalization (on the example of track and field)" (№ of st. registration 0111U001721).

Purpose, tasks of the work, material and methods

Objective of work – improvement of research methodology on the basis of analysis of technical skills, physical fitness, functional and mental state of top level athletes by means of determining structure and logical organization of scientific studies in track and field sport.

Material and methods: to solve the tasks of study the following methods were used: analysis of scientific and methodical literature and generalization of advanced sports experience; anthropometry, videorecording; modelling; myotonometry, stabilography, electrotensodynamometry, pedagogical and psychological testing; spirometry, electrocardiography (ECG); methods of mathematical analysis of cardiac rhythm variability with application of "Cardio+" diagnostic automated complex, methods of mathematical statistics.

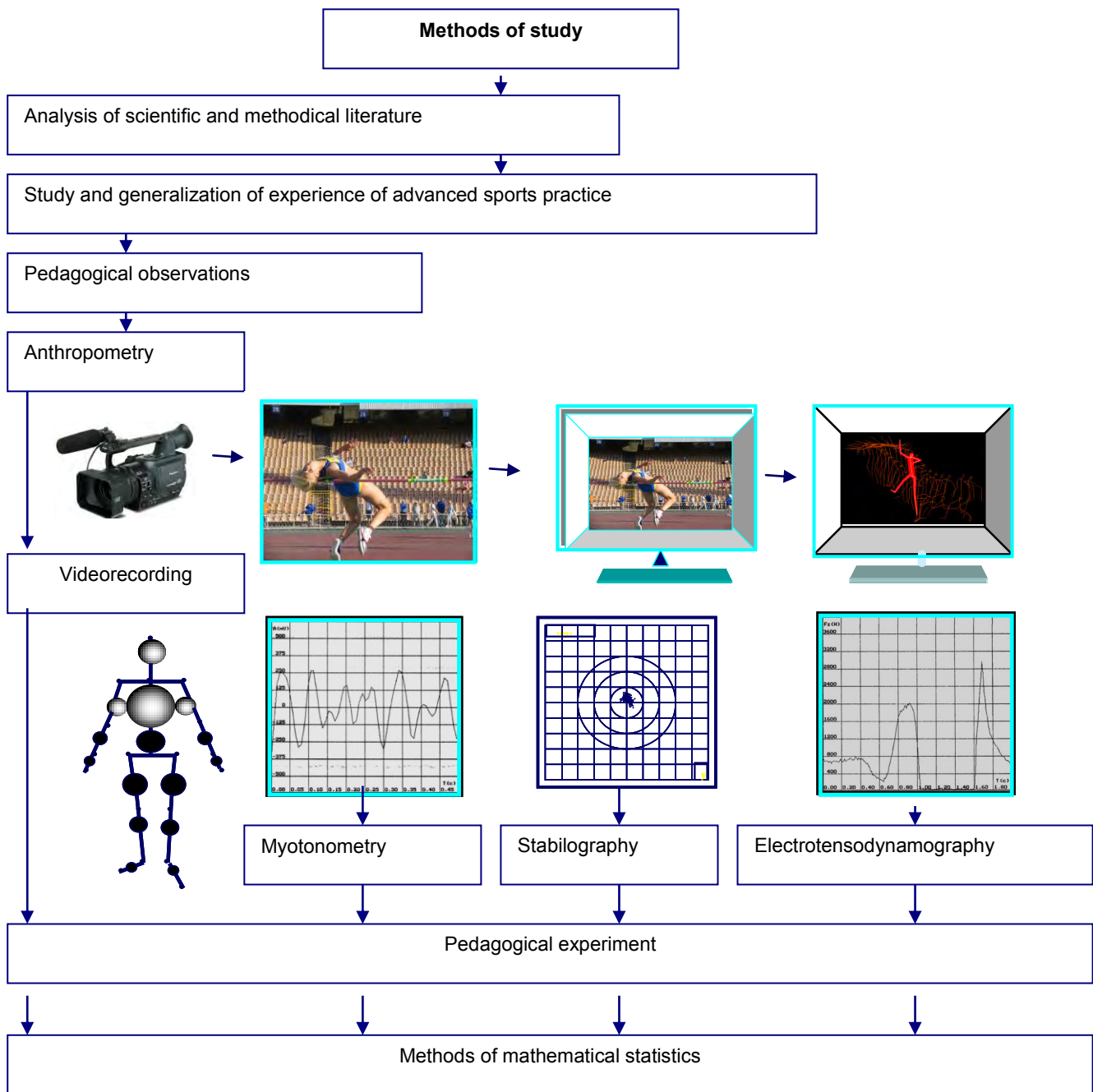


Fig. 1. Algorithm of studying technical skills of track and field athletes

The study was conducted at Track and Field Department of National University of Physical Education and Sport of Ukraine.

Problematics concerning improvement of technical skills and estimation of motor action techniques (on the material of track and field competitive jumps) has been developed in 1995-2005 together with Kinesiology Department under the guidance of Professor A.N. Laputin. Methodology of studying technical skills of athletes based on usage of the complex of informative indices of motor action techniques, functional state of viscoelastic qualities of skeletal muscles involved in main system-forming elements of the techniques of track and field competitive jumps, state of vestibulomotor system and speed-strength fitness has been introduced in preparation system of top level track and field athletes - members of national team of Ukraine (Fig.1).

In the course of methodology development a JUMP special computer program for analysis of athletes' technical skills has been created and informative biomechanical indices of track and field competitive jumps have been revealed; besides, significance of their contribution to high sports performance achievement has been determined; biokinematic schemes, multifunctional biomechanical models of motor actions, providing achievement of targeted sports results in track and field jumps and the system of objectives have been developed together with technology of operative biomechanical modelling; regularities determining the efficiency of jump execution; peculiarities of competitive jumping exercise execution by males and females have been discovered. 208 athletes (males and females) specialized in track and field jumps participated in studies, among them 11 Merited Masters of Sports (MMS), 39 Masters of Sports of International Class (MSIC), 142 Masters of Sports (MS) and 16 Candidate Masters of Sports (CMS).

Since 2006 until now the studies have been directed to improvement of the system of evaluating the level of physical fitness of athletes in short, middle and long distance running, track and field jumps and throwing events by means of elaborated complex of informative tests, estimation of athletes' body functional state on the basis of application of "Cardio+" diagnostic automated complex, assessment of athletes' mental state. 450 athletes participated in studies. Since 2010, the system of evaluating mental state of athletes has been introduced in preparation process of top level track and field athletes – members of national team of Ukraine.

Results of studies and their discussion.

Motion videorecording [1, 12-14] followed by analysis of image on computer complex and development of JUMP special computer program, criteria of which have been obtained during study of track and field competitive jump biophysics, physical essence and content of complex motor actions, 45 biomechanical characteristics were analyzed and the most informative of them were revealed [1, 3]. It appears, that achievement of high sports performances in track and field competitive jumps depends on anthropometrical and biomechanical indices, presented in Tables 1-6. Revealed biomechanical indices and regularities of their alteration underlie organization of rational biomechanical structure of major system-forming elements of track and field competitive jump techniques. They are objective criteria of control and may be used in sports practice for formation of technical skills of top level track and field jumpers at stages of realization of individual capacities and maintenance of high sports mastery.

Proceeding from optimum integration of conceptual and motor aspects of complex system of motions, multifunctional biomechanical models of motor actions have been developed providing the achievement of targeted sports results in high jump: from 2,15 to 2,55m and from 1,90 to 2,25 m in males and females, respectively; in long jump: from 7,15 to 9,55 m and from 6,25 to 8,20 m in males and females, respectively; and in triple jump: from 15,80 to 19,50 m and from 13,10 to 16,50 m in males and females, respectively. They allow to determine the reserves of achieving planned biomechanical indices, main directions of technical skills formation and optimum levels of various aspects of fitness.

Methods of model creation included the following procedures: collection of information in the form of quantitative biomechanical characteristics of track and field competitive jumps; determination of their variability by means of personal computer; identification of interrelations between those characteristics and the degree of their impact upon sports result.

General regularities of organization of rational biomechanical structure of major system-forming elements of track and field competitive jump techniques have been revealed, which influence the achievement of high sports results; this is related to increase of all informative biomechanical indices of motor action multifunctional models, presented in Tables 1-6. The only exception refers to the duration of take-off phase and body mass of athlete, which tend to decrease along with improvement of sports results. Carried out studies have permitted to determine the contribution of informative biomechanical indices of track and field competitive jump techniques to the achievement of high sports results (see Tables 1-6). Besides, the technology of operative biomechanical modelling in accordance with informative biomechanical characteristics influencing the achievement of high sports results has been developed (Fig.2).

This technology allows measuring and controlling biomechanical characteristics of techniques, creating the most efficient models of motor actions by means of software, predicting different variants of complex motor task solution, and represents the system of objective regularities of rational organization of competitive jumping exercises.

Table 1.

Quantitative characteristics of motor actions multifunctional biomechanical models, providing the achievement of targeted sports results in high jumps (males)

Sports result, m	Body mass, kg	Body length, m	Duration of take-off phase, s	Speed of run-up before take-off, m·s ⁻¹	Speed of body GCM fly off during take-off, m·s ⁻¹	Angle of body GCM fly off, degr.	Mean horizontal constituent of speed of CM of leading leg during take-off phase, m·s ⁻¹	Angular velocity of supporting knee joint extension during take-off, rad·s ⁻¹	Angular velocity of supporting ankle joint flexion during take-off, rad·s ⁻¹	Resultant support reaction force during take-off phase, kN	Mean complete energy of athlete body motion during take-off, kJ	Take-off power, kW
2,15	73,90	1,90	0,16	7,10	5,88	53,70	8,46	6,11	13,21	3,95	2,49	7,26
2,25	73,29	1,96	0,15	7,39	6,12	54,41	8,68	6,76	13,47	4,12	2,69	7,86
2,35	72,67	2,02	0,14	7,75	6,40	55,55	8,91	7,52	13,89	4,32	3,00	8,46
2,45	71,93	2,09	0,13	8,10	6,69	56,56	9,04	8,23	14,52	4,62	3,32	9,06
2,55	71,32	2,15	0,11	8,45	6,93	57,32	9,06	8,51	14,71	5,00	3,62	9,66
Contribution of index, %	3,92	5,00	11,76	6,84	13,72	13,98	3,50	1,96	5,88	7,96	9,80	15,68

Notes: selective data are presented; the range of values in original model varies from 2,15 m to 2,55 m per 1 cm. Improvement of sports results leads to increase of: take-off power, mean complete energy of athlete body motion during take-off, resultant support reaction force during take-off phase, angular velocity of supporting ankle joint flexion during take-off, angular velocity of supporting knee joint extension during take-off, mean horizontal constituent of speed of centre of mass (CM) of leading leg during take-off, angle of body general centre of mass (GCM) fly off, speed of body general centre of mass (GCM) fly off during take-off, speed of run-up before take-off, body length. Duration of take-off phase and body mass of athlete tend to decrease along with improvement of sports results.

Table 2.

Quantitative characteristics of motor actions multifunctional biomechanical models, providing the achievement of targeted sports results in high jumps (females)

Sports result, m	Body mass, kg	Body length, m	Duration of take-off phase, s	Speed of run-up before take-off, m·s ⁻¹	Speed of body GCM fly off during take-off, m·s ⁻¹	Angle of body GCM fly off, degr.	Angular velocity of supporting knee joint extension during take-off, rad·s ⁻¹	Angular velocity of supporting ankle joint flexion during take-off, rad·s ⁻¹	Mean complete energy of athlete body motion during take-off, kJ	Take-off power, kW
1,90	57,50	1,80	0,17	6,60	4,90	43,00	5,69	12,00	1,82	4,50
1,95	57,19	1,83	0,16	6,82	5,10	44,40	6,09	14,51	1,85	4,86
2,00	56,89	1,86	0,15	7,03	5,31	45,61	6,49	16,01	1,89	5,17
2,05	56,58	1,89	0,13	7,27	5,51	46,31	6,89	17,52	1,92	5,51
2,10	56,27	1,92	0,12	7,57	5,72	47,12	7,29	19,29	1,95	5,93
2,15	56,96	1,96	0,12	7,68	5,92	47,63	7,69	20,96	2,00	6,38
2,20	56,63	1,99	0,11	7,74	6,04	48,84	8,09	22,84	2,09	6,64
2,25	56,33	2,02	0,10	7,80	6,10	50,00	8,49	24,10	2,15	7,00
Contribution of index, %	3,32	6,75	6,92	11,53	11,22	14,53	13,41	6,69	10,68	14,95

Notes: selective data are presented; the range of values in original model varies from 1,90 m to 2,25 m per 1 cm. Improvement of sports results leads to increase of : take-off power, mean complete energy of female athlete body motion during take-off, angular velocity of supporting ankle joint flexion during take-off, angular velocity of supporting knee joint extension during take-off, angle of body GCM fly off, speed of body GCM fly off during take-off, speed of run-up before take-off, body length. Duration of take-off phase and body mass of athlete tend to decrease along with improvement of sports results.

Table 3.

Quantitative characteristics of motor actions multifunctional biomechanical models, providing the achievement of targeted sports results in long jumps (males)

Sports result, m	Body mass, kg	Body length, m	Duration of take-off phase, s	Speed of run-up before take-off, m·s ⁻¹	Speed of body GCM fly off during take-off, m·s ⁻¹	Angle of body GCM fly off, degr.	Mean horizontal constituent of speed of CM of leading leg during take-off phase, m·s ⁻¹	Minimum angle of supporting knee joint during take-off, degr.	Angular velocity of supporting hip joint extension during take-off phase, rad·s ⁻¹	Work performed by athlete during take-off, kJ	Mean complete energy of athlete body motion during take-off, kJ	Take-off power, kW
7,15	79,30	1,85	0,13	9,50	9,00	19,00	12,10	144,15	6,87	0,550	3,90	6,37
7,60	78,79	1,86	0,13	9,71	9,15	19,07	12,55	144,60	7,41	0,608	4,20	6,84
8,00	78,33	1,88	0,12	9,91	9,27	19,28	12,94	145,00	7,48	0,662	4,48	7,30
8,50	77,76	1,89	0,11	10,36	9,63	23,34	13,44	147,90	7,66	0,713	4,82	7,92
9,00	70,26	1,93	0,10	10,81	9,93	25,12	13,92	149,64	7,96	0,763	5,15	8,54
9,55	69,50	2,05	0,09	11,55	10,88	26,25	14,45	154,10	8,60	0,830	5,55	10,25
Contribution of index, %	5,00	4,00	10,50	7,90	12,72	11,98	3,80	2,40	3,53	13,85	8,30	16,02

Notes: selective data are presented; the range of values in original model varies from 7,15 m to 9,55 m per 5 cm. Improvement of sports results leads to increase of : take-off power, mean complete energy of athlete body motion during take-off, work performed by athlete during take-off, angular velocity of supporting hip joint extension during take-off phase, minimum angle of supporting knee joint during take-off, mean horizontal constituent of speed of CM of leading leg during take-off phase, angle of body GCM fly off, speed of body GCM fly off during take-off, speed of run-up before take-off, body length. Duration of take-off phase and body mass of athlete tend to decrease along with improvement of sports results.

Table 4.

Quantitative characteristics of motor actions multifunctional biomechanical models, providing the achievement of targeted sports results in long jumps (females)

Sports result, m	Body mass, kg	Body length, m	Duration of take-off, s	Speed of run-up before take-off, m·s ⁻¹	Speed of body GCM fly off during take-off, m·s ⁻¹	Angle of body GCM fly off, degr.	Mean horizontal constituent of speed of CM of leading leg during take-off, m·s ⁻¹	Angular velocity of supporting knee joint extension during take-off phase, rad·s ⁻¹	Extension angle of supporting hip joint during take-off, degr.	Work performed by female athlete during take-off, kJ	Mean complete energy of female athlete body motion during take-off, kJ	Take-off power, kW
6,25	57,90	1,72	0,12	9,16	8,55	18,50	11,87	7,24	183,50	0,450	2,39	5,06
6,60	57,48	1,75	0,10	9,31	8,90	18,99	12,12	7,34	191,98	0,500	2,63	5,11
7,00	57,00	1,78	0,09	9,50	9,33	19,50	12,50	7,50	195,00	0,548	2,69	5,46
7,50	55,47	1,82	0,08	9,76	9,42	20,11	12,78	7,81	196,22	0,566	2,75	5,78
7,90	54,26	1,85	0,07	9,97	9,49	20,60	12,99	8,05	197,20	0,581	2,79	6,03
8,20	53,35	1,87	0,07	10,13	9,55	20,96	13,16	8,23	197,92	0,592	2,82	6,22
Contribution of index, %	4,92	7,46	8,54	8,35	9,84	8,92	6,56	7,38	6,20	9,54	9,54	12,75

Notes: selective data are presented; the range of values in original model varies from 6,25 m to 8,20 m per 10 cm. Improvement of sports results leads to increase of : take-off power, mean complete energy of female athlete body motion during take-off, work performed by female athlete during take-off, extension angle of supporting hip joint during take-off, angular velocity of supporting knee joint extension during take-off, mean horizontal constituent of

speed of CM of leading leg during take-off, angle of body GCM fly off, speed of body GCM fly off during take-off, speed of run-up before take-off, body length. Duration of take-off phase and body mass of female athlete tend to decrease along with improvement of sports results.

Table 5.
Quantitative characteristics of motor actions multifunctional biomechanical models, providing the achievement of targeted sports results in triple jump (males)

Sports result, m	Body mass, kg	Body length, m	Take-off	Duration of take-off, s	Speed of run-up before take-off, m·s⁻¹	Speed of body GCM fly off during take-off, m·s⁻¹	Angle of body GCM fly off, degr.	Angular velocity of supporting hip joint extension during take-off, rad·s⁻¹	Angular velocity of supporting knee joint extension during take-off, rad·s⁻¹	Angular velocity of supporting ankle joint flexion during take-off, rad·s⁻¹	Mean complete energy of athlete body motion during take-off, kJ	Take-off power, kW
15,80	77,53	1,84	1	0,11	9,50	8,50	12,50	9,5	8,34	15,18	4,51	5,85
			2	0,13	8,50	7,80	11,8	8,34	7	13,18	3,9	5,2
			3	0,16	7,25	6,90	14,00	8,32	6,41	14,39	2,90	4,45
16,80	75,89	1,86	1	0,11	10,00	8,97	13,31	15,08	11,30	20,73	5,07	6,71
			2	0,12	9,10	8,56	12,61	13,92	9,79	18,29	4,4	6,11
			3	0,15	8,01	7,56	16,51	13,67	9,39	18,62	3,40	5,31
17,80	73,97	1,88	1	0,10	10,57	9,42	14,42	20,66	14,26	26,27	5,78	7,63
			2	0,11	9,67	8,92	13,42	19,54	12,69	22,96	4,98	7,03
			3	0,13	8,67	7,92	18,62	19,02	12,38	22,85	3,98	6,10
19,50	69,50	1,92	1	0,09	11,50	10,30	16,20	30,15	19,30	35,70	6,37	8,80
			2	0,10	10,70	9,50	15,5	28,35	17,7	31,24	5,9	8,35
			3	0,11	10,00	8,90	21,00	28,11	17,45	30,05	4,90	7,40
Contribution of index, %	1,04	1,47		10,25	12,41	17,21	15,30	5,03	3,21	5,66	8,88	19,54

Notes: selective data are presented; the range of values in original model varies from 15,80 m to 19,50 m per 10 cm. Improvement of sports results leads to increase of : take-off power, mean complete energy of athlete body motion during take-off, angular velocity of supporting ankle joint flexion during take-off, angular velocity of supporting knee joint extension during take-off, angular velocity of supporting hip joint extension during take-off, angle of body GCM fly, speed of body GCM fly off during take-off, speed of run-up before take-off, body length. Duration of take-off phase and body mass of athlete tend to decrease along with improvement of sports results.

Table 6.

Quantitative characteristics of motor actions multifunctional biomechanical models, providing the achievement of targeted sports results in triple jump (females)

Sports result, m	Body mass, kg	Body length, m	Take-off	Duration of take-off phase, s	Speed of run-up before take-off, m·s ⁻¹	Speed of body GCM fly off during take-off, m·s ⁻¹	Angle of body GCM fly off, degr.	Angular velocity of supporting hip joint extension during take-off, rad·s ⁻¹	Angular velocity of supporting knee joint extension during take-off, rad·s ⁻¹	Angular velocity of supporting ankle joint flexion during take-off, rad·s ⁻¹	Mean complete energy of female athlete body motion during take-off, kJ	Take-off power, kW
13,10	55,00	1,71	1	0,10	8,80	7,80	17,50	10,47	8,18	15,53	2,90	4,50
			2	0,12	7,70	6,90	12,70	8,05	8,05	14,17	2,40	4,00
			3	0,14	7,00	6,30	19,00	9,97	8,2	14,08	1,80	3,40
14,10	53,86	1,76	1	0,09	9,00	8,00	18,07	14,23	10,84	19,36	3,46	4,97
			2	0,11	8,04	7,19	13,34	12,36	10,58	17,83	2,91	4,29
			3	0,13	7,37	6,59	19,57	13,71	10,51	17,36	2,23	3,80
15,10	52,71	1,81	1	0,09	9,20	8,20	18,64	17,98	13,51	23,18	4,07	5,41
			2	0,10	8,39	7,47	14,01	16,67	13,11	21,49	3,43	4,59
			3	0,12	7,74	6,87	20,14	17,46	12,82	20,71	2,66	4,20
16,50	51,00	1,88	1	0,08	9,50	8,50	19,5	23,24	17,24	28,54	5,10	6,10
			2	0,09	8,90	7,90	15,00	22,7	16,66	26,61	4,20	5,00
			3	0,10	8,30	7,30	21,00	22,7	16,05	26,18	3,30	4,80
Contribution of index %	1,23	1,28		11,79	16,03	17,02	16,04	3,99	3,10	4,01	6,80	18,71

Notes: selective data are presented; the range of values in original model varies from 13,10 m to 16,50 m per 10 cm. Improvement of sports results leads to increase of : take-off power, mean complete energy of athlete body motion during take-off, resultant support reaction force during take-off phase, angular velocity of supporting ankle joint flexion during take-off, angular velocity of supporting knee joint extension during take-off, angular velocity of supporting hip joint extension during take-off, angle of body GCM fly off, speed of body GCM fly off during take-off, speed of run-up before take-off, body length. Duration of take-off phase and body mass of female athlete tend to decrease along with improvement of sports results.

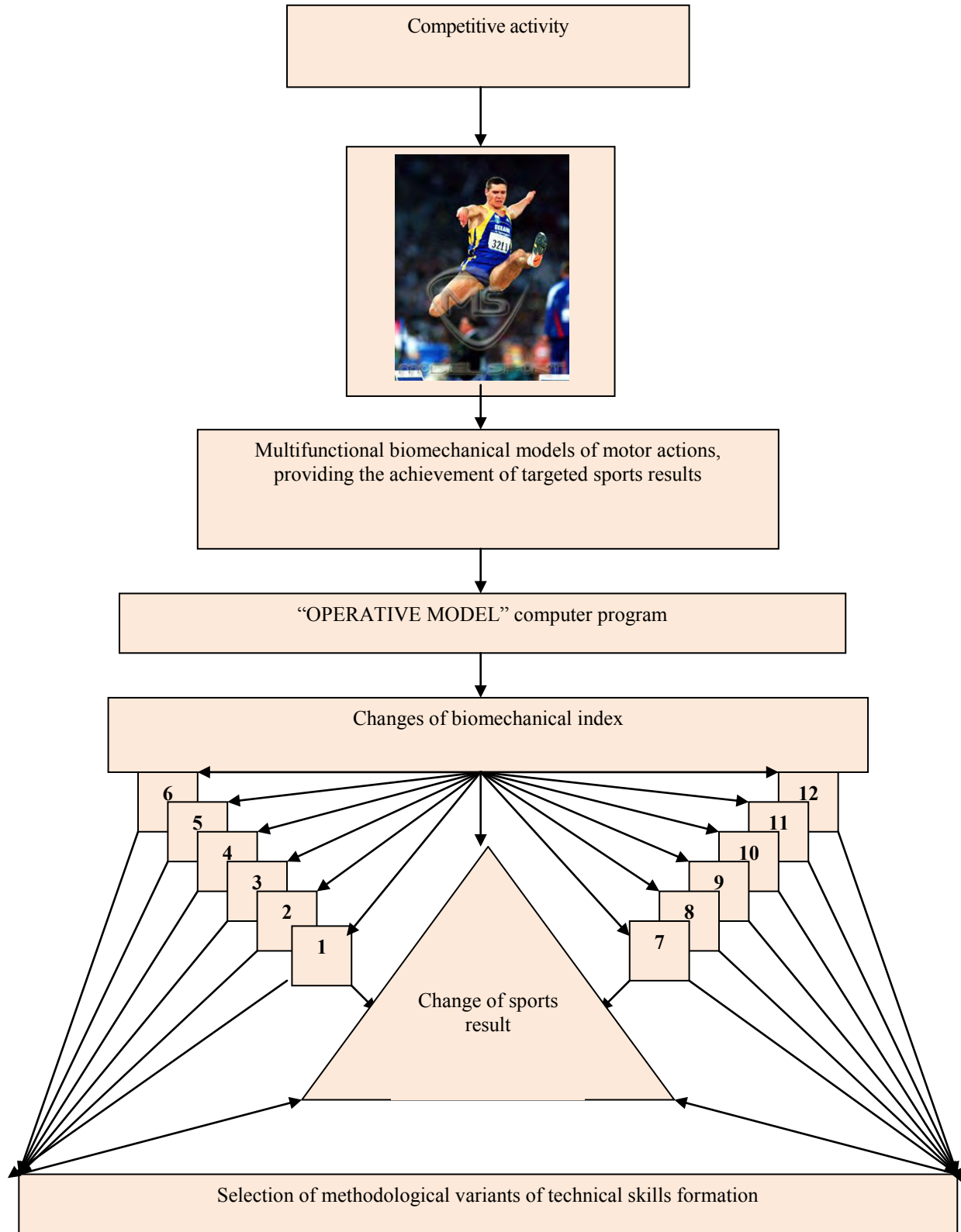


Fig. 2. Diagram of the technology of operative biomechanical modelling of track and field competitive jumps techniques.

Note. 1–12 – informative biomechanical indices of competitive activity of highly skilled jumpers

“OPERATIVE MODEL”, specifically developed computer program, permits to change the value of biomechanical index, thus leading to alteration of sports result. As a result of setting different values of dynamic or kinematic indices of track and field competitive jumps techniques, one may determine, at the expense of which it is expedient to improve sports result. The given computer program allows projecting and analyzing the most expedient variants of motion techniques which may be adapted to specific athlete. Selection of respective variant depends on specificity of jumping discipline, individual peculiarities of competitive exercise performance, alteration of those indices, which are not genetically restricted but are sensitive to improvement as a consequence of application of proper complex of training impacts contributing to their increase.

Study of the functional state of viscoelastic properties of skeletal muscles, actively involved in basic system-forming element of jumping techniques, i.e. the take-off (gastrocnemius muscle, biceps of the thigh, musculus longissimus, dorsal gluteal muscle, quadriceps muscle of thigh) has been carried out by means of myotonometry method with application of special computer program allowing obtaining information on-line in graphical and digital form (15 indices). 19 male and 19 female high jumpers, 8 male and 8 female pole vaulters, 21 male and 21 female long jumpers and 16 male and 16 female triple jumpers participated in the experiment.

Correlation analysis has allowed to reveal informative indices of functional state of skeletal muscle viscoelastic properties and statistically significant relationship between rigidity (stiffness) ($|r| = 0,48-0,71$, $p < 0,01$); damping capacity ($|r| = 0,48-0,68$, $p < 0,01$); muscle contractility ($|r| = 0,44-0,72$, $p < 0,01$); energy of relaxed muscle oscillations during dosed mechanical impact ($|r| = 0,44-0,72$, $p < 0,01$); energy of tensed muscle oscillations during dosed mechanical impact ($|r| = 0,45-0,72$, $p < 0,01$) and sports result in long, high and triple jumps and pole-vaulting both in males and females.

On the basis of revealed informative indices it has been determined, that indices of skeletal muscles of take-off leg of top level athletes were inferior to those of leading leg at $p < 0,05$ with the exception of triple jumpers and female high jumpers. In triple jumpers an even development of muscles of take-off and leading leg was observed, conditioned by competitive activity specifics. This functional state of skeletal muscles is related to irrational organization of training process, execution of basic training exercises by take-off leg.

Method of stabilography and special software packages providing information in graphical and digital form (10 indices) were used to study functional state of jumpers' vestibulomotor system.

Carried out correlation analysis has indicated, that objective evaluation of vestibulomotor system functional state necessitates taking into account the following informative indices, which have statistically significant association with sports result: mean ($|r| = 0,60-0,67$, $p < 0,01$) and maximal ($|r| = 0,61-0,76$, $p < 0,01$) amplitude of body general centre of mass (GCM) oscillations, mean frequency of body GCM oscillations ($|r| = 0,61-0,68$, $p < 0,01$), body GCM maximal moving away from the centre of its projection ($|r| = 0,60-0,71$, $p < 0,01$) in the course of performing all track and field competitive jumps.

Conducted studies revealed peculiarities of vestibulomotor system functional state. High values of mean frequency of body GCM oscillations (from $\bar{x} = 13,66$, $S = 1,09$ to $\bar{x} = 22,50$, $S = 1,78$ Hz) and low values of mean amplitude of body GCM oscillations (from $\bar{x} = 6,78$, $S = 0,41$ to $\bar{x} = 8,20$, $S = 0,59$ mm) were observed in females, whereas in males low values of mean frequency and mean amplitude of body GCM oscillations (from $\bar{x} = 9,73$, $S = 0,61$ to $\bar{x} = 15,19$, $S = 1,21$ Hz and from $\bar{x} = 5,87$, $S = 0,59$ to $\bar{x} = 8,06$, $S = 0,48$ mm) were noted at $p < 0,05$.

It has been discovered, that vestibulomotor system functional state is dependent on jumping discipline specifics. It appears to be better in high jumpers and pole vaulters as compared to long and triple jumpers. The above is due to manifestation of greater degree of agility, coordination of movements and spatial orientation during performance of basic competitive exercise.

Improvement of sports results in track and field competitive jumps is provided by enhanced level of speed and strength fitness of athletes and their ability to organize motions, so that to realize their motor capacities in competitive activity.

Hardware-software complex intended for tensodynamometric studies and providing information in graphical and digital form on-line (14 indices) was used for assessment of speed and strength fitness of highly skilled athletes. In the course of studies informative indices have been determined, their statistically significant association with sports result in track and field competitive jumps in males and females has been established: maximal strength ($|r| = 0,50-0,59$, $p < 0,01$), strength gradient ($|r| = 0,50-0,76$, $p < 0,01$), strength impulse ($|r| = 0,51-0,64$, $p < 0,01$), time of maximal strength achievement ($|r| = 0,51-0,63$, $p < 0,01$), height of body GCM elevation ($|r| = 0,50-0,67$, $p < 0,01$).

Peculiarities of speed and strength capacities have been revealed: prevalence of speed and strength capacities in females and males, respectively. For instance, during performance of standing upward jump with arm swing, the time of maximal strength achievement varied from $\bar{x} = 0,16$, $S = 0,02$ to $\bar{x} = 0,28$, $S = 0,05$ s and from $\bar{x} = 0,30$, $S = 0,02$ to $\bar{x} = 0,50$, $S = 0,04$ s in females and males, respectively, whereas maximal strength varied from $\bar{x} = 2154,28$, $S = 129,26$ to $\bar{x} = 2486,3$, $S = 185,73$ H, and from $\bar{x} = 1798,1$, $S = 176,24$ to $\bar{x} = 2107,04$, $S = 168,56$ H at $p < 0,05$ in males and females, respectively.

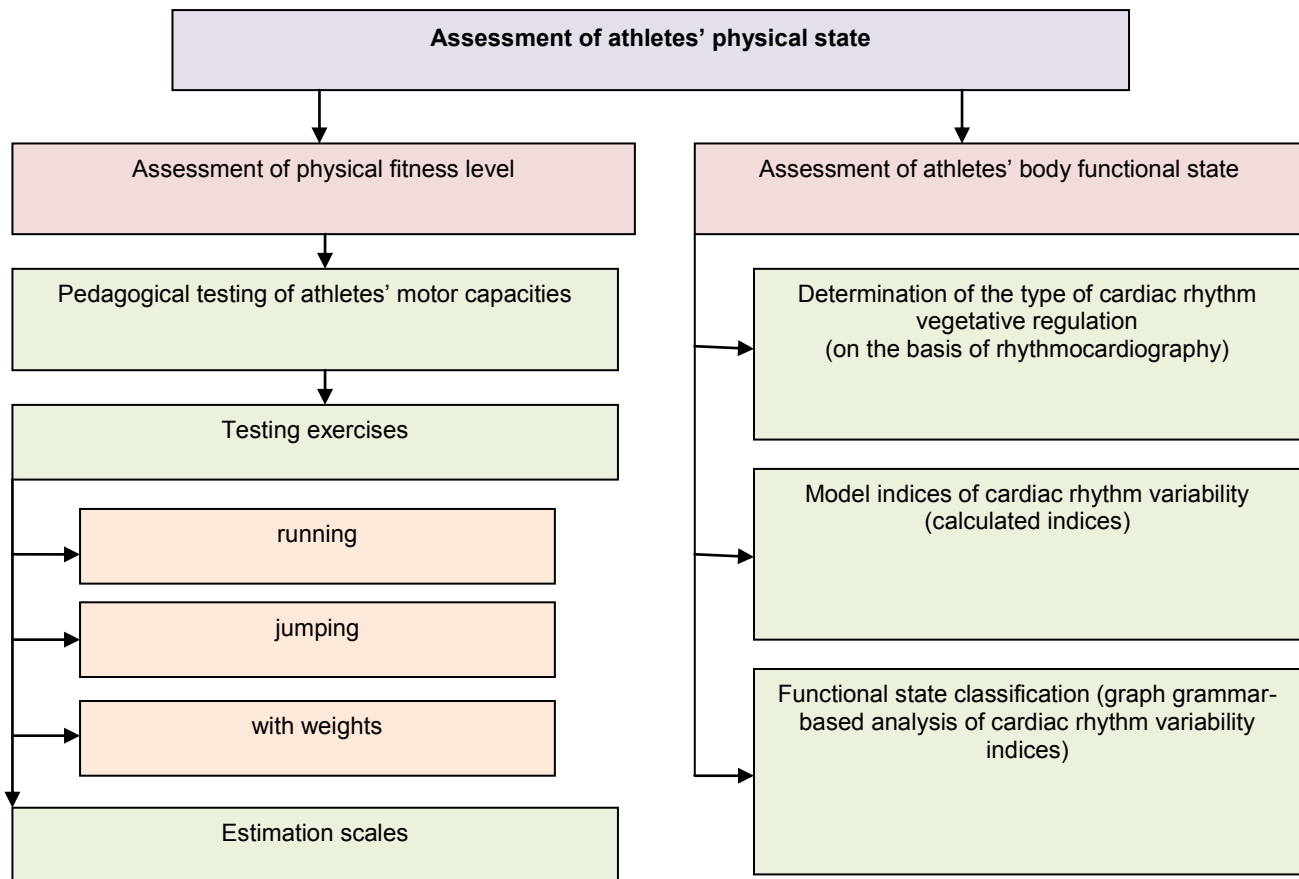


Fig. 3. Diagram of the methods of estimating physical state of skilled track and field athletes – members of reserve national team of Ukraine

Beginning from 2006 methods of physical state assessment of athletes of different skill levels have been actively implemented at educational and training camps. This has been mainly realized with respect to members of reserve national team specialized in running disciplines, jumps and throwing. Methods included the complex of pedagogical tests, estimation tables, model indices of cardiac rhythm variability, determination of the type of cardiac rhythm vegetative regulation and classification of functional states of athletes of different skill levels, specialized in different track and field events (Fig.3). Suggested methods were common for track and field athletes of different skill levels, however testing exercises, criteria of estimation of both physical fitness and functional state differed. Estimation tables were calculated with account for skill level. Mathematical analysis of cardiac rhythm variability, on the basis of which the type of cardiac rhythm vegetative regulation was determined, was made at rest before forthcoming load after the day of rest.

Functional state classification was conducted before the load both at rest and after standard testing load. Model indices of cardiac rhythm variability were calculated with account for sports specialization and athletes' skill levels (at rest, after load).

Various testing exercises in running, jumps and throwing were used. Let us consider sprint and middle-distance running as an example (Fig.4).

Statistica-6, Excel-7, SPSS-16.0 integrated statistical and graphical packages were utilized for experimental material processing. Physical fitness level was estimated according to 5-point scale: 1 – low, 2 – below average, 3 – average, 4 – above average, 5 – high. It was determined for each group of track and field athletes on the basis of sigmoid scales {4}. Estimation scales were calculated for males and females separately, depending on their specialization. Coefficient of the relative strength of the upper extremities was determined according to formula: mass of bench-pressed barbell (kg) / m (kg), where m – body mass of athlete.

Despite successful testing and confirmation of the efficiency of developed system for assessment of physical state of track and field athletes of various skill levels the necessity of the given system improvement has arisen; it has been due to inclusion in it of current fundamental instrumental methods, allowing to obtain reliable information about functional state of body major systems (vegetative nervous, cardiovascular, system of external breathing). Necessity of mental state diagnostics gave no rise to doubts, which had been previously almost neglected (Fig.5).

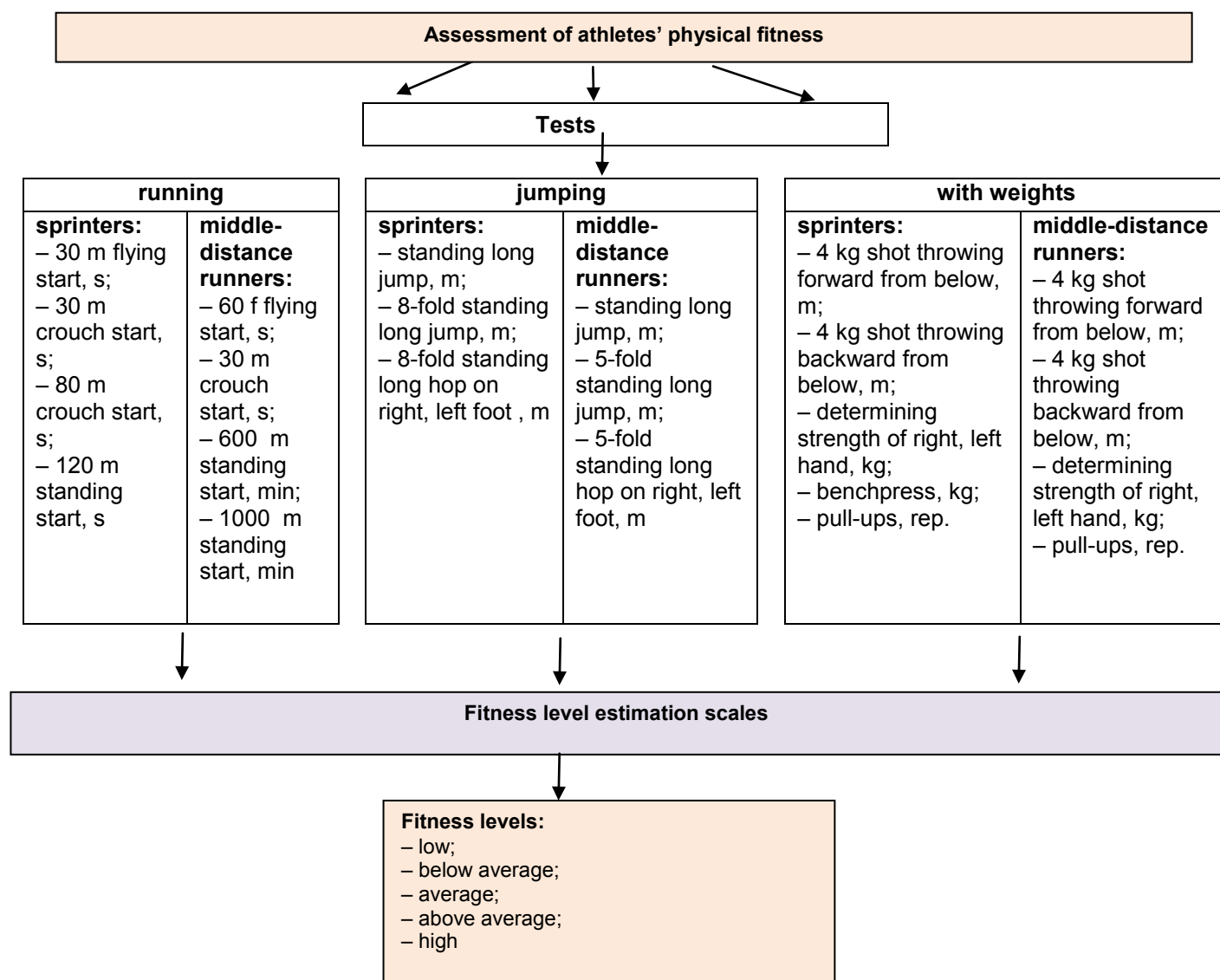


Fig. 4. Diagram of the methods of estimating physical fitness of skilled track and field athletes (on the example of sprinters and middle-distance runners)

System of physical state assessment and prediction presented in Fig.5 has some advantages as compared to previously developed one, presented in Fig.3: “Assessment of body functional state” component has been expanded and “Efficiency of athlete’s activity under extreme conditions” new component has been introduced.

Assessment of physical fitness level included testing exercises allowing thorough determination of the level of manifestation and development of speed, speed-strength, strength, coordination capacities, special endurance, intermuscular and intramuscular coordination by means of accessible informative tests as well as hand dynamometry (significance of each exercise has been mathematically confirmed). In addition, one may determine predisposition of an athlete to track and field specialization, predict performance success in forthcoming competitions, find out leaders, and build a team for participation in high-level competitions on the above basis. “Assessment of body functional state” including evaluation of cardiovascular, vegetative nervous system and system of external breathing by means of “Cardio+” diagnostic automated complex (Fig.6) represents an important component in the system of estimating and predicting physical state of track and field athletes of national team of Ukraine.

Methods of functional state assessment on the basis of application of “Multimoda Cardio 1” computer program have been developed under the guidance of I.A.Chaykovsky, Candidate of Medicine, together with Professor V.I.Bobrovnik, Doctor of Physical Education and Sport, for athletes with account for sports specialization. They have been integrated into software of “Cardio” complex of functional diagnostics in the form of “ORAKUL” program. It includes complex estimation of vegetative regulation on the basis of cardiac rhythm variability, state of myocardium on the basis of complete analysis of amplitude-and-temporal parameters of electrocardiogram, analysis of cardiac rhythm disorders as well as complex evaluation of cardiovascular and vegetative nervous system (estimation criteria have been developed with account for sports specialization and skill level of athletes) [2]. It is known that training and competitive

activity is accompanied with high mental tension. Efficiency of athlete's activity under stress situations depends on type and traits of temperament, personal anxiety and mental reliability of athletes (Fig.7).

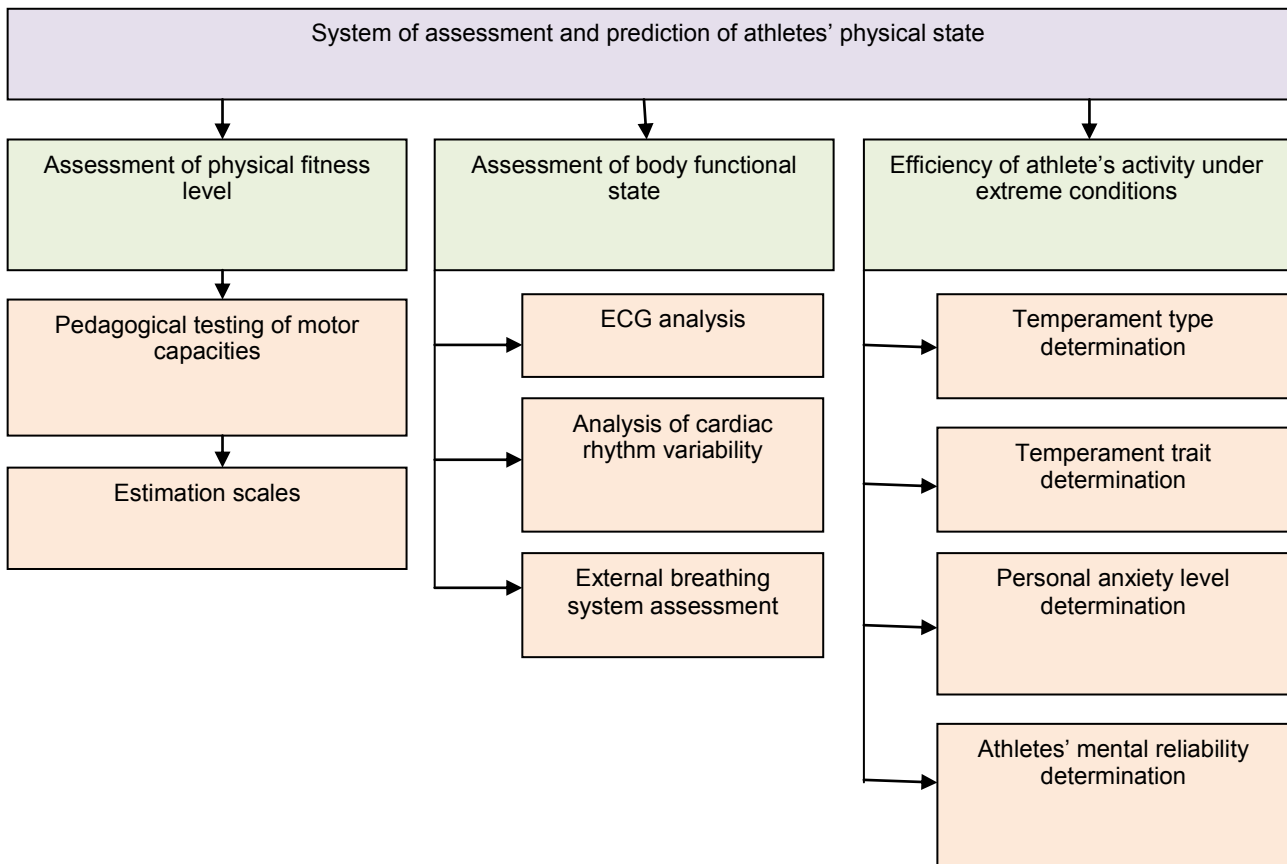


Fig. 5. Diagram of the system of assessment and prediction of physical state of skilled track and field athletes – members of reserve national team of Ukraine

The above has necessitated an expansion of criteria of their fitness assessment, the efficiency of athlete's activity under extreme conditions, in particular [5].

Efficiency of athlete competitive activity depends in large part on temperament type and traits, which is a biological cornerstone of personality, based on properties of nervous system – power of excitation and inhibition processes, mobility of nerve processes, nervous system balance [5]. However, data about temperament only are not enough for prediction of successful competitive activity. Information about its structure is needed as well. Applied B.N.Smirnov's "Study of temperamental psychological structure" questionnaire allows revealing several polar temperament traits: extraversion – introversion, emotional excitement – emotional balance, response rate (fast-slow), activity (high-low). For the purpose of studying psychological reliability of athletes, methods, developed by V.E.Milman have been used allowing to characterize the level of competitive emotional resilience (CER), competitive motivation (CM), stability - interference resistance (StIR) and self-regulation (SR).

Long-term studies of athletic activity of highly skilled athletes – members of national track and field team of Ukraine permit to recommend an integral system of training and competitive activity control, which includes assessment of technical skills, physical and mental fitness. Methodology of studies in track and field is presented in Figure 8. Its main advantage is an opportunity to predict success of performance in forthcoming competitions, find out leaders and build a team for participation in high level competitions.

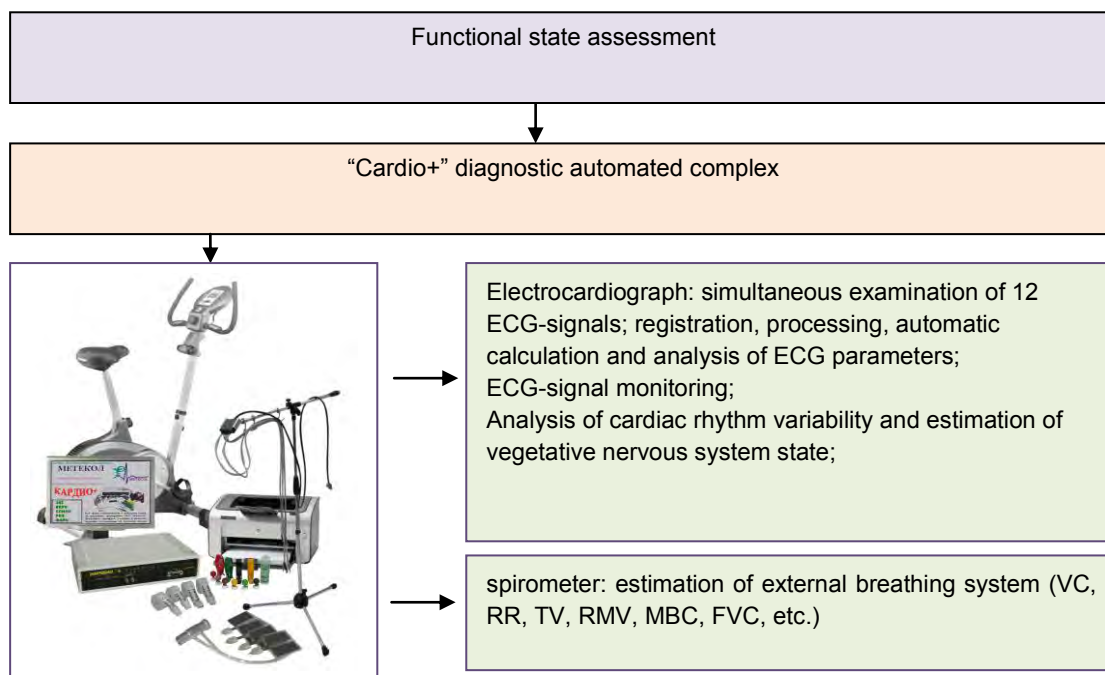


Fig. 6. Estimation methods of functional state of skilled track and field athletes – members of reserve national team of Ukraine

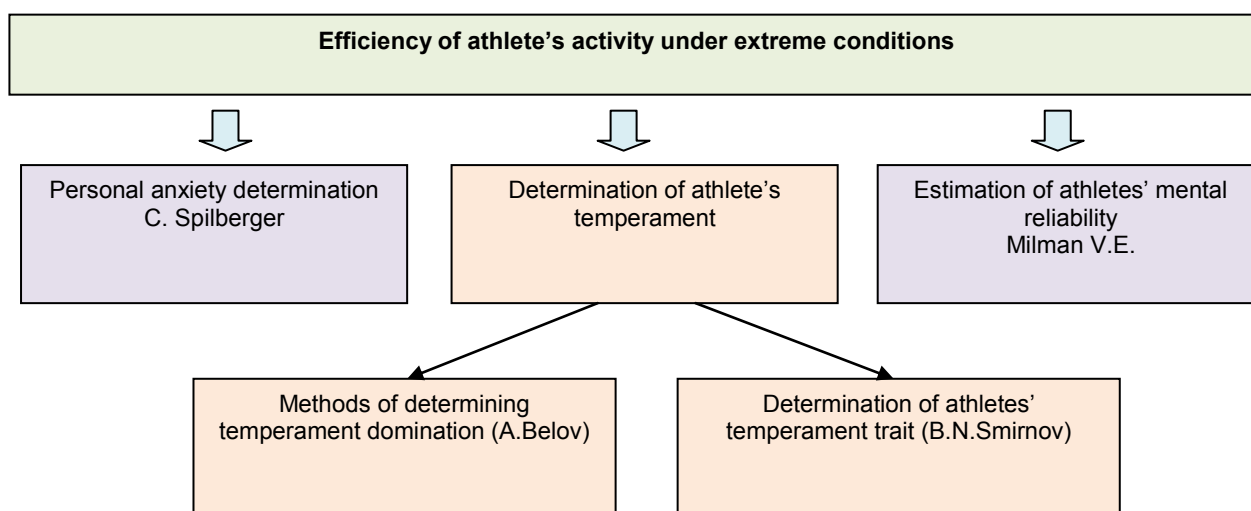
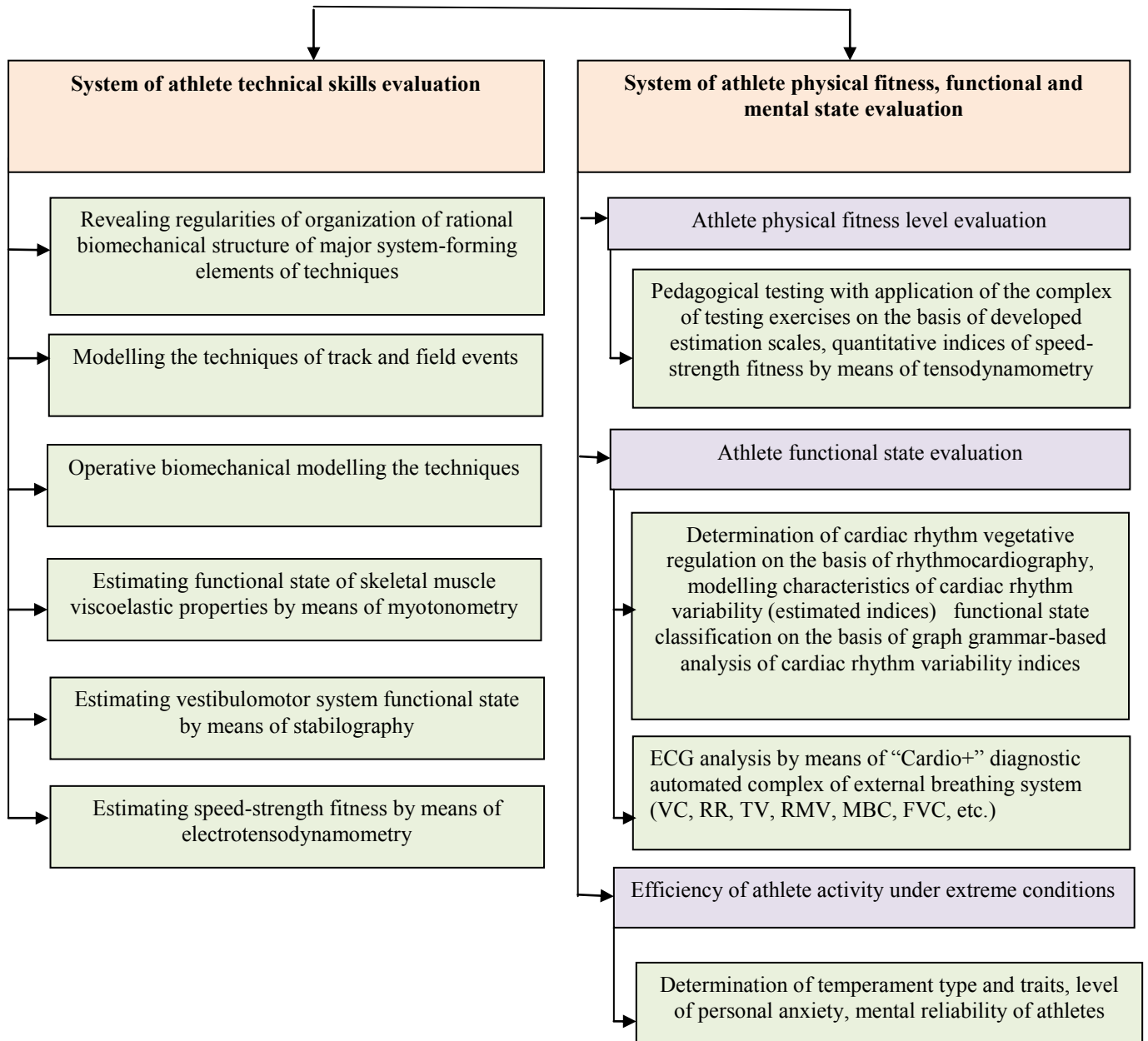


Fig. 7. Diagram of estimation of athlete activity efficiency under extreme conditions



*Fig. 8. Structure of studying training and competitive activity athletes' state in track and field
состояния спортсменов*

Conclusions

1. Structure and logical organization of studies in track and field sport based upon objective criteria of estimating technical skills, physical state of skilled track and field athletes and sequence of their application have been determined.
2. System of evaluation and prediction of athletes' technical skills has been developed, including:
 - complex of informative biomechanical indices and regularities of their changes, underlying organization of rational biomechanical structure of major system-forming elements of track and field competitive jump techniques and being objective criteria of control;
 - biomechanical models of motor actions, providing the achievement of targeted sports results, which determine the main vector of top track and field athlete technical skills formations in the system of sports preparation and are objective criteria of control and prediction of sports result increase, estimation of individual reserves for the achievement of planned biomechanical indices of competitive activity;
 - technology of operative biomechanical control, allowing prediction of various variants of solution of complex motor tasks by means of software, which represents the system of objective regularities of competitive jumping exercise rational organization;
 - complex of informative indices and regularities of their alteration of functional state of viscoelastic features of skeletal muscles, vestibulomotor system and speed-strength fitness.
3. System for estimation and prediction of skilled track and field athlete physical state has been developed, including the complex of pedagogical tests, estimation tables, assessment of functional state of vegetative nervous, cardiovascular system and that of external breathing by means of analyzing ECG, cardiac rhythm variability, determining vegetative balance, state of myocardium, cardiac rhythm disorders, spirometric studies.
4. System of estimation of athlete activity efficiency under extreme conditions has been developed and tested by means of determining temperament type and traits, level of personal anxiety and estimating psychological reliability of athletes.
5. Modified structure and logical organization of current studies, based on revealed regularities of control and prediction of motor action technique, physical state and activity of athlete under extreme conditions, including the whole complex of modern research methods and obtained objective informative criteria and sequence of their application have been developed.

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APPROPRIATENESS OF THE USE OF INNOVATIVE TECHNOLOGIES IN THE FORMATION OF PERSONALITY ORIENTED MOTIVATION OF STUDENTS TO PHYSICAL EDUCATION

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Annotation. *Purpose:* introduction in educational process of innovative technologies aimed at creating a student-centered motivation of students on the value of physical education. *Material:* the study involved 379 1st year students from different regions of the Crimea and the students of the Crimean Tatar nationality. *Results:* determined the dominant category of motives that emphasize feature innovative technologies in shaping the personality-oriented motivation of students to physical education. Identified the following groups of motives: cognitive activity, social, emotional satisfaction from motives of exercise; motives of needs of importance of physical education in the future professional activity; motives of critical attitude to the conditions and forms of organization of physical education. Found that the fundamental principles in innovative implementations become the following: the humanization; nature-compliance and nature-appropriate; tolerance; differentiation and individuality, which is closely linked with the principles of physical education. *Conclusions:* the proven efficiency of formation of positive student-centered motivation among college students to physical education provided records of all significant components of the previous ethnic environment.

Keywords: innovative technologies, students, motives, physical education, regions.

Introduction

During years of independence in Ukraine there have been built legal framework in sphere of education; there have been adopted documents and laws of Ukraine “On education”, “On higher education” as well as State national program “Education”. Education, based on such components as teaching (didactic sub-system), education (pedagogic sub-system), becomes a factor in formation of socially active, physically and mentally healthy personality, who is responsible for creation of future professional labor potential of nation. So, implementation of innovations and realization of innovative processes in students’ physical education is rather important. The basis of innovational processes in physical education is formed with the following important moments:

- creation at academic trainings of conditions, based on implementation of educational innovations and facilitating students’ activation for motion functioning;
- students’ mastering of methodology and technology of innovations, based on ethno-regional characteristics of place of residence and studying;
- formation of students’ personality, capable to master and creatively implement in everyday life means and methods of physical education for making organism harmonious and perfect.

Alongside with it innovative directions, connected with formation of personality-oriented motivation in system of students’ physical education, have been studied insufficiently [9].

In researches, devoted to factors, influencing on effectiveness of physical education at higher educational establishments, reflecting students’ attitude to physical education, students’ orientation for achievement of socially-significant results, in which their abilities and forces would manifest, there are determined position of personality in respect to process and results of functioning, in particular – demand in cognition – one of main human demands [3, 4, 10, 12-15].

At the same time physical culture, being a part of general culture, to large extent determines human behavior in education, in communication; it facilitates solution of educational, health related and social-economic tasks [5].

Analyzing modern methodic of physical education at HEE it is necessary to mark its imperfectness; for example negative influence has a priority of normative approach, when educational process and functioning of departments are oriented not on student’s personality but on purely external indicators, which are characterized by control test normative of regular academic program. This fact requires forced adaptation of student’s personality for evaluation of his motion skills by aggregate normative, which evidently contradict to idea of personality’s freedom and do not involving of students in active trainings of different forms of physical culture [9]. Basing on the mentioned above, the purpose of physical culture instructors shall be creation of conditions and formation of students’ skills in self-perfection, which must be based on education of personal motivation, interest to physical education and own health. Meanwhile, emotional-valuable attitude to physical culture-sport activity is very important and it is not formed spontaneously and is not inherited. It is received by personality in the process of functioning and effectively develops with mastering of knowledge and accumulating of motion experience, connected with initiative and activity in educational-pedagogic process [1].

Scientists established that technologies of control over formation of student’s personal interest to physical culture is a system of mutual “student-instructor’s” activity, based on diagnostics, projecting, organization and correction of educational process, oriented on achievement of certain result in improvement of motion fitness in comfortable conditions [7].

It is also interesting that in conditions of intensive implementation of pedagogic technologies in educational and teaching process, methodic innovations, connected with development and realization of personified models of physical, intellectual and mental levels, especially in systems of students' physical education till now have not been expanded sufficiently. Personality-oriented physical education envisages students' personal orientation on selection of means, methods; i.e. its envisages creation for every student of optimal conditions for harmonious development, intellectual, mental and motion spheres of functioning [8].

So, innovative introductions in educational process in personality-oriented physical education have their peculiar technologies, which stipulate determination of motives as well as understanding of targets and tasks of training; students' knowledge of means of targets' achievements; mastering of basic education; systemic, valid determination of educational process's dynamic and level of obtained knowledge, skills and habits. The character of these skills and habits is determined by many factors: ethnic and cultural traditions, natural capacity of territory, specificities of mutual activity [9].

Scientists found that belonging to certain ethnopsychological conditions individual, characteristic only for this nation set of ethnic dispositions (personal motivation, behavior, mentality, attitude to motion functioning). Timely and correct determination of ethnic peculiarities of motivations' formation in respect to physical culture permits to coordinate the process of perfection of youth's potential intellectual and physical abilities [2].

It has been determined that physical culture in its wholeness and objectiveness (meaning actual reality) has subjectively-personal character, i.e. in formation of student's personality it is resumed as free individual [11]. In researches of scientists attention is concentrated on idea that physical culture is objective creature, which has subjective and more over, individually personal character. In this connection physical culture is a basic, fundamental stratum, integrating link of general human culture, having great potential of personality's reflection as wholeness [9].

At the same time researches, oriented on implementation of innovative technologies in organization and methodic of physical education are practically absent in respect to poly-ethnic groups of first year students of HEEs of AR Crimea.

The work has been fulfilled in compliance with plan of SRW of Crimea economic institute of CNEU, named after V. Hetman.

Purpose, tasks of the work, material and methods

The purpose of the work is to study application of innovative technologies in formation of 1st year students' personality-oriented motivation for physical education, depending on region of residence.

The tasks of the research: 1. Determination of personality's motivation demands of 1st year students for values of physical education, pre-conditioned by previous region of residence; 2. Experimental testing of innovative technologies' influence on formation of personality-oriented motivation of 1st year students for physical education, considering region of residence.

The methods of the research: theoretical analysis and generalization of scientific and methodic literature; questioning, pedagogic experiment.

Results of the research

In the research 379 1st year students took part (256 girls and 123 boys).

Questioning of students was carried out at the beginning and at the end of academic year. During academic year we implemented methodic of personality-oriented motivation's formation with innovative technologies, conditioned by region of residence of 1st year students.

Detail analysis of students' answers concerning attitude to physical trainings resulted in marking out of categories of motives, which shall be guidelines in organization and fulfillment of physical education process with the help of adequate methodic of teaching.

Analytical generalization of questioning results permitted to form the following dominating categories of motives:

1. Cognitive-functioning motive;
2. Social motive;
3. Emotional satisfaction with motion functioning;
4. Significance of physical education in preparation for future professional functioning;
5. Motive of critical attitude to conditions, forms in organization of physical education trainings.

When analyzing data, received from 1st year girl students, first of all it was interesting that among dominating categories leading motive was cognitive-functioning one. Its manifestation was registered among girl students: from small towns of Crimea – 25.2% of the questioned, from regions of Ukraine – 29.9%, ethnic groups – 27.2 %, from Simferopol – 28.3%, from countryside – 28.0 % of respondents. The following was social motive. By answers of girl students it was present in all tested groups, but among girls from small towns of Crimea it was registered at 24.4% from Simferopol 14.9%. Motive of emotional satisfaction with motion functioning was determined in the following way: small towns of Crimea – 14.4% of the questioned, from regions of Ukraine – 15.9%, ethnic groups – 16.6 %, from Simferopol – 14.1%, from countryside – 15.0 %. Motive for physical education for future economic activity of girl students was the following: small towns of Crimea – 16.1% of the questioned, from regions of Ukraine – 12.7%, ethnic groups – 14.3 %, from Simferopol – 16.1%, from countryside – 14.9 % Critical attitude to conditions and organization of physical trainings, absence of desire to train is characterized in the following way: small towns of Crimea – 19.9% of the questioned, from regions of Ukraine – 21.4%, ethnic groups – 13.5 %, from Simferopol – 26.6%, from countryside –

19.0 % . Thus the carried out questioning resulted in determination of low level of 1st year girl-students' realized motivation for motion self-perfection.

For boys of 1st year studying we found cognitive-functioning motive as a leading one: small towns of Crimea – 33.3% of the questioned, from regions of Ukraine – 34.2%, ethnic groups– 35.8 %, from Simferopol – 30.2%, from countryside– 31.3 %. Next category was social motive. A little bit higher social motivation was at boys from ethnic groups – 18.9%, lower –of boys from small towns of Crimea – 17.4%. Motive of emotional satisfaction manifested in the following way: small towns of Crimea – 20.3% of the questioned, from regions of Ukraine – 20.1%, ethnic groups– 16.9 %, from Simferopol – 21.1%, from countryside– 21.0 %. Motive for physical education for future economic activity of girl students was the following: small towns of Crimea – 12.4% of the questioned, from regions of Ukraine – 15.2%, ethnic groups– 14.8 %, from Simferopol – 13.3%, from countryside– 15.8 %. Critical attitude to conditions and organization of physical trainings, absence of desire to train is characterized in the following way: small towns of Crimea – 16.6% of the questioned, from regions of Ukraine – 12.4%, ethnic groups– 13.6 %, from Simferopol – 17.1%, from countryside– 14.3 %.

Thus, as a result of the research we marked out groups of motives' dominating categories, depending on regions of students' residence. The determined motives permit to specify main directions in formation of personality-oriented motivation of students for physical education with the help of innovative technologies. During organization of the research, oriented on education of youth's positive motivation for physical education, at trainings we applied methodic, which included initial statements, based on the following principles:

- humanization of physical education – creation of conditions for formation of personality's, including motion, abilities of students; humanization of relationship “student-instructor”, respect to student's personality, facilitating progressing of student's motion skills, understanding of student's demands, interests, dignity; educating of fair and merciful being;

- Innovative character of physical education, based on implementation of different forms, means and methods of training and education and reflecting creative seeking of original, non standard solutions in poly-ethnic students groups;

- compliance with nature and natural purposefulness of physical education – consideration of many facet and holistic nature of a human being, age, individual, physiological, psychic and regional specificities, which are influenced by landscape-climatic processes;

- tolerance in physical education, which implies parallel existence of ethnic elements of physical culture for their inter- penetration, and creates opportunities fro development of intellectually-cognitive and motion skills of youth;

- Differentiation and individualization of physical education – consideration of physical, psychic, social, intellectual development of students in health related physical culture work, stimulation of their physical culture-sport achievements, opening of sport-motion potential of everybody.

So, for formation of students' motivation for physical education, for expansion of motion skills and habits' experience we developed methodic, which envisaged innovative, teaching-cognitive and aesthetic-physical functioning, ensuring natural integrity of motivation-valuable, physical culture-sports and creative-active approach. Motion program at physical culture trainings for 1st year students had adaptive character and considered all significant components of previous ethnic environment, in compliance with which we used targeted physical exercises and outdoor games; i.e. trainings were constructed on principles of multi-sensor convergence.

In mentioned program physical exercises were directed on ensuring of optimal adaptation of first year students to socialization in new environment. The content of health-related physical culture trainings was grounded by compulsory observation of principles of systemic character, orientation on formation of positive motivation for systemic physical trainings, planned character, accessibility and stimulating difficulty, rational alternation of work and rest.

Thus, results of pedagogic experiment, targeted on implementation of innovative technologies in academic trainings witness about positive formation of girl-students' motivation for physical education. For example, formation of cognitive-functioning motive for physical education at first year of study was marked with increasing of results. Indicators increased in the following way: small towns of Crimea –by 10.5% of the questioned, from regions of Ukraine – by 12%, ethnic groups–by 13.8%, Simferopol – by 15.1%, countryside – by 12.8 % .

In educational process we introduced emotionally attractive, pedagogically and methodically grounded means and methods of physical education. It facilitated increasing of emotional attractiveness of physical education in formation of girl-students' motivation of personality. The determined methodic facilitated changes of motive of emotional satisfaction for better: small towns of Crimea – by 7.0% of the questioned, from regions of Ukraine – 5.3%, ethnic groups– 2.0%, from Simferopol – by 8.5%, from countryside– by 5.3% .

Formation of physical education's significance for future professional activity changed in the following way: ethnic groups– 5.4 %, from Simferopol – 2.2%. Concerning students from small towns of Crimea and from regions of Ukraine – we registered insignificant positive trend to demand in physical education.

The first year girl students demonstrated motive of critical attitude to conditions and forms of physical education's organization. Implementation of methodic for mastering of basic knowledge about physical culture in pedagogic experiment as well as introduction of ethnically colored physical exercises, dances, increasing of physical fitness, releasing of psycho-emotional tension by physical exercises and etc. reduced negative attitude to physical trainings, In particular: small towns of Crimea – by 17.6% of the questioned, from regions of Ukraine – by 18.4%, ethnic groups – by 8.9%, from Simferopol – by 24.0%, from countryside – by 16.6% % .

Insignificant trend to reducing of social motive among first year girl-students is based on the fact that at the end of academic year girl-students adapted to HEE conditions and solved a part of their social problems.

Analyzing results of conducted research, oriented on formation of personality-oriented motivation of first year boy students, we found the following changes. For example results of cognitive-functioning motive improved as follows: small towns of Crimea – by 6.9% of the questioned, from regions of Ukraine – by 4.9%, ethnic groups – by 4.6%, from Simferopol – by 7.5%, from countryside – by 6.1% .

Owing to introduction of demanded by boys exercises, motives of emotional satisfaction also increased: small towns of Crimea – by 4.6% of the questioned, from regions of Ukraine – by 1.9%, ethnic groups – by 5.0%, from Simferopol – by 2.9%, from countryside – 2.9% .

Results of conducted research witnessed about reducing or absence of first year students' motive of critical attitude to conditions and organization of physical trainings. It was absent among first year boy students from small towns of Crimea and regions of Ukraine. Among ethnic groups' students it reduced by 9.1 % , students from Simferopol – by 14.3%, from countryside – by 9/5 %.

Social motive had trend to reducing from 0.9% to 3.2%.

Thus, implementation of innovative technologies witnesses that application of methodically selected means and methods of physical education, considering students' interests, ethnic demands, peculiarities, conditioned by region of residence, facilitated formation students' demand in physical education, which is based on tolerance in personality-oriented training.

Conclusions:

The conducted questioning resulted in determination that students' motivation for physical education's values is conditioned by the following dominating categories of motives: cognitive-functioning, social, demand in physical fitness in future professional activity, motive of emotional satisfaction with health related physical functioning, motive of critical attitude to insufficient conditions of organization, forms of physical trainings.

Basing on the above mentioned it is critically important that the program of poly-ethnic group students' physical education would be of innovative character, facilitating them to adapt to HEE conditions, and would consider all signally significant components of previous ethnic environment. In compliance with it it is necessary to realize certain physical exercises, national outdoor games, i.e. motion functioning shall be built on principles of sensor convergence.

Further researches stipulate selection and implementation of additional innovative technologies on physical education, combined with studying of physical condition of students of economical higher educational establishment.

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EFFECTIVENESS OF THE PILOT PROGRAM CORRECTION PSYCHOPHYSICAL CONDITION OF CHILDREN IN THE SECOND YEAR OF A COMMON EDUCATIONAL SCHOOL

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Annotation. *Purpose:* the algorithms have been defined and grounded that contain projecting operations for the formation and implementation of a programme aiming at the correction of psychophysical state of children in the process of physical education during the second year of studying at school. In the investigated was attended by 19 girls and 15 boys second class of experimental group and 30 girls and 30 boys in the control group. *Results:* it is shown that the increase in body weight of 2.4% in girls and 3.9% boys, increase in body length 14.7% of girls and 11.5% boys, vital capacity of the lungs 22% and 21.8%, respectively, in the muscle strength by dynamometry results brushes right and left hands grew by 142.4 and 94.8%, revealed a significant (from $p < 0.05$ to $p < 0.001$) improved values of all investigated parameters of physical fitness girls and boys. *Conclusions:* use within one year of the proposed development of 19 girls and 15 boys achieved the much better results in solving tasks than the traditional organization and content of physical education, which are used in the control group.

Key words: second year pupils, psychophysical, correction, physical, education.

Introduction

At present stage one of the most important tasks of physical education at second year of children's studying in comprehensive educational establishment (CEE) – is their rational adaptation to new conditions of educational activity. It is connected with the fact that just with starting of second year of studying regime of the mentioned functioning changes from that, which is intrinsic to pre-school educational establishment (first year of studying at CEE) to regime, characteristic for older pupils [1]. Such change stimulates children's appropriate adaptation responses, but in most cases, in connection with absence of systems' readiness, these responses take place in stress forms [4, 10, 15, 16]. That is why studying of psycho-physical state of second form pupils is an urgent task for working out of organism's rational adaptation technologies for enduring of high teaching loads and prevention from their negative influence on health and other indicators of psycho-physical state.

Teaching and education of junior schoolchildren is one of the most important problems of modern educational system in Ukraine, because just in this period foundations of physical, mental, intellectual and creative development of a child are formed, see National doctrine of development of education in Ukraine in 21st century (Ukrainian educational server <http://ues.org.ua>: 8100. 2001). Special place in this period is taken by second year of studying and one of reasons of it – is the mentioned above transition of children to new regime of teaching load, i.e. regime of teaching and rest at CEE. In case if such transition has stressful character, negative after effects often occur, in particular in general development of a child, his (her) health, in different functional and psychological indicators, especially is they are lower than age standards [9].

In connection with the latter, statistic [12] witnesses that recent five years have had the trend to annual increasing of primary school pupils with different somatic and psychic disorders, while different indicators in 80% of cases do not comply with age standards. First of all it concerns disharmonious character of general development, reducing of biological development rates, reducing of physical activity, functional abilities, rising of chronic tiredness of primary school pupils in general and second form pupils in particular. The problem becomes deeper also owing to the fact that pedagogic process of the latter is overloaded with academic disciplines, i.e. facilitates only progressing of intellect [11]. With it influence of child's way of life on studying practically is not considered [3] that is one of main factors of risk of diseases; life style determines child's health by 51% [13].

One of leading places in child's life style is taken by physical functioning; it is becoming an integral part of life style, first of all in connection with its efficiency in improving of psych-physical indicators [2]. Methodological aspects and ways to increasing of effectiveness of primary school pupils' physical education have been elucidated in great number of scientific works, which can be classified by the following directions: formation of conception of physical education; review of criteria of the process's effectiveness; improvement of its normative basis; foundation of health related physical culture trainings' content; organizational-methodic provision of such trainings [6]. One of most important directions of foreign researching at present is formation of strategy of pupils' physical education [14]. At the same time there are very little of works [5; 7], devoted to mental workability of primary school pupils for optimization of their study-rest regime. Till now there is no works on correction of children's psycho-physical correction in the process of physical education for improvement of mental workability without negative after effects for health or mental state. It is specially important because this state changes everyday during academic year at second form of CEE and it conditioned the urgency of the present research.

The research has been fulfilled as per combined plan of scientific & research works in sphere of physical culture and sports for 2006-2010 of ministry of Ukraine of family, youth and sports by topic 3.1.1 "Theoretical methodic and program-normative principles of pupils' and students' physical education" (state registration number

0107U000771), in compliance with plan of scientific-research work of physical education faculty of Ternopil national pedagogic university, named after Volodymyr Gnatiuk for 2011-2014 by topic “Theoretical-methodic principles of extra-curriculum forms of children’s and students’ physical education”.

Purpose, tasks of the work, material and methods

The purpose of the work is to experimentally ground effectiveness of the worked out program for correction of second form pupils psycho-physical state in the process of physical education.

The methods and organization of the research were used the following: general scientific (analysis, generalization) pedagogic (testing, formation experiment), medical-biological (anthropometry, spirometry, dynamometry, pulse-metering), methods of mathematical statistic.

During academic year we applied the worked out program (experimental group (EG) of girls (g) 19 persons and boys (b) – 15 persons and traditional organization and content of physical education at CEE in control group (CG) 60 girls and 60 boys for second form pupils. At the beginning and at the end of academic year we measured morphological functional indicators (length and mass of body, vital capacity of lungs (VCL) heart beats rate (HBR) in rest and after dozed load, after 45 seconds of rest as well as indices: power (PI), VI- vital index, index Ruffiet (IR). For studying of physical fitness we used the following tests: absolute muscular strength – hand dynamometry; speed power – 20 meter run,; explosive power – long jump from the spot; mobility of lumbar spine – forward bent in sitting position; shoulder joints – twisting of rule behind back; coordination in cyclic motions – shuttle run 4x9 meters, ballistic movements – throwing of tennis ball for distance; acrobatic movements – three forward roll-overs. Somatic health was evaluated by quantity of missed because of diseases classes, considering recommendations [8].: “0 points” – high level, “1-3” –middle, “4 and more” – low level.

Conclusions about applied program, were made after comparing of data, obtained from experimental and control groups in compliance with criterion of quantity of analyzed indicators, values of which during experiment substantially (at level from $p < 0,05$ to $p < 0,001$) changed.

Results of the research

Quantity of indicators, value of which substantially changed by the end of experiment. Girls. Comparison of morphological functional indicators of EG at the beginning and at the end of experiment did not show any negative change of any indicators (see table 1).

Table 1

Dynamic of second form (CEE) girls’ indicators of physical condition at stages of formation experiment

Indicator	Group	At beginning		At end		CXhange($\bar{x}_1 - \bar{x}_2$)		t_1 ($\bar{x}_1 - \bar{x}_2$)	t_2 (EG- CG; $\bar{x}_2 - \bar{x}_2$)
		\bar{x}_1	m	\bar{x}_2	m	absolute	%		
<i>Morphological-functional</i>									
Body mass, kg	EG	24.5	0.61	28.1	0.57	3.6	14.7	4.31***	0.9
	CG	24.9	0.67	27.3	0.68	2.4	9.6	2.51*	
Body length, cm	EG	125.1	0.74	128.1	0.67	3.0	2.4	3.01**	0.43
	CG	125.8	0.70	128.5	0.64	2.7	2.1	2.82*	
VCL, ml	EG	1115.3	28.7	1360.5	24.3	245.2	22.0	6.52***	6.71 ***
	CG	1125.2	33.41	1106.7	29.00	-18.5	-1.6	0.42	
HBR in rest, b.p.m. ⁻¹	EG	86.1	0.97	79.1	0.75	-7.0	8.1	5.71***	3.51 **
	CG	85.2	1.53	83.8	1.11	-1.4	1.6	0.74	
HBR after physical load,, b.p.m. ⁻¹	EG	126.3	1.50	114.4	1.21	-11.9	9.4	6.17***	4.66 ***
	CG	125.5	1.89	123.1	1.42	-2.5	2.0	1.04	
HBR at 45 sec of rest, b.p.m. ⁻¹	EG	89.1	1.31	82.4	0.62	-6.7	7.5	4.62***	4.95 ***
	CG	88.7	1.76	90.3	1.47	1.6	-1.9	0.73	
Power index (PI), %	EG	16.3	1.45	44.1	2.15	27.8	170.6	10.7***	2.59 *
	CG	16.0	1.76	35.9	2.32	19.9	124.7	6.84***	
Index Ruffiet (IR), conv. Un.	EG	10.2	0.35	7.6	0.25	-2.6	25.5	6.04***	5.27 ***
	CG	9.9	0.44	9.7	0.31	-0.2	2.2	0.41	
Vital index (VI) ml.p.kg ⁻¹	EG	45.5	1.55	48.4	0.95	2.9	6.4	1.6	4.87 ***
	CG	46.3	1.61	41.4	1.08	-4.9	-10.6	2.54*	
<i>Physical fitness</i>									
Shuttle run 4x9 m, sec	EG	13.6	0.15	12.3	0.08	-1.3	9.6	7.65***	3.93 **
	CG	13.5	0.22	12.9	0.13	-0.6	4.7	2.51*	
Throw for distance with main arm, m	EG	6.2	0.27	11.2	0.21	5.0	80.7	14.6***	9.57 ***
	CG	6.3	0.31	8.0	0.26	1.7	26.6	4.14***	
Three forward roll overs, sec.	EG	6.2	0.15	5.1	0.10	-1.1	17.7	6.1***	2.77 *
	CG	6.2	0.19	5.6	0.15	-0.6	9.4	2.35*	

Long jump from the spot, cm	EG	105.1	1.80	121.5	1.42	16.4	15.6	7.15***	3.07
	CG	104.5	2.40	112.9	2.41	8.4	8.1	2.48*	**
Forward bent in sitting position, cm	EG	5.8	0.5	9.2	0.7	3.4	58.6	3.95***	3.01
	CG	5.9	0.59	5.4	1.05	-0.5	-8.3	0.41	**
Twisting of rule behind back, cm	EG	60.1	1.02	50.4	1.12	-9.7	16.1	6.4***	5.79
	CG	58.5	1.17	61.0	1.45	2.5	-4.2	1.32	***
20 meters straight off run, sec.	EG	5.1	0.12	4.2	0.06	-0.9	17.7	6.71***	4.71***
	CG	5.0	0.11	4.6	0.06	-0.4	8.6	3.39**	
Hand dynamometry of main arm, kg	EG	4.1	0.38	12.4	0.25	8.3	202.4	18.3***	4.04
	CG	4.0	0.44	9.7	0.62	5.7	142.4	7.47***	***
Hand dynamometry of weaker arm, kg	EG	3.8	0.41	10.6	0.32	6.8	179.0	13.1***	4.47
	CG	3.9	0.47	7.6	0.59	3.7	94.8	4.84***	***
<i>Somatic health</i>									
1 st semester, days	EG	3.8	0.52	-	-	-	-	-	0.13
	CG	3.7	0.58	-	-	-	-	-	
2 nd semester, days	EG	-	-	2.1	0.47	-	-	-	3.23
	CG	-	-	4.8	0.69	-	-	-	*
Total:	EG	-	-	5.9	0.5	-1.7	44.7	2.43*	2.05
	CG	-	-	8.5	1.27	1.1	-29.7	1.22	*

Notes: Hereinafter confidence of difference of two mean values: «*» – $p < .05$, «**» – $p < 0.01$, «***» – $p < 0.001$

At the same time substantially positive changes were registered in the following indicators: length and mass of body, increments of which was accordingly 2.4 and 14.7%, VCL (increment 22%), HBR in rest (8.1%), after dozed physical load (9.4%) and during rest after such load (7.5%) ($p < 0.05$ to 0.001). Besides, positive dynamic was noticed in indices, which reflected functional abilities of muscular system (PI increased by 170.6%), of cardio-vascular system (IR improved by 25.5 %); respiratory system showed trend to improvement – increment of VCL was 6.4% ($p > 0.05$).

Analysis of the same CG indicators also showed some improvement but it was much less, videlicet: length and mass of body (accordingly 2.1 and 9.6%) and PI (increment 124.7%). With it we registered reduction of VI by 10.6% that witnessed about worsening of respiratory system's functional state in provisioning of organism with oxygen in rest.

Applied simultaneously variants of physical education's organization and content facilitated unequal change of girls' physical fitness indicators. For example at EGg we found substantial (from $p < 0.05$ to $p < 0.001$) improvement of all tested indicators; with it the highest increment had muscular strength, which by data of right and left hand dynamometry was, accordingly, 202.4 and 179%, and explosive power, increment of which was 80.7% (see table 1).

In CGg such positive changes were in most of the tested indicators, with exclusion of flexibility (mobility in lumbar spine, shoulder joints), which during the whole year remained on initial level. Concerning improved indicators we obtained the following data: coordination in cyclic motions increased by 4.7%, in throws for distance and acrobatic movements – accordingly by 26.6 and 9.4%, explosive power – by 8.1%, speed power – by 8.6%, muscular strength by results of right and left hand dynamometry – accordingly by 142.4 and 94.8%.

Dynamic of somatic health in tested groups of girls was the following: in EGg quantity of missed because of disease days of academic year in 1st semester was 3.8 ± 0.52 , in 2nd – 2.1 ± 0.47 , i.e. their health showed positive dynamic, but, accordingly low and middle levels (see table 1). Considering total (for two semesters) quantity – 5.9 ± 0.5 days and normative [8], we stated in general low level of girls' health but with trend to improvement to middle level.

In CGg indicator in first semester was at level 3.7 ± 0.58 , in 2nd – 4.8 ± 0.69 , i.e. in total 8.5 ± 1.27 days. The obtained data in all cases witnessed low level of somatic health of this group's girls. At the same time we stated that in this group there was negative trend in indicator's changes, as far as in 1st semester quantity of missed days was much less than in 2nd.

Boys. Comparing morphological functional indicators of EGb at the beginning and at the end of academic year we did not register negative changes of any (see table 2).

Table 2

Dynamic of second form (CEE) boys' indicators of physical condition at stages of formation experiment

Indicator	Group	At beginning		At end		CXhange($\bar{x}_1 - \bar{x}_2$)		t_1 ($\bar{x}_1 - \bar{x}_2$)	t_2 (EG-CG; $\bar{x}_2 - \bar{x}_2$)
		\bar{x}_1	m	\bar{x}_2	m	absolute	%		
<i>Morphological-functional</i>									
Body mass, kg	EG	26.1	0.65	29.1	0.52	3.0	11.5	3.6**	0.2
	CG	26.6	0.76	28.9	0.85	2.4	8.9	2.06*	
Body length, cm	EG	127.2	0.77	132.1	0.72	4.9	3.9	4.65***	0.74
	CG	128.4	0.84	131.3	0.81	2.9	2.3	2.52*	
VCL, ml	EG	1250.1	28.13	1522.0	27.15	271.9	21.8	6.95***	5.33
	CG	1247.5	29.45	1280.0	36.42	32.5	2.6	0.69	
HBR in rest, b.p.m. ⁻¹	EG	85.7	1.1	78.6	0.87	-7.1	8.3	5.06***	3.83
	CG	85.0	1.3	84.0	1.11	-1.0	1.2	0.59	
HBR after physical load,, b.p.m. ⁻¹	EG	121.2	1.85	112.2	1.42	-9.0	7.4	3.86**	3.96
	CG	120.7	2.28	120.7	1.61	0	0	0	
HBR at 45 sec of rest, b.p.m. ⁻¹	EG	87.9	1.27	80.1	0.88	-7.8	8.9	5.05***	4.92
	CG	86.7	1.32	87.3	1.17	0.7	-0.8	0.38	
Power index (PI), %	EG	18.8	1.35	54.0	2.05	35.2	187.2	14.3***	4.21
	CG	16.9	1.54	41.1	2.28	24.2	143.0	8.79***	
Index Ruffiet (IR), conv. Un.	EG	9.5	0.30	7.1	0.25	-2.4	25.3	6.15***	5.38
	CG	9.2	0.38	9.2	0.30	0	0	0	
Vital index (VI) ml.p.kg ⁻¹	EG	47.9	1.45	52.3	1.35	4.4	9.2	2.22*	3.45
	CG	47.4	1.54	45.5	1.44	-1.9	-3.9	0.89	
<i>Physical fitness</i>									
Shuttle run 4x9 m, sec	EG	13.1	0.1	12.0	0.09	-1.1	8.4	8.18***	3.43
	CG	13.1	0.12	12.6	0.15	-0.4	3.4	2.37*	
Throw for distance with main arm, m	EG	9.8	0.42	15.7	0.31	5.9	60.2	11.3***	5.31
	CG	10.8	0.51	12.8	0.45	2.0	19.0	3.04**	
Three forward roll overs, sec.	EG	5.3	0.16	4.1	0.10	-1.2	22.6	6.36***	2.91
	CG	5.3	0.18	4.7	0.18	-0.5	10.4	2.21*	
Long jump from the spot, cm	EG	115.1	1.84	129.1	1.12	14.0	12.2	6.5***	3.44
	CG	116.0	2.00	121.3	1.97	5.3	4.6	1.9	
Forward bent in sitting position, cm	EG	2.7	0.81	6.4	0.62	3.7	137.0	3.63**	2.88
	CG	2.6	0.86	3.2	0.92	0.6	25.4	0.52	
Twisting of rule behind back, cm	EG	65.5	1.42	51.4	1.2	-14.1	21.5	7.58***	7.89
	CG	66.4	1.56	66.0	1.41	-0.4	0.6	0.18	
20 meters straight off run, sec.	EG	4.6	0.09	3.9	0.07	-0.7	15.2	6.14***	3.02
	CG	4.5	0.12	4.4	0.15	-0.1	1.9	0.44	
Hand dynamometry of main arm, kg	EG	4.9	0.4	15.7	0.32	10.8	220.4	21.1***	5.0
	CG	4.7	0.42	11.9	0.69	7.2	155.2	8.97***	
Hand dynamometry of weaker arm, kg	EG	5.1	0.38	14.9	0.36	9.8	192.2	18.7***	5.91
	CG	5.5	0.46	10.3	0.69	4.8	85.7	5.72***	
<i>Somatic health</i>									
1 st semester, days	EG	5.8	0.72	-	-	-	-	-	0.28
	CG	6.1	0.79	-	-	-	-	-	
2 nd semester, days	EG	-	-	4.1	0.64	-	-	-	3.76*
	CG	-	-	8.6	1.01	-	-	-	
Total:	EG	-	-	9.9	0.68	-1.7	29.3	1.77	2.67*
	CG	-	-	14.7	1.8	2.5	-41.0	1.95	

At the same time we determined significant (from $p < 0.05$ to $p < 0.001$) improvement of length and mass of body – increment was accordingly 3.9 and 11.5%. The same change was also in such functional indicators: VCL increased by 21.8%, HBR in rest, after dozed physical load, in rest after load, on the contrary, reduced accordingly by

8.3, 7.4 and 8.9%, but such change witnessed about improvement of indicators. Besides, positive dynamic was registered in indices, reflecting functional abilities of tested organism's systems, as far as PI, IR, VI increased accordingly by 187.2, 25.3 and 9.2%.

In *CGb* we received quite different results – substantial improvement was noticed in much less quantity of indicators in comparison with *EGb*, videlicet: length and mass of body (increment was accordingly 2.3 and 8.9%; $p < 0.05$) and CI (143%; $p < 0.001$). With it we determined trend to worsening of VI (reduction by 3.9%) and HBR in rest, after dozed physical load and (increasing by 0.8%, $p > 0.05$), that witnessed about unfavorable picture in change of functional abilities of respiratory and cardio-vascular systems.

The applied in experiment variants of organization and content of physical education resulted in unequal changes in boys physical fitness's indicators. For example in *EGb* changes implied significant (from $p < 0.05$ to $p < 0.001$) improvement of all tested indicators (see table 2). With it the highest increment was in coordination in throws for distance (60.2%), mobility in lumbar spine (1.7%) and muscular strength – by data of right and left hand dynamometry increment was 220.4 and 192.2%. Improvement of other indicators also was confident but increment was a little less – it was within limits from 8.4 to 22.6%.

In *CGb* coordination in cyclic motions significantly improved (increment 3.4%; $p < 0.05$), in throws for distance (19%; $p < 0.01$), in acrobatic movements (10.4%; $p < 0.05$) and muscular strength by data of right and left hand dynamometry, which increased accordingly by 155.2 and 85.7% ($p < 0.01$). Other indicators in this group had only trend to positive changes that witnessed that their values remained at initial level during academic year.

Dynamic of somatic health in *EGb* had the following specificity: quantity of missed because of disease days in 1st semester was 5.8 ± 0.72 , in 2nd – 4.1 ± 0.64 , i.e. there was certain improvement of indicator (see table 2). Considering total missed because of disease days (9.9 ± 0.68) and existing normative [8], we stated generally low level of health in *CGb* but with trend to improvement.

In *CGb* this indicator in 1st semester was 6.1 ± 0.79 days, in 2nd – already 8.6 ± 1.01 , i.e., in total for academic year – 14.7 ± 1.8 . In all cases, obtained data witnessed low level of CG boys' somatic health, with it with negative trend of changes during academic year.

Conclusions:

1. At present stage most of second form pupils have unsatisfactory psycho-physical level; approaches to organization and realization of physical education's content in CEE for its correction do not consider specificities of daily mental workability during week in different periods of academic year that do not facilitate children's rational adaptation to new regime of studying and rest at CEE and, consequently, improvement of psycho-physical state. In this connection there appears a demand in solution of this problem.

2. The worked out as per offered algorithms program for correction of psycho-physical state of second form pupils in the process of physical education ensures substantial improvement of more indicators than traditional organization and content of physical culture at CEE that witnesses higher effectiveness of our program in solution of the set task.

The prospects of further researches are connected with working out of technologies of psycho-physical state correction for pupils of other primary school forms, considering dynamic of their daily mental workability during week in different periods of academic year.

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INTEGRATED APPLICATION OF HEALTH IMPROVING METHODS OF PILATES AND BODYFLEX FOR IMPROVING PSYCHOPHYSIOLOGICAL POSSIBILITIES OF STUDENTS

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Annotation. *Purpose:* to determine the effect of complex application procedures Bodyflex and Pilates using information and communication technology on the level of psycho-physiological capabilities of students. *Material:* the study involved 46 university students. Research methods - physiological (speed detection of simple and complex reactions in different modes of testing, the level of functional mobility and strength of the nervous system), pedagogical experiment, methods of mathematical statistics. *Results:* the positive effect on the level of the developed technique psychophysiological capacities of students. The application of the developed technique in the experimental group showed a significant decrease in the latency time of a simple visual-motor reaction time latent complex visual-motor reaction time test run "level of functional mobility of nervous processes" in feedback mode. Found that the use of Bodyflex and Pilates promotes strength of nervous processes. *Conclusions:* the recommended use in the learning process of students of complex techniques of Pilates Bodyflex using information and communication technologies, increased levels of psychophysiological features, mobility and strength of the nervous processes.

Key words: students, preparedness, information, communication, education, culture, health, technology, Bodyflex, Pilates, strength, mobility, nervous system, psychophysiology, capabilities, speed, reaction, rhythm.

Introduction

Results of modern scientific researches [4, 5, 6, 9, 12, 14] prove that system-formation factor of students' healthy life style if health related motion functioning. That is why involving of students in regular physical exercises, increasing of rising generation's motivation to health related motion functioning and healthy life style has become very urgent [15, 17, 20, 21, 25, 26, 27]. Demand in solution of this task is amplified by the fact that formation of children's, teenagers' and youth's habit of regular motion functioning is main strategy of prophylaxis of chronic diseases in mature age [12, 18, 19, 28, 29, 30, 31].

It is known that long term limitation of motion functioning results in hypodynamia that in itself is a dangerous factor [22, 23, 24, 31]. It ruins organism and leads to early disability and if disorders, caused by hypodynamia in adult organism, are reversible (i.e, they can be eliminated with the help of timely started physical training), then growing organism cannot compensate at all effect of hypodynamia. Hypodynamia is especially dangerous at early stages of ontogeny and in period, when functional formation of young organism takes place. It results in significant reduction of growth's rates and organism's development as well as in disordering of bio chemical processes, including genetic apparatus of cells. With it significant functional deviations in development of brain cortex, are observed as disorders of nervous system and low workability of brain [8].

Meanwhile, hypodynamia has becoming a prevailing among students: regime of studying and progress of civilization, creating comfort, doom young man for constant "muscular hanger", deprive him of motion functioning [12, 18, 19].

In this connection implementation of new health related methodic in students' physical education with application of modern information-communicative technologies is urgent and timely, while research of these methods' influence on students' psycho-physiological abilities is a required condition of scientific foundation of this application's effectiveness.

The research has been fulfilled in compliance with combined plan of scientific-research works for 2011-2014 by topic 2.4 "Theoretical-methodic principles of individualization in physical education and sports" (state registration number 0112U002001) and in compliance with scientific works, financed by Ministry of education and science for 2013-2014 "Theoretical-methodic principles of application of information, pedagogic and medical-biological technologies for formation of healthy life-style" (state registration number 0113U002003).

Purpose, tasks of the work, material and methods

The purpose of the research is to determine influence of complex application of body flex and pilates methodic in combination with information-communicative technologies on students' psycho-physiological abilities at higher educational establishments.

The methods of the research: psycho-physiological methods (determination of speed of simple and complex responses in different modes of testing, of nervous system's functional mobility and strength [1, 10, 11, 14]), which were fulfilled with the help of program "Psycho-diagnostic"[1]; pedagogic experiment; methods of mathematical statistic.

46 students of Kharkov national pedagogic university, named after G.S. Skovoroda took part in the research; from them 24 students were in control group, 22 – in experimental one. During 2 semesters in experimental group we

applied complex methodic of body flex and pilates with using of authors' internet-blog for information of students about principles of physical culture.

Results of the research

Mental workability and mental endurance are indicators of general endurance. As indicators of mental workability psycho-physiological indicators are used. As it is known [7, 8, 10, 11, 14], it is difficult to change psycho-physiological indicators and just owing to this fact receiving of statistically significant differences between indicators, obtained before experiment and after experiment witness about positive influence of worked out by us methodic not only on functional fitness but also on level of psych-physiological abilities. For determination of influence of this methodic on level of speed of simple and complex visual-motor responses, strength and mobility of nervous system we chose psycho-physiological testing of control and experimental groups' students and received data were analyzed for statistically confident changes in the course of experiment.

As far as it is difficult to change psycho-physiological indicators [10, 11, 14], and just owing to this fact receiving of statistically significant differences between indicators, obtained before experiment and after experiment witness about positive influence of worked out by us methodic not only on functional fitness but also on level of psych-physiological abilities.

In our case nervous system's strength shall be understood, as per commonly accepted definitions, as ability of nervous system to work for long period of time with high intensity of demonstrate great strength in limited time.

In our research properties of nervous system were determined with the help of program "Psycho-diagnostic" [1, 14]. With it, as indicators of nervous system's strength we used values of quantity of mistakes in tests, oriented on determination of latent time of complex response in feedback mode and forced rhythm (mistakes in first stage ($p < 0.001$), from 2.96 to 0 at second stage ($p < 0.05$), from 3.56 to 0.23 at third stage ($p < 0.05$), from 3.88 to 0.32 at fourth stage ($p < 0.05$), from 10.45 to 4.52 at fifth stage ($p < 0.001$) (see table 3.4, fig. 3.15). In control group such changes were not confident ($p > 0.05$). test "level of functional mobility of nervous processes", in feedback mode and in mode of forced rhythm). As of indicators of nervous system's mobility we used results of tests "Time of fulfillment of tests "level of functional mobility of nervous processes, sec." And "Time of coming to minimal exposure in test " level of functional mobility of nervous processes" in feedback mode, sec."

As a result of experiment, in experimental group we registered confident reducing of latent time of simple visual-motor response (from 325.76 ± 45.09 msec. to 270.89 ± 41.23 msec. $p < 0.05$) (see table 3.4), of latent time of complex visual-motor response (from 566.87 ± 54.43 msec. to 456.44 ± 51.45 msec., $p < 0.05$), time of fulfillment of test " level of functional mobility of nervous processes" in feedback mode, sec." (from 425.12 ± 56.51 msec. to 392.1 ± 47.65 msec. $p < 0.001$), time of coming to minimal exposure in test " level of functional mobility of nervous processes" in feedback mode, (from 74.54 ± 15.43 msec. to 58.21 ± 12.55 m.sec., $p < 0.001$). In control group such changes were not confident ($p > 0.05$).

In our research in experimental group we observed confident reduction of quantity of mistakes in tests " level of functional mobility of nervous processes" in feedback mode and " level of functional mobility of nervous processes" in mode of forced rhythm: from 2.78 to 0 at first stage ($p < 0.001$), from 2.96 to 0 at second stage ($p < 0.05$), from 3.56 to 0.23 at third stage ($p < 0.05$), from 3.88 to 0.32 at fourth stage ($p < 0.05$), from 10.45 to 4.52 at fifth stage ($p < 0.001$) (see table 3.4, fig. 3.15). In control group such changes were not confident ($p > 0.05$).

Besides, confident reduction of values in tests "time of fulfillment of test " level of functional mobility of nervous processes" in feedback mode" and time of coming to minimal exposure in test " level of functional mobility of nervous processes" ($p < 0,001$) in feedback mode, sec. witness about increasing of nervous processes' mobility, resulted from body flex and pilates trainings.

Thus, the conducted research showed purposefulness of application of our methodic for increasing quality of students' psycho-physiological processes. It was evident that one of main element of our methodic influence on psycho-physiological indicators was accent on conscious perception of elements of physical education process, in particular, activation of vivid perception of body flex's and pilates's elements in application of special breathing exercises, which require high concentration of attention, for activation of workability's restoration.

In this connection we can conclude that our methodic influences positively not only on level of physical fitness and students' functional abilities; it can be recommended for implementation in practice of students' physical education.

The presented by us results of scientific research on determination of students' psycho-physiological states permit to create theoretical methodic principles for harmonious physical and mental progressing of a person, which, at present, are rather promising for science and practice. It concerns psycho-physiology, physiology, pedagogic, psychology, cybernetic and etc. Physical education serves perfection of man. But, as most of specialists-evolutionists consider, development of a person as biological being has already been completed and further human progress is possible only at the account of perfection of psychic and intellectual qualities. This principles concern physical education as well, because physical and mental perfection are connected with development of psycho-physiological functions.

Forst of all it concerns kinds of functioning in variable circumstances, which, in modern life, are very important for adaptation of a person in society. For situational kinds of functioning constant change of situation is characteristic that requires instant response to it. Quantity and quality of researches, devoted to this direction, is constantly growing. It witnesses about high urgency and perspectiveness of this problem.

Formation of a personality on all stages of his (her) progressing has its peculiarities and are important because every stage is a step ahead in perfection of human psycho-motor functioning.

Specifying of psycho-physiological states' manifestations is especially important because modern physical education requires methodic, which would permit to optimize educational process. It is rather difficult task, as far as construction of physical education process requires seeking of not only new forms of organization but also new forms and means of physical education. That is why for harmonious building of educational process of students it is necessary to determine peculiarities of psycho-physiological states that has just been presented in our work.

Conclusions:

1. We have proved positive influence of worked out methodic on students' psycho-physiological abilities: as a result of experiment in experimental group we registered confident reduction of latent time of simple visual motor response (from 325.76 ± 45.09 msec. to 270.89 ± 41.23 msec., $p < 0.05$), of latent time of complex visual-motor response (from 566.87 ± 54.43 msec. to 456.44 ± 51.45 msec., $p < 0.05$), time of fulfillment of test " level of functional mobility of nervous processes" in feedback mode, (from 425.12 ± 56.51 msec. to 392.11 ± 47.65 msec., $p < 0.001$). It was found that increasing of nervous processes' mobility, resulted from application of our methodic: in experimental group time of coming to minimal exposure in test " level of functional mobility of nervous processes" in feedback mode, reduced (from 74.54 ± 15.43 msec. to 58.21 ± 12.55 msec., $p < 0.001$), also we registered confident reducing of values in tests "time of fulfillment of test " level of functional mobility of nervous processes" in feedback mode, sec." and "time of coming to minimal exposure in test " level of functional mobility of nervous processes" ($p < 0.001$) in feedback mode, sec."

2. We have established that application of body flex and pilates facilitates increasing of nervous processes' strength. In experimental group of students we registered confident reducing of mistakes in tests "level of functional mobility of nervous processes" in feedback mode" and " level of functional mobility of nervous processes" in mode of forced rhythm: from , 2.78 to 0 at first stage ($p < 0.001$), from 2.96 to 0 at second stage ($p < 0.05$), from 3.56 to 0.23 at third stage ($p < 0.05$), from 3.88 to 0.32 at forth stage ($p < 0.05$), from 10.45 to 4.52 at fifth stage ($p < 0.001$) (see table 3.4, fig. 3.15). In control group such changes were not confident ($p > 0.05$).

In the future it is planned to improve system of health related technologies for development of students' psycho-physiological abilities.

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ACTUAL PROBLEMS OF PHYSICAL REHABILITATION OF STUDENTS WITH SPINAL PATHOLOGY

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Annotation. *Purpose:* to analyze integrative rehabilitation approaches to solving the problem of physical rehabilitation of students with spinal pathology. *Material:* analyzed more than 50 references. The analysis of the results of a comprehensive physical rehabilitation 67 students 19-20 years old with neurological manifestations of vertebral osteochondrosis of 1 degree. *Results:* actual problems of students with physical rehabilitation spinal pathology, analyzes the main aspects and rehabilitation approaches to solving these problems. Application integrative model of physical rehabilitation 20.7% increased its efficiency by general indicators of clinical research, valeology literacy, health and quality of life, stability of the results of rehabilitation. *Conclusions:* proven effective integrative rehabilitation system based on the integrated use of pedagogical, psychological treatment and physical rehabilitation in higher educational institutions.

Keywords: physical rehabilitation, vertebral osteochondrosis, spinal pathology, youth health.

Introduction

To day health of Ukrainian students is not only important social economic and medical problem but also a factor that determines steady development of country in the third millennium [6; 13].

Unfortunately chronic diseases, hypertension, neurosis, dorsopathy, obesity, in-born defects are quickly progressing among students. For example, in Ukraine, in average, only 6.0–10.0% of higher educational establishments' applicants can be considered to be healthy, 36.0–40.0% suffer from chronic diseases [8]. For period of studying at HEEs morbidity indicators practically of all nosologies grow several times.

Especially troublesome are backbone diseases. For example at the moment of entering HEE 70–80% of boys have pathological postures, 20% - have different backbone deformations [4; 8]. During first three years of studying at higher educational establishments quantity of healthy students reduces two times [6]. After graduation from educational establishments mist of young specialists' functional disorders of backbone transform into degenerative-dystrophic diseases of backbone, which are accompanied by pain syndromes of vertbragenous character [20]. By quantitative indicators these syndromes reached dimensions of non-infectious epidemic, causing numerous moral, physical and material losses in society [1; 4; 17; 19]. Alongside with it rejuvenation of dorsopathies (pain syndromes in part of torso and limbs of non-visceral etiology and connected with degenerative diseases of backbone).

That is why, in conditions of influence of unfavorable environmental factors, social-economic problems, weakening of moral values' role, which deepen the trend to decreasing of children's and youth's health, special role in training of physical and mentally healthy, socially and professionally competent, creative, responsible and tolerant personality shall be played just by physical education of youth.

As on to day, in Ukraine there exist legal and normative documents, which determine requirements to physical education trainings, to preservation and strengthening of youth's health. With it, it is stressed that the purpose of these trainings is creation of conditions for ensuring of optimal motion functioning of every person during all life, facilitating welfare, improvement of health state, prophylaxis of morbidity and physical rehabilitation. (National doctrine of development of physical culture and sports (Order of Presidents of Ukraine № 1148/2004, dt. 28.08.2004). However, measures, which are worked out on governmental level for improvement of students' health and physical condition, can not ensure positive changes without using of health related potential of physical rehabilitation at higher educational establishments [8].

The work has been fulfilled as per "Combined plan of S&RW in sphere of physical culture and sports for 2011-2015" by topic 4.6.3.1: "Theoretical-methodic principles of physical education and sports for all in formation of healthy life style" and by topic 3.5.2: "Programming and methodic of physical rehabilitation of persons of different nosological and age groups".

Purpose, tasks of the work, material and methods

The purpose of the work is to analyze urgent problems of rehabilitation of students with backbone pathology and to work out integrative rehabilitation approaches to their solution.

The tasks of the work:

- 1) Analysis of urgent problems of rehabilitation of students with backbone pathology;
- 2) Determination of main aspects of physical rehabilitation process and rehabilitation approaches to solution of these problems;
- 3) Analysis of effectiveness of integrative rehabilitation system, which is based on complex application of pedagogic, psychological correction and physical rehabilitation at higher educational establishments.

Organization and materials of research. At first stage we analyzed more than 50 literature sources, devoted to the subject of the research. We also systemized problems of youth's physical rehabilitation by main directions as well as ways of their solution. At the second stage we studied integrative rehabilitation approach to physical rehabilitation of

students with backbone pathology as the most rational variant of this problem's solution. On the base of laboratory of health related-rehabilitation technologies of Sumy state pedagogic university, named after A.S. Makarenko we tested 67 students (52 women, 77.6% of 19-20 years old age with neurologic symptoms of osteochondrosis of 1st degree. We also present results of complex application of pedagogic, psychological correction and physical rehabilitation of students at higher educational establishments as example of effective integrative approach.

The methods of the research: theoretical analysis and generalization of scientific-methodic literature's data, mathematical-statistic processing of results of the research.

Results of the research

In our opinion problem of rehabilitation of students with vertebrogenous pathology implies analysis of three its main aspects:

- 1) Organizational methodic;
- 2) Health-related or valuelogic;
- 3) Medical-prophylactic;

Now, below – more detail description is presented.

Organizational-methodic aspect of the problem.

Reformation of education in Ukraine is accompanied by intensification of educational process, stress overloads, which in their turn, acute contradictions between such value of priority as health and conditions, required for its preservation at HEE, where there exist substantial problems in physical education of youth.

System of rehabilitation measures at higher educational establishments, which is oriented on improvement of youth's health, has a number of problems that require urgent solution. The main problems are: insufficient state of material base and equipment, insufficient financing, low health related effectiveness of physical education and medical control over students' health, absence of specialists in physical trainings of students with chronic diseases and functional disorders at higher educational establishments, absence of single complex rehabilitation program at HEE.

Formation of physical rehabilitation as separate branch of vocational training of specialists started at higher educational establishments of physical culture profile in Ukraine, Poland, Russia, Byelorussia, Lithuania in 90-s of last century [8]. During this period there were opened specialties and created or re-organized (from departments of therapeutic physical culture) departments for preparation of physical rehabilitation specialists at HEEs of 3rd – 4th levels of accreditation.

In Ukraine, in 2001 new specialty "Physical rehabilitation" was introduced in classificatory of professions under code 3226. In 2005, there was approved new scientific degree, according to which thesis on problems of physical rehabilitation are related to scientific code 24.00.03 – physical rehabilitation, which envisages awarding of scientific degree of candidate of science in physical education and sports. To-day, at many higher educational establishments there have already happened several graduations of specialists in physical rehabilitation, but appropriate posts in typical staff schedules of educational establishments for their employment have still been absent. Though, it is quite possible that just these specialists, empowered with knowledge in valuelogy, pedagogic, physical and medical rehabilitation shall, deal with complex rehabilitation of students at higher educational establishments.

Thus, rehabilitation of students with dorsopathies shall include also solution of many organizational-methodic problems, among which problem of personnel is far from the last place.

2. *Health related or valuelogic aspect of students' physical rehabilitation.*

Since ancient times medical doctors in the whole world have known the truth: it is easier to prevent from any disease than to cure it. As per the data of modern researches, conducted by the most authorized scientific centers of different countries, human health depends approximately by 8–10% on medicine, by 15–20% – on state of environment (ecological factor), by 18–20% – on biological factors (heredity). Though decisive factor is human style of life (50–58%) [2; 14].

So, just style of life is the most powerful factor, which determines human health. According to numerous researches, conducted in different countries, distribution of different factors of life style and some other reasons by degree of influence on morbidity and span of life is approximately the following: eating – 25%, smoking – 25%, motion functioning – 22%, excessive alcohol drinking – 10%, infectious diseases – 7%, influence of toxic substances, ungrounded and excessive using of medicine – 6%, venereal diseases – 2,5%, transport traumatism – 1,5%, fire arms – 1% [13; 15].

Immobile way of life, incorrect eating, emotional imbalance, excessive weight, excessive using of medicine, harmful habits, unfavorable ecological factors, conditions of labor and etc. force organism to use more and more adaptation-compensating mechanisms, lowing with it vital forces, weakening functional potential [14].

It is often proposed to solve the problem of preservation and strengthening of health by mean of application of on certain method (certain kind of motion functioning, special diet, psychological training, different methodic of organism's cleansing). Attempts of determination of dominating factor and taking it as the base of ensuring of health have been realizing already for long time. Though any of such factors, used separately, can not embrace all varieties of processes, which take place in human organism in its interaction with nature, social environment and all that determine life activity and condition health.

That is why, with solving of health related tasks complex approach is the most effective; it requires first of all high level of student's valuelogic knowledge [13]. It means that more attention shall be paid to just valuelogic education of youth, constantly propogandizing healthy life style and following principle of medical prophylaxis.

Part of such measures has already been implemented by Ministry of education and health protection. There are annual medical prophylactic examinations of students, certain physical load has been envisaged by academic program on physical education; if required special health groups function; sport circles are available at higher educational establishments; innovative technologies of prophylaxis and treatment of scoliosis are implemented; valuelogic disciplines both in schools (as discipline of health protection) and in higher educational establishments is unified.

Alongside with it, it is necessary to realize searching of new forms of rehabilitation measures, to wider use means of physical rehabilitation for improvement of students' health, to pay more attention to medical-prophylactic aspect of rehabilitation measures.

3. Medical prophylactic aspect

Especially many problems appear in such young but very important branch as physical rehabilitation. Specialists in this sphere achieved significant success in grounding of physical factors' influence on state of supporting-motor system, on creation of new rehabilitation methodic. Though in modern rehabilitation of people with vertebral pathology there are some unsolved problems. For example system of recreational treatment of patients with clinical symptoms of such diseases shall be improved; insufficient attention is paid to psycho-somatic aspect of rehabilitation of patients with vertebral pathology; unified principles of manipulative backbone treatment shall be perfected; not always influence of ecological and social factors on progressing of a disease is considered [9; 11].

Only analyzing all complex of these problems it is possible to adequately create rehabilitation system for providing aid to population; system of prophylaxis and medical aid to patients with backbone problems.

In spite of the fact that min physical rehabilitation methods – therapeutic massage and therapeutic physical culture – have been applying for treatment of vertebrogenous pathology since ancient times, though as on to-day there is no such classification of backbone pathologies, which would permit to differentiate massage manipulations and carry out them individually and, thus, would satisfy demands of modern rehabilitation. Besides, there exist some disadvantages in application of manipulation techniques on vertebra-mobile segments in therapeutic massage.

By different data there are from fifteen to seventy rehabilitation methodic [12], oriented on work with patient's body, with it principles of rehabilitation work with patient are interpreted rather ambiguously. First of all it concerns psychological preparation of patient for physical rehabilitation. This part of rehabilitation specialist's work is very important. Because we know that 95% of diseases (statistic of WHPO) are connected with stresses [5; 9; 21, 22]; besides, pathology of supporting motor system is sill oftener admitted as adaptation syndrome. So, first psychological problem appears and only after it degenerative - destructive changes in vertebra-mobile segments start progressing.

Nowadays, both in medicine and in rehabilitation this problem is solved by prescribing of consultations with different profile specialists. It is undoubtedly that qualified recommendation is extremely important sometimes, but it could be maximally effective only if rehabilitation specialist has knowledge and practical experience in different branches of rehabilitation. He shall be not only aware of main means of physical rehabilitation (therapeutic physical culture, therapeutic massage, physic-therapy, mechanical therapy, labor therapy) but be skillful in psycho-correction and some psycho-therapeutic methodic. Psycho-correction, in our opinion, shall be carried out both on stage of psychological preparation for physical rehabilitation and directly at the stage of rehabilitation process with degenerative-destructive damages of backbone [9].

So, in physical rehabilitation integrative approach to personality shall be used, when first patient's psychological problem is solved and then functional disorders of backbone are corrected with the help of medical rehabilitation's physical factors. And only with insufficient effect medical therapy shall be used, because long-term and sometimes uncontrolled using of medicine can result in medical allergy and other adverse responses [5; 15; 21]. Only with integrative approach (with compulsory consideration of psycho-somatic factor) rehabilitation can be considered full-fledged.

Psycho-correction, in our opinion, shall be carried out both on stage of psychological preparation and directly in rehabilitation process. Also studying of new psycho-technologies (methodic of trans-personal psychology and so on) should be paid attention to.

Prophylaxis of neurological complications, conditioned by manipulations on backbone is very important. Analyzing reasons of complication we came to conclusion that significant quantity of them is connected with rough one-plane techniques of some kinds of massage and manual therapy (especially it concerns such techniques as tosses, strike methods) [3; 18]. From our point of view spiral-like movements in therapeutic massage and in manual therapy is the most physiological and shall be one of main acting factors of therapeutic process. Methodic of body-oriented therapy techniques of manual soft techniques (for example occipital release, cranio-sacral therapy), techniques of fine manual therapy shall be wider used. So, modern physical rehabilitation of students requires permanent searching of new forms of rehabilitation measures in case of backbone pathology. That is why rehabilitation science faces problems of development and implementation of system of measures, which would be capable to solve these problems on several levels.

Scientific researches, dealing with these problems, belong to different scientific branches. Researches in branch of valuelogy and correcting pedagogic are more oriented on educational element of physical culture and sports and physical rehabilitation, on working out of combined innovative technologies of training. This scientific direction is comparatively young but it has great potential. Researches in human physiology, physical and medical rehabilitation pay greater attention to grounding of physical factors' influence on supporting motor system, to creation of rehabilitation methodic [7; 9; 10; 16; 17]. Alongside with it in these branches there exist some unsolved problems.

Insufficient attention is paid to psycho-somatic aspect of rehabilitation; there are no unified principles of manipulation techniques' application on vertebra-mobile segments in therapeutic massage.

The mentioned problems in their complex can be solved only owing to integrative approaches to rehabilitation in general, which would consider both preventive direction of modern rehabilitation science and complex patho-genetic approach to treatment of different diseases and necessity to wider implement non-medical methods of diagnostics and therapy. Just the presence of these problems conditions need in searching of new integrative approach to rehabilitation and development of integrative model of not medical rehabilitation.

For example on the base of health-related rehabilitation technologies' laboratory at Institute of physical culture of Sumy pedagogic university, named after A.S. Makarenko we created peculiar health center, where we implemented in practice program of complex physical rehabilitation of higher educational establishments' students with pathologies of backbone [8]. We have developed and grounded complex program of pedagogic correction and physical rehabilitation of students with backbone pathology, which, correcting students' intellectual sphere and psycho-somatic state, also improves their health's state, increase effectiveness of recreational treatment of such backbone pathologies, rises level of valuelogy knowledge, students' life quality. In this program we for the first time have offered structural model of students' valuelogic training and fulfillment of rehabilitation measures; we have developed algorithm of differentiated application of pedagogic correction, psycho-correction, therapeutic massage, manual therapy and therapeutic physical culture depending on certain psychological characteristics and specificities of nervous system; we have applied improved methodic of psycho-correction in the process of students' physical rehabilitation. The laboratory was equipped with modern medical diagnostic instrumentation, with specially worked out computer programs of diagnostic of students psycho-somatic state with highly qualified staff. It permitted rather quickly to rearrange psycho-diagnostic, early diagnostic of supporting-motor system's diseases and visceral pathologies, to scientifically ground purposefulness of application of improved rehabilitation methodic of complex rehabilitation system during medical examination of 67 students of 19-20 years old age, who had neurological symptoms of osteochondrosis of 1st degree. For example with 29 (87.8%) of patients from main group, to whom innovative rehabilitation system was applied, there was registered high effectiveness of rehabilitation by integral indicators, which included complete clinical recovery, high indicators of valuelogical knowledge, level of health and life quality; besides, we registered steady positive results of rehabilitation. In control group, in which we used traditional therapeutic massage without complex program of physical rehabilitation for students with backbone pathology, we registered the same positive results only with 22 students (64.7%) and it is by 23.1% lower than results of main group (statistically significant difference, $p < 0.05$).

Analysis of urgent problems of physical rehabilitation resulted in certain conclusions.

Conclusions:

1. Analysis of urgent problems of physical rehabilitation of students with vertebrogenous pathology permitted to mark out three main aspects of this problem: organizational-methodic; health related or valuelogic; medical – preventive. Just such classification of aspects permits to determine main parts of rehabilitation systems, oriented on youth's health improvement.

2. The most optimal way to solution of these problems is searching of new integrative approaches to rehabilitation and working out of integrative model of non medical rehabilitation.

3. Development and implementation of integrative rehabilitation programs facilitate optimization of health-related rehabilitation technologies in process of complex physical rehabilitation at higher educational establishments.

For example, combined application of pedagogic and psychological correction methods as well as means of students' physical rehabilitation shall increase effectiveness of rehabilitation measures (on example of program of complex physical rehabilitation of students with backbone pathologies at SSPU, named after A.S. Makarenko).

The prospects of further researches implies development of integrative rehabilitation systems, which would influence simultaneously on psychological sphere and backbone's functional state and other factors of its diseases' progressing. Considering analyzed above aspects of physical rehabilitation (organizational-methodic, health-related or valuelogic, medical preventive), in our opinion, this topic has scientific foundation, ensures improvement of rehabilitation methodic effectiveness and is rather promising for physical rehabilitation of all population strata.

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DETERMINING THE ATTITUDE OF MIDDLE SCHOOL STUDENTS TO THE PHYSICAL EXERCISES IN THE STUDY OF THE VARIOUS SECTIONS OF THE PROGRAM

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Annotation. *Purpose:* to consider the ratio of students of the middle classes to the game, to the competition, to the implementation of the training exercises, putting educational standards while studying athletics, football, basketball, volleyball and gymnastics. *Material:* a sociological survey involved 229 students' grades 5-9 secondary schools of Kherson region, Novotroitsk district. *Results:* set a high level of interest to students of all classes of gaming method of training on physical training lessons, except gymnastics, the re-studying volleyball, basketball, competitive learning athletics, football, controlling the lessons volleyball, basketball. *Conclusion:* there is no clear game system for learning students gymnastic exercises and the study of other subjects is not enough, poor quality or missing their use during the execution of training exercises to learn techniques and tactics.

Keywords: *method, games, educational institution, motivation*

Introduction

The curriculum is one of the main documents at school. It defines the maintenance and volume of knowledge, skills from a subject, the maintenance of sections and that with their distribution behind years of training [3]. Throughout 1920-1990 school programs on physical training varied depending on political changes in the country and the world. These circumstances became the reason of change of school programs from the military man to sports, and then to a mass direction. In modern conditions occurs directions of the purposes of programs towards an improving orientation [4]. Scientists and teachers see the future prospect of school physical training in change of its main objective on formation of physical training of the person of schoolboys, and also creation in general educational institutions corresponding the physical training and educational environment, in which each subject of pedagogical process (pupils, teachers, parents) will be conscious and its active participant [13]. According to Hohlova L.A. [12] who investigated the relation of pupils to estimations at physical training lessons, it is necessary to create conditions for objective, fair system estimations which will have besides an incentive component, it is possible by complex estimation knowledge, abilities, practical skills which are connected with formation of health of schoolboys [12]. The relation to a technique of teaching and a program material it was not studied. Conscious and voluntary increase of physical readiness of the individual is connected with motivation which the set of factors influences. The organization and a physical training technique at school – basic elements which influence interest to employment. The revealed century features of the relation of schoolboys to physical training process at school testify to necessity of completion of programs on physical training in a direction of their adequacy to age and sexual requirements, motives and interests of schoolboys and the differentiated approach which will promote increase of their motivation to employment by physical exercises at lessons [1].

Purpose, tasks of the work, material and methods

Proceeding from requirements to a modern lesson of physical training: maintenance of the differentiated approach to the organization of educational process taking into account a state of health, level of physical development, impellent readiness and a floor of pupils, the account of motives and interests of pupils to employment by physical exercises; achievement of optimum impellent activity of all pupils throughout each lesson [11], – an objective of this research are findings – out of the importance of methods of game, competition, repeated, control at lessons of physical training of different sections of the program and influence on desire to be engaged in physical training of pupils of general educational institutions of the Kherson area of Novotroitsk region.

Research technique. To solve the put problems in 2010-2011 the researcher of the Kharkov state academy it has been spent special sociological interrogation of pupils of general educational institutions of the Kherson area of Novotroitsk region. Pupils of 5-9 classes have been interrogated. In the course of interrogation the questionnaire of open type was used. It contained questions which have helped to find out the relation of pupils to factors which define motivational stimulus to employment. Pupils answered each question – «yes and not». In the course of processing of questionnaires were defined in percentage quantity of pupils which chose the affirmative answer (yes), negative (not). The relation of pupils behind a class in which they study was defined. Definition is made in percentage depending on quantity of interrogated children in each class on such sections: track and field athletics, football, gymnastics, basketball, volleyball. Each question opens desire to carry out a problem or on the contrary. Quantity of the interrogated pupils: 5 classes – 33, 6 classes – 31, 7 classes – 49, 8 classes – 64, 9 classes – 52, all – 229.

Results.

Results of research are brought to table 1. At track and field athletics studying positive results are received: to take part in relay races of 81 %, 86 %, 78 %, 83 %; the highest results – to play outdoor games of 93 %, 99 %, 92 %, 97 %, 95 %. A number of authors to concept of game is united also by relay races. Though interrogation of pupils has shown about difference of their relation. The games which maintenance is made by different kinds of run, jumps, a throwing and other movements are called as mobile. Mobile game develops the child, but, unlike physical exercises, does not bother it thanks to the interesting character. There are many outdoor games which help to develop qualities and habits, to solve a problem, specific to track and field athletics. One games promote education of speed of reaction, help to improve techniques of start or a kick, others directed basically on run development on turn, run with stick transfer, etc. Besides, the most productive way of formation of the qualities necessary for productive collective work, is a game modeling of situations of the general activity where they will be shown [8]. Impellent games always among interests of each child. Continuing thought in this direction, it is necessary to tell, that attempt to connect game with other subject, for example, with physics increases active participation of pupils, training to a theoretical subject passes with satisfaction. This activity adds the important visual supervision in association with memory of muscles. In the given association of knowledge of simple laws of physics will help pupils to realize the main aspects of safety precautions and preservation of health during employment by impellent activity. That is, than running start, collision, falling, not performance of elementary rules of games [2] can end. Mobile game has great value for improving development of any person. In impellent activity there are positive changes in development of a brain and organism functioning. To the roots in biological aspects of a life game is connected also with cultural aspects of human development, can promote the general physical preparation in any age [1].

But use of outdoor games not always pertinently. Strong emotional lifting stirs to an attention concentration on quality of performance of exercise. Therefore use of games, exercises which bring to children pleasure, satisfaction (jumping, exercises with claps in palms etc.) before learning of techniques of movements is inexpedient. Performance of exercises of the competitive, game form is better for planning for the end of a lesson and in a case before learning of techniques of exercises because arising in schoolboys in the course of competition to companions emotional excitation, owning inertness, will interfere with concentration of attention on the technician of movements, and the movements will make impulsive, sharp [6]. And with reusable repetition it is possible to interest mastering process, consolidation of certain movement by means of mobile, approached to sports, changing the purposes: on quality of performance, smoothness, accuracy, speed, endurance, etc.

At studying of kinds of gymnastics of desire to take part in relay races every year decreases. The motivation decreases to performance of training exercises, delivery of specifications. Gymnastics teaching requires searches of new methods for motivation increase to employment. There is no accurate system of games for training to gymnastic exercises at pupils of 5-6 classes, integrally connected with the program material, directed on development of the impellent abilities necessary for qualitative mastering technicians of gymnastic exercises. And application of a game method promotes training improvement of quality, improvement of physical readiness of schoolboys. Introduction of a game method in educational process on physical training is positively displayed on the relation of pupils of 5-9 classes to lessons with a gymnastic orientation [5].

At volleyball studying the highest results: to play [2] approached to sports game 87 %, 99 %, 82 %, 97 %, 91 %. To hand over specifications in 5, 6, 8 classes contains on high level, in 7, 9 classes the motivation decreases. To carry out training exercises 84 %, 92 %, 80 %, 91 % contain approximately at one level of. Approached to sports games in preparation of young volleyball players find more and more and application. Beginners cannot quickly seize the basic techniques, game in volleyball for them in the beginning the excessive. As a result interest to employment decreases. Invaluable advantage approached to the sports directed on development of physical qualities and improvement of elements technicians [7].

Studying football to take part in competitions of desire of pupils 81 %, 77 %, 68 %, 75 %, 74 % contain at level of; to play approached to sports games at level of 78 %, 64 %, 72 %, 62 %, 78 %. The motivation decreases every year training to performance of training exercises, performance of specifications. Integral making the joint preparations of young football players also are educational and outdoor games. Their use allows to solve qualitatively different informative, educational, educational, control, improving problems, promotes transformation of the differentiated training effects in productivity of game and competitive actions [9].

Table 1

Indicators of the relation of pupils of middle classes to training methods in %.

Sections of the program		5classes in percent		6classes in percent		7classes in percent		8classes in percent		9 classes in percent	
I. Track and field athletics	Gymnastics	Light athletics	Gymnastics	Light athletics	Gymnastics	Light athletics	Gymnastics	Light athletics	Gymnastics	Light athletics	Gymnastics
Likes:											
1. to execute of training exercises (the repetition for assimilation of the technology)?		100	90	86	81	74	70	69	74	78	59
2. execute checking exercises?		87	72	90	77	80	64	54	58	78	53
3. to take part in relay races?	1. to take part in relay races?	81	90	86	86	78	70	83	74	68	61
4. to compete?		87		83		74		78		65	
5.to play in outdoor games?		93		99		92		98		95	
The football, basketball. Likes:		football	basketball	football	basketball	football	basketball	football	basketball	football	basketball
1.execute of training exercises?		87	90	80	73	68	74	78	75	72	76
2. execute checking exercises?		90	84	86	80	74	70	78	83	72	70
3. to take part in relay races?		93	84	86	80	60	68	67	66	68	78
4. to compete?		81	75	77	74	68	62	75	69	74	70
5. to play in approached to sports game?		78	90	64	90	72	84	62	84	78	85
III. The volleyball. Likes:											
1.execute of training exercises?		84		92, 8		80		91, 2		70, 3	
2. execute checking exercises?		84		80		70		83, 2		70, 3	
3. to take part in relay races?		75		86, 4		70		84, 8		70, 3	
4. to compete?		81		80		74		94, 4		68, 4	
5.to play approached to sports game?		87		99, 2		82		97, 6		91, 2	

At basketball studying the highest indicator of motivation – to play approached to sports game 90 %, 90 %, 84 %, 84 %. 85 %. The desire to carry out training exercises contains within 90 %, 73 %, 74 %, 75 %. 76 %, to hand over educational specifications of 84 %, 80 %, 70 %, 83 %, 70 %.

The analysis of result of interrogation has shown, that the motivation decreases every year to delivery of specifications. It is probable, that the operating monitoring system on level of physical readiness of schoolboys which is based on results in impellent tests, does not consider complexity of achievement by children of standard results through their individual, morphological, functional, psychological and constitutional features. Accessible norms which answer individual possibilities of an organism of each child should become criteria of an estimation of physical readiness of schoolboys. Use of norms which consider availability and individualization principles, in the monitoring system behind physical readiness, will promote replacement of priorities in the course of school physical training from the is authoritative-conservative person on orientation. The scientific substantiation and working out of accessible specifications of physical readiness of children is actual aspect of improvement of process of school physical training [10]. Control exercises which will consider principles of availability and individualization in the monitoring system of physical readiness of pupils, will promote as well to motivation to performance of specifications.

Conclusions.

1. High level of motivation in track and field athletics to play outdoor games, in volleyball – in approached to sports games, in basketball – in approached to sports, in football participation in competitions and outdoor games. The game method of carrying out of a part of a lesson more all is pleasant to pupils of comprehensive schools. At skilful to

application of outdoor games and approached to sports employment in process, interest to them is stored throughout all period of training that has proved interrogation of pupils. Transition of pupils from an elementary school to average, from outdoor games to sports, not always passes qualitatively. Mobile, approached to sports games this that link which connects this transition, is not enough to use of it means to bring to nothing motivation of schoolboys to physical training lessons.

2. During studying of volleyball, basketball to hand over specifications in 5, 6, 8 classes contains on high level, in 7, 9 classes the motivation decreases. Reception of specifications requires search of new methods, approaches and forms. Norms which consider principles of availability and an individualization in the monitoring system of physical readiness of pupils, will promote as well to motivation to performance of specifications.

3. Pupils have high level of motivation to performance of training exercises during employment by volleyball and basketball which contains throughout 5 years of training. Results have shown about not sufficient, not qualitative or not use in track and field athletics, gymnastics, football during performance of training exercises for studying of techniques, tactics mobile and approached to sports.

In prospects further studying is planned to find out the relation of parents and teachers to estimation at physical training lessons.

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STATUS INDICATORS OF FORMATION OF PATRIOTIC EDUCATION OF FUTURE TEACHERS OF PHYSICAL CULTURE

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Annotation. *Purpose:* to examine the formation of the system components of patriotic education of students. *Material:* the study involved 324 students of the first, third and fifth courses of National University. *Results:* the components of extracurricular activities and their relation with indicators of patriotic education are studied. Determined that the majority of students indicate the relevance and the need to implement the content of patriotic perspective, as well as patriotic educational activities. Determined that the implementation of the tasks of patriotic education is due to the specifics of the departments of the University. Focuses on the need to develop a system to introduce patriotic education in extracurricular activities. *Conclusions:* the training and educational system must have an integrated personality-developing character and to foster world students shape their patriotic outlook.

Keywords: *performance, components, students, forming system, physical culture, patriotic, education.*

Introduction

Experimental research of the system of patriotic education of future teachers of physical culture in extracurricular activity was carried out from the position which was set by an experimental way in content-structural components of extracurricular activity of future teachers of physical culture in the context of realization of principles of patriotic education [3,6].

A problem of forming of physical culture as a component of the students' personality of future teachers of physical culture is difficult enough and ambiguous in understanding by the future specialists of physical culture as our research showed. This problem has a considerable attention in a context of realization of tasks of patriotic education and formation next to the personal quality of awareness by a student of physical culture its patriotic direction [4,5].

Special value has the fact that in accordance with our observation the problem of forming of physical culture, in particular, its personal and generally developmental aspects are sufficiently at a low level. Observations in relation to introduction of the extracurricular tasks showed, that this form of activity is carried out unsystematically within the students of the future specialists of physical culture. Thus, in most cases, extracurricular activities have a standardized, casual character and the quality of their realization from the side of teachers of physical culture and implementation from the side of students in its realization are at low not enough skilled level [1,2].

Purpose, tasks of the work, material and methods

The aim of the article is to set the level of forming indexes of the system of students' patriotic education. To learn the components of extracurricular work and their correlation with the indexes of patriotic education.

The following *objectives* came forward on this stage of research: the establishment of levels of formed indexes of the system of students' patriotic education who get the speciality of teacher of physical culture; technologies of patriotic direction of psychological-pedagogic character and organizational methodical conditions of organization of patriotic education of future teachers of physical culture. Thus, the achievement of set objectives and their specification confirms our supposition that technologies of forming of patriotic direction and creation of organizational-methodical conditions on organization of patriotic education of future teachers of physical culture are integrated in methodical and content components, psychological-pedagogical technologies are seen in personally developed, patriotically positioned and physically health-improved components.

Results of the research

Established experiment of the research of organizationally methodical, psychological-pedagogical and patriotic integrational technologies was carried out during three years among the students of Cherkasy national university named after Bohdan Khmelnyckij.

State of formed and displayed methodical component of realization of principles of patriotic education of future teachers of physical culture in an extracurricular activity was determined by an observation, questionnaire, analysis of products of students' activity who study, testing, conversation.

State of formed and realization of content component was determined by the analyses of curricula and programs from basic courses and disciplines, which are realized in educational activity of students as well as within the limits of extracurricular activity.

State of formed personality developing component was determined by the analyses of products of students' activity, observation, conversation and questionnaire.

State of formed patriotically positioned component was determined by the analyses of products of students' activity, questionnaire and observation.

State of formed physically health-improvement component was determined by the analysis of the existing means of realization of forms and types of physical activity in an extracurricular process in the preparation of the students of future teachers of physical culture, analysis of products of students' activity, conversation, questionnaire.

Established stage of the research covered the determination of formed level and realization of components of model realization of principles of patriotic education in extracurricular activity of future teachers of physical culture. The following methods of research were applied:

- observation: searching, periodic, single, opened, laboratory in natural conditions;
- open-ended interview with application of direct, indirect and proactive questions;
- analysis of products of students' activity (descriptions on patriotic issues, solving of tasks on the patriotic projected situations, participating of students in organization of sporting health-improvement events with application of facilities of the Ukrainian physical culture, participation of students in organization of competitions with application of the system of facilities of the Ukrainian physical culture);
- questionnaire, in particular, the questionnaires were offered on a theme of personal attitude and relation of the questioned students toward the problem of patriotic education, determination of attitude and levels of awareness and understanding of patriotic aspects in realization of tasks of physical culture, attitude to patriotic education as basic constituent of extracurricular activity of students of future teachers of physical culture.

Looking after the students of experimental and control groups in the process of their lectures, seminars within the limits of educational process, implementation of tasks on patriotic issues during independent work, participation in patriotically orientated events within the limits of faculty as well as within the limits of all university in extracurricular activity, and also participating in section grouped, sporting competitions and health-improvement-athletic events showed insufficient formation of personal-entertaining, patriotically positioned and athletic-health-improved components. Special attention was paid to the state of formed of methodical and content components, so as their realization in the context of realization of tasks of patriotic education in extracurricular activity remains on a rather low methodical and organizational levels. The received results of observation were confirmed by the received results of questionnaire of the questioned students and through conversations with them.

Conversations which were conducted within the limits of established research with students were directed on the establishment of:

- students' understanding of essence of patriotic education and essence of patriotism in general, and also role of patriotic education in preparation of future teachers of physical culture;
- the display of the formed presentations and state of their realization in relation to an object and subject of patriotism, its kinds on directions, which must be realized in extracurricular preparation of future specialists;
- places and roles of patriotic education in the system of professional extracurricular preparation of future teachers of physical culture.

Research enabled to define that 74% of questioned students of control group and 69% of questioned students of experimental group specified on an appropriateness and necessity of introduction of patriotic issues and, in general, pedagogical activity of patriotic direction within the limits of extracurricular activity in the institute of higher education. The questioned students realize and understand the value of principal items of patriotic education such as: patriotism, citizenship, patriotic position, responsibility, obligation, call of patriotic Motherland and people's duty. In general, the questioned students found out the readiness to realization of patriotic education within the limits of extracurricular activity in the institute of higher education.

In relation to the establishment of the state of subjectivity in realization of principles of patriotic education, which is structurally presented in personal developing and patriotically position components, 62% of probed in control group and 56% of probed in experimental group determine themselves as subjects from whom the progress of realization of patriotically orientated technologies in the process of realization of extracurricular activity and process of educational-professional preparations depend. 20% of probed in experimental group and 17% of probed in control group specified that subjective position in relation to realization of tasks of patriotic education was stipulated by the specific activity of departments of the university, which carry out direct professional preparation, and activity, from this perspective in the university in general. Thus attention was accented on prominent position in realization of tasks of patriotic education by the university; in particular within the limits of extracurricular activity 19% of probed in experimental group and 11% in control group. Thus 10% of probed in control group and 5% in experimental group have never thought about the problems of patriotic education and their realization in extracurricular activity.

Analysis of answers, which were received in the conducted conversation allows to specify that the majority of students realize and understand the necessity of realization of tasks of patriotic education within the limits of studies in the institute of higher education directly in an educational process, as well as in an extracurricular activity and, at the same time, they occupy passive position, in most cases, in practical embodiment of these principles of such activity. They do not show activity in the conducting of specially organized events on realization of tasks of patriotic issues and do not display independence in this aspect.

Thus, due to the received experimental results in relation to formed methodical, content, personally developed, patriotically positioned and physically health-improved components of realization of patriotic education in extracurricular activity as a result of the inculcated experimental methods the following aspects were set (tabl1.).

Table 1

A comparative analysis of the formed indexes of patriotic education among the future teachers of physical education

№	Components of extracurricular activity	Indexes of patriotic education	Questioned in % (n-70)	
			Control group	Experimental group
1.	Methodical	Organizationally-methodical	68	59
2.	Content	Gnoseological	54	51
3.	Personally developed	Motivationally-creative	49	47
4.	Patriotically positioned	Valued	48	43
5.	Physically health-improved	Ethnophysical	35	28

The conducted experimental research enabled by an experimental way to define the indexes of patriotic education, which are realized with the help of the components of extracurricular activity. Thus, due to the received results 68% of probed in control group and 59% of probed in experimental group specified that patriotic education must be realized within the limits of activity of some departments as well as the university, in general and, that patriotic technologies must be organized and content presented in every extracurricular definite event. 54% of probed in control group and 51% of probed in experimental group specified on the necessity to create additional extracurricular events as to the understanding of this or that principle of patriotic education, its maintenance and role in the modern system of society development and their professional preparation, so the question is about thegnoseological or cognitive aspect of realization of patriotic education within the limits of extracurricular activity.

Conclusions.

Thus, it is possible to specify that research of components of extracurricular work and their correlation with the indexes of patriotic education is rather problematic in the aspect of awareness and understanding by the probed students the essence and role of patriotic education which is realized directly in educational and physically health-improved technologies. The given aspect specifies on the necessity of development of the system of introduction of patriotic education in the extracurricular activity which would have a personally-developed character and would forward an expansion of not only personal world view of the probed students but also the formation of patriotic world view.

Perspectives of further development is to conduct the more detailed research on the problem of forming of students' physical culture in the system of extracurricular work.

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METHOD OF MOTOR FUNCTION RECOVERY IN PATIENTS WITH MUSCLE SPASTICITY AFTER STROKE

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Annotation. *Purpose:* to prove the effectiveness of an innovative method of recovery of motor function of persons with spasticity after stroke. *Material:* in the experiment involved 26 patients aged 45-68 years who have had an ischemic stroke, a period of illness from 6 months to 5 years. *Results:* the analysis of specialized literature on the problem of reduced mobility due to spasticity confirms that spastic muscle condition after stroke significantly reduces the possibility of movement after stroke. The results of applying the method of recovery of motor function of persons with post-stroke spasticity of the muscles, which is based on the use of the second phase of post isometric relaxation - passive stretching muscles after heat-treatment procedures. This study confirms the high efficiency of this method for reducing pain in the shoulder and restore motor function of persons with spasticity after stroke. *Conclusions:* the implementation of the proposed method of recovery of motor function of persons with spasticity of muscles can increase the amplitude of the active movements of the shoulder and elbow joints, and, consequently, improve motor function in patients after stroke.

Keywords: *ischemic stroke, spasticity, motor function.*

Introduction

The problem of cerebral brain attack is rather urgent in connection with its great prevalence, high mortality and resulting in disablement. Brain attack is third by frequency reason of death and one of main reasons of disablement in most of developed countries of Europe and USA as well as in Ukraine [3; 8]. The third part of people, who suffered from brain attack, is persons of workable age; only every fifth patient recovers workability. Full professional rehabilitation is achieved only in 8% of cases [2; 4; 11; 15].

After brain attack nearly 85% have motion disorders [9; 13; 14].

$\frac{3}{4}$ of patients have disorders of motion function in acute period. 1 month after brain attack only 55% can freely move, after 2 month – nearly 80%. After half of year steady motion effect is preserved at 53% of patients, who suffered from brain attack [4; 8]. For some patients significant contribution in limitation of life activity is made by high muscular tonus (spasticity), treatment of which shall be regarded in context of obvious disorders and aims of rehabilitation [11].

During first three months after brain attack muscular tonus is increasing in limbs and, though at first stage light or moderate spasticity takes place in extensors of lower limbs would even facilitate rehabilitation of walking function, then in most cases this progressing increasing of tonus would result in appearance of muscular contractions, combined with periodic pain attacks of muscular spasms. Then trophic changes take place in limbs' joints and joint contractions happen. Spasticity of muscles is rather significant obstacle in rehabilitation of motion functions and results in loosing of workability, skills of self-servicing and sharply decreases quality of life of patients, who suffered from brain attack [5; 10; 12]. Battle with spasticity of muscles, recreation of normal muscular tonus is important and necessary component of motion rehabilitation of patients, who suffered from brain attack [11].

The following method of muscular spasticity's treatment with the help of post-isometric relaxation is well known; it consists of two phases, which alternates 5-6 times: first isometric contraction of muscles shall be fulfilled on inhale during 8-10 seconds with the help of light resistance in direction, opposite to muscle's contraction; then – passive stretching of muscle at exhale during 10-20 seconds [1].

However, this method can not be used with expressed muscular spasticity, because it shall be fulfilled in phase of muscle's contracting that is possible only with very light spasm; contraction of muscle and retention of this phase during 8-10 seconds results in steady pain syndrome and facilitates further progressing of spasticity.

One of effective directions of rehabilitation of patients with spasticity is application of physical therapy methods. Treatment with warm for reducing of muscular hyper-tonus is applied practically for all patients with post-brain attack spastic paresis. Positive influence on spastic hyper tonus was registered with using of mud treatment, wax – treatment. In this methodic favorable effect on muscular tonus is connected with deep heating of tissues. Disadvantage of this method is in limited duration of clinical effect: from several hours to several days [6; 7].

In spite of using modern, in our time, complexes of rehabilitation treatment in different periods of brain attack, often they result only in adaptation of patient to present defects but not in their elimination [9].

Effectiveness of traditional methods of motion function's rehabilitation with pathology of central motor-neuron is especially low in late recreational and residual periods of disease [7]. Creation of new rehabilitation methods, oriented on liquidation of muscular spasticity and recreation of motion function, especially in late periods after brain attack, is highly urgent [10].

The researches have been fulfilled in compliance with combined plan of physical rehabilitation department of SHEE UzhNU "Up to date technologies in physical rehabilitation, evaluation of life quality of different population

strata with diseases of internal organs and organism's systems and supporting motor systems", state registration number 0111U001870.

Purpose, tasks of the work, material and methods

The purpose of the research is determination of effectiveness of worked out by us method of motion function's rehabilitation of patients with muscular spasticity after brain attack.

The methods and organization of the research: 26 patients of 45-68 years old age participated in the research. These persons were on rehabilitation treatment in Center of social protection of Vinogradov's population during three weeks. All patients suffered from ischemic brain attack with period of disease from 6 months to 5 years. All patients had increased tonus in limbs' muscles.

The patients were divided in two groups: main (13 persons) and comparative (13 persons).

The methods of control. Pain and constraint in shoulder is rather frequent with brain attack complication. Pain in shoulder is an obstacle in patients' rehabilitation and prolongs rehabilitation process. Pain and restricted amplitude of shoulder motion is an obstacle for self-servicing, worsens balance, and make moving more difficult. That is why for determination of our method's effectiveness for persons with muscular spasticity after brain attack we carried out testing, which included: determination of amplitude of active movement in shoulder and elbow joints and determination of pain degree by seven-points' scale.

The methods of rehabilitation. Patients of both groups were on complex rehabilitation treatment, which included treatment position, physical exercises in form of complex of therapeutic gymnastics, warm therapy of big joints of affected limbs and massage. Patients of main groups, after procedure of warm therapy also stretched muscles with spasms by the offered method: after locating of a limb in comfortable position, facilitating relaxation of muscles with spasms, patients fulfilled passive exercises, because patient can not fulfill active movements with maximal amplitude independently. Considering the fact that the length of muscle with spasm is shortened there shall be fulfilled exercise for stretching, which increase the length of the muscle and ensures by reflex its relaxation; turns of waist or foot during exercise create direction of physiological motion of muscle with spasm by bio-mechanic of movement, facilitating its even stretching and recreation of physiological tonus. Fulfillment of exercise on exhale creates conditions of reflexive muscle's relaxation and muscle's adaptation to "healthy" state, preventing from progressing of spasm. Exercises shall be fulfilled up to feeling of stretching and disappearance of steady pain syndrome and limb's trauma. 20-30 minutes of a session permit repeat exercise several times, increasing unbending angle in joint of limb with spasm at the account of gradual increasing of muscle's length and its relaxation.

Results of the research

In table 1 we presented tested indicators of pain degree in shoulder and amplitude of active movements in shoulder and elbow joints with primary examination.

Table 1

Comparing of tested indicators of main and control groups before and after research

Parameter	Main group (n=13)	Comparative group (n=13)	Stjudent's criterion
value	M±m	M±m	t
parameter	Pain in shoulder, points		
value	4.31±0.34	3.77±0.38	1.06
parameter	Amplitude of active bending of shoulder, degrees		
value	44.08±2.24	41.23±2.59	0.83
parameter	Amplitude of active moving shoulder aside, degrees		
value	43.38±2.59	46.15±0.90	1.01
parameter	Amplitude of active bending of forearm, degrees		
value	67.08±5.17	73.17±2.10	1.09
parameter	Amplitude of active unbending of forearm, degrees		
value	79.69±2.89	83.62±2.38	1.05

From data, presented in 6table 1 we can make conclusion that the tested from main and control groups had no statistical difference at primary examination (p>0.05).

Changes in the tested indicators of main and control groups' indicators are given in table 2.

Table 2

Dynamic of tested indicators of main and control groups

parameter	Main group (n=13)			Comparative group (n=13)		
	Primary examination	After rehabilitation	Stjudent's criterion	Primary examination	After rehabilitation	Stjudent's criterion
value	M±m	M±m	t	M±m	M±m	t
parameter	Pain in shoulder, points					
value	4.31±0.34	5.46±0.25	2.72	3.77±0.38	4.69±0.27	1.99
parameter	Amplitude of active bending of shoulder, degrees					
value	44.08±2.24	55.00±2.64	3.15	41.23±2.59	48.15±2.08	2.08

parameter	Amplitude of active moving shoulder aside, degrees					
value	43.38±2.59	53.38±1.93	3.10	46.15±0.90	49.00±1.02	2.09
parameter	Amplitude of active bending of forearm, degrees					
value	67.08±5.17	90.50±5.18	3.20	73.17±2.10	79.00±2.01	2.01
parameter	Amplitude of active unbending of forearm, degrees					
value	79.69±2.89	83.62±2.38	2.85	69.69±1.99	76.46±2.55	2.05

The research showed that in main and control groups the following dynamics of indicators' change had been by the end of training course:

- indicator of pain degree in shoulder (be seven-points' scale) in main and control groups confidently increases, but in main group this indicator increases by greater value and, so, pain in shoulder reduces more substantially;
- indicators of goniometry in shoulder and elbow in main and comparative groups confidently improve, but in main group improvements were more substantial. It means that patients of main groups can fulfill active movements in tested joints with greater amplitude than in control group.

In table 3 we presented differences in change of tested indicators between main and comparative groups.

Table 3

Differences between indicators of main and comparative groups after research

Parameter	Main group (n=12)	Comparative group (n=12)	Stjudent's criterion
value	M±m	M±m	t
Parameter	Pain in shoulder, points		
value	5.46±0.25	4.69±0.27	2.06
Parameter	Amplitude of active bending of shoulder, degrees		
value	55.00±2.64	48.15±2.08	2.04
Parameter	Amplitude of active moving shoulder aside, degrees		
value	53.38±1.93	49.00±1.02	2.01
Parameter	Amplitude of active bending of forearm, degrees		
value	90.50±5.18	79.00±2.01	2.07
Parameter	Amplitude of active unbending of forearm, degrees		
value	83.62±2.38	76.46±2.55	2.09

Analysis of table 3 showed that:

- indicator of pain degree in shoulder (be seven points' scale) in main group is confidently higher in respect to comparative group's patients;
- indicators of goniometry in shoulder and elbow joints are confidently greater in respect to comparative group's patients.

The research showed that at the end of the research there was confident positive dynamic of the tested indicators between main and comparative groups.

Conclusions:

Application of existing in our time complexes of rehabilitation treatment after brain attack often are little effective in late rehabilitation and residual periods after brain attack and often result only in adaptation of a patient to defects but not to liquidation of them. The research showed that application of offered method of stretching of muscles with spasms after heat treatment significantly reduces pain in shoulder of patients after ischemic brain attack. Application of the offered method of motion functions' rehabilitation of persons with spastic muscles permits to increase amplitude of movements in shoulder and elbow joints and that is why improve motion function of patients after brain attack.

Further researches will be oriented on determination of influence of the offered methodic on rehabilitation of motion functions of sportsmen with traumas.

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The electronic version of this article is the complete one and can be found online at: <http://www.sportpedagogy.org.ua/html/arhive-e.html>

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INFLUENCE OF BREATHING EXERCISES USING METHOD OF BODY FLEX BY GREER CHILDERS ON TO THE SELECTED SOMATIC TRAITS OF WOMEN WITH OVERWEIGHT AND OBESITY

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Annotation. *Introduction.* Overweight and obesity are without any doubts an epidemic of our times, resulting from a change in the living style of the people. Majority of the people reduces the physical activity to the minimum, because of the lack of time they have after the work. That is why we are attacked from time to time by various publications about miraculous methods how to throw away an excessive body weight. In this work is made a close investigation of the method of Greer Childers "Body Flex", which has become very popular among other in the United States and in Russia, because of the simplicity of exercises to be done and the short time necessary to perform them. The essence of exercises of "Body Flex" type are the breathing exercises connected with isometric and stretching exercising. The main stress is applied to the lower breathing path with keeping the abdominal muscles tone as well as adding the posture muscles operations, what is as consequence to reduce the body weight, selected body circumferences and to strengthen the muscles exercised. *Purpose:* The aim of presented work was the comparative assessment of the selected somatic traits of the persons making regularly exercises, at least 5 times a week, using the modified "Body Flex" method as well as the assessment of effectiveness of the application of those exercises. *Material and methods:* The examination has covered a group of 25 persons, which was women in the age range 36 – 63, average age amounted to $58,45 \pm 8,92$ years, including 16 persons of them constituting the tested group and 9 persons being a control group, which has not made regular exercises. In the tested group was separated: 4 persons' group of women with BMI indicating their obesity, 8 persons' group of women with BMI indicating overweight and 4 persons' group of women with BMI within the limits of the norm. Before and after 1 month's, and for 9 persons – after 2 months' therapy, their BMI index, weight, circumference of waist, hips, circumferences: UI, UII, GI, GII and RI. *Results:* In the tested group, BMI of the subgroup of women with obesity before the exercises having been applied, amounted to 34.50 ± 3.48 on the average, after 1 month 34.07 ± 3.18 kg/m², after 2 months 31.80 ± 6.93 kg/m²; BMI of the subgroup of women with overweight before the exercises having been applied, amounted to 27.67 ± 1.26 kg/m², after 1 month 27.46 ± 1.16 kg/m², after 2 months 27.11 ± 3.45 kg/m²; BMI of the subgroup of women within the norm before the exercises having been applied, amounted to 23.26 ± 1.32 kg/m² on the average, after 1 month 23.36 ± 1.31 kg/m², after 2 months $23.1 \pm$. And in the control group, BMI of the subgroup of women with obesity amounted to $33.37 \pm (+/-0.79)$, after 1 month $33.10 \pm (+/-0.84)$, for the subgroup of women with overweight amounted to $28.25 \pm (+/-0.70)$, after 1 month $28.14 \pm (+/-0.58)$. *Conclusions:* Results obtained both in the tested group and in the control group allow stating that exercises done using the modified method Body Flex have reduced BMI values and the more substantial difference was found in the tested group.

Key words: overweight, obesity, breathing exercises, Body Flex, BMI.

Introduction

As per data of WHPO in February 2010 prevalence of obesity reached epidemic scales in the whole world; at least 2.6 million people die every year because of excessive weight or obesity [6, 7]. The problem of obesity in the world has been becoming aggravating since 1980. In 2008 1.5 billion people of age more than 20 years, had excessive weight. From them more than 200 million of men and nearly 300 million of women suffer from obesity. Today's statistic scares: 65% of world population lives in countries, where excessive weight and obesity kill more people than starvation.

In the last year level of physical functioning, especially of urban population, significantly reduced in spite of great effort of medical workers and specialists in field of physical culture and physiatrists in polarizing of physical loads as therapeutic mean [7]. Reducing of physical functioning is considered to be the forth from the most important risk factors, which are the reasons of mortality in global scale (its share is 6% from total quantity of deaths in the world); at the same time 5% is taken by excessive weight and obesity [7].

It was proved that regular physical functioning reduces risk of cardio-vascular system's diseases, brain attack, diabetes of 2nd type, hyper tension, cancer of large bowel, cancer of mamma and depression. Besides, physical functioning is an important factor in limitation and control of energy level of dissimulation and, therefore, influencing on energy metabolism and control of body weight [5, 6, 8-15].

In "Global recommendations on health related physical functioning" of World health protection organization [7] effectiveness of normal weight preservation with aerobic exercises is stressed. It is noted that some short lessons, 10 minutes every day or one long training, are sufficient for preservation of normal mass of body. Results of recent researches, organized by method of occasional choice, with duration of 12 months, showed that aerobic trainings for not less than 150 minutes a week, usually are accompanied by losing of 1-3% of body mass and it is sufficient for maintaining normal mass of body [1-3].

In present work we should like to study effectiveness of original method of aerobic exercises" application for reducing excessive weight and releasing from obesity. Duration of one training was from 10 to 25 minutes; with single its using it permits to reach result, recommended by WHPO for age group from 18 to 64 years old [2].

"Body flex" methodic, created by American Greer Childers [4] implies execution of breathing exercises in combination with isometric straining of abdomen muscles and simultaneous stretching of muscles of limbs, back and torso in aerobic mode/ The sense of „**Body Flex**” exercises is combination of breathing exercises with isometric straining of muscles and stretching. Central attention is paid to training of lower part of straight and oblique muscles of abdomen, diaphragm. These exercises also result in strengthening of the so-called postural muscles that, in opinion of the authors, permit to reduce mass of body and dimensions of selected circumferences of body.

"Body flex" methodic implies isometric straining of postural muscles in phase of deep exhale (8-9 seconds pause) and fulfillment in this phase of different stretching exercises. In fig.1 main initial position for fulfillment of five stages (steps) is shown in the following order: 1) full exhale through mouth; 2) quick inhale through nose; 3) deep exhale through mouth; 4) 8-9 seconds pause, muscles" straining, especially of abdomen muscles. 5) rest.

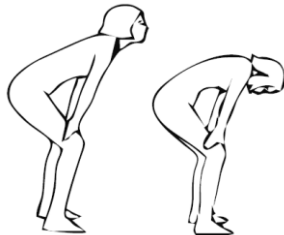


Fig.1. Initial position for fulfillment of "Body Flex». Source [4].

Purpose, tasks of the work, material and methods

The purpose of the present research was to estimate effectiveness of „**Body Flex**” in correction of excessive weight and obesity, determining their influence on such somatic indicators as body mass, circumferences of different parts of body, BMI.

Material and methods:

In the research 25 persons took part; they were women of 36-63 years old age, mean age was 58.45±8.92 years old. 16 of them were related to main group; 9 – to control. In main group we marked out: subgroup – 4 persons with BMI, indicating on obesity, subgroup of 12 women with BMI, pointing at excessive weight and 4 women with normal BMI. 9 women from control group, which did not train regularly, depending on body mass index were divided into 3 subgroups: 5 women with obesity, 3 – with excessive weight, 1 – with normal BMI. Before and after 1 month of "Body flex" application in main group and after 2 months of irregular trainings in control group we evaluated the following: index of body mass (BMI), weight (electronic scales of Winchy FWS-01), circumference of waist, of hips, circumference of legs: UI – thigh circumference in widest place, U II – thigh of circumference at 10 cm distance from base of knee cap, GI – circumference of shin in the widest place, G II – circumference of shin at 1.5 cm height from ankle, R II – circumference of arm in the widest place.

Besides, before and after 7 weeks of regular application of physical exercises of modified method "Body flex" we determined (on voluntary base) of one of women's of 54 years old age lipid profile in laboratory of "Medis" net in Stargard-Schetsinskiy.

The offered by us breathing exercises for the group of tested women is shown in fig. 2.

The complex consists of 10 exercises and is fulfilled as it is shown in fig.2, in order "from above– downward", involving in movement, first, upper part of body, then – lower one. Every exercise is fulfilled on count 16: inhale through nose – 3-4 counts; pause – 2-3 counts; deep exhale and movement, shown in fig. – 8-9 counts. At first sessions every exercise was repeated 2 times; gradually quantity of repetitions increased up to 8. Fulfillment of complex lasted up to 15-20 minutes. The offered complex differs from complex of Greer Childres by extracting from the latter of two exercises; "scissors" and "cat" in connection with possible unfavorable influence of these exercises on lumbar spine of women with excessive body mass and obesity.

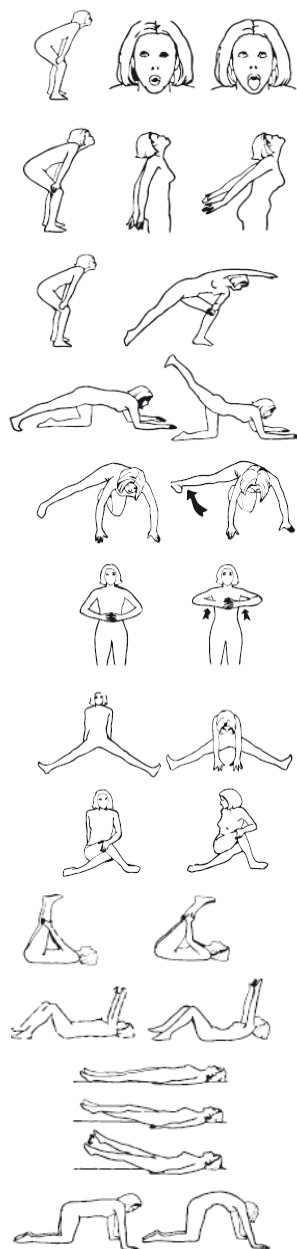


Fig. 2. Fulfillment of exercises "Body flex", offered for group. Source: [4].

Results of the research

In main group BMI in subgroups of women with obesity was before training in average, $50 \pm 3.48 \text{ kg.p.m}^2$, after 1 month it was $34.07 \pm 3.18 \text{ kg.p.m}^2$, after 2 months – $31.80 \pm 6.93 \text{ kg.p.m}^2$ (see table 1). BMI of women with excessive weight was before training in average $27.67 \pm 1.26 \text{ kg.p.m}^2$, after 1 month – $27.46 \pm 1.16 \text{ kg.p.m}^2$, after 2 months – $27.11 \pm 3.45 \text{ kg.p.m}^2$ (see table 2). BMI of women with normal weight before training was in average $23.26 \pm 1.32 \text{ kg.p.m}^2$, after 1 month – $23.36 \pm 1.31 \text{ kg.p.m}^2$, after 2 months – $23.1 \pm 2.08 \text{ kg.p.m}^2$. In control group average BMI in subgroup of women with obesity was $33.37 \pm 0.79 \text{ kg.p.m}^2$, after 1 month – $33.10 \pm 0.84 \text{ kg.p.m}^2$ (see table 1) in subgroup of women with excessive weight – $28.25 \pm 0.70 \text{ kg.p.m}^2$, after 1 month – $28.14 \pm 0.58 \text{ kg.p.m}^2$ (see table 2).

Results of testing witness that decreasing of BMI in main group were more expressive than in control group, though we did not register confident changes of the tested parameter ($p > 0.05$).

Circumference of thighs in both groups of the tested decreased in average by 3.49 cm after one month and after 2 months in main group it reduced by 3.23 cm more that gives total reduction in average by 6.72 cm (see table 1, 2). Also more expressed trend to reduction was manifested by values of circumference of other parts of body in groups, where "Body flex" was applied (see tables 1, 2).

Table 1.

Changes of somatic characteristics of women with obesity before and after "Body flex" exercises and results of control group

	Main group (n=4)			Control group (n=5)		
	Before	After 1 month	After 2 months	Before	After 1 month	After 2 months
BMI, kg.p.m ²	34.50±3.48	34.07±3.19	31.80±6.93	33.37±0.79	33.10±0.84	No data
Mass of body, kg	85.57±5.27	84.55±5.20	81.93±6.94	92.90±10.42	92.34±10.27	No data
Waist circumference, cm	105.12±10.65	98.75±9.38	93.83±10.02	97.80±5.24	95.50±5.04	No data
Thighs" circumference, cm	116.25±6.01	111.87±6.19	105.50±5.02	118.50±6.02	116.60±6.08	No data

Table 2.

Changes of somatic characteristics of women with excessive weight before and after "Body flex" exercises and results of control group

	Main group (n=8)			Control group (n=3)		
	Before	After 1 month	After 2 months	Before	After 1 month	After 2 months
Mass of body, kg	27.67±1.26	27.46±1.16	27.12±0.53	28.26±0.71	28.14±0.58	No data
Waist circumference, cm	70.55±2.27	69.86±2.40	68.26±2.82	78.93±5.97	78.63±5.96	No data
Thighs" circumference, cm	83.87±2.82	81.60±3.52	76.66±0.94	88.50±6.18	89.50±7.45	No data
	105.18±3.57	102.6±3.31	102.50±1.22	111±2.16	109.33±0.94	No data

Results of measurements of thigh, shin and arm circumferences are given in tables 3 and 4. As it is seen from these results in main group of women with obesity and excessive weight reducing of the measured circumferences of lower limbs and arm were more expressed than of women, who do not train regularly. In control group we did not register any substantial changes of the mentioned indicators (see tables 3, 4).

The data of analytical research of lipid profile of 54 years" old patient, who regularly fulfilled physical exercises of modified complex "Body flex", witnessed about reducing of general value of cholesterol, normalization of parameters, which characterize lipid metabolism (see table 5).

Table 3.

Changes of main circumferences of limbs of women with obesity before and after physical exercises упражнений "Body Flex», and results of control group

	Main group (n=4)			Control group (n=5)		
	Before	After 1 month	After 2 months	Before	After 1 month	After 2 months
U I, cm	60.12±2.70	58.30±2.75	56.33±3.30	67.60±3.02	66.84±3.30	No data
UII, cm	46.12±2.45	45.95±1.82	43.63±1.44	49.90±2.15	48.92±2.04	No data
G I, cm	39.65±2.08	38.87±2.07	37.66±1.25	41.10 ±1.71	40.64±1.49	No data
R II, cm	34.10±2.83	33.62±2.56	31.66±2.46	34.94±1.10	34.30±1.23	No data

Table 4.

Changes of main circumferences of limbs of women with excessive weight before and after physical exercises упражнений "Body Flex», and results of control group

	Main group (n=8)			Control group (n=3)		
	Before	After 1 month	After 2 months	Before	After 1 month	After 2 months
U I, cm	59.25±3.13	57.09±2.50	56.50±0.71	60.83±1.70	59.23±2.33	No data
U II, cm	45.312±1.90	44.30±1.55	43.00±1.41	44.40±0.94	44.00±1.06	No data
G I, cm	36.75±0.61	36.05±0.65	36.10±0.29	37.83 ±1.03	36.90±0.94	No data
R II, cm	32.00±1.91	30.66±1.86	30.60±1.98	30.67±1.03	30.23±1.84	No data

Таблица 5.

Morphological-functional parameters and lipid profile before and after 7 weeks of regular trainings by modified "Body flex" method of a 54 years old patient

	Before	After 7 weeks	Reference values	
			Min	max
Cholesterol HDL, mh.p.dl	69	71	45	65
Cholesterol general mh.p.dl	286	199	150	200
Triacylglycerol, mh.p.dl	217	156	<	200
Cholesterol LDL, mh.p.dl	174	97	<	129
BMI, kg.p.m ²	28,80	27.33	18	25
Mass of body, kg	66,3	64.5	-	-
Waist circumference, cm	81,5	76	-	-
Thighs" circumference, cm	105,5	101	-	-
U I, cm	62	56	-	-
U II, cm	47	44	-	-
G I, cm	37	36	-	-
R II, cm	28	27.2	-	-

Conclusions:

Analyzing the presented above data about influence of "Body flex" on organism of women with obesity and excessive weight as preliminary ones we can make conclusion that reduction of body circumferences, resulted from trainings, was more expressed and had more expressed trend to reducing than normalizing of body mass and BMI parameter. In control group the tested circumferences of waist, thighs, legs, arms, body mass and BMI practically did not change.

Results of analytical blood test of one patient, who regularly trained recommended exercises, showed that under influence of modified method "Body flex" general cholesterol content reduced as well as ЛПНП and η triacylglycerol. We can assume that „Body flex" complex can be effective mean in fight with obesity, but it is necessary to conduct additional researches about its influence on women with obesity and excessive weight, involving greater quantity of the tested and using the complex for longer time.

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COMPARATIVE ANALYSIS OF USING INTELLECTUAL GAMES IN THE EDUCATIONAL PROCESS

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Annotation. *Purpose:* to explore the experience of World Mind Games in the educational process. *Material:* 26 literary sources have been analyzed. *Results:* there is a degree of intellectual development of sports in the world. The kinds of intellectual games, which are used in the educational process in schools. Found that in accordance with the cultural traditions of the East and the West the greatest distribution in the school environment received Go and chess. The directions of application of chess, checkers, Go, bekgemmona, tangram in teaching practice and especially the impact of these games on the development of the child. *Conclusions:* Identifying promising implementation of intellectual games in the learning process as a means of enhancing cognitive mental processes and the general culture of the individual. Subject attempts to introduce the teaching of intellectual games in school educational process in many countries.

Keywords: *mind games, chess, checkers, Go, backgammon, tangram, the educational process, schoolboys.*

Introduction

The development of humans' playing activity led to the appearance of a special kind of games that mostly at the XX century became known as mind games. Perhaps the phrase "mind games" was for the first used by K. Groos, who spoke about their special function "add-on" to the existence of people who are engaged in manual labor and M. Lazarus, who distinguished between games related to physical activity, shows, gambling and mind games [17, p.44].

At the beginning of XXI century a jump in the development of mind sports has seen. This is especially typical for countries of South-East Asian, whose economies are rapidly progressing. For example, there are four national channels in South Korea, that broadcast game of Go and in Japan Go tournaments are as well widespread as sumo. The undoubted leader in popularizing of mind sport is China.

World Mind Games are conducted by the patronage of International Mind Sports Association (IMSA). The main games in this competition are chess, draughts, Go, and bridge. But the country, which holds the competition, may include an additional mind sport. Thus, at the World Mind Games, that have been conducted in China, to the four main mind games Chinese chess (Xiangqi) have been added to the program of competition.

In 2013 the educational project "Moscow mind games" has started in Russia. It provides an open master classes, festivals and marathons at the leading universities and schools. At the program of the project there are classic and Chinese chess, backgammon and Sport Bridge, and Japanese board games - Go, Renju and Shogi.

In addition to the competitive aspect, mind games, as a tool of development for cognitive mental processes, have started to be used in the educational process in many countries. Therefore the interest of teachers and psychologists has increased to the scientific study of the features of mind games, possibilities of their application in education. Thus, comprehensively mind games have been of the subject of scientific development in the following areas: features of sportization of mind games (Ja. Garal, A. Kylasov), comparative characteristics of intellectual forms of playing (S. Korchytskiy), development of creative abilities by mind sports (E. Skarzhinskaya), recommendations for the use of mind games in elementary school (E. Gik, V. Zabara, E. Kistj). However, the main research focuses on psychological and pedagogical features of using certain types of mind games.

Analysis of educational literature and modern school practices has allowed revealing that in Ukraine mind games are used rarely. It is caused by a number of factors. In particular, there are no sound psychological and pedagogical researches on the influencing of various intellectual games, especially board, on the schoolboy; methodical recommendations for the use of mind board games in the educational process. The level of teachers' readiness for using of mind games in educational and extracurricular activities is rather low.

Purpose, tasks of the work, material and methods

Purpose of the research: to examine the global experience of using intellectual games in the educational process.

Research methods. The analysis of 26 published sources was done.

Results of the research

The range of mind games is extremely wide. However, each game has its intelligent features that should be considered while using them in the learning process.

Chess. The first professional psychologist, who used chess for research, was the director of the Institute of Experimental Psychology in Paris Henri Binet. The scientists interested in the psychology of memory. For studying this problem in 1892, he applied to the famous chess players of his time with a questionnaire that included 14 questions. As a result the psychologist made the following conclusions: one plays better who evaluates more correctly a position on the board and calculates variants further; in chess the logical memory is more important in comparison with visual; it was discovered the leading role of "internal speech" in the process of reflection; the chess players' thinking is very complex and diverse [11, p.22].

The analysis of psychological and educational literature allowed to reveal that today in the dissertations it was experimentally confirmed the issue of a positive impact of chess in school education at formation of consistent thinking, logical methods of mental activity (V. Zakharov, T. Petrosyan, Ja. Rokhlin, N. Talyzina, Yu. Yakovlev), imagination and memory (O. Bartashnikov); chess game develops arbitrariness of consideration, the ability for planning an action and internal analysis (V. Kuprashvili, E. Kuchumova), for reflection, generates creative thinking (R. Ferguson), cognitive activity (E. Vasyukova, V. Zakharov, V. Knyazeva), educates diligence, perseverance and will (N. Krogius), develops fine motor skills of children with cerebral palsy effects (V. Panush).

In the World Chess Federation there is a special commission that deals with the problems of school chess. Thanks to its activity chess is carried out in many countries. Moreover, there are countries (Andorra, Russia, Venezuela, Iceland, Spain, Sweden, Bulgaria, Turkey, Armenia etc.), where chess, as a subject, is in the program of the public schools.

In 2012 the European Parliament adopted the Declaration "Chess in School", in which recommended to apply chess in school activity, because they directly contribute to success in learning, develop critical thinking, ability to solve problems and to make decisions.

For over ten years in the Republic of Kalmykia children have learned chess from the first class. The number of applications to the Commission for Minors is decreased, the results in physics, mathematics are improved, and overall performance is increased by 40 percent. Based on the inspection of the commission of the Ministry of Education it was proved that these positive changes had been held by studying chess.

Hungarian Institute of Educational Research and Development officially approved the Judith Polgar's program "Developing Chess" and recommended it for use in elementary schools across the country since September 2013. The program, instead of teaching chess as a sport, aims to improve academic skills, logical and creative thinking and independent solution of the problems. The educational program combines chess with math, reading and writing.

Chess, as an educational vehicle, is used not only in educational institutions. Thus, among the studies related to the issue of socialization of persons, who are in prison, Brazil has an interesting experience. The program "Chess bringing freedom" received an award of the government. The aim is development of cognitive, moral and social qualities among prisoners by using chess. The program works at 22 prisons, where 2200 prisoners are involved. Most of them are men between 19 and 30 years old, semi-literate, with low-income African-Brazilian citizens, murderers, thieves and drug dealers. As a result of the program it was marked improvement in relations and reducing violence among prisoners who playing chess. Such experience of using chess in prisons exists in Almeria and in other parts of Spain.

In XXI century human life becomes longer. A lot of countries deal with the problems of aging and socialization of the elderly. Scientific studies have shown that chess can be also useful to solve these problems. Thus, the study of the American Academy of Neurology has established a link between cognitive activity and the risk of Alzheimer's disease. According to their conclusions mind games (chess and bridge) help to overcome Alzheimer's disease [26].

Checkers. The game of checkers, only for the first, seems simple. Checkers demand from the person, who is playing, intensified mental activity and ingenuity, contribute to the development of memory and attention. A player must always expect variants, which appear on the board, outline a plan of the game and seek to implement it, must be able to resist the plans of the enemy and fight against his will.

The influence of checkers on the development of mental function has been less studied at special psychological or pedagogical researches than chess: individual style of activity with the dominance of cognitive components based on the game of international checkers (M. Prokhorova), features of the development of creativity and imagination in young teenagers at checkers (A. Kychkina), features of sportsmen's psychological preparation by checkers and chess (Yu. Anikeev) and methodological aspects of using checkers in the educational process (A. Altyntsev, S. Malakhov, M. Karam, V. Sivtseva etc.). Scientists explain smaller using of checkers as an experimental material in comparison with chess by similarity of psychological processes that occur during a game [2, p.4]. Didactic materials based on chess are richer than checkers because the lines of movement of chess pieces are more diverse.

Checkers develop objectivity of thought, train memory, bring perseverance, ingenuity, dedication, precise calculation, form character, engender creativity in a person, help the child quickly to adapt to the school environment, help easier to learn the course material.

S. Malakhov marks in the training program of checkers [16] that today it is necessary to educate in employees mental stamina and endurance to an error-free operation. These qualities are difficult to cultivate in adulthood. Training should be started from childhood, gradually increasing load. According to the author, the best coach for this purpose is checkers, which military has long appreciated and attributed to the important means of education and leisure. Thus, Napoleon Bonaparte did not leave the pearl checkers board in all campaigns. Peter I not only played, but also widely

popularized checkers in the Assembly. A. Suvorov also admired checkers. Checkers have no practical importance in military affairs, but attract by training personal qualities in different field.

For an inattentive pupil, the ability to concentrate for a long time, that checkers develop, is a precious heritage. Based on perennial observation B. Sivtseva notes that many cases of sharp reduction of children's inattention coincide with the start of their deep concern by checkers. The most important properties for a student in checkers are concentration and sustained attention. Focusing is equally necessary both for perception and for playing, thinking and imagination. Attention of a checkers player is particularly closely related to thinking, and therefore it can be justifiably spoken of predominantly intellectual character of a checkers player's consideration that has a pronounced arbitrary nature [21].

In the educational process checkers are used in many countries. For example, in Brazil it is entered checkers lesson in the school curriculum of 42 schools in Sao Paulo, where more than 3,300 children aged 5-6 years are studying secrets of this ancient game.

Backgammon. The history of backgammon in different countries and features of influence of the game on children are studied by M. Kleg. According to the author, the game of backgammon promotes the learning of mathematics. It teaches a child to count the numbers and add the trajectory of bone on the board, better understand chances and statistics. In addition the game of backgammon gives children a good opportunity to talk as equals with adults at the gambling board.

Go. Go is one of the most popular board games in the world. It is the most widespread in China, Japan and Korea. In 1975, with the publication of the article by W. Astashkin and G. Nilov about the theory of Go [3, p.127] began the large-scale capture of the game in the Soviet Union.

Features of influence of this mind game on the development of cognitive processes are described by M. Chaplin. According to the author, Go promotes deeper assimilation of cause-effect relationships, develops a sense of responsibility, ability to set goals, to make decisions and consistently implement them. A player learns constantly to keep in sight a global position on the board in Go. Many well-known corporations (among them "Microsoft", "Acer", "Japan Airlines") are used the strategical principles of Go, choice of destinations in entering new markets. In the East Go is also used to develop military strategies and strategies of governance [24].

In addition to countries of South-East Asian the game of Go in the schools is studied in Brazil, Venezuela, Russia, USA and other countries.

Tangram. Tangram is one of the tasks for the cutting that belongs to the oldest genres of interesting mathematics. Geometric shapes are cut into various parts, from which it is necessary to make a start or some other figure (or body). Similar games exist in different cultures: Mongolian game, Vietnamese game, Columbus egg [6]. The ancient Greeks were big fans of geometric games. One of them is "Stomahion". It is much more difficult than Tangram. According to the rules it is necessary from 14 square pieces to make different shapes. It can be called also "Pentamino", under which developed the world-famous game "Tetris", which was so popular in the 1980s.

Tangram consists of only seven pieces, which are called tans: square, parallelogram and five triangles (two large, two small and one medium). These tans have a simple form, but they can make an infinite number of different figures. Today we know more than 10 thousand combinations. Drawing these figures raises very high demands for geometric intuition and artistic ability of the player.

If we consider the application of tangram in the educational process, the first thing that is certainly attracted to this game - the simplicity of the props for the game. There is only a square piece of paper, which can be substituted if you want, by fabric, wood, plastic etc. The second is the application: from kindergarten to high school, from the study of geometry, science, design, to speech correcting and development of fine motor skills in preschool children.

In teaching activities Tangram can be used as an element of tales' therapy, in the adaptation period in games on union team, in the leisure activity for aesthetic and intellectual training, can be used in working with children with special needs. Particularly interesting is the usage of tangram in the tales, when during story figures are moving and turning from one to another in front of a child.

An interesting experience of development of mind culture by using search and creative problems is accumulated by primary school teacher V. Zabara. In the teacher's arsenal are various mind games: tangram, playing with matches, checkers, puzzles, mazes, magic squares etc. The author distributes different tasks for the formation of mind skills: games on combining, planning and ability to analyze. Among the intellectual educational games V. Zabara emphasizes riddles. They expand children's worldview, acquaint them with the environment, natural phenomena, and enrich their language. Also, they "are very important in shaping the capacity for creativity, logical thinking and elements of heuristic thinking."

The teacher E. Kistj in the methodical recommendations on the use of mind games in elementary school calls the game "Scrabble" as one of the premium mind games for younger schoolboys. Playing in this game, a child learns to read quickly, adds vocabulary, learns about nouns, but also improves the knowledge of arithmetic [9]. But we can not agree with the author's approval that unlike chess checkers has much more opportunity to show imagination and develop not only the intellect, but accuracy and cunning. The author links it with a great number of checkers games. However, besides the classical chess, there are also many mind chess games.

One of the first attempts was made by S. Korchytskiy comprehensively to evaluate gaming activities in different types of mind game. The author supposes that all mind games are characterized by their complexity of developmental effects on the child's thinking. The general algorithm of choice for various courses is likely for all mind

games. It contains three consecutive processes: situation assessment, planning and calculation options. The process of assessment requires logical thinking, planning process - strategic and creative thinking, process of calculation options - combinatorial thinking. Author concludes that all intellectual games develop the ability to act in the mind's eye that is abstract thinking. Games Renju and Russian checkers S. Korchytskiy recommends as a means of attracting to intellectual play activity of preschool children. Education in early childhood in games of Othello and Mancala is also possible, although these highly dynamic games have complexity purpose. In order to use the game of Go (homogeneous chips, highly complex purpose, two operations, low external dynamics of the game) in the preschool years it is necessary to use a small 9x9 playing board, due to a significant decrease in variability and duration of the game. Learning the game of Go on great boards and chess should be started, according to the author, not before primary school age [10].

Conclusions.

The essence of intellectual games is overcoming of mental difficulties. Outside the result of playing activity is the right answer or victory in the competition, and internally, and it is the most important - the emotions and conditions that accompany intellectual process, gaining experience in individual productive mental activity, intellectual affirmation. The analysis discovered, that it is spread the attempts to introduce the teaching of intellectual games in the school's educational process in many countries. Every intellectual game has its own characteristics, but they are accustomed to a sense of responsibility, raise curiosity, the autonomy of thought, develop the child's thinking.

Further developments are required specific methods for the application of intellectual games in the school educational process.

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FEATURES OF FORMATION OF THE INDIVIDUAL STUDENTS IN SECONDARY AND HIGH SCHOOLSutula V.O.¹, Sutula A.V.¹, Golik A.S.¹, Abdulvahid D.N.²Kharkov State Academy of Physical Culture¹University of Baghdad²

Annotation. *Purpose:* Analyzed features of motivation to achievement and need to praise the students of secondary and high school. *Material:* In the survey took part 1634 students of secondary school in Kharkov, Vinnitsa and Lugansk regions. Carried out a comprehensive psychological testing, which allowed to find out the level of motivation of students to achievement and need for praise. *Results:* It is shown that during the period of study at school from fifth to eleventh classes a number of students have a low motivation to achievements, and low need for praise. Confirmed provision indicates that the modern school is still not fully realized the potential of educational pedagogy. *Conclusions:* It is shown that the formation personality physical education students in general education is possible only with the active and conscious of their participation in various forms of sports and recreation activities undertaken in the modern school.

Keywords: personality, needs, motivation, achievement, physical culture.

Introduction

As analysis of special literature shows the best methods of influence on schoolchildren, which are oriented on formation of their personal physical culture [7, 8, 9, 14, 15], imply application at physical culture lessons such approaches, which would form children's and teenagers' of school age effective attitude to physical exercises [2, 3, 4, 5, 10]. It is evident that this process has some specific features, conditioned, on the one hand, by peculiarities of psychic development of schoolchildren and, on the other hand, by spectrum of social-economic conditions of personality's formation [6, 11, 13, 16]. The outlined directions of scientific search, which open from different sides the sense of personality's formation [3, 9, 11], create objective pre-conditions for studying of motivation for achievement and demand in encouragement of secondary and senior pupils as basic factors for development of educational pedagogic technologies, oriented on formation of comprehensive educational establishments' pupils personal physical culture. The research was fulfilled in frames of realization of complex scientific project "Theoretical-methodic principles of formation of personal physical culture of children and youth as the basis of their health" (state registration number 0113U001205).

Purpose, tasks of the work, material and methods

The purpose of the work is to determine manifestations of motivation for achievement and demand in encouragement of secondary and senior schools' pupils.

The methods of the research: for realization of our purpose we carried out special psychological testing of 5-11 forms' pupils, which permitted to determine the level of their motivation for achievements and demand in encouragement. In the course of testing we used standard psychological tests [1, 12]. In the research 1634 pupils of comprehensive schools of Kharkiv, Vinnitsa and Lugansk regions took part.

Results of the research

Studying of demand-motivational sphere of pupils witnessed about some differences in development of motivation for achievement of pupils from cities and from countryside. High level of motivation for achievement was found at 8.0-9.0% of f5 form pupils from cities, while at countryside schools such motivation was found at 2.2%. Starting form 6th form quantity of pupils with high motivation for achievement at city's school increases up to 5.3-7.6% in 8-9 forms and up to 9.4% - at countryside schools. In senior schools quantity of pupils with high motivation for achievements reduces up to 3.1-3.8% both in city's and countryside schools.

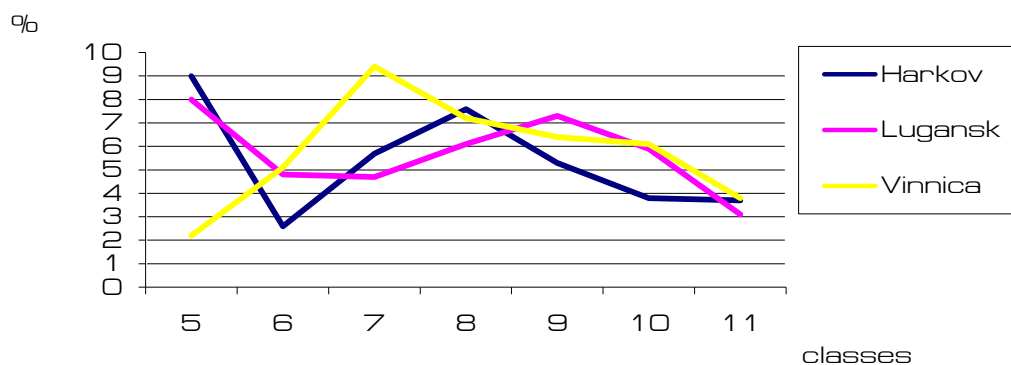


Fig.1. Dynamic of changes of high level of motivation for achievement of pupils from different regions of Ukraine

Results of the conducted research also showed that with entering secondary school quantity of pupils with low level of motivation sharply increases. For example, if in fifth form quantity of pupils with low level of motivation for achievements is 25.7-45.5%, in sixth form it reaches 41.9-57.9%. From sixth to ninth forms this figure is relatively stable and changes within limits of 40-60%. In senior forms of city's schools there is observed a trend to increasing of quantity of pupils with low level of motivation for achievements. Especially this trend is characteristic for Kharkov, where quantity of such pupils in 11th form reaches 85.7%. Alongside with it should be noted that among countryside pupils there exists opposite trend, which witnesses that starting, approximately from eighth form quantity of pupils with low motivation reduces and is, in 11th form, 21.2%.

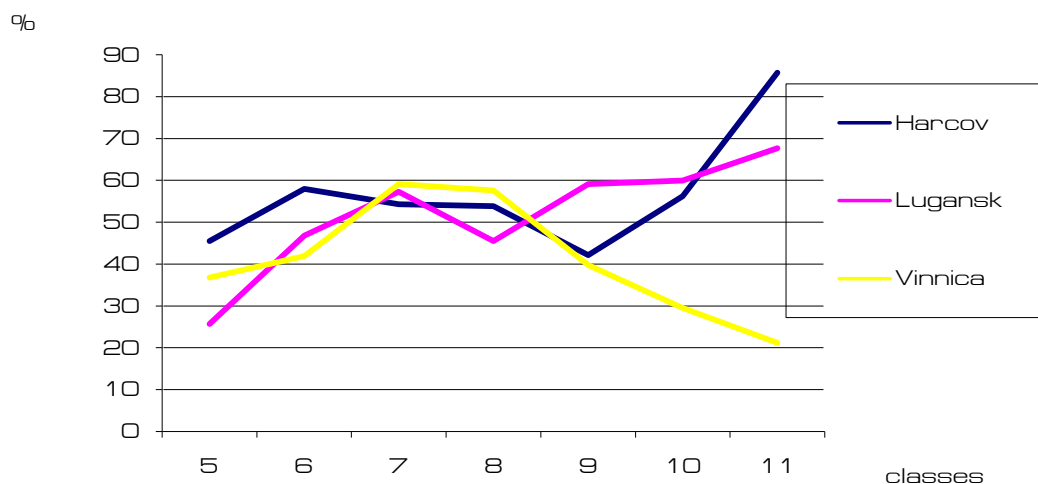


Fig.2. Dynamic of changes of quantity of low motivated pupils for period of studying at school

The mentioned above trends in formation of school age children's and teenagers' personalities are proved by results of evaluation of their demand in encouragement (see fig. 3 and 4). They witness that with entering of main school quantity of pupils with high level of demand in encouragement reduces to some extent. If in 5th form there were 7.4-10.4% of such pupils then in sixth – 6.1-9.2%. Also attracts attention the fact that from sixth to seventh forms quantity of such pupils a little increases, reaching 12.1-16.7%, and starting from seventh form quantity of pupils with high level of demand in encouragement is steadily reducing, reaching in 11th form only 5-8%.

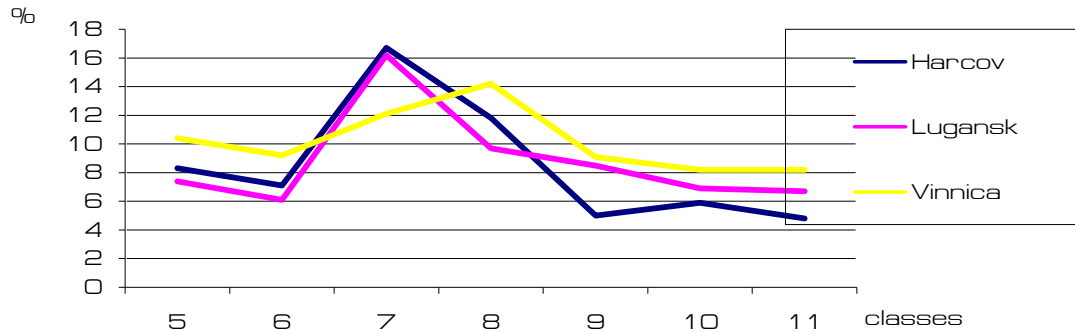


Fig.3. Dynamic of changes in quantity of pupils with high level of demand in encouragement for the period of studying at school

Results of the fulfilled research also showed that during period of studying at school from fifth to eleventh forms quantity of pupils with low level of demand in encouragement is steadily increasing from 19.0-25.0% in fifth form to 33.1-55.1% in eleventh form (see fig. 2.6). This regularity is characteristic for pupils of city's schools.

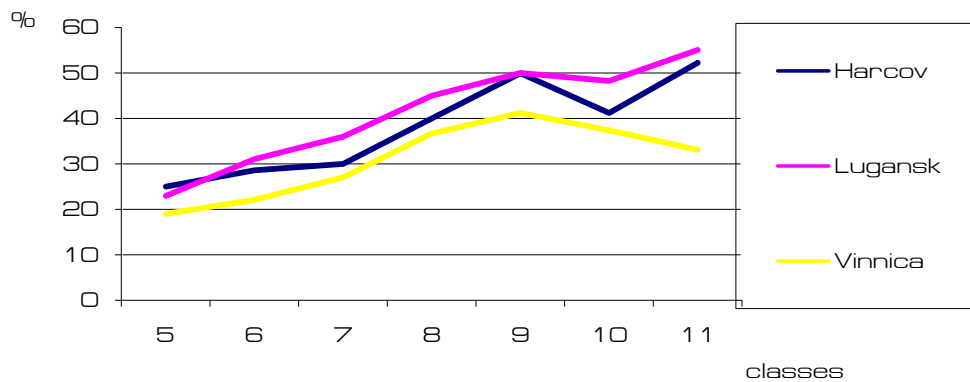


Fig.4. Dynamic of increasing of pupils with low level of demand in encouragement in secondary and senior schools for the period of studying

Conclusions:

1. Results of the research showed that for the period of studying at school, from fifth to eleventh forms, quantity of pupils with low level of motivation for achievements increases. It witnesses that great majority of secondary and senior schools' pupils have not formed orientation on achievement of certain target during period of studying at school.

2. For period of studying at secondary and senior schools quantity of pupils with low level of demand in encouragement is increasing. It witnesses about existence of certain contradiction between existing direction of pedagogic influence on pupils' personalities and its results because most of pupils do not correspond to approved standard.

3. The found regularities in formation of pupils' personalities witness, that in modern schools potential of educational pedagogic have not been realized completely yet. As far as main mean of formation and development of pupils' motivational sphere is active and significant for personality functioning, it means that formation of pupils' physical culture is possible only under condition of their active and conscious participation in different forms of health related physical culture functioning, which are realized in modern school.

In the future it is planned to more specifically study orientations of school age children's and teenagers' personalities (orientation on themselves, orientation on communication, orientation on functioning).

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COMPARATIVE ANALYSIS OF PHYSICAL FITNESS AND MOTOR COORDINATION ABILITIES OF STUDENTS OF THE FIRST AND SECOND COURSES OF HIGHER EDUCATIONAL INSTITUTIONS ENGAGED IN AEROBICS

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Annotation. *Purpose:* to analyze the method of applying modern health technologies, taking into account varying degrees of motivation and physical condition of students. *Material:* 358 students aged 16-19 years took part in the experiment. The analysis of more than 50 references, studies devoted to the peculiarities of the female body health forming technologies. *Results:* significant increase of interest in physical education classes using the suggested health forming technologies. Established that the main ways to improve physical education students can be formed needs in health promotion by means of aerobics, shaping, Pilates, Callanetics. *Conclusions:* The identified prospect of improvement of physical education students, which allows the structured problems they need to develop options and solutions to the successful implementation of health- education strategy.

Keywords: *health -forming technology, students, motor, coordination, abilities, morphofunctional.*

Introduction

Physical education in educational process of higher educational establishments (HEE) is a mean, which solves one of sides of students' professional preparation; it facilitates their individual creative development, formation and perfection of students' professionally important skills and qualities in interconnection with their physical and mental progress (On reconsideration of Law of Ukraine "On physical culture and sports" and other legislative documents of Ukraine: Law of Ukraine №.1724-VI, dt. November 17, 2009 "On approval of Principles of organization of physical education and mass sports at higher educational establishments: order of Ministry of education and science of Ukraine No.4, dt. 11.01.2006; On approval of measures, oriented on system of physical education of pupils and students of Ukrainian educational establishments: order of Ministry of education and science of Ukraine, dt. 27.11.2008).

Strengthening of population's health is main governmental task, which is solved by means of motion functioning with the help of different gymnastic exercises (run, outdoor games, tourism, gymnastic exercises and other kinds of motion functioning) [7, 9].

Different interpretation of different systems of gymnastics [6, 8] is oriented on effective application of their opportunities in educational process. Devotion to one or another kind of motion functioning passes very quickly; attention is attracted to other aspects of fitness and components of health that creates additional problems for HEE instructors [11].

As per data of questioning, fulfilled in our research, the most popular for first and second year girl students are comparatively new kinds of gymnastics: aerobics, shaping, callatenics, pilates and other.

Perfection and development of pedagogic technologies of physical education trainings' building with the help of non traditional gymnastics and their influence on organism practically have not been regarded yet. Therefore seeking of new ways of improvement of students' physical education is important aspect of our research and this topic is rather urgent [12, 13].

The work has been fulfilled in compliance with "Combined plan of SRW in sphere of physical culture and sports for 2011-2015" by topic 2.4 "Theoretical-methodic principles of individualization of teaching-training process in physical education and sports" (state registration No. 0112U002001), and in compliance with state-financed scientific-research work for 2013-2014 – "Theoretical-methodic principles of application of informational, pedagogic and medical biological technologies for formation of healthy life style" (state registration No. 0113U002003).

Purpose, tasks of the work, material and methods

The purpose of the work is improvement of methodic of application of modern health related technologies for first and second year girl students of pedagogic HEEs with different degree of motivation and physical condition.

The contingent of the tested consists of first and second year girl students of Municipal establishment "Kharkov humanitarian-pedagogic academy7" of Kharkov region council. 358 girl students of 16-19 years old age participated in experiment.

We formed experimental and control groups. Every group consisted of 25 girl students. Distribution of girl students in groups was carried out by results of fulfilled questioning, devoted to choosing of motion functioning at physical culture lessons. That is why in experimental group we included non traditional kinds of gymnastics: aerobics, pilates, shaping, callanetic [1,2]. Control group trained by typical academic program on physical education for Ukrainian HEEs of 3rd and 4th levels of accreditation.

The role of the author implied working out of data about influencing of physical exercises in non traditional kinds of gymnastics on morphological functional state of first and second year girl students of pedagogic HEEs.

In order to study main problems of modern pedagogic educational establishments and ways of their solution, which would be oriented on strengthening of rising generation's health, we carried out expert questioning of first and

second year girl students. The questioning of girl students facilitated their wider involving in application of health related technologies (aerobics, pilates, shaping, callanetic) [4,5,14].

For solution of our tasks we used the most popular methods, which are applied in physical education of HEE students.

Motion-coordination abilities (MCA) were determined by accuracy of realization of muscular efforts; characterizing MCA was determined by degree of efforts' dozing.

Quickness of motion response was evaluated with the help of test "quickness of catching by stronger hand of falling down rule (40 cm length).

Quickness of actions was measured by time (sec.) of fulfillment of 20 claps with straitened above head arms and then claps on thighs. One attempt is fulfilled.

Physical fitness was determined by the following group of tests: jumps for 20 sec. (dexterity), forward bents in sitting (legs apart) position (flexibility), long jumps from the spot (explosive power), pressing ups in lying position (strength).

Morphological functional indicators were determined by the following: WHI (weight-height indicator); VCL (vital capacity of lungs; HBR (heart beats rate).

Anthropometric data were measured by the following anthropometric indicators: length of body, mass of body, circumference of chest, waist, thighs, shins. The measuring procedures were carried out as per methodic of E.G. Martirosov [3].

Pulse metering in our research was fulfilled by dynamic of HBR indicators. HBR was studied for determination of functional state of girl students' cardio vascular systems, for evaluation of intensity of health related gymnastics' training, for comparing of different structural blocks of experimental trainings.

Results of the research

Studying of literature sources showed that with age human physical and coordination abilities significantly change [10]. In researches of recent years there have been received data, which witness about positive influence of physical exercises on physical condition of trainees, including morphological functional of people and their coordination abilities [12]. Basing on this information, one of particular tasks was determination of dynamic of involution changes of physical condition and motion-coordination abilities of first and second year HEE girl students, who trained in experimental group.

Results of testing of girl students, who trained in experimental groups, witness that at age of 16-19 years old the tested indicators were better than in control groups (see table 1).

Table 1

Confidence of changes of first and second year girls students', training in experimental groups, indicators

№	Indicators	16-17 Years old (25 persons)	18-19 Years old (25 persons)	p	t
Morphological functional indicators					
1	Height (cm)	164.9±3.4	165.8±4.2	< 0.05	0.41
2	Mass, kg	55.4±2.6	63.7±2.9	< 0.05	2.13
3	Vital capacity of lungs (m)	2950±96.3	2770±101.7	< 0.05	1.28
4	Weight height indicators WHI (g.p.cm)	335.96±12.3	384.2±15.4	< 0.05	2.44
5	Heart beats rate (b.p.m.)	59.1±1.46	59.6±1.84	< 0.05	0.25
Physical fitness					
1	Quantity of jumps per 20 sec (times)	61.4±2.81	59.2±3.12	< 0.05	0.3
2	Flexibility (cm)	13.32±1.84	9.97±2.03	< 0.05	1.22
Motion-coordination abilities					
1	Quickness of motion response (sec.)	9.86±0.86	13.2±1.02	< 0.05	2.51
2	20 claps (sec.)	13.8±1.03	14.41±1.12	< 0.05	0.4

In connection with introducing of new kinds of motion functioning there appeared certain load on girl students' cardio vascular systems, while functional abilities of these systems were limited and with age manifest trend to worsening. Heart beats rate, with age, increases, on the contrary (see table 1). For example pulse of experimental group girl students became more frequent, but insignificantly. At the same time pulse of control group girl students increased significantly.

Measurements of motion response's quickness with the help of test «catching of falling down rule by stronger hand» showed, that this quality started worsening quicker in senior experimental group. For example, in first group this indicator was 9.86±0.86 sec. in senior – 13.2±1,02 sec. (t=2.51).

Evaluation of flexibility by commonly known methodic witnesses that its quality without proper maintenance reduces rather quickly in control groups, while in experimental groups it increases up to 13.32±1.84 cm (t=1,22).

Indicators of speed power endurance, measured with maximal quantity of jumps up at the spot for 20 seconds with age confidently reduce that is witnessed by data in table 1.

Thus, comparative analysis of results of physical condition's and motion coordination abilities' testing of experimental groups' girl students showed substantial changes in their organisms in comparison with control group's girl students.

Conclusions:

1. Analysis of scientific-methodic literature showed that little attention is paid to maintenance and improvement of girls' coordination abilities; methodic approach to composing of programs on physical education in respect to development of their motion coordination abilities has not been sufficiently worked out. In this connection seeking of opportunities for rehabilitation and development of girls' coordination abilities is interesting both in theoretical and practical aspects.

2. In the course of the research we also specified a prospect of improvement of girl students' physical education. It permits to structuralize problems by their necessity, to work out variants of solutions in order to successfully realize educational health related strategy.

3. Comparative analysis of physical fitness and motion-coordination abilities of first and second year girl students of higher pedagogic educational establishments showed that with introducing of new health related technologies in educational process on physical culture in experimental groups these indicators significantly improved. Besides, owing to interest to such trainings girl students' attendance also increased.

The further researches will be oriented on studying of comparative characteristics of physical condition and motion-coordination abilities of third and fourth year girl students, who train aerobics.

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CULTURE OF HEALTH OF A PERSON AS A PART OF PHYSICAL CULTURE

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Annotation: *Purpose:* to determine the general concepts of the theory and methods of physical education. On the basis of their form defining the components of physical culture and personality reflect the place of culture health of individuals among these components. *Material:* processed more than 40 references. *Results:* a definition of generalizing concepts of "culture", "health", "physical culture", "culture of health" formulated defining components of physical culture personality: health culture personality, culture motivational values and beliefs, culture of educational excellence, physical culture perfection, excellence and culture of the motor provides a definition of each. Given a reflection of culture of health in the physical culture of the individual. Considered separately culture a person's health as a component of physical culture. *Conclusions:* it has a logical and hierarchical unity of the principal terms of the theory and methods of physical education, including culture of health of the person is a body of knowledge and skills of a healthy lifestyle, self psychological, social, spiritual and physical development.

Key words: culture, health, physical, personality, time.

Introduction

At present in manners and customs of citizens, and sometimes in scientific literature we can often see identification of physical culture with the school subject physical culture. The terms physical culture, physical preparation and physical education are apprehended as the synonyms. The content of school subject physical culture doesn't meet its name.

As it is mentioned in the State National Program "Education (Ukraine of the XXI Century)", perspective direction of reforming of the home system of education is transition from lessons of applied character to the modern technologies of realization of students' creative potential. Improvement of population health becomes the main goal in the work of personnel in the sphere of physical culture, which is achieved by means of improvement of quantitative characteristics of the indices of physical qualities development [1; 2]. Directing of the efforts of voluntary physical culture-sport collectives and organizations, general educational and higher educational establishments for improvement of children's, teenagers' and young people's health, demands harmonious actions. That is why the problem of making conceptual apparatus of theory of physical culture in accordance with the modern demands and level of development of the system of physical education of pupils and students is quite topical.

There are about a few hundred definitions of the notion culture [2], where it is mainly explained as acquisition [3], creative activity and social manifestations of mankind [2]. When uniting the content of the already existing definitions into one, we can affirm that the culture is totality of material and spiritual acquisition of mankind, accumulated and enriched during the history, which is passed from one generation to another [2; 3].

Physical culture is shown as a part of general culture and it is creative activity [4] directed to harmonious formation of personality [5] and which is a combination of achievements of the society in the sphere of physical mastering and improvement of person's health [6].

In the law of Ukraine "About Physical Culture and Sports" physical culture is defined not as a value, which plays the leading role in formation of person's health, but as a process of active operating of the subjects of sphere of physical culture, which goal is harmoniously developed body and the ability to lead healthy way of life. In this context physical education appears as the main way of introduction of physical culture into the life of citizens. This introduction is carried out due to the compulsory conducting of physical training lessons in all educational establishments of Ukraine [4: 6]. So, in this law we can see reflection of physical culture according to the stereotypes of our society. Physical culture is shown as a process, but not as a goal of physical activity. In the law of Ukraine "About Physical Culture and Sports" the definitions of terms physical preparation and physical education are also given. The goal of physical preparation is to form motive skills and abilities, as well as development of physical abilities of the organism. The goal of physical education is to educate a person using motive activity. The authors of the law explain physical preparation as a component of physical education, and physical education they understand as a totality of all known forms of activity in the sphere of physical culture, directed to the thorough development of personality, his improvement of health and ability to do professional activity.

Health in the scientific literature is defined as a state of well-being [7; 8; 2; 6] and prosperity of the organism [7; 8; 2; 9], as an ability to counteract negative influence of the surrounding [7; 4; 2; 9], and as the highest vital value of a person and a society [6]. Uniting the experience of the previous researchers into one definition, we can affirm that the health is the state of physiological, psychological and spiritual well-being, and the harmony of the organism with surrounding world, which guarantees and remains determinative precondition of effective fulfillment of physical educating of young people, physical, intellectual, psychological and moral abilities of the personality [7; 8; 2; 6; 9].

Culture of health is shown as a component of physical one, and so of general culture, which presence favors preservation of personality's health [10; 11].

Personality - is an individual, who in the process of social development becomes carrier and creator of culture [12; 13].

Purpose, tasks of the work, material and methods

The aim of the research is to determine the main concepts of the theory of physical culture, to systematize and to arrange them in hierarchic unity.

Tasks.

1. To give generalizing definition of the terms: “culture”, “health”, “physical culture”, “culture of health”.
2. To determine the components of personality’s physical culture.
3. To show the place of culture of health in personality’s physical culture.

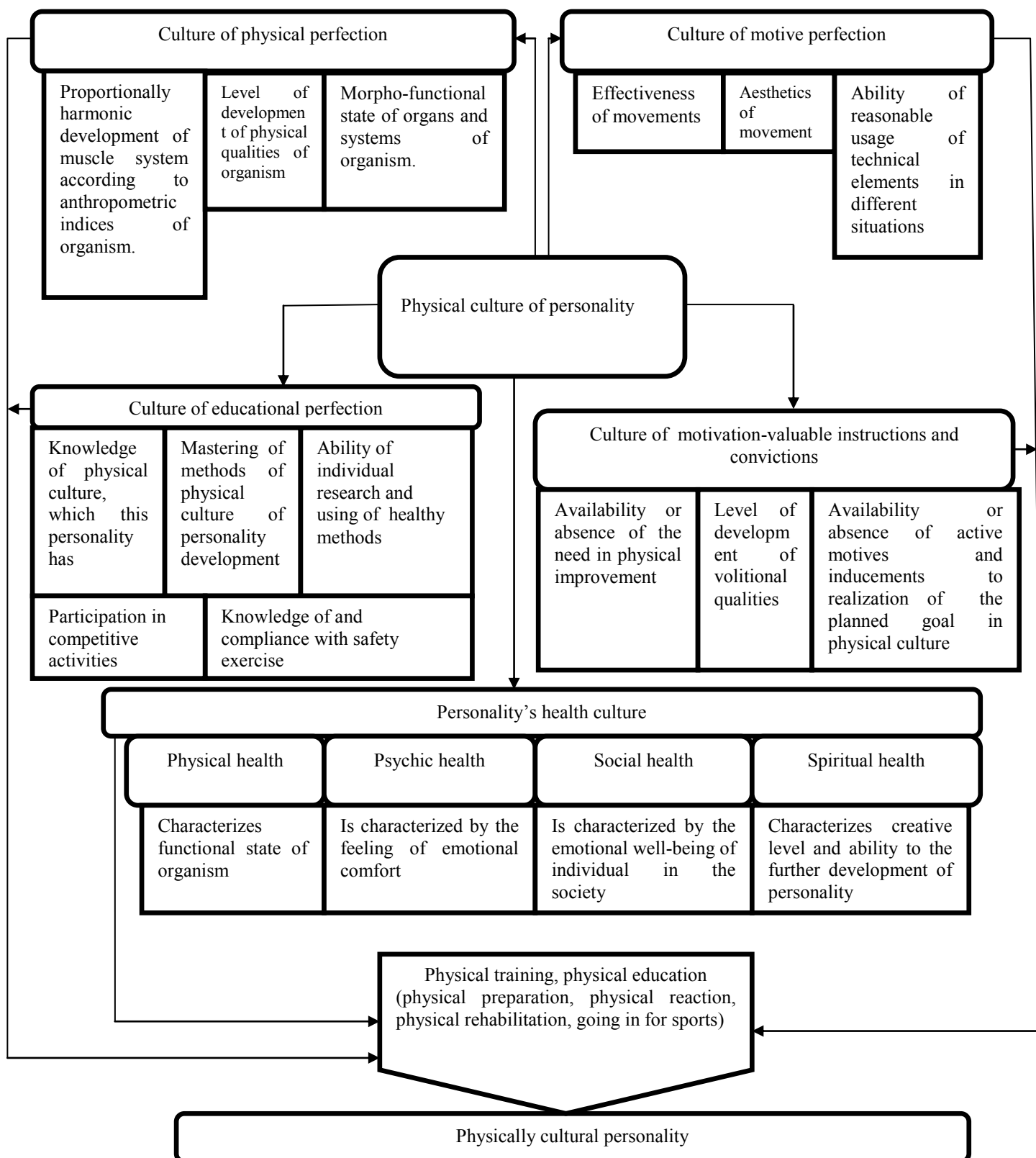
Methods of research.

On the basis of the studied literary sources and analysis of the received information, the generalizing preliminary scientific experience definitions of the basic terms of physical culture were formed.

Results of the research

Literary sources contain different views to the definition of the term “physical culture”. Combining the content of these views in one definition, we can affirm the following: physical culture is a part of general culture, which is creative activity [4], directed to harmonic formation of personality [5], and which is totality of society’s achievements in the sphere of physical mastering and improvement of person’s health [6]. The goal of physical culture, as a number of authors claim, is formation of healthy, educated, creative personality. Personality, who is able to adapt himself to modern realities of existence and changes, taking place both in nature and in society [4; 5; 6]. Formation of such a personality takes place in the process of acquisition of the individual values of physical culture, and changing them into personal values, typical only for this particular individual, forming, in such a way, physical culture of personality, as a component of general physical culture [4; 5; 6]. In its turn, physical culture of personality – is an affective aspect of pedagogical activity of specialists, directed to formation vitally-necessary skills and abilities, knowledge that guarantee high level and quality of personality’s life. Teacher of physical culture is a professional, who is characterized by the high level of formed physical culture (physically cultural personality), and who is able to pass and form vitally important values of the pupils in the sphere of physical culture. But, as the experience and practice prove, not every teacher of physical training can be called a teacher of physical culture. And in the same time a teacher mustn’t always be a professional in physical education in order to assist introduction of values of physical culture into the students’ lives [14].

The analysis of scientific sources on the subject allowed us to define components of personality’s physical culture and their content, to which belong: culture of personality’s health, culture of motivation-valuable instructions and convictions, culture of educational perfection, culture of physical perfection, culture of motive perfection (see pic.1).



Pic. 1. Structural-contextual chart of forming of physically cultural personality.

So, components of physical culture of personality have several elements. Firstly, it is culture of personality's health – totality of acquirements of personality, which were received in the process of development and favor preservation and improvement his health. Secondly, it is culture of motivation-valuable instructions and convictions - acquirements of personality, which were received in the process of development of personality with the aim to form the need in physical perfection, motivation, value guidelines and development of volitional qualities. Thirdly, culture of

educational perfection is the result of mastering of the physical culture knowledge, methods of development of physical, psychic, intellectual qualities of the organism, ability individually to implement developing methods, to conduct complex self-educational activity in the sphere of physical culture and sports, to take part in competition activity, mastering of the knowledge of safety at work, which in complex, make educational component of personality at this stage of his development. Two other elements are defined as: culture of physical perfection – it is the result of physical education of personality, which is manifested in proportionally harmonic development of muscle system, development of physical qualities of the organism and morpho-functional state of organs and systems of the organism; culture of motive perfection – it is the result of physical education of personality, which is manifested in effective technique of movements, aesthetics of movements and ability to reasonably apply the acquired technical abilities and skills in different situations.

In the context of tasks of the research it is necessary to study the essence of the notion “culture of personality’s health”, to determine its components and its semi-functional structure. So, on V.P.Horashchuk, V.M.Yeminov and others opinion, culture of health is an important component of physical culture, which is determined by certain material and spiritual environment of society’s vital activity, expressed in the system of values, knowledge, needs, abilities and skills as for formation, preserving and strengthening of health. The essence of the notion “culture of personality’s health” can be also explained as an important component of physical culture of a person, determining formation, preserving and strengthening of his or her health [10; 11].

As a number of authors claim, the main way of physical culture forming is physical education [15]. Accordingly, physical education is the main way of forming physical culture of personality, as a component of physical culture and culture of personality’s health, as a component of personality’s physical culture. At this stage of society’s development the process of physical education is oriented mainly to forming of culture of personality’s health and it is a totality of all known forms of activity in the sphere of physical culture, directed to thorough development of personality, his or her improvement of health and ability to perform professional activity [10; 11; 15].

The world science worked out complex opinion to the culture of health of personality as a phenomenon, integrating at least four its spheres or components: physical health, psychic health, social health and spiritual health [15; 16; 17]. As it is mentioned by O.A.Fedko in his work “Multidimensionality of the notion “Health” in the Modern Scientific Thought” about the first component of the personality’s health culture, physical culture is the most important component of the culture of person’s health, it characterizes biological state of the organism. Physical health depends on the ability of the organism to adapt to the surrounding factors, level of physical development, physical and functional preparation of the organism to doing physical exercises and ability to continue family tree.

Besides physical health of personality O.A.Fedko gives characteristics to the second and the third component of culture of personality’s health, and namely psychic and social health. Psychic health – it is a state of individual’s psyche, when all psychic functions of the organism harmoniously and in concerted way cooperate and guarantee individual feeling of comfort, favoring high ability to work in the given surrounding, psychic health provides for ability to live in love and harmony with himself or herself and with the surrounding world. Social health is characterized by the feeling of an individual in the surrounding society, presence of health allows the personality to feel himself or herself comfortably among other people.

The fourth component of culture of personality’s health is spiritual health, which includes the following: presence of the ideal of healthy personality, vital values, working capacity, creative activity, feeling of beautiful and cheerful, trust in himself and in other people, responsibility for the own deeds; spirituality of the personality is characterized by the categories: “morality”, “spirituality”, “conscience”, “responsibility”, “respect” [16; 18].

Conclusions.

Analysis of the literary sources and official documents proved considerable differences and contradictions in understanding and interpreting outgoing scientific categories of theory and methods of physical culture. Thus, in the law of Ukraine “About Physical Culture and Sports” “physical culture” is explained not as the goal of physical activity, but as a process of activity, directed first of all to physical development, and to the healthy way of life. Actually, this interpretation reflects understanding of physical culture by the students of university. Survey says that for majority of freshmen physical culture is a pedagogical subject, which should provide development of their physical qualities. But in the scientific literature on the theory and methods of physical education the notion “physical culture” is reflected as a component of general culture, and it is a combination of acquisitions of the society, directed to forming of healthy personality.

In the process of work with literary sources and conducted analysis of the received information, we generalized definitions of the main terms of the theory and methods of physical culture. On the basis of received information we found logical and hierarchic unity of the main terms of the theory and methods of physical culture, where physical culture, as a semi-semantic notion, becomes a part of general culture of the society. Physical culture of the personality is a complex notion, which content is formed by means of acquiring new qualities as a result of contextual symbiosis of the components, which are the part of it: culture of personality’s health, culture of motivational-valuable instructions and convictions, culture of educational perfection, culture of physical perfection, culture of motive perfection.

As a result of working out literary sources we determined that in scientific literature still take place scientific discussion as for the content and components of culture of personality’s health, and the state of being worked out of this problem is sometime characterized by controversial results, which are obtained because of usage of different

methodological approaches to solving of this important scientific-pedagogical problem. As a result of the research we made, we determined components of physical culture of personality and formulated their definitions.

Culture of health of personality is a component of physical culture and it is a totality of knowledge, abilities and skills of leading healthy way of life, psychological self-perfection, social and physical development. The components of culture of health of personality are: physical, psychic, social and spiritual health. Formation of culture of personality's health is determined by the level of development of health, health-preserving methods of personality, ability to preserve and improve own and others' health, and apprehend it as the highest value. Culture of personality's health favors formation of the personality as full value member of the society, adjusted to life in this environment and able to adapt to the changes of society.

Perspectives of further researches in this direction. Determination of the content of methodological bases of forming of students' culture of health.

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SOCIAL AND EDUCATIONAL CHARACTERISTICS OF THE HEALTH STATUS OF PUPILS – SPORTSMEN

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Annotation. *Purpose:* to analyze the biomedical and social determinants of health and hygiene of pupils athletes. *Material:* the study involved 60 athletes 12-15 years and their peers (n = 60), which are not involved in sports, as well as parents of schoolchildren. Comprehensive study was conducted using questionnaires by the "copy - a couple." *Results:* it was found that young athletes have less influence adverse biological factors than their peers. Systematic sports distract students from passive pastime and regulate rational mode of the day. Food of young athletes has the following features: Custom mode, high multiplicity meal predominance in the diet of vegetables, meat and dairy products. Found that most of the families of pupils athletes have sufficient material level and adequate housing. At the same time, parents of the ordinary students are more prone to the spread of harmful habits. Psychological climate in families of pupils is low conflict. Medical support is stable, but not sufficient. More than half of the families of pupils - athletes perform medical advice given extra hygiene knowledge. *Conclusions:* the students who participate in sports is a specific social-demographic group. The main factor of social and pedagogical state of the family is the attitude of the parents to the child's health.

Key word: *health, factors, pupils, sportsmen.*

Introduction

Health of children and teenagers is an urgent problem of first importance as far as it determines the future of country, genofond of nation and economic potential of society; along with other demographic indicators it is a sensitive barometer of social-economic development of country. Significance of this problem is outlined by Constitution of Ukraine, which declares human being, its health and life the highest social value of state [1, 4].

Recent years there have been existing steady trend to worsening of school age children's health. With entering comprehensive schools health indicators of children start progressive reducing owing to influence of unfavorable and school risk factors [2, 5, 6].

Main ways of this problems' solution are determined by National doctrine of development of education, by Laws of Ukraine "On pre-school education", "On General secondary education", "On extra-school education", "On protection of childhood"; by Concept of positive motivation's formation and healthy life style of children and youth, which undoubtedly prove priority of preservation of pupils' physical and psychic health, education of conscious attitude to own health and health of citizens as the highest social value [6, 7, 9,11].

Involving of pupils in sport circles and children-junior sport schools is substantially significant for realization of strategy of pupils' health progressing. Initial position of health-related functioning of such establishments shall be understanding of social-pedagogic, medical-biologic and hygienic aspects of organization of pupils' sport loading [3, 8, 9, 12-15].

For working out of scientifically grounded measures, oriented on prophylaxis of diseases, it is necessary to specify factors, which condition appearance of pathology. It is important to remember that junior sportsman endures at the same time influence of two groups of risk factors: traditional, starting from heredity and finishing by ecologic problems and reasons, connected with sport trainings.

Our researches were conducted in compliance with scientific topic of human biology and immunology department of Kherson state university and is a component of topic "Urgent problems of vocational training of modern school teachers", registration number 0198U007532).

Purpose, tasks of the work, materials and methods

The purpose of the work is determination of social-pedagogic factors of pupils-sportsmen's health.

For achieving of this purpose we had to solve the following *tasks*:

1. Studying of literature, devoted to medical-biologic and social-hygienic factors, influencing on health of junior sportsmen;
2. Working out of questionnaire and questioning of different schoolchildren categories for evaluation of social pedagogic factors of pupils-sportsmen's health;
3. Determination of social-pedagogic characteristics of pupils'-sportsmen's health.

In our complex research, which was carried out with the help of specially worked out questionnaires by method "copy-pair": we determined medical biologic and social-pedagogic factors, influencing on state of children and teenagers (who train at sport schools) health. In research 12-15 years old age sportsmen (n=60) took part as well as their peers (n=60), who do not practice sports. Control group consisted of schoolchildren, who practice physical culture as per program of comprehensive schools.

Results of the research

Most of the questioned disciples of children-junior schools (90.4%) train 3-6 times a week. 63.2% of pupils-sportsmen have duration of one training 1.5-2 hours. With it 61.6% of sportsmen have one training a day; however 38.4% of sportsmen noted that they have 2 trainings a day. Total duration of junior sportsmen’s trainings is 9-12 hours per week; 86.4% attend only physical culture lessons and practice physical exercises 1-3 hours every week. Tensed rhythm of trainings reduces period of junior sportsmen’s recreation; as a result – 33.6% of them subjectively feel no recreation in days of rest and between trainings (see table 1).

Table 1

Social-hygienic factors, characterizing health of junior pupils-sportsmen and pupils of comprehensive schools

Factors	Frequency of sign, %		p
	Pupils-sportsmen	Comprehensive school’s pupils	
Regular being outdoors at first year of life Регулярне	95.0 ± 1.9	82.0 ± 3.4	0.001
Cold-related disease in 1 st year of life	24.0 ± 3.8	46.0 ± 4.6	0.001
Violent eating	77.0 ± 3.8	53.0 ± 4.5	0.001
Quantity of eating per day (four and more)	46.0 ± 4.6	22.0 ± 3.7	0.001
Family diet (prevailing of milk, meat or vegetables)	76.0 ± 3.8	52.0 ± 4.5	0.001
Everyday eating of vegetables and fruits	35.0 ± 4.3	6.0 ± 2.1	0.001
Everyday TV watching more than 2 hours	27.0 ± 4.0	55.0 ± 4.4	0.001
Using of alcohol by parents (I time a week and more)	31.0 ± 4.1	51.0 ± 4.5	0.003
Duration of child’s sleep 8-9 hours a day	72.0 ± 4.0	48.0 ± 4.5	0.001

Very often junior sportsmen start training, feeling tiredness (28.8%), with weakness and symptoms of disease (accordingly 6.4% and 6.8%), with absence of desire to train (12%). It is reflected in self-feeling and health of sportsmen; in this connection 5.6% appraise their state after trainings as unsatisfactory and 4.8% subjectively connect worsening of health with starting of sport functioning.

When studying sleeping we determined that 19% of children, who practice sports, have duration of sleep less than eight hours, 72% - eight-nine hours, 9% - more than nine ours. When answering question: “Why do you practice sports?” 30.4% of children-junior sports schools’ disciples put on first place wish to be physically healthy, 12.8% want to be physically attractive, 8.8% want to maintain workability; 7.2% of sportsmen think that sport distracts them from harmful habits and 3.2% noted that trainings help to remove tiredness. 44% of respondents gave combinations of these answers. Among other motivations to sports the following variants of answers were registered: wish to be known, entering combined team, wish to be a champion, to become a professional sportsman.

In compliance with materials of our researches 0.8% of junior sportsmen smoke; in control group there are 2.7% of smokers. With it 2.4% of smoking sportsmen do it from time to time and their quantity is less than of pupils, who do not practice sports (14.5% smoke from time to time, 2.7% – up to five cigarettes a day and 0.9% – five-ten cigarettes a day).

Most of junior sportsmen (85.6%) and 69.1% f comprehensive schools pupils think that smoking influences negatively on health (p<0.01), only 24.0% of sportsmen and 8.2% of comprehensive schools’ pupils know that smoking worsens mental and physical workability; 3.2% of junior sportsmen and 8.2% of comprehensive schools’ pupils answered that smoking does nor influence on health substantially.

85.6% of junior sportsmen and 86.4% of comprehensive schools pupils do not use alcohol; 11.2% of sportsmen and 5.5% of pupils use alcohol use alcohol once a month; one time per every two week alcohol is used by 1.6% of sportsmen and 4.5% of pupils. Most frequently junior sportsmen use alcohol “in company”, “for better mood”, “for better communication”; sometimes alcohol is used for releasing tiredness.

Detail analysis of frequency, starting of using alcohol and its dozes did not show substantial distinctions between pupils, who did not practice sports and sportsmen.

In case if medical aid is required, only 12.0% of disciples of children-junior sports schools address medical-physical culture dispensary, 72.8% - address local polyclinics and 14.4% - practice self-treatment. It conditions demand in increasing of qualified medical aid to pupils-sportsmen on base of medical centers of sport-educational establishments.

Medical biological factors, such as parents’ health, heredity and other play important role in formation of children’s health. It is known that in families, in which children have different somatic diseases, parents confidently oftener suffer from chronic diseases.

Acute respiratory diseases during pregnancy period of mothers were registered for 9.0% of their children – members of main group and for 19.0% of children from control group (p< 0.05). As it was stated by the research 24% of junior sportsmen and 46% of comprehensive schools’ pupils suffered from acute respiratory diseases in first year of life (p<0.001). Regular being of child outdoors was noted by 95.5% of sportsmen’s parents and by 82.0% of comprehensive schools pupils’ parents (p<0.001). So, junior sportsmen endure less influence of negative medical-biological factors.

Children's way of life is closely connected with parents' way of life. In childhood and teenagers' age habits and value orientations are formed; just in this period it is necessary to form such way of life, which would facilitate strengthening of health. In this aspect much depends on personal example of adults, their behavior, on their relations with a child.

As a result of the research we found that as on the moment of child's birth 34% of mothers, who educate children-sportsmen, belonged to categories of workers by social status (in control group – 15.0%; $p < 0.001$), 53% – belong to office workers (in control group – 60.0%), other were students (5.0%), housewives (6.0%), unemployed (2.0%). Analysis of social state of junior sportsmen's parents showed the following: 51.0% of fathers were workers (in control group – 16.0%; $p < 0.001$), 39.0% - office workers (in control group – 65%; $p < 0.001$), other – military officers and students.

The fact that parents' social state and educational level in main group is lower than in control is also interesting. For example 34.0% of mothers and 45.0% of fathers from main group and 48.0% of mothers and 64.0% of fathers in control group ($p < 0.05$) have higher education and not finished higher education. The obtained data witness that most of families in main and control groups are rather trouble-free in material aspect and have satisfactory living conditions.

It is known that parents harmful habits, such as smoking and taking alcohol, negatively influences on children's health. As per our research expansion of harmful habits is rather high. For example 12.0% of parents of junior sportsmen smoke, 31.0% of sportsmen's parents and 49.0% of pupils, who do not practice sports, use alcohol one time every two weeks and oftener ($p < 0.001$). Only 3.0% of families, who breed child - sportsman recognize that alcohol is the reason of conflicts. Actually there are much more problems, connected with taking alcohol in families and its is noted by other researchers. Besides, both parents and teenagers bent to conceal dependence on alcohol. It should be noted that with arranging of full psycho-emotional contact we received more informative data about alcohol taking.

The health of children and teenagers, who practice sports, to large extent depends on daily regime: rational eating, regular sleep and rest, being in the fresh air, correct organization of trainings.

As a results of the research we stated that in families with junior sportsmen violent eating is more frequent than in families with pupils-not sportsmen (77 against 53.0% $p < 0.001$). But quantity of daily eating of junior sportsmen is higher. 46.0% of pupils-sportsmen and only 22.0% of pupils-not sportsmen have meal four and more times a day ($p < 0.001$).

High physical load intensifies metabolism that is why eating of young sportsmen shall not only compensate significant energetic and plastic losses, which are peculiar for young organism, but also facilitate increasing of sport workability and acceleration of recreational processes after trainings and competitions. It was found that according to this rule, vegetable, meat and milk food is taken by pupils-sportsmen confidently oftener than by their peers – not sportsmen (accordingly 76.0 and 52.0%; $p < 0.001$), fresh vegetables and fruits are daily taken by 35.0% of sportsmen and only by 6% of pupils-not sportsmen ($p < 0.001$).

Junior sportsmen spend confidently less time watching TV (more than 2 hours) than pupils of control; group) accordingly 27 and 55%; $p < 0.001$). It witnesses that systemic practicing of physical culture and sports facilitate distraction of children from passive wasting of time and help to observe more rational daily regime.

It is also interesting to study influence of factors, connected with school environment, on teenagers' health.

In our research we have not found confident distinctions between educational progress of comprehensive schools' pupils and pupils-sportsmen. However 4% of sportsmen's parents noted that teachers consider behavior of their children to be unsatisfactory.

It is known that psychological climate in family, family relationship, can render both positive and negative influence on indicators of children's and teenagers' health. In 9% of junior sportsmen's families and 15% of pupils-not sportsmen's families often conflicts appear. Episodic conflicts appear accordingly in 72% and 54% of families. There were no conflicts in 19% of sportsmen's families and in 31% of families of pupils-not sportsmen. The most often reasons in families of junior sportsmen is explosive character of one of parents (36% against 24%, $p < 0.05$), material troubles (21% against 34% accordingly, $p < 0.05$), difficulties, connected with breeding of child - 19% of sportsmen's parents and 28% of parents of children-not sportsmen.

It should be noted that 63% of sportsmen's parents evaluate family relationship as good and open, 4% - as troublesome; in control group - accordingly 47% and 13% ($p < 0.05$).

With studying of medical supervision it was found that 53% of the questioned form sportsmen's families seek medical advice only in case of child's heavy disease, with it – 39% - only in second day of disease. Recommendations of medical workers concerning treatment of children are completely followed only by 51% of sportsmen's families and 28% of families with children-not sportsmen ($p < 0.001$). Main reasons of ignoring of medical recommendations were: deficit of time – 14.0%; absence of belief in medical specialist – 11.0%; absence of required medicine – 6.0%. Among other reasons of ignoring of medical advices (20%) were: high price of medical preparations, material troubles. It should be stressed that 31% of main group families practice self-treatment, which is one of main reasons of incorrect application of medicine and often reduce health of junior sportsmen. Also attracts attention the fact that 5% of main group mothers and 8% of control group mothers abandon hospitalizing of child even if symptoms of disease are present.

22% of sportsmen's mothers and 9% of not-sportsmen's mothers seek for medical advice systemically by own initiative ($p < 0.001$).

Among reasons of dissatisfaction with medical aid the most often were long waiting in queue for doctor's consultation (30,0%). We registered great number of complaints on indifferent attitude of medical personnel (14.0% in

main group and 24.0% in control) as well as on insufficient qualification of doctors (14.0% and 8.0% accordingly). Medical activity in tested groups is on different levels and, as a rule, depends on type of family and place of residence. Leading principle of determination of disadvantaged family, from the point of view of district doctor, is family's attitude to own child's health, wish and possibilities of parents to create optimal conditions for child's development and desire to follow doctor's recommendations.

For example in 61% of sportsmen's families parents confidently oftener carry out regular control over organization of daily regime and eating (against 21% in control group). Most of questioned (66% of main and 65% of control group) consider their knowledge on prophylaxis of children's disease to be sufficient. Among sources of medical knowledge sportsmen's parents called mass media (43%), friends and relatives – (43%), popular medical literature – 26% and 10% accordingly.

It is rather remarkable that question "when medical knowledge were received" was answered by equal quantity of parents (32-33%) both of main and control groups : "after child caught disease". It witnesses about low prophylaxis work of centers of maternity and childhood protection, about low quality of population's hygienic education, formation of healthy life style.

Conclusions:

1. Generalizing results, we can note that schoolchildren's health is formed under influence of groups of factors, which can be classified as mega-, macro-, meso-, and micro-factors. Mega-factors are those, which influence on health of all population of the Earth. Macro-factors – cover country, society ethnos, state, i.e. factors, which determine directions of socialization of people, living in certain countries, in case if mass media are involved. Meso-factors are conditions of socialization of big groups of people, who are divided by type of locality and place of residence (region, city, village), by their belonging to certain sub-cultures. Micro-factors are factors, which directly influence on definite individuals. They include families, groups of peers, educational establishments, public, governmental, religious organizations, micro-society. Such structuralizing of factors permits to determine interconnection of individual and public health, total dependence and inter-determinative character of all levels of their manifestation.

2. The highest influence on quality and way of life as well as on pupils and pupils-sportsmen's health is rendered by micro-factors. Just under their influence in the process of socialization of child (pupil) certain social orientation is formed, as well as individuality, certain style of life, certain attitude to own health and health level.

3. The process of socialization, in which formation of healthy life style takes place and certain health level is achieved, is realized as social-psychological and social-educational mechanisms. Social-psychological mechanism is represented by imprinting, inheritance, existential pressure, identification and reflection. Social-educative mechanism includes certain kinds of interaction: institutional, traditional and inter-personal.

4. Junior sportsmen endure less influence of negative medical-biological factors than their peers. Systemic trainings distract pupils from passive spending of time and regulate rational daily regime. Junior sportsmen's eating has the following signs: violent regime, high quantity of taking meal, prevalence of vegetable, meat and milk in diet.

5. Most of sportsmen's families have sufficient material level and satisfactory living conditions. At the same time parents of pupils-not sportsmen are characterized by high level of harmful habits. Psychological climate in sportsmen's families is low-conflict, relationship are open and friendly. Medical supervision is stable but not sufficient. About half of families of pupils-sportsmen follow medical recommendations, receive additional hygienic knowledge. Substantial group of parents does not follow medical advices owing to deficit of time and material troubles. Leading factor of social pedagogic state of a family is attitude to health of own child, desire and possibility to create optimal conditions for child's development, wish to follow hygienic recommendations.

Thus, schoolchildren, who practice sports, are specific social demographic group and, accordingly, have peculiar indicators of health as well as conditions of life and life style, which shall be considered, when working out scientifically grounded system of organization measures oriented on strengthening of health of this contingent.

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USAGE OF THERMOGRAPHY AS INDIRECT NON-INVASIVE METHOD OF EVALUATION OF PHYSICAL EFFICIENCY. PILOT STUDY

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Annotation. *Introduction.* One of main features deciding on functional abilities and agility of a man is his conative efficiency. The aim of the study was to determine the influence of physical effort on changes of skin temperature of each body areas and the analysis of dependence between the body temperature and the level of maximum absorption of oxygen (VO₂max). *Material and methods:* The study group consisted of 7 women at about average age of 23.86 (±0.69) years. All participants of the study were healthy, did not have overweight nor chronic illnesses. They also did not do sport professionally. During the research each participant performed the effort in the form of 6 – 8-minute-long step Astrand – Rhyming test and then 10-12-minute-long run on the athletic track. Before and after the effort the women were examined by means of thermo visual cameras (temperature in front and back of the body). In the moment of effort ending studied persons had heart rate measured with heart rate monitor. *Results.* Statistically non-exchangeable temperature reduction of body surface on thighs, forearms, arms, trunk (both in front as well as the back) and behind shins was observed during the study. The greatest drop of about -1.13 °C, appeared behind shoulders, least, about -0.04 °C, on the back surface of the trunk. Only on front side of shins the temperature increased in non-exchangeable manner, about +0.06 °C. The important dependence (p<0.05) between the change of temperature in front (r=-0.82) and the back of the trunk (r=-0.78) as well as VO₂max was shown. *Conclusions:* The higher pulse was measured at the studied participant the lower VO₂max values were. There is dependence between the thermal reaction and the efficiency – the greater drop of temperature on the trunk the higher VO₂max was. Thermal observation can be therefore helpful as indirect estimation of the efficiency in medicine and rehabilitation.

Key words: thermography, physical, efficiency, assessment.

Introduction

One of main components conditioning undertaking of physical effort is physical efficiency of the organism. It is what decides whether the organism is able to undertake heavy physical efforts, and which loads it will not manage with. It influences also on how quickly after the effort we can return to state of rest, previous to the activity [1].

Physical efficiency of the organism in many cases is the element conditioning the course of rehabilitation. The level of physical efficiency plays special role in the cardio logical rehabilitation. Regular physical training reduces the risk of occurrences of metabolic illnesses and diseases of circulatory system. It was proven; that the regularly done physical training enlarges not only physical efficiency, but it also diminishes clinical symptoms of patients with incapacity of the left heart ventricle. Consequently, tolerance of physical effort and resistance to fatigue improves too. Patients are able to undertake new challenges and greater training-loads, and everyday activities often stop to be the hindrance for them. The rehabilitation of cardio logical patients lengthens the life and improves its quality [1 and 2].

Physical efficiency is also an important part of social and professional life of handicapped persons. Often its level decides on taking up professional work. Medical rehabilitation and an active life style favourably influence psychophysical condition of handicapped persons. Therefore, participation of these persons in rehabilitative camps and therapeutic exercises is essential [3].

Undertaking physical activity increases the level of physical efficiency, and consequently improves quality of life at patients with incapacity of kidney and patients struggling with overweight and obesity. Regular physical training is recommended also as the prophylaxis of osteoporosis [4].

Doing physical activity leads to distinct acceleration of calorification inside the organism, what is a result of increased metabolism of working muscles. The temperature of muscles at rest amounts about 36°C, and its rise follows at once after the beginning of effort and depending on the intensity it can increase to 38°C, and even 42°C (e.g. in thigh muscles) [5]. Warmth with enlarged muscular flow of blood penetrates far inside the body, due to that its temperature also increases. The rise of exertional temperature of internal organs is connected with the intensity of training. During prolonged efforts of endurance the stabilization of internal temperature follows after about 30-40 minutes, and its value is dependent on the workload expressed as the percentage of individual maximum receiving of oxygen (VO₂max). This parameter is a subject to considerable individual differentiation and, depending on the level of physical efficiency, the body temperature can be higher or lower at different persons in spite of undertaking of effort with the same intensity [5].

A human organism, due to ability of maintaining constant body temperature and the calorific radiation of tissues, is an excellent object of thermo visual study. The distribution of temperature in different human body parts can serve as a diagnostic criterion and evidence the processes, which happen inside the organism. Thermo graphic research

more and more often proves to be a valuable supplement of diagnostic research, and the main advantage is its entirely non-invasive and unlimited use regardless of age, gender or health condition.

Basing on above-reasons, the aim of this study was to qualify dependence between the thermal reaction of organism on the prolonged effort and the level of physical efficiency measured with the level of maximum absorption of oxygen (VO₂max). Tests on verification of possibility of thermography utilization as the indirect method of estimating the efficiency in the physiotherapy were undertaken too.

Material and methods

There were 7 participants randomly chosen from students of the Warsaw Medical University for this study. They were aged 23–25 years (averagely 23.86 ±0.69). Each of studied persons stressed out, that her life is not related to any over average physical activity (e.g. high-performance sports, regular fitness training, participation in slimming programs etc.). All persons were healthy. For the influence on the thermoregulation as a result of the interview it was ascertained that none of participants had been pregnant. Participants did not have overweight nor obesity problems (BMI within the range 19.1-24.5).

The exercise of each participants consisted of ingress and descent from the step (the step test – 33 cm) in strictly defined tempo (45 times within 2 minutes) set by means of metronome. After 6–8 minutes of effort or achievement of suitable pulse level (steady-state) the examined person performed 10-minute-long run on the track (with defined in the test pulse as the state of functional equilibrium) (tab. 1). The above-activities each of participants performed after about 15-minute-long period of the acclimatization, at rest, in the room of thermo neutral temperature (20–22°C). Each participant performed the physical activity chosen for the examination in sports clothes with uncovered lower and upper limbs as well as the best part of the trunk.

After the acclimatization and before the beginning of effort in the step-test, all participants had photos taken with the thermo visual camera – imaging in front and the back of the body (the trunk, upper limbs, lower extremities, head and neck). Such examine with the thermo visual camera was also performed after the end of running on the track.

Each studied person was wearing heart rate monitor in time of the effort. In the moment of ending the effort the measurement of pulse was taken on the step. Values of the pulse in this moment were taken for assessment of maximum absorption of oxygen in compliance with the method of the Astrand-Rhyming test and for delimitation of the intensity with the track running. VO₂max values read from the nomograph were subjected to statistical analysis [6].

Table 1

The course of the study for each participant

Thermal adaptation	Thermovision measurement	Step Test*	Heart rate measurement	Run	Thermovision measurement	End of the test
15 minut	X	6-8 minut	X	10 minut	X	X

* - the heart rate had to stay within the range 120-170 /min.

Thermo graphic imaging was made with the use of Flir A325 camera. The room temperature was set at 22–24°C, while the moisture 48-50% and these parameters were situated in so called „Golden Standard”. Additionally external sources of warmth were eliminated. The analysis was done with the Researcher 2.9 Pro software. Each examined person had a thermograph taken from the distance of 3 m. It was the imaging of the front (F) and back (B) surface of the body (separately an upper and lower part). First images were made in resting conditions, after 15-minute-long

adaptation to thermal conditions present in the room, while following two images were made directly after the end of track test. Polar areas marking fields of measurement were appointed markers so that every time the analysis referred to the same surface.

Changes in temperature which happened as a result of the test were verified by means of the t-Student test for dependent data. Dependences between the height and the body mass, the level of BMI and HR, the temperature and VO₂max were qualified by means of the Pearson’s correlation coefficient. Values on the p≤0.05 level were accepted as statistically important.

Results

Five from the studied persons were characterized with the average efficiency (characterized with the VO₂max level). According to the criterion of the American Heart Association, the good result was reached only by three studied persons (fig. 1).

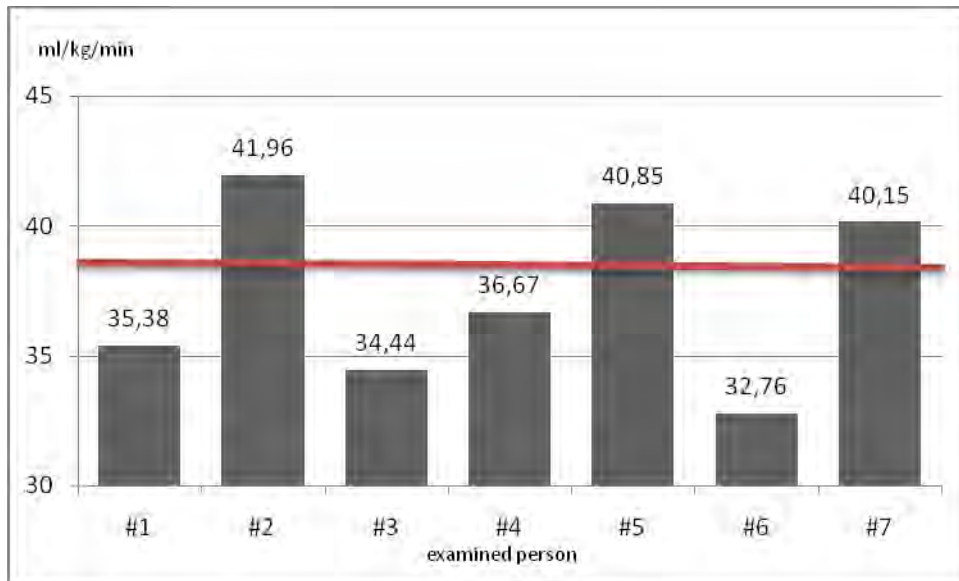


Fig.1. Results of the Astrand-Rhyming test after the reading of nomograph („the good result”, according to American Heart Association, was marked with the line).

Table 2

Temperature changes of the body surface of studied persons occurring due to realized physical effort

	FRONT					BACK				
	Shin	Thigh	Trunk	Fore-arms	Arms	Shin	Thigh	Trunk	Fore-arms	Arms
BEFORE	31,62	32,26	33,18	31,02	32,04	32,00	31,99	34,01	31,07	32,32
RE	±1,13	±1,43	±2,26	±1,91	±0,99	±1,18	±1,97	±2,18	±1,16	±1,33
AFTE	31,68	31,99	32,85	30,92	31,90	31,84	31,76	33,97	30,91	31,19
R	±1,14	±1,52	±2,70	±2,19	±1,06	±1,44	±1,99	±2,15	±0,93	±1,11
CHANGE	p>0.05									

Due to effort the average superficial temperature of the trunk (both sides) and thighs and forearms (in front) dropped (tab. 2). However, there were no statistically essential changes ($p>0.05$). The large range of results requires attention too, because this decrease referred only to some studied persons and mean values, while at some research participants there was observed also the temperature rise. The greatest differentiation of results appeared on front and back of the trunk, where changes of superficial body temperature from -2.2 to $+2.2^{\circ}\text{C}$ were noted.

Correlation analysis showed its significant level ($p<0.05$) for the front ($r=-0.82$) and back of the trunk ($r=-0.78$). It means that the greater decrease of temperature on this trunk, the higher VO_2max was. There was no statistically important dependence ($p>0.05$) between VO_2max and BMI and the frequency of heart contractions.

Discussion

The analysis of dependence of obtained pulse at the end of undertaken exercises (about 15-minute-long step test and the run) did not show its dependence on VO_2max and the body mass of the examined persons. It is convergent with the results by, among others, Thomas et al. (1993) which ascertained that age, gender, quantity of adipose tissue, body mass nor length of lower limbs significantly correlate with VO_2max . They infer, that the maximum consumption of oxygen is dependent on many factors simultaneously, which result in the large variability of data [7]. However, strong negative correlation was observed. The higher pulse was obtained by the person in the last part of the effort, the lower VO_2max level calculated with Astrand-Rhyming nomogram was.

Similar dependence was observed by Chudecka and Lubkowska (2012) at volley-ball players training for 90 minutes. They noticed that the higher pulse the lower VO_2max at training sportsmen. Additionally they noted that drops of temperature on the front body surface were greater than on the back. It means that the organism gets rid of the excess of internal warmth more or in the first instance through back body surface (shoulders, back, buttocks, thighs) than through front [8]. It explains obtained in the study greater temperature drops on the front surface of the trunk and the back one of lower limbs and only the minimum-difference (-0.04°C) on the back surface of the trunk at research participants.

It is doubtless that the warmth generated in muscles during the effort must be taken (convectively by blood) and sent to organs and distant areas from working muscles, and when this does not suffice outside. It seems that the

large body surface (back or front one) is a foreground-area of warmth rendition (in the way of convection, but also perspiration and vaporization of the sweat). Akimov et al. (2009) ascertained, that the temperature always grows close to the nape, along the centre line of the body (near the spine), until the lumbar region and it has the shape of the perpendicular belt, whereat the more toward the sides, temperature decreases. Additionally in the analysis Akimov showed the statistically essential correlation between VO₂max and the superficial temperature of the back of the trunk [9].

On the other side, as Adamczyk (2013) proves, there is statistically significant dependence between the thermal reactions visualized in thermo visual image and the level of oxygenic efficiency measured by means of VO₂max. The higher efficiency of the organism translates to greater efficiency of mechanisms of thermoregulation, what in turn, in thermo visual image, causes the greater reduction of exertional temperature of the body surface. The author explains this as the result of efficient rendition of warmth through perspiration. In this context the temperature rise at the progressive effort can testify about the low efficiency [10].

The part of other authors also evidences the occurrence of temperature decrease on the body surface due to the effort, what is connected with the occurrence of the sweat and further its evaporation from the skin [11-13]. This can prove good rendition of the warmth. Therefore, if we notice the drop of skin temperature, it may indirectly inform us about the higher readiness to effort. This effect was confirmed for numerous kinds of preparatory exercises used in the warming up [10].

During effort there is increase of blood flow in working muscles, and this happens this with the cost of diminution of perfusion by visceral organs and cutaneous coats, especially in close area to muscles working most intensely [14].

Johnson and Robinson showed that quickly at the beginning effort leads to skin temperature reduction (skin vasospasm) because blood runs to nearby working muscles [15].

In a little smaller degree the limitation of the perfusion appeared in forearms (drop of skin temperature: behind forearms -0.16°C, forearms in front -0.1°C and on shins -0.16°C. Instead on front side of shins there was minimum-increase (+0.06°C), which can prove little meaning of this area of the skin in thermoregulation, or for the nearness to the tibial bone this area of the skin does not take part in thermoregulation (quite large front-paracentral surface of bone adheres directly to skin and separates it from muscles of the calf). That is why it is an important thermal barrier which blocks the warmth flow from muscles of calves to the skin in front of tibia.

Research with the use of thermo visual method at those exercising on cycle ergometer was run, among others, by Torii and Zontak. In turn Zaidi examined swimmers, and Ludwig applied thermography at those practicing breathing exercises [11, 16-18]. In this research changes in temperature of coats in different body areas - both drops (Torii) as well as rises (the rest of quoted above), were observed.

Ferreira (2008) assessed changes of temperature at younger and senior citizens. Bertraming (2008) studied schedules and local changes of temperature, among others of deltoid muscle [19 and 20]. Merla (2005) first and only yet published the research with the use of thermo visual camera at trained and not trained before, during and after the effort. This research could be the guideline for the elaboration of standardized thermo graphic study in clinical and sports practice [21].

The occurrence of the first drop of skin temperature from the area above the intensely working muscles at not trained people (ones leading rather sitting life style) was observed by Formenti and co. (2013). It is also described by other authors [22]. Merla (2012), at those tested on the track, in the twelfth minute of the effort, observed decrease of temperature on the skin of whole frontal part of body, and only in the resting phase the skin temperature increased to the value from before the effort [23]. Adamczyk (2012) observed drops of temperature in the area close to quadriceps during the warming up before the training. The statistically significant decrease was obtained for the intensive warm-up with the utilization of elastic band, though light 10-minute-long warming up or 5-minute-long one combined with the warming up with the use of elastic band also caused, though statistically non-exchangeable, temperature reduction in the area close to quadriceps [13].

Research run in the present work are partly coherent with observations of other authors. Its interpretation however must take into consideration the kind of effort, its intensity and the time of thermo visual measurement from the beginning of the effort (or possibly after its end). The characterization of research participants is very important for the interpretation too. Different results will be obtained for persons who trained and those who have not trained. The results will also differ for small children, adults and the elderly, and probably also for both genders. All the more it seems, that after suitable standardizing of official investigative records the thermography as the method should find the wide use in the rehabilitation and sport, as well as in the clinical diagnostics (assessment of possibility of using suitable trainings for persons after heart failure, with heart disease, arterial hypertension, diabetes etc.). Basing on initial results of thermogram it is possible to recommend, to forbid or to modify the suitable kind of the training for a person. It would improve the safety of trainings, but also their effectiveness. Moreover, with the observation of thermal reaction of the organism on physical effort we can assess the level of efficiency, what in the physiotherapy seems to be essential.

Conclusions

1. Pulse values are connected with values of the maximum absorption of oxygen (VO₂max).
2. As the result of undertaken effort the average temperature of each body part (with the exception of the front surface of shins) decreased. Large surfaces of the body such as e.g. the trunk are the best place to observe thermal reactions of the organism on.

3. It was not univocally decided whether there is any dependence between the body temperature and the level of maximum absorption of oxygen (VO₂max). This demands more methodically composite investigative experiment which can be based on results obtained in this research.
4. The thermo visual camera can prove to be a helpful tool used for assessment of progress during the process of rehabilitation; for planning the course of rehabilitation; for analyses and assessment of preparation of professional sportsmen as well as those unprofessional ones. It can also be a valuable diagnostic device at ill.

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THE INFLUENCE OF SOCIOECONOMIC STATUS ON THE LEVEL OF EARLY-SCHOOL-AGED CHILDREN'S MOTOR ABILITIES – BLURRING OF DIFFERENCES IN THE ECONOMICALLY UNDERDEVELOPED AREAS

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Annotation. *Aim:* The aim of the study was to determine differences in the level of motor abilities of 7-9-year-old girls and boys in relation to the socioeconomic status of their families. *Material and Methods:* The research was conducted in 12 primary schools in two regions of Poland namely of Warmia & Mazury and Pomorskie voivodeship, on the total of 1205 pupils (584 boys and 621 girls) aged 7-9. Selected economic factors such as the type of school (public or private), monthly income per household member, and the number of children in a given family were accepted as the independent variables. The factors behind social status included the place of residence and parents' educational background. In order to determine the level of motor abilities, 13 motor tests were applied. *Results:* The research revealed that motor tests such as 1 and 3 min. Burpee test and medicine ball throws (forward and backward) appeared to show the biggest differences in the level of motor abilities of the children whose social and economic status varied. The results of these tests as well as those of the shuttle run were significantly higher for the girls from the families of high social status than for the boys of low social status. Social status to a greater extent than economic one differentiated the tested motor abilities, especially in the case of the girls from families marked by high social status, who scored better than boys. The exception is the skipping with clapping of hands – 8 s trial, which differentiated only the tested categories of economic status, especially when referred to the girls. *Conclusions:* Owing to the small number of significant differences between high and low social and economic status in both sex groups in the motor tests applied, it can be assumed that in the less developed, agriculture and tourism-oriented areas there has occurred blurring of the differences in the level of children's motor abilities depending on their social and economic status.

Key words: children, motor fitness, status, social, economic.

Introduction

A child's lifestyle is a type of a cultural modifier which is influenced by a range of both endogenic (temperament, sensitivity, needs) and exogenous factors such as customs, traditions and values combined with social-economic and environmental conditions. Physical activity occupies a special role among various elements of lifestyle. Numerous studies have confirmed the existence of positive relationships between physical activity and motor fitness (1), the intensity of which in the case of children was found to be only low or moderate (2). People who possess a higher level of motor fitness are more likely to be engaged in physical activity, which in consequence significantly decreases their proneness to illnesses such as: cardiovascular disease, type 2 diabetes, and all-cause mortality (3) in adults. The changes induced by physical exercise are mostly adjustable and disappear gradually once the stimulus is removed. On the whole, males tend to be more ecosensitive in terms of their sensitivity to the effect of physical and environmental factors and lifestyle (4).

It is common knowledge that the influence of socioeconomic status on the physical development of children is extensive. The analysis of the influence of socioeconomic modifiers on an individual's motor fitness typically takes into account the size and type of social environment (village, town, city, degree of industrialization, etc.) as well as the subject's financial situation (income, household wealth, number of family members) (5).

Adequate fulfillment of every person's basic needs largely depends on the income per family member (6). A lower monthly income per household member generates additional obstacles against undertaking physical activity due to, for example, difficulty in paying transport fares or trainers' fees, necessity to purchase sports facilities and equipment, or inability to secure safe neighborhood (7). By way of contrast, children from affluent families and whose parents are well-educated are characterized by accelerated biological development when compared to children growing up in less-educated, lower income families (8, 9). In the main, there exists a kind of socio-cultural code in a society to value people predominantly according to their educational background. Interestingly enough, the children raised in the families of the intelligentsia tend to grow taller. Moreover, they exhibit a higher level of motor fitness (10). This can be explained by the fact that physically fit and active parents, who frequently come from well-educated backgrounds themselves, emulate educational patterns of their parents and bring up their offspring(s) alike (11). Because of this, there is a strong likelihood that habits promoting active lifestyle will be formed and cultivated throughout the child's developmental period (12).

Physical development is largely determined by the place of residence, be these villages, towns or cities (13). The accelerated growth and development of children living in an urban environment seems to be caused by better care and living conditions (nutrition, hygiene, health care). Apart from this, the influence of stimuli affecting the nervous system and sensory organs such as television, cinema, and advertisement should not be underestimated. Moreover,

children growing up in urban environments have easier access to sporting facilities, which undoubtedly exerts a positive influence on their motor fitness (14).

Nonetheless, there has been observed a negative phenomenon of a steadily decreasing level of children's physical activity, particularly noticeable in the societies of highly developed countries and regions. Health care programs applied worldwide seem to have been ineffective in bringing the expected results as the research on the health status of children and adolescents presents a very worrisome outcome (15-Chiodera, 2008). This dangerous phenomenon bears special significance when pertaining to children because a poor level of physical activity during the formative stage results in a low level in adult life (16). This is often parallel with the tendency to overweight or obesity, which are the main causes behind numerous civilization diseases (17). In view of the above, motor fitness is an important measure of human health, and for this reason researching its level has become particularly significant in today's postindustrial societies.

The aim of the study was to determine any possible differences in the level of 7-9-year-old girls and boys' motor abilities in relation to the socioeconomic status of their families.

Material and Methods

Ethical consideration

The research was carried out with prior approval of the Ethical Committee of UWM, and the volunteers willingly agreed to participate in the study, which they confirmed by signing a written consent form.

Material

The research was conducted in 12 primary schools in north-eastern Poland (the voivodeship of Warmia & Mazury – 6 schools, and Pomorze – 6 schools) and was composed of over 97% of the students attending 1st, 2nd and 3rd grades at these institutions. The schools in which the research was conducted were randomly selected across the region of western part of warmińsko-mazurskie voivodeship and eastern part of pomorskie voivodeship adjacent to Warmia & Mazury. Such a selection of the research area was due to practical reasons (immediate environs). Apart from this, both regions are believed to be similar in terms of socioeconomic status.

A total of 1205 students (584 boys and 621 girls) aged 7-9 participated in the studies. The motor tests were conducted during obligatory P.E. lessons between September and October 2008. In order to provide a wide range of the socioeconomic statuses, the schools located in villages as well as small, medium, and large cities were selected for the research. Therefore, taking into account a big number of participants, a homogenous (narrow) and relatively developmentally stable age group and diverse urbanization statuses, the study group can be considered representative for this type of research.

Methods

Selected socioeconomic factors, which are most often accounted for by research, were accepted as the independent variables. These factors constituted the following: the type of school (public or private), monthly income per household member, and the number of children in a given family. The independent variables connected with social status were the following: the place of residence and parents' educational background. Each category of the analyzed factors was given a set number of points (Tab.1)

Table 1

The number of points in each SE and SS category

Economic status – total : min - 3, max – 10		Number of points
Type of school	Public	1
	Private/	2
Income per one person in a family [PLN]	x – 800	1
	801 – 1600	2
	1601 – 2400	3
	2401 – 3200	4
	3201 – x	5
Number of children in a family	1 – 2	3
	3	2
	4 and more	1
Social status - total: min - 3, max – 10		
Place of permanent residence	Village or town up to 20 000	1
	Town up to 50 000	2
	Small city 50 - 100 000	3
	City over 100 000	4
Father's educational background	Primary and secondary vocational	1
	Secondary	2
	Higher education degree (BA/BS; MA/MS)	3
Mother's educational background	Primary and secondary vocational	1
	Secondary/high school	2
	Higher education degree (BA/BS; MA/MS)	3

A bigger number of points awarded for the material status of families of the children attending private schools is based on the assumption that such families are better-off. On the other hand, the bigger the number of children in a given family, the stronger the likelihood that they are characterized by a lower economic status (18). The point system was developed in such a way that the maximum (10 pts) and minimum (3 pts) number of points awarded for economic (ES) and social (SS) status was the same. As a result, ES and SS were divided into two subcategories: lower status (3-6 pts) and higher status (7-10 pts). This division was conducted on the basis of the median so that the number in each group would be similar in the individual age and sex categories (Tab. 2).

Table 2

Numbers of individuals in established categories of sex, age, and economic and social status

Sex	Age [years]	Number (N)	Economic status		Social status	
			Low	High	Low	High
Boys	7	186	88	98	118	68
	8	200	101	99	112	88
	9	198	90	108	124	74
	7-9	584	279	305	354	230
Girls	7	207	80	127	125	82
	8	187	82	105	75	112
	9	227	101	126	129	98
	7-9	621	263	358	329	292

The results obtained by the children in the individual motor tests constituted the dependent variables. Eleven motor tests were used to precisely assess the level of motor abilities, namely: the standing long jump [cm], the 4x10 m shuttle run [s], the skipping with clapping of hands – 8 s [number of claps], sit-ups – 30 s [number of sit-ups], the medicine ball (2 kg) forward throw [cm], the medicine ball (2 kg) backward throw [cm], the bent arm hang on bar [s], the downward bend from standing position [cm], the sit and reach [cm], and the 1 and 3 min. Burpee test [number of cycles]. The accuracy and reliability of these tests have been confirmed by Pilicz (19). Prior to performing the actual trials each participant took part in a 10-minute warm up. The children taking part in the experiment were instructed how to perform each motor task and provided ample time to execute it properly. In order to gather the information concerning the socioeconomic status of the children examined in the research, their parents were surveyed by a questionnaire.

Statistical analysis

The results of the studies were calculated using the Statistica software package. The arithmetic mean and standard deviation were calculated for each of the three age categories and both sexes as well as the indicated social and economic status categories. The Shapiro-Wilk test was used to assess whether the distribution was normal and revealed no significant deviations from normality. Based on this data, the position of each participant in his or her category was additionally calculated in the Z scale (0;1 normalization). The Z value constitutes the quotient of how much a given individual's result differed from the average of the category and the standard deviation calculated for the category. By this, all age categories could be combined into one and the analysis to be carried out only on the more numerous sex categories. Therefore, average Z and SD_Z values were calculated for both boys and girls. The t-Student test was used to calculate the differences between higher and lower ES and SS categories of average arithmetic absolute mean values of the analyzed motor abilities as well as average Z value.

Results

Table 3

Differences in motor fitness of the boys and girls from the families of low and high economic and social status

Sex	Age [years]	Motor test	Economic Status	
			Low (3-6 pkt)	High (7-10 pkt)
Boys	7	Medicine ball backward throw	+	-
		3 min. Burpee test	+	-
	8	Flexed-arm hang on bar	-	+
	9	Skipping with clapping of hands	-	+
	7-9 (Z-scores)	No differences		
Girls	7	4x10 m shuttle run	+	-
		Skipping with clapping of hands – 8 s	-	+
		Downward bend from standing position	+	-
	8	Skipping with clapping of hands – 8 s	-	+
		1 min. Burpee test	+	-
	9	4x10 m shuttle run	+	-
		1 min. Burpee test	+	-
7-9	4x10 m shuttle run	+	-	

		(Z-scores)	Skipping with clapping of hands – 8 s	-	+
			1 min. Burpee test	+	-
Social Status					
Boys	7		Sit-ups - 30 s	+	-
			Downward bend from standing position	-	+
			Medicine ball backward throw	+	-
			Medicine ball forward throw	+	-
			1 min. Burpee test	+	-
			3 min. Burpee test	+	-
	8		Medicine ball backward throw	+	-
	9	No differences			
	7-9		Medicine ball backward throw	+	-
	(Z-scores)		Medicine ball backward throw	+	-
Girls	7		Standing long jump	-	+
			Medicine ball backward throw	-	+
			Medicine ball backward throw	-	+
			1 min. Burpee test	-	+
			3 min. Burpee test	-	+
	8		4x10 m shuttle run	-	+
			1 min. Burpee test	-	+
			3 min. Burpee test	-	+
	9		Flexed-arm hang on bar	+	-
			1 min. Burpee test	-	+
			3 min. Burpee test	-	+
	7-9		4x10 m shuttle run	-	+
			1 min. Burpee test	-	+
		3 min. Burpee test	-	+	
(Z-scores)					

Note: Only the features showing statistically significant differences ($p \leq 0.05$) were included, marking better results with (+), and worse results with (-).

The motor tests which most significantly differentiated the children in the analyzed ES and SS categories were the 1 and 3 minute Burpee test. The number of cycles performed during these time limits was significantly bigger in each of the three analyzed age categories as well as the combined age categories (Z-scores) for the girls raised in the families characterized by high social status (SS) (Tab. 3). The opposite was observed among 7-year-old boys, as the children from low SS families were characterized by a smaller number of performed cycles. Economic status (ES) influenced the number of cycles conversely and to a lesser extent, as the children from the families of low ES achieved better results, although only in the case of 7-year-old boys (3 minute Burpee test) and 8- and 9-year-old girls (1 minute Burpee test). This effect remains detectable when the impact of age is eliminated in the case of girls (1 minute Burpee test).

The results of the medicine ball forward and backward throws as well as the 4x10 m shuttle run displayed a similar, though not as clear, tendency. Significantly better results in the medicine ball throws were observed among 7-year-old girls from the families with the highest SS, 7- and 8-year-old boys as well as 7-9-year-old boys from the families with a lower ES. As far as the 4x10 m shuttle run test is concerned, the whole group of 7-9-year-old girls (Z-scores) and 8-year-old girls from the families marked by a high SS as well as the whole group of 7-9-year-old girls from the families characterized by a lower ES scored significantly better. The results above revealed no significant differences as regards the boys from the families in different ES and SS categories. It is worth noting that SS differentiated the analyzed motor abilities more than ES (25 significant differences as opposed to 11). The only motor test which was found to be unaffected by any SS in any age or gender category was the skipping with clapping of hands – 8 s. The same trial, however, was characterized by higher results obtained by the children from the families of higher ES in four separate categories: 9-year-old boys, 7- and 8-year-old girls, and 7-9-year-old girls (Z-scores). Both SS and ES failed to clearly differentiate the remaining motor tests. The observed individual differences can be treated as coincidental.

Discussion

In order to make sense of the relationships between socioeconomic status and the level of motor abilities of early-school-aged children, it is necessary to interpret these dependencies in terms of cause and effect. According to Krombholz (20), children falling into the lower categories of socioeconomic status are exposed to fewer stimuli which could encourage them to be involved in a physical activity. As a result, they lead a more sedentary lifestyle and tend to consume unhealthy foods and drinks. This, in consequence, makes them prone to becoming overweight. Overweight individuals, in turn, tend to be even less physically active and gain more weight, which over time can lead to obesity

(21). Since there is a positive correlation between physical activity and physical fitness, overweight and less active individuals usually perform worse in motor tests (especially involving aerobic efforts) (2, 15, 22).

The way socioeconomic status affected the level of physical development of Polish children in the 1980s was presented by Wolański et al. (23). In the case of psychomotor traits, females from rural areas showed greater muscle strength and shorter reaction time than those living in cities (13). Other research by the same author, focused on the effect of family types under different cultural and economic conditions in Poland, Bulgaria, Japan, Korea, and Mexico. It provided evidence for civilization-related distinction of families creating an environment for child's development (8). It should be noted, however, that the Polish socioeconomic situation of the 2000s differs significantly from the socioeconomic conditions of the 1980s. On the other hand, the research conducted over the past two decades has shown that the phenomenon of the negative impact of low physical activity of children on their motor abilities occurs in both developed areas (15, 24) and those of low socioeconomic status (20, 21).

Our research showed that out of 11 motor tests, in the majority of cases there were no significant differences between children representing low or high SES. With regard to the factors included in the SS (place of residence and parents' educational background), 25 cases of significant differences were found in the level of motor abilities in the tests applied. Taking into account the factors of SE (type of school, monthly income per family member, and the number of children in a family) only 9 differences occurred. Therefore, it can be assumed that in the case of early-school-aged children from the regions of Warmia & Mazury and Pomorze, the factors determining SS differentiated the level of children's motor abilities to a greater degree than those of SE.

No significant differences in most of the motor tests may indicate blurring of the differences between developed and economically poor areas, which may be accounted for by several reasons including: the improvement of the living conditions of the populations in rural areas and the deterioration of these conditions in the urban agglomerations. In general, stronger impact of socioeconomic factors is more noticeable in the case of economically underdeveloped areas where unemployment is very high (25). Warmia & Mazury is one of the most underdeveloped regions in Poland, with the highest unemployment rate (>25%), and most of its land zoned for agriculture and tourism. In consequence, the financial situation of families living in urban areas (the vast majority of 20 up to 50 thousand of inhabitants) is similar in respect of socioeconomic status to those living in the country. Moreover, a marginal number of larger agglomerations (only two 150-180-thousand inhabitants large) is strongly influenced by the surrounding agro-tourism-oriented environment. This assumption is confirmed by the survey carried out with the students at the UWM in Olsztyn, which showed no influence of socioeconomic status on the results obtained in the motor tests by the students living in Warmia & Mazury (26). Even though the region of Pomorze is characterized by a higher level of development and the unemployment rate there is relatively low, the schools involved in the research were located either in the country or in the small towns across the area which lies in the immediate environs of Warmia & Mazury. That is why their socioeconomic status was similar to that of the children living in warminsko-mazurskie voivodeship.

The analysis of the results by gender led to several surprising conclusions. Although boys tend to be more ecosensitive than girls, fewer cases (13) of significant differences were observed in their motor tests when compared to the girls' (24). This effect may be explained by a different social acceptance for physical activity between girls and boys (27). Furthermore, Fisher et al. (28) suggest that the effect in question is not necessarily linear but rather prevalent at the extremes of the distribution. It is supposed that children with the poorest motor skills may be the most sedentary, whereas children who are the most coordinated may be the most physically active. However, the underlying mechanisms of the cause-and-effect chain in the relationship between physical activity – overweight – motor performance are not clear in the case of children (21, 28) because it is still undecided which aspects of children's physical activity are relevant in regulating body weight (29). For this reason the influence of socioeconomic factors on the level of children's motor abilities can be limited, as the studies in this field have been conducted mainly on adolescents rather than children (30). The research conducted with German (31) and Flemish children (32) revealed that the children of higher socioeconomic status performed better than the children of lower status, whereas the results of the children in Mozambique showed the reverse (25).

On the other hand, taking into account the number of significant differences that have occurred in the applied motor tests it was found that they appeared in large numbers but only in some tests, namely: the 1 minute Burpee test (8 cases), the 3 minute Burpee test (6 cases), the 4x10 m shuttle run (5 cases), the medicine ball backward throw and the skipping with clapping of hands – 8 s (4 cases), the medicine ball forward throw (3 cases), the hang on bar and the downward bend from standing position (2 cases), the sit up 30 s, and the standing long jump (1 case). The largest number of these cases have been observed in the 1 and 3 minute Burpee tests. Despite the fact that both trials refer to the same motor task, time is a distinctive factor which distinguishes them fundamentally. The effort carried out within the 1 minute Burpee test focuses mainly on anaerobic processes, whereas the 3 minute Burpee test – on aerobic ones (33). A similar number of significant differences that occurred in these trials may be associated with an integrating component of strength, which at the same time implies the hybrid nature of both motor tests (34). It is hard to explain, however, why the number of cycles performed within 1 minute Burpee test is higher as regards the girls in the higher category of SS, while lower in the higher category of ES. On the other hand, this effect when observed in the boys is maintained for socioeconomic status in the case of the 3 minute Burpee test. In addition, the boys in higher categories of SS achieved lower scores whereas the girls tended to score better in both tests.

For the whole group of girls, the results obtained in the trials such as 1 and 3 minute Burpee test are very consistent with those obtained in the trials attained by boys in the 4x10 m shuttle run for the SS and SE categories (with

the exception of 3- minute Burpee test), while the skipping with clapping of hands – 8 s shows a reverse trend for SE. Speed abilities demonstrated in the tests such as the 4x10 m shuttle run and the skipping with clapping of hands, are strongly positively correlated with strength abilities, which in some ways may be explained by the convergence of these trends with the speed-strength tests (1 minute Burpee test). In contrast, endurance abilities are negatively correlated with strength abilities so that the convergence of the 4x10 m shuttle run and the skipping with clapping of hands – 8 s is rather accidental, or due to other reasons.

On the basis of the above data it can be concluded that the obtained results failed to confirm these observed by many authors, which may stem from the economic specificity of the tested region. Motor fitness depends on the level of a child's physical activity and therefore has been shown to be influenced by multiple environmental, sociocultural, psychological, and biological factors (12).

Limitations

Although the findings of the research were very interesting they revealed the blurring of the differences in the level of motor abilities of the early-school-aged children living in poorly developed regions, it cannot be denied that the scope of the research, which was limited to only two voivodeships, was far from exhaustive. In order to confirm these assumptions the research should be conducted in other voivodeships or regions of Poland marked by analogous unfavorable socioeconomic conditions so as to compare them with the areas characterized by a high socioeconomic status.

Conclusions

Owing to the small number of significant differences between high and low SS and SE in both sex groups in the motor tests applied, it can be assumed that in the less developed, agriculture and tourism-oriented areas there has occurred blurring of the differences in the level of children's motor abilities depending on their social and economic status.

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Structure of article:

- title of an article;
- surname, full first name and patronymic;
- full name of organization (place of work or study);
- annotation in three language (Russian, Ukrainian, English). The scope of the annotation is to be 800-1000 symbols. Annotation must contain translate of surname, full first name and patronymic of authors, in Ukrainian (Russian) and English. Structure of annotation: aim, material, result. For authors from Russia, the translation in the Ukrainian language makes editorial board.
- Key words for the three languages: (1-2 lines of words. Do not use word combinations).
- Introduction (statement of a problem; analysis of the last researches and publications of this theme; to single out the open problem in the research article).
- Connection of the article with important scientific programs or practical tasks.
- Aim, tasks, material and methods.
- Results of the research (description of the main research material with full substantiation of the derived scientific results).
- Findings.
- Perspectives of future researches in this direction.
- Bibliographic references (more than 10) should be making up according to standard form.

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Conflicts of interests of persons who have direct or indirect relation to the publication of an article or any information that the article consist are settled according to the law of Ukraine in the field of intellectual property.

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