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The journal is intended for teachers, coaches, athletes, postgraduates, doctoral students research workers and other industry experts.

Contents Themes:
1. Physical education of different population groups.
2. Improving the training of athletes of different qualification.
3. Biomedical Aspects of Physical Education and Sports.
4. Human health, physical rehabilitation and physical recreation.
5. Biomechanical and informational tools and technologies in physical education and sport.
6. Management, psychological-educational, sociological and philosophical aspects of physical education and sport.
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CONTENT

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INFLUENCE OF PSYCHOPHYSIOLOGICAL AND MORPHOFUNCTIONAL INDICATORS OF HIGHLY QUALIFIED ATHLETES ON THE RESULT OF SWIMMING THE DISTANCE OF 400 METERS FREESTYLE

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Purpose: to determine the influence of psychophysiological and morphofunctional indicators of highly qualified athletes on the result of swimming the distance of 400 meters freestyle.

Material and methods: analysis and generalization of literature sources, anthropometric and physiological measurements, testing of psychophysiological indicators, methods of mathematical statistics. The surveyed group consisted of finalists of the Championships and Cups of Ukraine in swimming at the distance of 400 meters freestyle, who had the level of sports qualifications Master of Sports of Ukraine.

Results: the authors characterized psychophysiological and morphofunctional indicators of highly qualified athletes who specializing in freestyle swimming at the distance of 400 meters, determined the degree of their influence on the result of overcoming a competitive distance of 400 meters.

Conclusions: indicators of morphological and functional development of swimmers are more important for achieving high results at the distance of 400 meters freestyle than psychophysiological parameters; the construction of the training

process of highly qualified athletes who have various distance specialization should be carried out taking into account the degree of influence of the morphofunctional and psychophysiological indicators of the structure of special preparedness on the competitive result.

Keywords: highly qualified swimmers, freestyle, 400 meters, psychophysiological and morphofunctional indicators, influence.

Introduction

The constant growth of results, rapidly growing competition in modern swimming dictates the need to find the most promising ways to optimize training and competitive activities [3; 9; 14; 17].

The comprehensive analysis of the indicators of the structure of special preparedness of athletes allows to determine the most significant parameters by their influence on the result. Taking them into account in the process of construction the training process will improve the preparation of highly qualified athletes, which in turn will lead to improved sports results.

Currently, indicators of technical and tactical skills, anthropometric development, functional training of skilled swimmers, which are significant at distances of different lengths were fully considered by experts in the field of sport swimming [1; 6; 7; 8; 10; 13; 15; 16]. However, the study of psychophysiological parameters is relatively stay away, and the morphofunctional characteristics of athletes need continuous updating [2; 4; 5; 11; 12].

Carrying out of researches in this direction will allow to open new prospects in the decision of a problem of improvement of training activity taking into account distances specialization of highly skilled sportsmens-swimmers.

The purpose of the study: to determine the influence of psychophysiological and morphofunctional indicators of highly qualified athletes on the result of swimming the distance of 400 meters freestyle.

Objectives of the study:

1. To explore the features of morphofunctional development of highly qualified

athletes who specialize in freestyle swimming at the distance of 400 meters.

2. To characterize the psychophysiological parameters of highly qualified swimmers who successfully overcome the competitive distance of 400 meters freestyle.

To determine the degree of correlation between psychophysiological and morphofunctional indicators of highly qualified athletes and the result of overcoming the distance of 400 meters.

Material and Methods of the research

The following methods were used to solve the tasks: analysis and generalization of literature sources, anthropometric and physiological measurements, testing of psychophysiological indicators, methods of mathematical statistics.

Experimental data were collected at the Swimming Championships and Cups of Ukraine. The surveyed group consisted of finalists on the distance of 400 meters freestyle in the amount of 12 people. All athletes who took part in the experiment were members of the Ukrainian swimming team and had the level of qualification of the Master of Sports of Ukraine.

Results of the research

The result in swimming is determined by many factors, among which an important place is given to morphofunctional and psychophysiological parameters.

Peculiarities of morphofunctional development of stayer swimmers were evaluated by us on the basis of measurement of longitudinal, transverse and embracing body dimensions and indicators of functional development.

A total of 34 parameters were considered.

Based on the obtained digital material, it became the possible to build a morphofunctional profile of athletes who specialize in the distance of 400 meters freestyle (Figure 1).

Swimmers of this specialization have average values of length (185,58±7,69cm) and mass of body (75,42±5,92 kg), girth of the chest (at rest: 98,17±4,28 cm, on the breath: 104,95±5,49 cm, on exhalation: 95,00±4,73 cm). They have long limbs and their segments, strong physique, normosthenic type of

constitution.

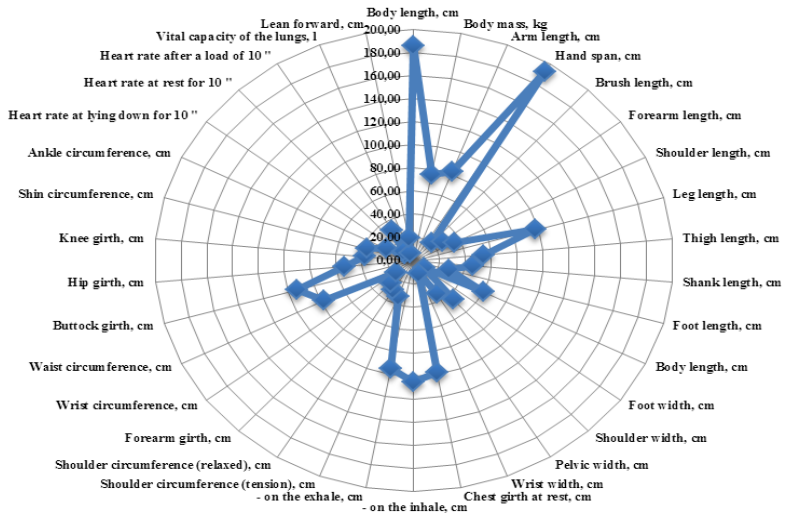

Figure 1. Morphofunctional profile of highly qualified athletes who specialize in freestyle swimming at the distance of 400 meters

These athletes have good flexibility, as evidenced by the results of the test «tilt forward» (20,07±5,04 cm).

The parameter of vital capacity of the lungs, which is one of the main indicators of the state of the external respiratory system, is at the level of 6,89±1,49 liters.

These features are explained by the performance of work mainly in the area of aerobic energy supply, which places high demands on the functionality of swimmers and their morphotype.

The lack of large coverage of stayers, compared to sprinters, is explained the increased requirements for their hydrodynamic qualities ─ body balance in water, flow, buoyancy.

Assessment of psychophysiological characteristics of highly qualified swimmers who specialize in the distance of 400 meters freestyle, was carried out on the indicators: time of motor reaction to a sound stimulus; sense of time, concentration of the attention; frequency of movements for a given period of time; determination of extroversion and introversion of personality.

The average values of the studied parameters recorded in athletes in the tests are presented in the table 1.

Table 1

Psychophysiological indicators of highly qualified athletes who specialize in freestyle swimming at the distance of 400 meters (n = 12)

№	Name	Test results					
		Reaction to a sound stimulus (s)	Sense of time (s)	Tapping-test (movements/10 s)	Aizenk questionnaire		Schulte test (number of digits for 15 s)
					Extraversion - Introversion (points)	Neuroticism (points)	
1	2	3	4	5	6	7	8
1.	Sh-ts K.	0,149	28,744	65,50	15	6	11
2.	R-k M.	0,168	24,5	56,83	15	5	16
3.	Sh-v M.	0,129	25,6	63,00	17	12	11
4.	M-y P.	0,151	28,59	61,33	18	14	11
5.	S-y O.	0,133	24,5	57,83	18	7	15
6.	V-ko V.	0,182	29,94	37	15	10	14
7.	G-v A.	0,163	23,42	34,33	15	16	13
8.	T-ko I.	0,174	30,84	42	19	11	14
9.	D-ko Ya.	0,198	31	39	19	12	12
10.	D-v D.	0,174	40	38,5	16	13	14
11.	K-ko M.	0,155	31,84	38	19	17	15
12.	K-y K.	0,147	34,2	50,33	10	11	13
The average values		0,16	29,43	48,64	16,33	11,17	13,25
The standard deviation		0,02	4,72	11,67	2,61	3,74	1,71

As can be seen from table 1, the results that characterize the speed of response to a sound stimulus are in the study group at the level of 0,16±0,02 s on average, at the same time the most athletes showed the relatively stable values in each of the 10 attempts.

50% of the surveyed swimmers have a well-developed sense of time, 33,3% show a difference with the sense of real time to a lesser extent, in turn 16,7% have a slow sense of time.

The results of the Schulte test indicate that athletes of this specialization have both medium and high levels of concentration, because in the allotted time, swimmers found a relatively large number of digits. The average values in the group

were 13,25±1,71 digits/15 s.

The first attempt during performing the tapping-test was the most effective in the surveyed swimmers (Figure 2).

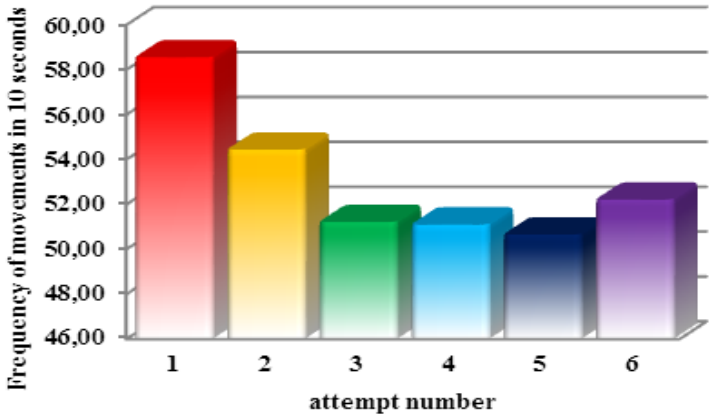

Figure 2. The results of the tapping test by highly qualified athletes who specialize in swimming at the distance of 400 meters freestyle

After a sharp deterioration in the second and third attempts, there was a relative stabilization with further improvement in the final attempt.

The results of testing on the Aizenk questionnaire allowed to reveal that almost all athletes in the surveyed group have an extroverted personality type.

In turn, the definition on the scale «emotional stability – neuroticism» revealed in 83.3% of swimmers the predominant features of emotional stability. Only two athletes, namely K-ko M. and G-v A., have indicators at the level of 17 and 16 points respectively, which indicates a pronounced neuroticism.

The analysis of the degree of correlation between morphofunctional development and sports results at the distance of 400 meters freestyle allowed us to conclude that the most important indicators for the demonstration of high sports results are arm span, torso length, shoulder girth in tension, ankle girth and vital capacity of the lungs (R is -0,53, -0,54, -0,63, -0.55, -0,50 respectively) (Figure 3).

Also significant indicatirs are the length of the arm (R=-0,45) and shin (R=-0,43), wrist circumference (R=-0,48) and resting heart rate (R=0,47).

Thus, the result of overcoming the distance of 400 meters by freestyle is

largely determined by the parameters of the girth size of the limbs and arm length, which provides a large «step» of the cycle of rowing movements, and the high rates of functional development.

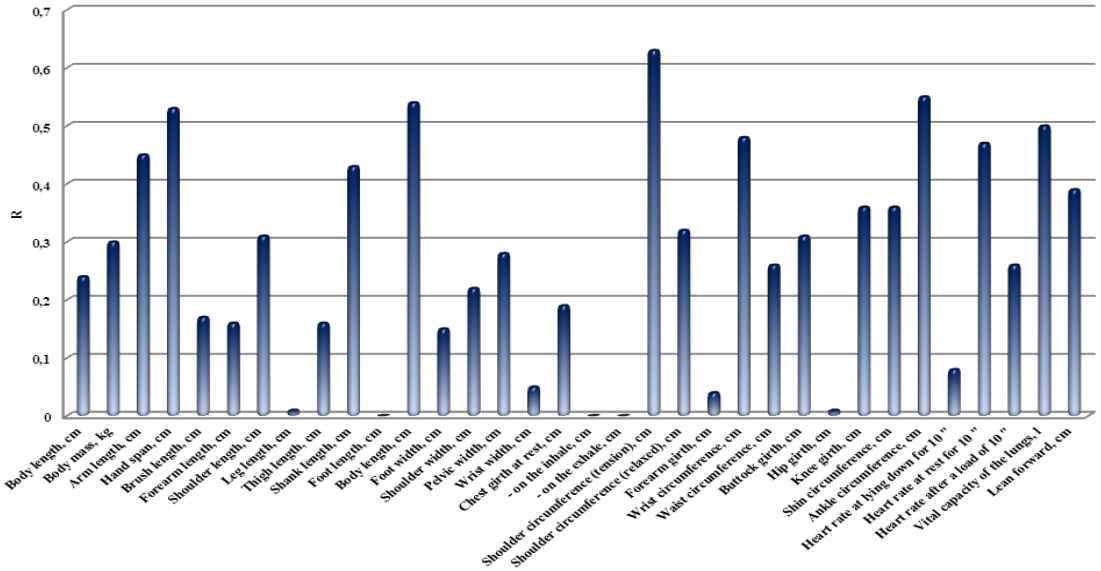

Figure 3. The degree of correlation between the morphofunctional indicators of highly qualified swimmers and sports result at the distance of 400 meters freestyle

In turn, the psychophysiological indicators of athletes insignificantly affect on the result of overcoming the distance of 400 meters (Fig. 4). Significant influence was recorded only in the parameter «response to a sound stimulus» (R = - 0,50).

Swimmers-stayers should have a strong type of nervous system, which in turn is a necessary condition for the effective transfer of long-term monotonous loads.

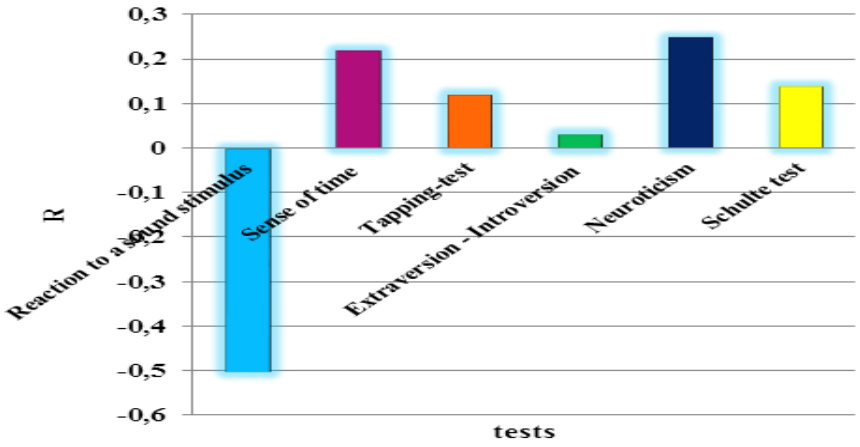

Figure 4 The degree of correlation between the psychophysiological parameters of highly skilled swimmers and sports results in the distance of 400

meters freestyle

The identified relationships should be taken into account during construction of the training process of athletes of this distance specialization, which will affect the achievement of high sports results.

Conclusions / Discussion

The results of the study confirm the existing opinion that the distance specialization of swimmers leaves an imprint on their morphotype.

It is proved that highly qualified athletes who specialize in freestyle swimming at the distance of 400 meters have: average values of length, mass and girth dimensions of the body, long limbs and their segments. They are characterized mainly by a strong type of nervous system, a well-developed sense of time, a high degree of concentration, extroverted personality type, emotional stability.

It was found that among the studied parameters of the structure of special preparedness of highly qualified swimmers the most influential on the result of overcoming the distance of 400 meters freestyle are indicators of morphofunctional development, while the relationship of psychophysiological parameters is quite insignificant except of the reaction to a sound stimulus.

Prospect of further research is to develop of model characteristics of the most important parameters of the structure of special preparedness of highly qualified athletes who specialize in freestyle swimming 400 meters.

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GENESIS OF THE CONCEPT OF "PHYSICAL CULTURE" IN RUSSIAN-SOVIET AND DOMESTIC SCIENTIFIC AND SOCIAL PRACTICES (first report)

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Purpose: to reveal the genesis of the concept of "physical culture" in the Russian-Soviet and domestic scientific and social practices.

Material and methods: the research materials are based on the analysis of special literature which covers various aspects of the development of the sphere of human activity related to the use of physical exercises.

Results: it is shown that the problem of objective definition of the essence of the concept of "physical culture" is one of the key in the development of integrative theory; the socio-political preconditions for the introduction of the term "physical culture" in Russian-Soviet scientific and social practice are revealed; it is deduced that the basic provisions formulated by G. Duperon in his theory are the basis of the integrative theory of physical culture.

Conclusions: it is shown that the term "physical culture" was introduced into the social practice of Russia in the spring of 1918 by the Bolshevik government through the administrative mechanism of public administration by issuing relevant decrees, decrees, etc.; it is shown that in the scientific community of that time physical culture was interpreted as the implementation of the basics of hygiene and sanitation; it is established that G. Duperron emphasized that the term "physical culture" acts as a general name for a special field of human activity.

Keywords: physical culture, integrative theory, sphere of activity, concepts, term, theoretical positions.

Introduction

The problem of objective definition of the essence of the concept of "physical culture" is one of the key in the development of integrative theory, which describes the patterns of historical evolution of the sphere of human activity associated with the use of exercise [22, 23, 31]. In the process of development of knowledge in this area historically formed two interconnected and complementary systems of knowledge, which are a consequence of the peculiarities of socio-historical practice of mankind. On the one hand, we have a system of knowledge about this area of human activity, which originated in Russia, and after 1922 actively developed in Soviet scientific and social practices. On the other hand, we have a system of knowledge about this area of human activity, which was formed in foreign, in particular, in English-language scientific and social practices, where the term "physical culture" appeared at the turn of the 19th century. In English-language publications, one of the first mentions of the term "physical culture" dates back to 1787. A. Wongier in the work "Treatise on the destruction of vice" [39], characterizing the activities of doctors and noting their dedication in the study of the human body, its various functions, states that they accumulate the results of medical knowledge of all times and combine them with their observations. According to the author, this knowledge distinguishes them from ordinary people, born without talents and uneducated, without proper upbringing or proper physical culture.

One of the main differences of these systems of knowledge is the peculiarities of the disclosure of the genesis of the concept of "physical culture", i.e. in the interpretation of its origin, use and disclosure of its essence. The existing differences in the existing systems of knowledge, and accordingly in the use of the term "physical culture", are especially evident in two fundamental generalizing works, which were published in the late 20th century almost simultaneously, namely "Theory of Physical Culture" (L. Matveev, 1991) [21] and "Fundamentals of Physical

Education and Sports" (D.Wuest, C.Bucher, 1995) [38]. They reflect the systems of scientific knowledge and ideas about the field of human activity related to the use of physical exercises, which were formed at that time, respectively, in Soviet and foreign scientific practices. Note that in the textbook of L. Matveev (1991) the term "physical culture" is fundamental, however, in this work there is no definition of the concept for the name of which it is used, while in the textbook D. Wuest, C. Bucher (1995) this term not used. Attention should also be paid to the similarities and differences in the definition of the names of the basic directions of historical development of the sphere of human activity related to the use of physical exercises. Thus, in the work of L. Matveev highlighted physical education, sports and professionally applied forms of physical culture, while Wuest, C. Bucher highlight physical education, sports and fitness. Thus, in these generalized works there are differences not only in the features of the use of the term "physical culture", but also in the definition of the name, and, consequently, the essence of the third direction in the development of human activities related to exercise. D. Wuest, C. Bucher use the term "fitness" for its name, and L. Matveev calls it professionally applied forms of physical culture (the concept of fitness is absent).

The above discrepancies indicate the need for a more detailed disclosure of the genesis of the concept of "physical culture", and consequently the systems of knowledge formed in the Russian-Soviet and foreign scientific and social practices. The presented article, which consists of two reports, reveals the features of the use of the term "physical culture" in the process of forming in the Russian-Soviet and domestic scientific and social practices a system of knowledge about the field of human activities related to exercise.

Material and Methods of the research

The research materials are based on the analysis of special literature, which highlights various aspects of the development of human activities related to the use of physical exercises, the name of which in domestic and modern foreign scientific and social practices is most often used "physical culture". The study used systematic and historiographical approaches to the analysis of this problem. The main governmental

and party documents that determined the development of this sphere in Russia and the Soviet Union in the period from 1918 to 1930, i.e. in the period of "military communism" (1918-1921) and "new economic policy" (1921-1930), taken from the collection of normative documents prepared by I. Chudinov (1959) [25]. The research used Google's online search service (Google Books Ngram Viewer).

Results of the research

Socio-political preconditions for the introduction of the term "physical culture" in Russian, and after 1922 in Soviet social practice. The results of the analysis of special literature show that in the system of knowledge that describes the field of human activity related to the use of physical exercises, which was formed in Russia and then the Soviet Union, in the process of using the term "physical culture", it is quite clearly differentiated two periods - before the October coup of 1917 (in Soviet historiography, the "Great October Socialist Revolution") and after. Thus, the results of a special historiographical analysis indicate that pre-revolutionary specialized Russian-language publications reflected mainly sports topics, and the term "physical culture" was practically not used. This conclusion is confirmed by the works of G. Duperron (1877-1934) "Bibliography of sport and physical development: a systematic list of all books, brochures, magazines published in Russia until 1913" [9], which has 2715 publications and only one of them (under № 142) there is a term "physical culture" [24]. It should also be noted that this term was not used in the works of famous experts of the time P. Lesgaft (1837-1909) and O. Butovsky (1838-1917), who made a significant contribution to the development of knowledge about the field of human activity related to using physical exercises, which was formed in pre-revolutionary Russia. They probably had an idea of the peculiarities of the use of the term "physical culture" in foreign practice, because in 1875-1877 P. Lesgaft visited thirteen European countries on behalf of the medical department of the military department, where he got acquainted with institutions for special training of gymnastics teachers. He published a report entitled "Training of gymnastics teachers in Western Europe." The results of these trips prompted P. Lesgaft to prepare a fundamental work "Guide to the physical education of school-age children" [19],

which laid the scientific foundations of the system of physical education. O. Butovsky (a member of the first composition of the International Olympic Committee) probably knew about the situation related to the use of the term "physical culture" in foreign practice. In 1880-1990, on behalf of the military department, he studied the teaching of gymnastics in educational institutions in Sweden, Denmark, Germany, Belgium, England and France. He published works: "How we should teach soldiers", "Guidelines for the production of gymnastic exercises in civilian schools", "Manual labor and physical development", "Notes on the history and methods of physical exercises", "Education and physical exercises in English schools " and others.

The term "physical culture" was not used until 1917 in the works of G. Duperron (member of the International Olympic Committee in 1913-1915), who during this period published a number of important books: "Football and other games of the same type" (1915); "Theory of Football" Association" (1910); Athletics and Games (1916); "Swedish Pedagogical Gymnastics" (1911) and the above-mentioned "Bibliography of Sports and Physical Development" and others. The activities of P. Lesgaft, O. Butovsky and G. Duperron are covered in more detail in the fundamental work of A. Sunik [27]. In the historical period until 1917, the term "physical culture" was not used in the works of famous teachers of hygienists V. Ignatiev [16] and V. Gorinevsky [6]. In their work, they used general terms, respectively, "physical education" and "physical education".

A completely different situation regarding the use of the term "physical culture" developed in Russia after the October coup of 1917, which resulted in the creation of an administrative-command system of governing society. In this system, physical culture began to be used as one of the directions of the Cultural Revolution, which was based on Marxist-Leninist ideology and which was introduced into the social practice of the time by the Bolshevik-Communist government. This provision follows quite clearly from the fourth paragraph of the resolution of the Central Committee of the RCP (b) of July 13, 1925, which states that "Physical culture should be an integral part of general political, cultural education, health improvement

and should be included in the general plan activities of relevant public and state organizations and institutions (trade unions, RLKSM, the Red Army, schools, health care facilities, etc.]. [25] It is the ideological component of the then state policy, which was practically implemented by the Bolshevik-Communist government, starting from the period of "military communism" (1918-1921) and "new economic policy" (1921-1930), contributed to a number of organizational and managerial decisions, which led to the introduction of the term "physical culture" in general social practice. Among the most significant decisions of this period are those that were decisive both for the further development of the sphere of human activity related to the use of physical exercises, and for the use of the term "physical culture" in public practice.

Historical evidence suggests that one of the first such decisions was the opening in May 1918 (almost seven months after the revolutionary events of 1917) of the Moscow Institute of Physical Culture. The initiator of its creation (we must think and the introduction of the then organizational and managerial practice of the term "physical culture") was Vera Mikhailovna Bonch-Bruevich (Velychkina).

Vera Mikhailovna Bonch-Bruevich (Velichkina) was born on September 8, 1868 in Moscow, in the family of a priest. She studied at the First Moscow Women's Gymnasium, graduating with honors in 1885. In 1892, Vera Mikhailovna went to study in Switzerland, where she graduated from the Medical Faculty of the University of Bern and defended her dissertation there. She spoke German, French, Italian, English, and was fluent in Latin. After the revolutionary events of October 1917, she organized and from December 20, 1917 headed the school-sanitary department of the People's Commissariat of Education, which was entrusted with the organization of the Moscow Institute of Physical Culture, and was one of the initiators of the People's Commissariat of Health. From March 1918 Vira Mykhailivna, Deputy Chairman of the Council of Medical Boards in the People's Commissariat, and from July 1918 - a member of the Board of the People's Commissariat of Health. As a doctor, she took part in the First World War, where she received the St. George's medal of the fourth degree and a silver medal on the Vladimir ribbon "For diligence". Vira Mykhailivna

died on September 30, 1918, contracting the Spanish flu, the pandemic of which lasted from January 1918 to December 1920.

Explaining the public need to create an institute of physical culture, Vera Mikhailovna in the report "Health care and physical education", which she read on June 15, 1918 at the First All-Russian Congress of representatives of health departments of the Soviets of Workers 'and Peasants' Deputies, explained this need "Aiming to scientifically train instructors and leaders of physical education in Russia, the Institute of Physical Culture should also serve as a laboratory for those young creative forces of the country who want to dedicate themselves to the development of this new scientific discipline (emphasis added)" [15]. It can be assumed that such an initiative of Vira Mykhailivna was a consequence of her scientific worldview, which was formed during her studies at the Medical Faculty of the University of Bern. Probably, it was during that period that she formed the idea of physical culture as a special activity of people related to the use of physical exercises aimed at their recovery. This understanding of the essence of the concept of "physical culture" was dominant in foreign practice at the time.

For example, Ch. Emerson in his work "Physical Culture" (1891) [37] described its essence as "The system of physical culture, which we will consider in the first place, provides health and recovery through exercise" (Features of formation in English). It is probable that the government's decision to establish the Moscow Institute of Physical Culture was significantly influenced by members of the then Russian government, namely V. Bonch-Bruevich (Vera Mikhailovna's husband), who at that time was the head of the Council of People's Commissars of the RSFSR. December 1920), as well as the first People's Commissar of Education (from 1917 to 1929), A. Lunacharsky, who was quite active in the development of physical culture [26]. The adoption of organizational and managerial decisions, which led to the widespread use in social practice of Russia of that time, and since 1922 the Soviet Union, the term "physical culture" was actively supported by M. Semashko, who from July 1918 to January 1930 headed the People's Commissariat of Health of the RSFSR. He had a medical education, graduating in 1901 from the medical faculty of

Kazan University, and probably had an idea of how the concept of "physical culture" was interpreted in the foreign practice of that historical period.

The opening of the Moscow Institute of Physical Culture was one of the first organizational and managerial steps towards the widespread introduction of the term "physical culture" in the social practice of contemporary Russia. However, the decisive role in this process was played by the 1st All-Russian Congress of Workers of Physical Culture, Sports and Pre-service Training, which took place in Moscow on April 3-8, 1919. G. Duperron was the speaker at the general congress of the section of physical culture at this congress.

Georgy Alexandrovich Duperron (1877-1934) - an outstanding theorist of physical culture, an excellent organizer, active public figure, in 1913-1915 a member of the IOC. He was at the origins of Soviet physical culture and Russian and Soviet sports. “All the most significant events in the history of domestic sports at the turn of the XIX-XX centuries took place with his direct, most active participation "[27]. Unfortunately, in Soviet and domestic historiography, the name of G. Duperron is practically not mentioned. A certain exception are the works of AB Sunik [27, 28], which gives a very warm and fair assessment of the multifaceted and fruitful work of G. Duperron. However, the scientific achievements of G. Duperron, as a theorist of physical culture, remain virtually unknown to the general scientific community. This is due to the fact that the main provisions of his theory were ahead of their time, because in that historical period the main focus of scientific research "new scientific discipline" (according to VM Bonch-Bruevich) was more health and hygiene orientation. The scientific and theoretical provisions of Duperron’s theory and their connection with modern integrative theory, which describes the development of the sphere of human activity related to the use of physical exercises, will be covered in detail in the second part of this article.

His proposals for the establishment of the Council for Physical Culture at the Central Office of Universal Education, as well as the opening of institutes of physical culture and short-term courses for pre-service training instructors formed the basis of the decisions of the Congress [4]. The social significance of the congress is evidenced

at least by the fact that its decisions were implemented almost immediately. Thus, in the summer of 1919 in Petrograd established the State Institute of Physical Education. P. Lesgaft (since 1930 the State Institute of Physical Culture named after P. Lesgaft), in 1929 the Belarusian State Technical School of Physical Culture was opened (since 1937 it was reorganized into an institute), in 1930 the State Institute of Physical Culture of Ukraine was established in Kharkiv.

The situation was more complicated with the implementation of the decision of the Congress on the establishment of the "Council for Physical Culture" at the Central Office of Universal Education. Vsevobuch (compulsory training in the martial arts of the working population) was introduced by a decree of the Central Executive Committee in April 1918 [8]. The function of teaching martial arts at that time was performed by the Main Directorate of General Military Training and Formation of Red Army Units, which included a department of physical development and sports, which was responsible for physical training in the army and training of conscripts. The first head of general education was L. Maryasin, who was replaced by M. Podvoysky, who from November 1917 to March 1918 was People's Commissar for Military Affairs of the RSFSR. From January 1918 he was also chairman of the All-Russian Board for the Organization and Formation of the Red Army, and from March 1918 he was a member of the Supreme Military Council of the RSFSR. It was under him that in 1920 the department dealing with physical development and sports in Vsevobuch was transformed into the Supreme Council of Physical Culture (VRFK) - an advisory body to Vsevobuch, headed by M. Podvoysky [3].

Thus, the decision of the 1st All-Russian Congress of Workers of Physical Culture, Sports and Pre-service Training was actually implemented. However, in this process the decision of the All-Russian Central Executive Committee (ARCEC), adopted in June 1923 on the transfer of VRFK from the advisory body of Vsevobuch to the direct subordination of ARCEC was more significant [25]. Paragraph nine of this decree states "Since the organization of the Supreme Council of Physical Culture, all other all-Russian sports organizations shall be liquidated with the participation of a representative of the Supreme Council of Physical Culture." The first head of the

Supreme Council of Physical Culture at the Central Executive Committee (4) was M. Semashko, at that time he headed the People's Commissariat of Health of the RSFSR. The VRFC, as an independent interdepartmental body at the Central Executive Committee, included representatives of the People's Commissariats of Health, Education, Military Affairs, Labor, and representatives of the RCP Central Committee, the RKSM Central Committee, the VCRPS, the GPU, the City Council, and the Moscow Council of Physical Culture. We can assume that it is from this time that the term "physical culture" has acquired a general state meaning. According to G. Duperron, in the history of modern peoples this is the first example of "nationalization of physical culture" [14].

Features of the formation of a system of knowledge about the field of human activity related to the use of physical exercises in Russian-Soviet scientific practice. The main purpose of the opening of the Moscow Institute of Physical Culture (1918) and the State Institute of Physical Education named after P. Lesgaft (1919) in Petrograd, as shown above, was to train "instructors and leaders of physical education", as well as to develop "this new scientific discipline", meaning physical culture (according to VM Bonch-Brunevich).

Features of the training "instructors and leaders of physical education". According to historical materials, these institutions in the first years of their operation were subordinated to the People's Commissariat of Health of the RSFSR, which determined the overall strategy of their development. This feature influenced the appointment of the heads of the newly established institutions, which were to practically implement this strategy. According to the GTSOLIFK Historical and Sports Museum, the first head of the Moscow Institute of Physical Culture (1918-1919) was Dr. M. Golovinsky, who was recommended for this position by the medical and sanitary department headed by V. Bonch-Brunevych at the time. The next rector of the institute in 1919-1923 was V. Ignatiev, who graduated from the medical faculty of the Imperial Moscow University in 1882 and had a doctorate in medicine (1903) (although the staffs of the Historical and Sports Museum GTSOLIFK consider him the first rector). In 1923–1929 the rector was A. Zykmund,

who in 1907 completed a two-year Higher Course at the University of Prague, obtaining the qualification of a gymnastics teacher, and in 1909 in Vienna he completed officer courses in military gymnastics.

The next rector in the period from 1930 to 1937 was S. Frumin, who graduated from the Medical Faculty of Moscow State University. Similar circumstances manifested themselves in the selection of heads of the State Institute of Physical Education. P. Lesgaft. The first rector of this institute in 1919-1924 was A. Sulima-Samoilo, who graduated from the Imperial Military Medical Academy (1898). In 1924-1926 the rector of the institute was L. Fedorov, a graduate of the Medical Faculty of Tomsk University. The third rector in 1926-1937 was E. Zelikson, who also had the profession of a doctor. He graduated from the Medical Faculty of the University of Zurich (Switzerland).

Thus, during the period of "military communism" (1918-1921) and the "new economic policy" (1921-1930), the rectors of the institutes were specialists with medical education. It is probable that this circumstance to some extent influenced the formation of curricula of institutes. Thus, the first curriculum of the Moscow Institute of Physical Culture, based on information posted on the website of the Historical and Sports Museum GTSOLIFK, provided for students to study dynamic anatomy, physiology, physiological chemistry, hygiene, psychology, gymnastics, labor processes, routine exercises, Swedish gymnastics exercises on P. Lesgaft, plastics, rhythmics, fencing, choral singing, musical culture, expressive language, carpentry and binding. Curriculum of the State Institute of Physical Education named after P. Lesgaft in that historical period, as shown by the research V. Ageevets [1], provided for the study of students of the following disciplines: theory and history of physical education, general biology (zoology and botany), anatomy and physiology, pathology and hygiene, physics, chemistry, higher mathematics, general pedagogy, history of pedagogical doctrines, theory and history of schooling, experimental psychology, child psychology, teaching physical exercises according to the system of P. Lesgaft, Swedish and falconry gymnastics, rhythmics and solfeggio, initially taught and

dances and methods of physical exercises and games. The teaching of social sciences began in 1923, and the teaching of military sciences in 1926.

The above list of subjects and the professionalism of the heads of institutes allow us to conclude that the training of "instructors and leaders of physical education" in that historical period was mainly psychological, pedagogical and medical and biological orientation. This feature was reflected in the scientific publications of the time, as evidenced by the results of the analysis of the content of the journal "Theory and Practice of Physical Culture" for 1925-1931, conducted by A. Sunik [29].

The main achievements and lost prospects for "the developing a new scientific discipline." Analysis of disciplines those were included in the first curricula of the Moscow Institute of Physical Culture (1918) and the State Institute of Physical Education named after P. Lesgaft (1919) indicates that the term "physical culture" was not used in the title of any of them. Probably, this was due to the fact that "In terms of physical culture, the question was further complicated by the fact that there was no such question in the world, it was necessary to create and create, having almost no samples of how to build and how (from the memoirs of Professor V. Gorinevsky, then an active participant and body) (5). In foreign practice, the training of specialists in the field of physical culture was quite active in the 19th century, as evidenced, in particular, the announcement of studies at the University of California in the direction of "physical culture" (1898) [36] .This announcement provides a list of disciplines and their content, and notes that during the first two years, students will engage in practical physical education three hours a week. studied such disciplines (here are some of them with significant reductions), for example, in the "Elementary course", which was read in the first year of study, and in the "Basic course", which was read in the second year of study, studied the exercises of the US Army Statute, as well as methods of using physical exercises using technical devices described by D. Sargent. The "Course for Young Women", which was taught in the first and second years of study, were studied exercises, adapted to the needs of young women. In addition to these subjects, students also studied "History of Physical Culture",

"Anthropometry", "Exercises adapted for public schools", "Physiology of physical exercises", "Physical examinations and diagnostics", "Acquired deformities", "Human anatomy" and "Hygiene"[5].

V. Gorinevsky's memoirs have an important scientific and cognitive value, because they fully reflect the period when the foundations of Soviet science of physical culture were laid in difficult conditions. This period began with the introduction of a new economic policy (NEP) in the country, which was introduced "seriously and for a long time" at the X Congress of the RCP (B) in March 1921 and which was gradually curtailed at the turn of the 1940s. The introduction of the NEP opened opportunities for the involvement of "pre-revolutionary" specialists in scientific work, in particular V. Gorinevsky. In 1921 he was invited by N. Podvoysky to work in Moscow, where he became head of the scientific part of the Main Military School of Physical Education. From 1923 to 1931 he headed the Department of Medical Control at the Central State Institute of Physical Culture. During this period, under his leadership, for the first time unified methods of "scientific-medical-pedagogical and social-domestic control", he conducted comprehensive surveys of athletes, including competitions, which was only possible in a totalitarian state. He was the first to draw the attention of scientists to the need for socio-cultural studies of sports. Thus, analyzing boxing, V. Gorinevsky considered it through the prism of a special social phenomenon "beginning to attract much attention of the masses, as a spectacle that delivers entertainment and apparently strongly arouses emotion." A separate section in his work "Culture of the Body" (1927) [7] is devoted to this issue, which has the eloquent title "Boxing as a social phenomenon."

The approach initiated by V. Gorinevsky is still used in the process of researching various sports. This position is also important from the standpoint of a deeper understanding of the basic principles of integrative theory of physical culture, which just assumes the presence in the theory of sports of two interdependent components of procedural and socio-cultural [40]. The procedural component of the theory answers the question of how to organize the training process, and the socio-

cultural component, to which V. Gordievsky drew attention, answers the question of why and why it is necessary to organize the training process in this way [32].

Historical materials show that the introduction of a new economic policy has opened a new page in the life of the country. During the NEP period, all spheres of public life (economy, trade, education, etc.) began to develop intensively, including the sphere of human activity related to the use of physical exercises. During this period, the number of periodicals, this covered various aspects of the development of this sphere and which acted as a mouthpiece for the communist-Bolshevik attitude to this kind of activity, began to grow rapidly.

According to K. Alekseev [3] for the entire period of military communism (1918-1921) there were no more than a dozen such publications throughout the country, and only in 1922 (the year of the formation of the USSR) began to be published at least sixteen. At that historical time, there was a heated discussion in the pages of the periodical press (apparently there was no such fierce discussion on any other type of activity) about the place of sports in the Soviet system of physical culture. It is reproduced in great detail on the real factual material in the articles of A. Sunik [28] and K. Alekseev [2]. The results of this discussion were reflected in the Resolution of the Central Committee of the RCP (b) of July 13, 1925, "The Party's Tasks in the Field of Physical Culture," which in fact legalized sport. It is probable that it was from this time that the phrase "physical culture and sports" began to be widely used in social practice, which became established at the state level with the creation in 1930 of a publishing house of the same name. The establishment of the publishing house "Physical Culture and Sports" and active promotion of "physical culture" (in the sense of the communist-Bolshevik regime) strengthened in the public consciousness these phrases as a kind of language stamps that exist without proper justification in our time [30, 33]. This is evidenced in particular by the resolution of the First International Congress "Terms and Concepts in the Field of Physical Culture" (St. Petersburg, December 20-22, 2006) in its first paragraph states that "…the situation with the terminology in the field of physical culture is unsatisfactory".

The new economic policy opened wide opportunities in the field of publishing, which was developing at that time on a commercial basis [3]. An example of this thesis can be found in advertisements for the price of books prepared by various authors, which were published by the State Publishing House of the RSFSR and the cooperative publishing house "Vremya" and which were placed in Duperron's books "Collection of games for older people" (1925) [11], "Training of the sportsman" (1926) [12], "Winter sports" (1928) [13], "Theory of physical culture" (1930) [14].

In the above-mentioned books of G. Duperron, which are available in the public domain, there are 66 advertisements for the sale of books. Their names give a general idea of how the issue of physical culture was covered in contemporary publications. Given the volume of the article, we note only some of them, for example, Kradman D.A."Full course of the Swedish system of physical exercises" and "Physical education on the basis of the Swedish system", Yakovlev M.A. "Weightlifting", Ivanov, V.A. "French wrestling", Koronovsky V.N. "Technique and methods of mass work in physical education", Podvoysky N.I. "Bow with the sun" and "Two directions of sports movement", Semashko N. "Physical education in winter". These ads also offered for sale translations of books by well-known foreign authors N. Buk "Basic Gymnastics", six books by I. Mueller "My system", "My system for women", "My system for children", "My respiratory system exercises", "My book about the air and the sun" and others. In 1925, the cooperative publishing house "Vremya" published J. Eber's book Sport against Physical Education on commercial terms, [34] and in 1930 the newly established publishing house "Physical culture Sport" published his book Sport against Physical Education.

Despite the large number of printed publications published at that time, the concept of physical culture was interpreted quite ambiguously in the scientific environment of that time. V. Ignatiev emphasized this in his book "Fundamentals of Physical Culture" (1925) [17] saying that the recently introduced term "physical culture" requires a few words, and the reason for this is the vagueness, the disagreement , which is often associated with the concept of physical culture. In the same work, he noted that "… physical culture in its main part - not so much exercise

as understanding and implementation of the basics of hygiene and sanitation (emphasis added)." The same general position with an emphasis on physical exercises is reflected in the work of B. Kalpus "Physical Culture for All" (1926), which states that "Physical culture is an activated hygiene, but the activating principle in it is just physical exercises "[18]. Under the domination of the Bolshevik-Communist ideology, the position of the state on physical culture, reflected by A. Lunacharsky (in 1917-1929, People's Commissar for Education) in the book "Thoughts on Sports" (1930) [20]. He spoke of physical culture as a culture that creates a solid foundation on which to build the "building of socialist culture," encompassing "all aspects of human physical life" and thus "achieving the maximum health of the masses."

Among the variety of scientific publications that were published during the NEP, the works of G. Duperron stand out, about which A. Sunik said quite capaciously [28] "No one wrote about physical culture, gymnastics, sports as much as he wrote." During this period, many books by G. Duperron were published, some of them mentioned above. However, the main one is his fundamental work "Theory of Physical Culture" (1930) [14]. From the standpoint of today, we can say that the scientific positions formulated in this work by G. Duperron, can be considered to some extent as a kind of foundation of modern integrative theory of physical culture. Unfortunately, they were not accepted by the scientific community of that time, and the author was actually forgotten. The first position, formulated by G. Duperon on the seventeenth page of the "Theory of Physical Culture", is as follows: "Questions of physical education, gymnastics, sports, etc. are now united by the term "physical culture". In this position, for the first time in scientific practice, he emphasizes that the term "physical culture" acts as a general name (!) of a special sphere of human activity, which has three main forms of social expression, namely physical education, sports and gymnastics? Note that the same structure of the sphere of human activity related to the use of physical exercises is reflected in the works of L. Matveev (1991) and D. Wuest, C. Bucher (1995), which were discussed in the introductory part of this article. The main differences arise in the process of determining the third direction. L. Matveev calls it professionally applied forms of physical culture, D.

Wuest, C. Bucher use the term "fitness" for its name, and G. Duperron called it gymnastics. Note that gymnastics at that time was interpreted as "a series of artificial movements, invented directly for the development of the body" [10], or "Gymnastics is the art of practicing and strengthening the body" (F. Amoros (1767-1848), founder of the physical training of soldiers in French army, which was called "French gymnastics"). It is obvious that the third direction of the historical evolution of the sphere of human activity related to the use of physical exercises is the most difficult to analyze, which is confirmed by the ambiguity of the interpretation of its name in the above-mentioned works. It will be discussed in detail in the next article.

The second provision. In the eighteenth and nineteenth pages of The Theory of Physical Culture, G. Duperron gives two definitions of "physical culture" "more broadly and more narrowly." They in a peculiar form reflect the resulting component of the modern consensus definition of this concept, which states the following. Physical culture, as a special socially significant phenomenon, is a historically determined activity of people, directly or indirectly related to the use of exercise and its individual and socially significant results [30, 32]. Individually significant results reflected by G. Duperron in the "narrow" definition of "When we more narrowly limit the benefits of life to our body, we speak of" physical culture "as a set of all physical and mental forces in a normally and highly developed human body and improving these forces. " Socially significant results of human activity reflected by him in the "broad" definition, which states that "All areas of life, because they can affect the state of our body, are part of the circle of physical culture."

The third provision. It is obvious that in the integrative theory of physical culture, which reveals the patterns of development of a special field of human activity related to the use of physical exercises, the concept of "physical exercises" is decisive. Exercise is a system-forming factor in this area of human activity. Thus, the correct definition of this concept is the basis for the correct construction of the theory. The most profound essence of the concept of "physical exercise" was revealed by G. Duperron in the work "A brief course on the history of physical exercise" (1924) [10]. He noted that "This utilitarianism is the difference between movements in

general and exercise." In another way, we can say that physical exercises are exercises that do not have a direct instantaneous utilitarian (benefit, benefit) for a person. A number of important practical implications follow from this definition. First, in order for the exercises to benefit a person, they must be applied systematically (regularly).

Thus, the concept of "physical exercise" means not just a specific exercise, but also the process of its use, which for the same exercises can differ significantly in different forms of social manifestation of physical culture (physical education, sports, fitness). Secondly, in order for a person to systematically perform activities with the use of physical exercises, i.e. exercises that do not have a direct utilitarian significance for him, it is necessary that he had the appropriate needs. Third, a particular human motor action is not a physical exercise, however, each motor action may be a physical exercise in compliance with the above requirements.

Conclusions / Discussion

The term "physical culture" was introduced into the broad social practice of Russia in 1918, as one of the consequences of the coup d'etat that took place in November 1917, which resulted in the creation of an administrative-command system of governing society. In this system, physical culture was used as one of the elements of the Cultural Revolution, which was based on Marxist-Leninist ideology. The ideological component of the state policy of that time, which was practically implemented by the Bolshevik-Communist government from the period of "military communism" (1918-1921) and "new economic policy" (1921-1930), contributed to the adoption of a number of organizational and managerial decisions led to the introduction of the term "physical culture" in broad social practice. Available historical materials indicate that the initiator of the introduction of the term "physical culture" in the then organizational and managerial practice was Vera Mikhailovna Bonch-Bruevich.

During the period of "military communism" (1918-1921) and "new economic policy" (1921-1930) in the society of that time in defining the essence of the concept of "physical culture" was dominated by the Bolshevik-Communist approach, which

was implemented through government decisions by state institutions, and in the scientific community, sanitary and hygienic prevailed to a greater extent. Such ambiguity in the interpretation of the concept of "physical culture" in a totalitarian state has turned this phrase and the related phrase "physical culture and sports" into a kind of language stamps, which are widely used without proper justification in our time.

The results of the analysis suggest that for the first time in scientific practice G. Duperron began to use the term "physical culture" for the general name of a special field of human activity, which has three basic directions of historical development, physical education, sports, gymnastics (fitness). This position is essentially a reference in the integrative theory of physical culture.

G. Duperron most deeply revealed the essence of the concept of "exercise". He stated that physical exercises, in contrast to motor actions in general, are exercises that do not have a direct immediate benefit (benefit) for a person. The fundamental nature of this approach to defining the concept of "exercise" is that it reflects one of the facets of human activity and does not depend on which of the forms of social manifestation of physical culture (physical education, sports, fitness) this activity is implemented. This position is one of the system-forming in the integrative theory of physical culture, which reveals the patterns of development of a special field of human activity, associated with the use of physical exercises.

Prospects for further research are to analyze the peculiarities of the use of the term "physical culture" in the system of knowledge about the field of human activity related to the use of physical exercises, which was formed in foreign, in particular in English scientific and social practices.

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RELATIONSHIP BETWEEN BIOMECHANICAL PARAMETERS TECHNIQUES OF THE PRELIMINARY ROTATIONS AMONG ELITE WOMEN HAMMERS THROWERS

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Purpose: to determine the relationships technique of the first preliminary rotation of the hammer with technique of the second preliminary rotation of elite women's hummer throwers.

Material and Methods: the research was attended by 8 hammer throwers (women) finalists' of European championships, and World championship during the

2016-2019 seasons. Research methods used: analysis and generalization of literary sources, processing video materials, methods of mathematical statistics.

Results: very strong correlation was observed between times of the second preliminary swing linear, angular velocities of the hammer, centrifugal force of the hammer at the end of the second preliminary swing and angles in the right and left elbows at the end of the first preliminary swing r=0,734-0,833. The correlation coefficient showed that if research women hummer throwers have more angles in the right and left elbows at the end of the first preliminary swing they will have more time of the second preliminary swing, linear, angular velocities of the hammer, centrifugal force of the hammer at the end of the second preliminary swing. As a result correlations analysis was discovered that such parameters of technique first pre-swing as: linear velocity of the hammer, angular velocity of the hammer, centrifugal force of the hammer, time of the first preliminary swing don't have significant impact on the technique second pre-swing.

Conclusion: the findings suggest established that for effective implementation second preliminary swing during improvement technique of the first preliminary swing the most attention should devote angles in the elbow joints, trajectory of the hammer, angle in the right knee and height lifting of the left heel from support at the end of the first preliminary swing.

Keywords: technique, biomechanical parameters, preliminary swings, elite women athletes, hammer throw.

Introduction

Preliminary swings one of the most important phase of the technique hammer thrower. During Pre-swing sportsmen enter to the rhythm of the throw. If throwers do mistakes on this phase they cannot get high performance results in the hammer throw [1, 3]. The biomechanical parameters of the techniques pre-swing researched R. Isele [6], L. Judge [7], J. Silvester [10].

V. Rozhkov [2] K. Bartoniet [4], have determined that in general elite hammers throwers use two preliminary swings.

N. Fujii, Y. Koyama [5] was studied speed indicators of the hammer. They founded that in the process of the swing phase's velocity increment of hammer amounts until 50% of the maximal velocity of hammer. Researchers K. Murofushi, S. Sakurai [8] has found necessary gradual increase speed of the hammer during pre-swing for smooth entry into the first turn. Shuai, W., Jihe, Z. [9] was determined that time pre-swing should be 1,06 s for effective turn with hammer.

However, despite on a lot of researches technique of the preliminary swings no studies to date have attempted to examine angles parameters of the techniques pre-swing and relationship between biomechanical parameters techniques of the preliminary swings.

Connection of the study with scientific programs, plans, topics. This study was performed in accordance with the research theme of the Department of Athletics of the Kharkiv State Academy of Physical Culture "Features of the spatial-temporal characteristics of sports (athletics) and routine physical activity" state registration number 0119U103785.

Purpose of the study is to determine the relationships technique of the first preliminary swing with technique of the second preliminary swing elite women hummer throwers.

Material and Methods of the research

The research was attended by 8 hammer throwers (women) finalists' of European championships, and World championship during the 2016-2020 seasons. Research methods used: analysis and generalization of literary sources, processing video materials, methods of mathematical statistics.

Results of the research

Parameters techniques of elite women hammer throwers which they have at the end of the first preliminary swing present at the table 1

Most biomechanical parameters of the techniques first preliminary swing had coefficient of variation V=5,3-14,0%. That showed that researched parameters of techniques was homogeneity and sportsmen didn't have significant differences between biomechanical parameters of the techniques first preliminary swing.

Coefficient of variation such parameters of the technique preliminary swings as height lifting of the left heel from support, linear velocity of the hammer, angular velocity of the hammer, centrifugal force of the hammer was V=20,61-37,28% %. That showed that researched women hammer throwers had significant differences in these parameters of the technique that explained individual parameters of the technique research hammer throwers.

Table 1

Biomechanical parameters technique elite women hammer throwers which they have at the end of the first preliminary swing

Indicators	$\overline{X}$	σ	V %
Angle in the right knee (°)	163,7	8,7	5,3
Angle in the left knee (°)	147,8	12,5	8,4
Height lifting of the left heel from support (cm)	9,6	3,1	32,2
Angle in the right elbow (°)	107,5	8,2	7,6
Angle in the left elbow (°)	106,9	8,4	7,8
Angle of the incline torso (°)	11,1	1,6	14,0
Height of the hammer (m)	1,95	0,2	8,9
Linear velocity of the hammer (m s^{-1})	7,25	1,50	20,66
Angular velocity of the hammer (rad$\cdot s^{-1}$)	5,11	1,05	20,61
Centrifugal force of the hammer (kg)	21,0	7,81	37,28
Time of the first preliminary swing (s)	1,06	0,08	7,36

Parameters techniques of elite women hammer throwers which they have at the end of the second preliminary swing present at the table 2.

Analysis of the technique second preliminary swings identify heterogeneity such indicators as height lifting of the left heel from support, angle of the incline torso, centrifugal force of the hammer v= 27,10-48,7%. That showed that researched women hammer throwers had significant differences in these parameters of the technique that explained individual parameters of the technique research hammer throwers.

Other parameters techniques of the second preliminary swing didn't have significant differences V=3,2-14,68%.

To determine influence biomechanical parameters technique of the first preliminary swing on the biomechanical parameters technique of the second preliminary swing we conducted Pearson pair correlation analysis.

Table 2

Biomechanical parameters technique elite women hammer throwers which they have at the end of the second preliminary swing

Indicators	$\overline{X}$	σ	V %
Angle in the right knee (°)	155,6	9,9	6,4
Angle in the left knee (°)	155,2	9,0	5,8
Height lifting of the left heel from support (cm)	9,2	4,5	48,7
Angle in the right elbow (°)	107,2	9,7	9,1
Angle in the left elbow (°)	107,9	10,0	9,3
Angle of the incline torso (°)	8,9	4,1	46,2
Height of the hammer (m)	1,99	0,06	3,2
Linear velocity of the hammer ($m\ s^{-1}$)	9,94	1,42	14,30
Angular velocity of the hammer ($rad \cdot s^{-1}$)	6,91	1,01	14,68
Centrifugal force of the hammer (kg)	37,6	10,2	27,10
Time of the first preliminary swing (s)	1,20	0,05	4,13

The relationship between biomechanical parameters of the technique preliminary swings among elite women hummer throwers present at the table 3.

Very strong correlation was observed between times of the second preliminary swing linear, angular velocities of the hammer, centrifugal force of the hammer at the end of the second preliminary swing and angles in the right and left elbows at the end of the first preliminary swing r=0,734-0,833. The correlation coefficient showed that if research women hummer throwers have more angles in the right and left elbows at the end of the first preliminary swing they will have more time of the second preliminary swing, linear, angular velocities of the hammer, centrifugal force of the hammer at the end of the second preliminary swing.

The correlation coefficient showed that if research women hummer throwers more up hummer above the ground at the end of the first preliminary swing they will have fewer angle in the left knee at the end of the second preliminary swing (r=-0,791).

Table 3

Relationship between biomechanical parameters of the technique preliminary swings among elite women hummer throwers

Biomechanical parameters first preliminary swing	Biomechanical parameters of the second preliminary swing										
	Angle in the right knee	Angle in the left knee	Height lifting of the left heel from support	Angle in the right elbow	Angle in the left elbow	Angle of the incline torso	Height of the hammer	Linear velocity of the hammer	Angular velocity of the hammer	Centrifugal force of the hammer	Time of the second preliminary swing
Angle in the right knee	0,408	0,513	-0,056	0,509	0,528	-0,101	-0,218	**0,704**	0,636	0,589	0,100
Angle in the left knee	0,298	0,543	-0,440	0,209	0,248	-0,107	-0,514	0,190	0,158	0,075	-0,208
Height lifting of the left heel from support	-0,039	-0,201	**0,799**	0,316	0,390	0,084	0,540	0,362	0,280	0,329	0,151
Angle in the right elbow	0,059	0,388	-0,281	**0,707**	0,651	0,434	-0,143	**0,753**	**0,830**	**0,810**	**0,833**
Angle in the left elbow	0,072	0,385	-0,288	0,679	0,621	0,454	-0,152	**0,734**	**0,816**	**0,789**	**0,825**
Angle of the incline torso	-0,201	-0,207	0,399	0,519	0,496	0,335	0,224	0,580	0,611	0,655	0,370
Height of the hammer	-0,279	**-0,791**	**0,728**	-0,107	-0,027	-0,426	**0,770**	-0,212	-0,352	-0,185	-0,229
Linear velocity of the hammer	0,295	0,469	0,042	0,334	0,408	0,590	-0,517	0,418	0,445	0,272	-0,254
Angular velocity of the hammer	0,294	0,469	0,041	0,335	0,408	0,591	-0,518	0,419	0,446	0,272	-0,253
Centrifugal force of the hammer	0,261	0,533	0,049	0,324	0,396	0,617	-0,516	0,377	0,416	0,236	-0,205
Time of the first preliminary swing	-0,444	0,507	0,376	0,156	0,205	0,249	-0,231	-0,168	-0,087	-0,171	-0,202

Note: R > Rcr, if R > (0,707)

If research women hummer throwers have more up left heel and hummer above the ground at the end of the first preliminary swing they will have more up left heel from support at the end of the second preliminary swing r=0,799 and r=0,728.

Strong correlation was observed between Angle in the right elbow at the first and second pre swing r=0,707. Correlation showed increase angle in the right elbow at the end of the second preliminary swing if sportsmen will have more angle in the right elbow at the end of the first preliminary swing.

If research women hummer throwers have more hummer above the ground at the end of the first preliminary swing they will have more height of the hammer at the end of the second preliminary swing r=0,770

Strong correlation was observed between linear velocity of the hammer at the end of the second preliminary swing and angle in the right knee at the end of the first preliminary swing r=704. The correlation coefficient showed that if research women hummer throwers have more angle in the right knee at the end of the first preliminary they will have higher linear velocity of the hammer at the end of the second preliminary swing.

Conclusions / Discussion

The results of the present investigation suggest about importance angular parameters of techniques of the first preliminary swing for effective execution second preliminary swing. This research confirms results J. Silvester [10], K. Bartonietz [4], about increase height of the hammer at the second preliminary swing if hammer will have higher trajectory during first preliminary swing.

Studying speeds parameters of the techniques pre-swings K. Murofushi [8], N. Fujii [5] founded increase linear velocity of the hammer until 50% during second preliminary swing in the comparison first preliminary swing. However our research wasn't determined strong correlation between speeds parameters of the techniques pre-swings r=0,418-0,486.

The results of the study expanded information W. Shuai [9], about time parameters of the techniques pre-swings. We was determined that if sportsmen have

more angle in the elbow during first preliminary swing they will have spent more time on realize second preliminary swing r=0,789-0,810.

Determined that for effective implementation second preliminary swing during improvement technique of the first preliminary swing the most attention should devote angles in the elbow joints, trajectory of the hammer, angle in the right knee and height lifting of the left heel from support at the end of the first preliminary swing.

Prospects for further research in this area. Further studies will be devoted to the research Relationship between preliminary swings and turns with hammer.

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PHYSICAL THERAPY FOR PATIENTS WITH POSTTRAUMATIC ELBOW CONTRACTURES

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Purpose: to develop and explain a modern program of physical therapy for people with posttraumatic elbow contractures during the late post-operative period using rating scales for the separate categories of International Classification of Functioning, Disability and Health (ICF) to assess the effectiveness of rehabilitation.

Material and methods: the study involved 17 patients aged 28 to 50 years. The control group (CG) – 9 people (4 women, 5 men) and main group (MG) – 8 people (3 women, 5 men) were selected. The program of physical therapy in MG patients included ultrasound therapy with immediate follow-up mobilization techniques for the elbow joint in addition to conventional means. Goniometry, manual muscle testing, questionnaires Quick Disability of the Arm, Shoulder and Hand Outcome Measure (QuickDASH), Patient-rated elbow evaluation (PREE), were defined as rating scales according to literature review.

Results: only 8 categories were identified, they were most significant for patients, and the corresponding ratings of the categories were established. After MG patients rehabilitation assessments of category b710 Functions of joint mobility

according to the results of goniometry improved from 2,8±0,2 to 1,9±0,2 c.u., p<0,001, for patients of CG - from 2,9±0,2 to 2,4±0,6 c.u., p<0,05, with a significant difference between the comparison groups, p<0,05. Also, assessments of category d445 “The using of the hand and arm” according to the PREE function scale for patients of MG had positive changes: from 3,5±0,5 to 2,4±0,5 c.u., compared with CG - from 3,5±0,5 to 3,0±0,2 c.u., p<0,05, p<0,001, with a significant difference between MG and CG, p <0.05. The average duration of the late postoperative period of the MG was 21,62±2,28 days, of the CG – 27,11±2,52 days with the difference between groups, p<0,05.

Conclusions: the most significant categories of IFC for the elbow contracture, their rating scales have been identified. Based on the significant differences of two IFC categories assessments (b710 “Joint mobility functions”, d445 “Use of hand and arm”, p<0,05) and reducing the duration of the rehabilitation period (p<0,05), the benefits of developed physical therapy program were proved by.

Keywords: posttraumatic elbow contracture, physical therapy.

Introduction

Elbow joint (EJ) fractures are rated at 5 – 6% within skeletal injuries structure, however, the frequency of posttraumatic elbow stiffness (PTES) and treatment of postsurgical complications concerning elbow injury has not been specified yet [2, 5, 11]. Research has proved that unsatisfactory treatment results cause 33-44% of PTES cases, and revision is required for 26-55% of patients [1, 6, 9, 31]. Thus, relatively high level of PTES, mean age (mostly more than 45 years old) can adversely affect a considerable part of the active patient population [8, 22, 25].

Currently the best evidence-based physical therapy (PT) for postoperative patience suffering PTES protocol is undiscovered and varies depending on intervention, hospital, moreover, rehabilitation outcome measures are not defined. Using ICF in rehabilitation will be instrumental not only in unifying the term of type and severity of functional impairment (disability) but also improve the quality of rehabilitation procedures planning when making up individual rehabilitation program.

Unfortunately, ICF Core Sets for individual diseases and injuries specify the qualification categories, but do not indicate the specific research methods that should be used. [10, 24, 30, 31].

Therefore, the development and verification of the modern PT program for people suffering PTES, using evidence-based rehabilitation means and efficacy evaluation methods based on ICF categories using rating scales, are relevant.

Connection of the study with scientific programs, plans, topics. The study has been carried out according to "Rehabilitation technologies joint and ligamentous apparatus pathology", the initiative topic of the research for 2019-2021 (state registration number 0120U104881).

Purpose of the study has been to develop and verify the modern PT program for people suffering PTES at the late postoperative stage using rating scales for ICF categories to evaluate rehabilitation efficacy.

Material and Methods of the research

The research involved 17 patients aged 28 to 50 years, who underwent rehabilitation treatment at "Fortis" Medical Health Center (clinical site of KhSAPC). The control group (CG) including 9 people (4 women, 5 men) and main group (MG), consisting of 8 people (3 women, 5 men) have been selected using random numbers method. Inclusion criteria have been the following: flexion-extension arc of the elbow<100° or stiffness>30° compared to the healthy limb, a history of elbow injury along with posterior approach surgical treatment of EJ, posterior splinting for 3-4 weeks, informed written consent. Exclusion criteria: EJ instability, polytrauma, inability to restore movement according to postoperative radiography, inflammatory diseases of EJ. In terms of general characteristics MG and CG have been congenerous.

In addition to currently accepted kinesitherapy (active and passive exercises to increase range of motion, stretching, postisometric muscle relaxation, proprioceptive-neuromuscular facilitation techniques, simple strengthening exercises for elbow muscles, scapula mobilization and exercises for its "core" muscles, exercises for the rotator cuff muscles, radiocarpal joint and wrist), daily home exercises, wearing night

static elbow brace in maximum extension position, the developed PT program for MG patients included ultrasound therapy (UST) followed by immediate mobilization techniques for the EJ. The patients of the CG had UST along with therapeutic massage of the shoulder and forearm [3, 16, 33].

3 Mhz ultrasound ("Biomed") has been applied for anterior and posterior surfaces of EJ during 3 min. for each area at 1.4 W/cm^2. Continuous mode, lability technique, contact (special gel), every other day, 8 procedures. It was followed by immediate elbow joint mobilization (MG) or massage of the shoulder and forearm (CG) during 15-20 minutes [15, 33].

Mobilization has been measured depending on patients' evaluation. The patients subjectively determined the level of tolerable pain and assessed the pressure, therewith have taken into account defensive tissue reaction, muscle spasm and contraction. III and IV grades of Maitland's mobilization have been applied at the late postoperative stage [4].

To improve flexion, the following joint mobilizations has been performed: distraction, anterior glide. To improve extension - distal radial glide has been done. Each rhythmic or oscillatory mobilization has been performed for at least 30 seconds with 3 repetitions [33].

According to the literature subjective and objective rating scales have been designated: goniometry [4], manual muscle testing [18], Quick Disability of the Arm, Shoulder and Hand Outcome Measure (QuickDASH)) [10, 29], Patient-rated elbow evaluation (PREE)) [27,28], that have been used to assess rehabilitation efficacy and severity of impairment (dysfunction), activity and participation according to ICF.

Mathematical statistics methods. Descriptive statistics has been used for the general characteristics of the values. The calculation of the average duration of the late postoperative stage has been carried out from the date of arriving at a stiffness diagnosis (5-8 weeks post surgery) and until reaching 30° to 130° range of flexion - extension of the EJ. To test the differences between groups over time, nonparametric statistics has been used due to the small number of observations, the Wilcoxon rank sum test – for related sets, Mann-Whitney test – for independent ones. $p<0,05$ value

has been considered significant. Statistical analysis has been performed using SPSS statistical computer program, 16.0 version [21].

Results of the research

Resulting from the research, the categories specific for the patients suffering PTES from the Brief ICF Core Sets for Hand Conditions have been selected as follows: body functions (b280 Sensation of pain, b710 Mobility of joint function, b730 Muscle power function) and activity and participation (d520 Caring for body parts, d550 Eating, d430 Lifting and carrying objects, d445 Hand and arm use, d850 Remunerative employment). All respondents among the patients participating in the study, complained about b710 Mobility of joint function, b730 Muscle power function, d430 Lifting and carrying objects, d445 Hand and arm use, 52,94±12,48 % noted the presence of the category b280 Sensation of pain, 88,23±8,05 % had problems with d520 Caring for body parts, 29,41±10,60 %, d550 Eating, 76,47±10,60 % - d850 Remunerative employment. Other categories from the Core Set were not significant for the people from the MG and CG, no one identified those impairments.

Each category has been qualified according to the appropriate scale (Table 1).

The aim of rehabilitation of patients suffering PTES according to ICF is to restore: the functions of the operated EJ (at the level of structure), the ability of self-care (at the level of activity), professional activity (at the level of participation).

Over 4-week time of the study, the efficacy evaluation of the late postoperative stage has been assessed based on the results of achieving goals and tasks of rehabilitation (Table 2-3). The aim “To restore hand functions” corresponded to 4 ICF categories, 2 of which have improved significantly: b710 Mobility of joint function and d445 Hand and arm use ($p<0,05$).

Table 1

Rating scales for ICF categories depending on the aim of rehabilitation

Objective	ICF category	Assessment instrument
To restore hand functions	b280 Sensation of pain	• PREE scale(pain) • 50-39 points (4 – complete problem); • 38 -26 points (3 – severe problem); • 25 -13 points (2 – moderate problem); • 1-12 points (1 – mild problem); • 0 points (0 – no problem).
	b710 Mobility of joint function	Goniometry (4 grades of flexion-extension stiffness)
	b730 Muscle power function	• Manual muscle testing • 0 = no contraction is present (4– complete problem); • 1 = trace of contraction that is contraction without movement (4– complete problem); • 2 = prominent muscle contraction and ability to make movement without help, without gravity (3 – severe problem); • 3 = full range of motion in antigravity position (2 – moderate problem); • 4 = full range of motion against moderate pressure along full range of motion (1 – mild problem); • 5 = full range of motion against strong pressure (0 – no problem).
	d445 Hand and arm use	• PREE scale (functions) • 50-39 points (4 – complete problem); • 38 -26 points (3 – severe problem); • 25 -13 points (2 – moderate problem); • 1-12 points (1 – mild problem); • 0 points (0 – no problem).
To ensure self-sufficiency in everyday life	d520 Caring for body parts d550 Eating d430 Lifting and carrying objects	• QuickDASH • 100-74 % (4 – complete problem); • 75 -49 % (3 – severe problem); • 50 -26 % (2 – moderate problem); • 1-25% (1 – mild problem); • 0 % (0 – no problem).
To return to work	d850 Remunerative employment	• QuickDASH (supplementary section) • 100-74 % (4 – complete problem); • 75 -49 % (3 – severe problem); • 50 -26 % (2 – moderate problem); • 1-25% (1 – mild problem); • 0 % (0 – no problem).

Table 2

Evaluation of achieving the set goal "To restore hand functions" at the late postoperative stage for patients with PTES in comparison groups

Rating scales and ICF categories	MG , M±m (n=8)		CG, M±m (n=9)		p, between comparison groups
	in the beginning	in 4 weeks	in the beginning	in 4 weeks	
PREE scale (pain), c.u.	23,0±6,0	20,25±7,1	23,2±5,5	20,5±5,9	>0,05
b280 Sensation of pain c.u.	2,2±0,5	1,7±0,6	2,2±0,6	1,8±0,9	>0,05
Goniometry (extension), c.u.	96,25± 6,25	143,75± 12,18**	95,55± 6,17	110,00± 8,89*	<0,05
Goniometry (flexion), c.u.	86,25± 5,35	45,55± 4,01**	85,26± 5,11	61,12± 4,87*	<0,05
Goniometry (pronation), c.u.	16,21± 1,13	50,15± 6,17**	15,33± 1,27	30,15± 3,49*	<0,05
Goniometry (supination), c.u.	10,23± 1,24	43,75± 3,44**	11,33± 1,11	25,45± 2,81*	<0,05
b710 Mobility of joint function, c.u.	2,8±0,2	1,9±0,2**	2,9±0,2	2,4±0,6*	<0,05
MMT flexion, c.u.	4,0±0,2	4,1±0,2	3,8±0,5	3,9±0,6	>0,05
MMT extension, c.u.	3,1±0,4	3,4±0,6	3,2±0,5	3,3±0,4	>0,05
b730 Muscle power function, c.u.	3,1±0,4	3,4±0,5	3,1±0,4	3,2±0,3	>0,05
PREE scale (functions) , c.u.	37,75± 2,87	25,37± 3,47**	37,89± 4,81	32,22± 5,48*	<0,05
d445 Hand and arm use, c.u.	3,5±0,5	2,4±0,5**	3,5±0,5	3,0±0,2*	<0,05

* - significant difference between the values of related options over time, p<0,05;

** - significant difference between the values of related options over time, p<0,001

The aim "To ensure self-sufficiency in everyday life" corresponded to three ICF categories, two of which have undergone positive changes in both comparison groups (Table 3).

Table 3

Evaluation of achieving the set goal "To ensure self-sufficiency in everyday life" at the late postoperative stage for patients with PTES in comparison groups

Rating scales and ICF categories	MG , M±m (n=8)		CG, M±m (n=9)		p, between comparison groups
	in the beginning	in 4 weeks	in the beginning	in 4 weeks	
QuickDASH, %	62,2±2,5	56,8±5,0	58,3±5,1	55,4±4,7	>0,05
d520 Caring for body parts, c.u	4,3±0,6	2,4±0,7*	4,1±0,8	2,5±0,7*	>0,05
d550 Eating, c,u	2,2±0,6	1,5±0,5*	2,2±0,7	1,4±0,5*	>0,05
d430 Lifting and carrying objects, c.u	3,6±0,9	3,2±0,6	4,1±0,4	3,4±0,4	>0,05

* - significant difference between the values of related options over time, p<0,05

The aim "To return to work" is derivative for person's participation in social life and is essential for rehabilitation. The category d850 Remunerative employment has improved greatly during the study period in both groups (p<0,05), but without considerable difference between them (Table 4).

Table 4

Evaluation of achieving the set goal "To return to work" at the late postoperative stage for patients with PTES in comparison groups

Rating scales and ICF categories	MG, M±m (n=8)		CG, M±m (n=9)		p, between comparison groups
	in the beginning	in 4 weeks	in the beginning	in 4 weeks	
QuickDASH (supplementary section), %	67,9±18,1	50,0±12,5*	72,9±15,2	46,9±13,4*	>0,05
d850 Remunerative employment, c.u.	3,00±0,75	2,25±0,62	3,22±0,69	2,12±0,74*	>0,05

* - significant difference between the values of related options over time, p<0,05

Moreover, the average duration of the late postoperative recovery stage was 21,62±2,28 days for MG patients (9,75±0,75 kinesitherapy sessions and 7,0±1,0 UST interventions plus joint mobilization), 27,11±2,52 days for CG patients (11,88±1,06 kinesitherapy sessions and 7,6±0,69 UST plus massage of the limb) with a significant difference between the duration of the period of physical therapy, $p<0,05$.

Conclusions / Discussion

ICF classification includes more than 1400 categories limiting its usage in clinical practice [20,31]. ICF Core Sets may serve as a base scheme and operational instrument for effective classification and description of the patient's functions. ICF Core Sets consist of minimal number of categories, but as many as necessary to describe patient's level of functioning. 117 ICF categories have been included into Comprehensive ICF Core Set for Hand Conditions. Based on the results of the survey only 8 categories, which in many cases are significant for the patients suffering elbow stiffness, have been selected from the Brief ICF Core Set for Hand Conditions (23 categories).

Goniometry (4 grades of elbow stiffness) [4], MMT (using 6 point scale) [18], QuickDASH (having 5 grades) and PREE scales, which are recommended as valid for the use of ICF categories evaluation, can be used to qualify the categories [28].

Pursuant to learning the literature [12, 13, 33] and analyzing functional changes associated with postoperative stiffness, UST followed by mobilization techniques along with the use of the evidence-based means of rehabilitation for PTES, have been included into PT program at the late postoperative stage. It is soft tissues mobilization techniques that have the following effects: pain management, blood flow increasing, mobility improvement, anti-inflammatory response triggering, incarnation. Clinically, scar tissue and fibrosis cause pain, muscle spasm and joint stiffness. Improving elasticity and stretching property of tissue that occurs after using UST which decreases tissue scarring and fibrosis, increases range of motion and reduces pain, and thus is clinically relevant.

The results obtained in this research are coherent with findings of the other studies. The possibility of using UST in terms of evidence-based therapeutic effect on

pain, muscle spasm and other joint stiffness has been proven [7, 13, 26]. An additional point is that attention has been paid to the results of scientific publications [13, 19] on the effective use of therapeutic exercises to increase range of motion during the 20-minutes period after applying UST, as this timespan has shown favorable physiological results. Furthermore, the combination of UST and joint mobilization has been efficient for posttraumatic stiffness of upper extremity joints based on the results of case series [13]. Joint mobilization has been performed immediately after the ultrasonic treatment, as the heat is quickly dissipated through the thermal conductivity from the area through the vascular system. Skeletal muscles temperature rise decreases rapidly within the first 10–15 minutes after finishing UST [19, 23]. F. Kaltenborn [17] believed that a greater range of motion in the hypomobile joint is obtained during mobilization rather than during basic stretching. Stretching triggers only angular components (i.e. flexion, extension), while joint mobilization engages auxiliary components, the most important of which is glide. Kaltenborn created the theory that the full range of passive motion in the synovial articulation is possible subject to the existence of so-called auxiliary joint movements: gliding, rolling, traction, compression. These are non-physiological low-amplitude movements that are beyond the volitional control of the patient, which can be performed only by a physical therapist [12, 15].

Indications for joint mobilization are pain, muscle spasm, blocking, joint laxity and functional stiffness.

Therefore, the most significant ICF categories for elbow stiffness, their rating scales have been specified. Based on rating scales and ICF categories qualification, the advantages of including UST followed by immediate elbow joint mobilization within the physical therapy program have been proved according to significant differences in the two ICF categories (b710 Mobility of joint function, d445 Hand and arm use, $p<0,05$) and reduction in the duration of the rehabilitation period ($p<0,05$).

Directions for future research in this area lie in the fact that the obtained results have an effect within a relatively short period of time and require longer testing.

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IMPROVING THE TECHNICAL TRAINING OF RHYTHMIC GYMNASTICS ATHLETES BY MEANS OF FOLK-STAGE DANCE

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Purpose: to experimentally substantiate the improvement of technical readiness of rhythmic gymnastics athletes aged 10-12 years by means of folk-stage dance.

Material and methods: theoretical analysis and generalization of data of special scientific and methodical literature, pedagogical observation, pedagogical testing, pedagogical experiment, method of expert assessments, methods of mathematical statistics. The study involved 14 gymnasts aged 10-12 years. Divided into two groups: control group (CG) 7 gymnasts and the main group (MG) 7 gymnasts.

Results: it was found that the level of technical training has increased significantly in the athletes of the main group, where in the training process used the means of folk stage dance.

Conclusions: the positive influence of folk-stage dance means on the dynamics of the level of technical readiness of female athletes in rhythmic gymnastics has been established. Confirmation of the effectiveness of the developed technique was a

statistical change in the gymnasts of the main group. The gymnasts of the control group showed positive dynamics of results, but no statistically significant changes were observed.

Keywords: rhythmic gymnastics, sportswomen, technical readiness, folk-stage dance.

Introduction

The performance of competitive programs in modern rhythmic gymnastics requires high technical skill from gymnasts. Traditional means of technical training in the educational and training process of female gymnasts do not fully correspond to the modern dynamism and evolution of the structure of competitive programs and their implementation [14, 15]. Improving the technique of performing the difficulties of body movement (jumps, turns, balance) and the expressiveness of their implementation requires gymnasts to have all-round choreographic readiness, since one of the ways to increase the cost of the composition of the competition is possible by performing complex and "expensive" elements of body difficulties [8, 12, 13].

Improving the performance skills of gymnasts on the basis of improving choreographic training is considered in the studies of Guevara Perez Jorge Enrique (1994) and S.I. Borisenko (2000). Research by S.I. Borisenko (2000), associated with improving the performance skills of gymnasts based on improving choreographic training. She showed that the priority of national gymnastics is due not only to high sports and technical skill, but also to special aesthetics, which is reflected in the performances.

A number of scientists (I. Viner, 2003; L.A. Karpenko, 2007; R.I. Andreeva, 2011) pay attention to the fact that the specificity of training in rhythmic gymnastics is determined by the fact that the purpose of the exercises is to achieve harmony of movements. High results are determined by the absolute values of one of the components: speed, flexibility, strength, endurance, coordination, as well as special connections between different sides of motor manifestations.

The analysis of special scientific and methodological literature showed that the use of modern directions of choreography in the training of young athletes takes place, but the use of movements of the folk-stage dance of the part is not traced. The solution to the problems of this topic is timely, as the development of rhythmic gymnastics takes place throughout Ukraine. Each region of the country has its own flavor, folklore, which can give an inexhaustible bonfire of movements of both folklore and folk-stage dance [5, 10, 17]. When combining choreographic movements with the skill of performing exercises with objects, athletes of rhythmic gymnastics reproduce a unique palette of colors of female plastic, its transformation into different images according to the musical accompaniment and its drama [11, 16].

The characteristic features of folk-stage dance movements give grace and dynamism in their performance. The interweaving of the multifaceted content of folk-stage dance with a choreographic pattern, the emotional component of a musical work reflects its nationality and era. Folk-stage dance is characterized from calm round dance figurative folk sketches to rapid movement in a choreographic drawing with the performance of complex exercises in one episode or another in the theme of reproducing an era or the present [7]. The foregoing testifies to the incredibly rich, inexhaustible flavor of folk-stage dance, which is inherent in its qualities for use in the structure and implementation of a competitive program in the sport of rhythmic gymnastics. Despite this, our research, the impact of folk stage dance on the level of technical readiness of female athletes in rhythmic gymnastics is relevant.

Connection of the study with scientific programs, plans, topics. The study was carried out in accordance with the initiative theme of the scientific research of the Department of Gymnastics, Dance Sports and Choreography of KSAPC: “Theoretical and methodological foundations of the system-forming components of physical culture (sports, fitness and recreation) for 2020-2025, state registration number 0120U01215.

Purpose of the study to experimentally substantiate the improvement of technical readiness of rhythmic gymnastics athletes aged 10-12 years by means of folk-stage dance.

Material and Methods of the research

Theoretical analysis and generalization of data from special scientific and methodological literature, pedagogical observation, pedagogical testing, pedagogical experiment, the method of expert assessments, methods of mathematical statistics. The study involved 7 gymnasts aged 10-12 years from the control group (CG) and 7 gymnasts aged 10-12 years from the main group (MG).

Results of the research

At the initial stage of the study, the estimated scores of the components were determined according to the criteria when performing the competitive program in the control group (CG) and the main group (MG) fig. 1. and fig. 2.

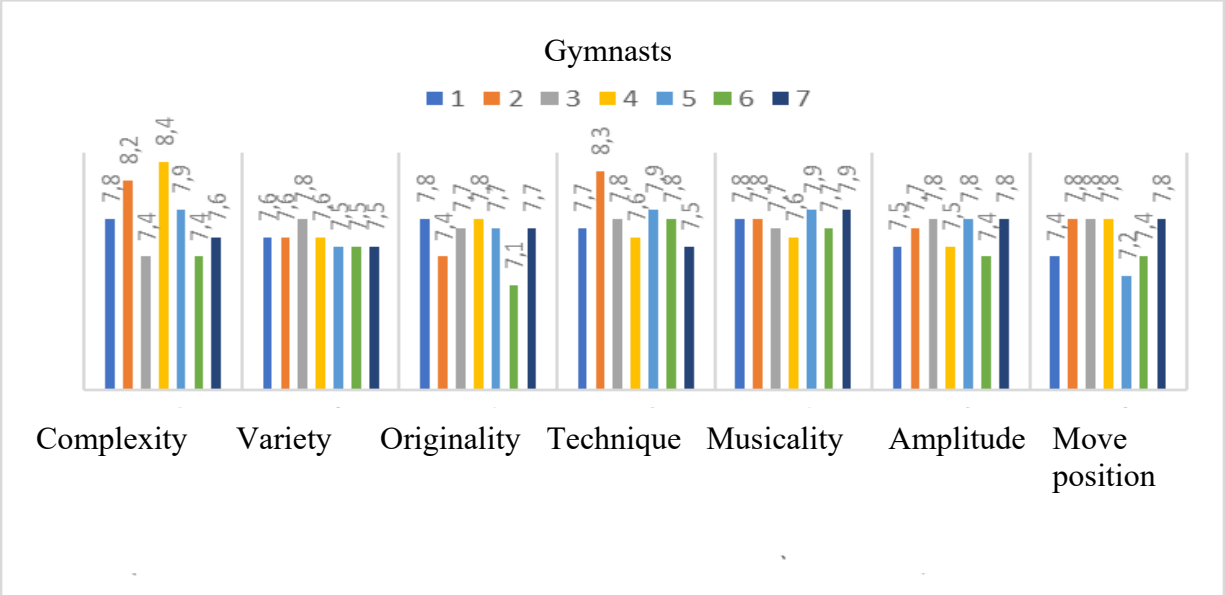

Figure 1. Results of testing the technical readiness of gymnasts at the initial stage of the experiment (CG, n=7)

The analysis of expert assessments of the performance of the competitive program by female athletes of this age at the beginning of the study in the control group gives reason to ascertain a large dispersion of individual results and the *greatest difference* in the level of technical readiness of female athletes in the component *complexity of elements* between their best and worst performance, which is 1.0 points from 7.4 points up to 8.4 points (V – 4,6%). Leading experts in rhythmic

gymnastics testify that at this age the difference in the level of technical readiness of rhythmic gymnastics female athletes in the technique of execution in the competitive programs of the *component complexity* of the elements has the *greatest difference* in the level of technical readiness than in the performance of other components, which is confirmed by expert assessments of testing in our study. As for other test results, in the *components, the diversity of body movements* from 7,5 points to 7,8 points (V – 1,3%), the *originality of elements and compounds* from 7,4 points to 7,8 points (V – 3,1%), *technique of performance of elements* from 7,5 points to 8,3 points (V – 3,0), *musicality of performance* from 7,6 to 7,9 points (V – 1,2%), *range of movements* from 7,4 points to 7,8 points (V – 2,1%), *movement across the site* from 7,2 points to 7,8 points (V – 3,1%) we have minimal differences in the dispersion of individual results, which make up the difference in the range from 0,6 to 0,3 points. The homogeneity of the group is obvious, where the coefficient of variation V% does not exceed 10 percent [9].

The primary testing of the level of technical readiness of female gymnasts of the main group (MG) was carried out (Fig. 2.)

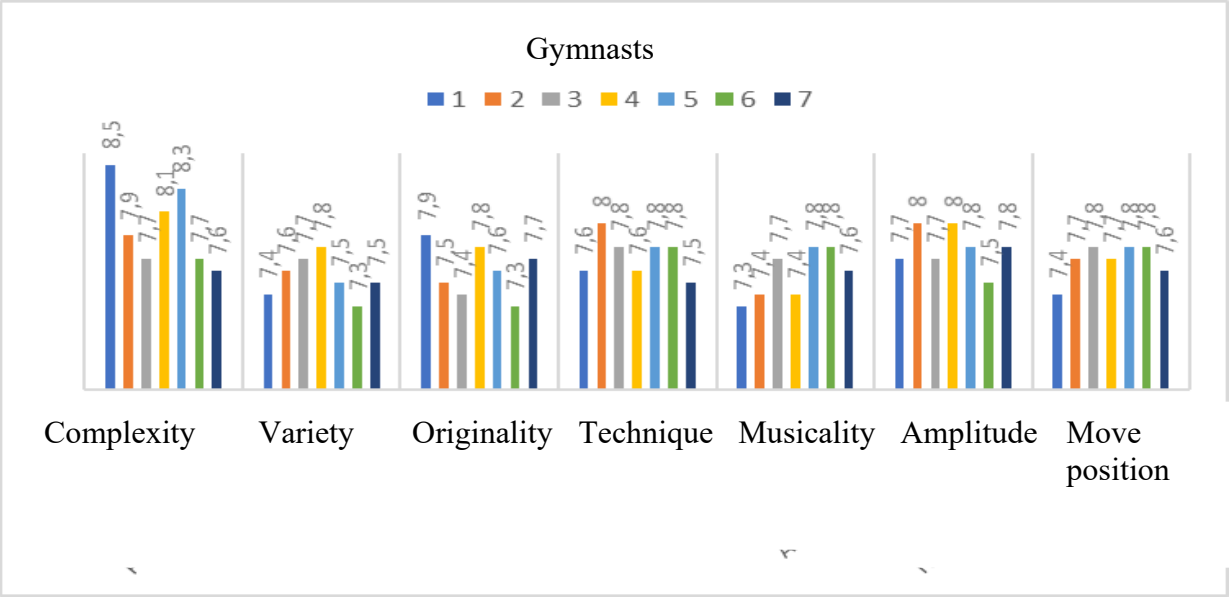

Figure 2. The results of testing the technical readiness of female gymnasts at the initial stage of the experiment (MG, n=7)

The testing carried out in the main group at the beginning of the experiment showed, as in the control group, a large dispersion of results was recorded in the component *complexity of elements* and *the greatest difference* in the level of technical readiness of female athletes between their best and worst performance, which is 0.9 points from 7,6 to 8,5 points (V – 3,9%).

The difference in test results for other components does not exceed the limits from 0,6 to 0,3 points: *variety of body movements* from 7,3 points to 7,8 points (V – 2,1%), *originality of elements and compounds* from 7,3 points up to 7.9 points (V – 2,6%), *technique of performing* elements from 7,5 points to 8,0 points (V – 2,0%), *musicality of performance* from 7.3 points to 7,8 points (V – 2,5%), *amplitude of movements* from 7,5 points to 7,8 points (V – 2,0%), *movement on the site* from 7,4 points to 7,8 points (V – 1,8%).

On the basis of the conducted pedagogical research, we have developed a methodology for improving the technical readiness of female athletes in rhythmic gymnastics at the age of 10-12 years by means of folk stage dance. It included exercises for performing varieties of Ukrainian folk stage dance: characteristic parterre and in unsupported movement turns, tracks.

Table 1

Statistical indicators of technical readiness of female gymnasts of the main group of the pedagogical experiment (n = 7, P < 0,05;0,01; 0,001)

№ i/o	Components	Main group (n = 7)		tp	p
		before	after		
		$\overline{X} \pm m$			
1	Complexity of elements, points	7,99 ± 0,12	8,61 ± 0,18	2,87	< 0,05
2	Variety of body movements, points	7,61 ± 0,06	8,65 ± 0,07	11,28	< 0,001
3	Originality of elements and compounds, points	7,66 ± 0,08	8,31 ± 0,06	6,50	< 0,001
4	Technique for performing elements, points	7,67 ± 0,06	8,46 ± 0,07	8,57	< 0,001
5	Musicality of performance, points	7,64 ± 0,08	8,4 ± 0,08	6,72	< 0,001
6	Amplitude of movements, points	7,82 ± 0,06	8,24 ± 0,05	5,38	< 0,01
7	Moving around the site, points	7,73 ± 0,05	8,38 ± 0,06	8,32	< 0,001

We applied the technique of improving the technical readiness of rhythmic gymnastics athletes at the age of 10-12 in the main group (MG, n=7). The educational and training process in the control group (CG, n=7) was held according to the traditional method of training female athletes in rhythmic gymnastics. Folk-stage dance exercises were used in the main group in the preparatory and final part of the training session. The statistical test results at the end of the pedagogical experiment are presented in tables 1, 2.

The indices of evaluation of the components of the fulfillment of the competitive program before and after the pedagogical research in the MG showed the dynamics of change: the component "Complexity of elements" in the group in percentage terms increased by 7,8% (t_p=2,87, p<0,05); component "Variety of body movements" – by 13,6% (t_p = 11,28, p<0,001); component "Originality of elements and compounds" – by 8,5% (t_p=6,50, p<0,001); the component "Technique for performing elements" – by 10,3% (t_p=8,57, p<0,001); the component "Musical performance" – by 9,9% (t_p=6,72, p<0,01); the component "Amplitude of movements" – by 5,4% (t_p=5,38, p<0,01); the component "Move around the site" – by 8,4% (t_p=8,32, p<0,001).

Table 2

Statistical indicators of technical readiness of gymnasts from the control group of the pedagogical experiment (n = 7, P < 0,05)

№ з/п	Components	Control group (n = 7)		tp	p
		before	after		
		$\overline{X}$ ± m			
1	Complexity of elements, points	7,81 ± 0,15	7,97 ± 0,13	0,81	> 0,05
2	Variety of body movements, points	7,59 ± 0,04	7,68 ± 0,06	1,25	> 0,05
3	Originality of elements and compounds, points	7,60 ± 0,10	7,84 ± 0,07	1,97	> 0,05
4	Technique for performing elements, points	7,80 ± 0,10	8,01 ± 0,09	1,56	> 0,05
5	Musicality of performance, points	7,77 ± 0,04	7,9 ± 0,05	2,03	> 0,05
6	Amplitude of movements, points	7,64 ± 0,06	7,77 ± 0,07	1,41	> 0,05
7	Moving around the site, points	7,60 ± 0,10	7,82 ± 0,07	1,80	> 0,05

At the same time, the dynamics of changes in the assessment of the components of the implementation of the competitive program at the beginning and after the pedagogical research in the control group is highlighted in the results: the expert assessment of the component "Complexity of elements" in the group in percentage terms increased by 1,3% (t_p=0,46, p>0,05) component "Variety of body movements" – by 1,2% (t_p=0,71, p<0,05) component "Originality of elements and compounds" – by 1,1% (t_p=0,77, p>0,05); component "Technique of performing elements" – by 2,5% (t_p=1,28, p<0,05) component "Musical performance" – by 1,2% (t_p=0,54, p<0,05) component "Amplitude of movements" – by 1,2% (t_p=0,57, p<0,05) to the component "Moving around the site"– by 1,2 % (t_p=0,44, p>0,05).

When comparing the indicators of the level of technical readiness of the female gymnasts of the main and control groups, the reliability of the results is observed in all evaluative components of the competitive program (Fig. 3.)

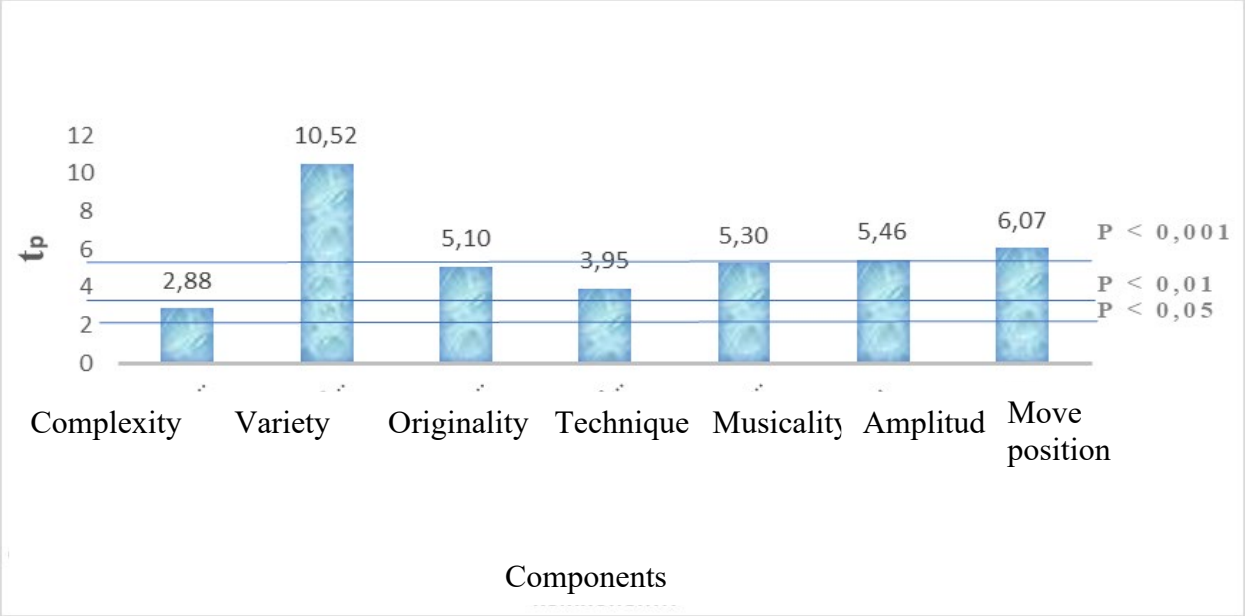

Figure 3. Reliability of indicators of the level of technical readiness of female gymnasts of the main and control groups after the pedagogical experiment

In the comparative characteristic of the average statistical assessment of the components of the fulfillment of the competitive program by athletes of rhythmic gymnastics, a positive difference was established in favor of the main group. The percentage is: MG – 5,2%; CG – 1,4%.

Conclusions / Discussion

Research on this topic has shown the inexhaustibility of scientific developments and practical approaches to the introduction of new innovations and folk-stage dance means into the training process in improving the technical readiness of rhythmic gymnastics athletes. Folk stage dance in its multifaceted unique reincarnation is a great treasure of all colors of the nationality, enrich not only our performance, but also play a big role in revealing the emotional and artistic state of rhythmic gymnastics athletes during the performance of the competitive program. A certain dynamics of changes in the indicators of the performance of competitive programs by female athletes of rhythmic gymnastics in percentage terms by groups indicates the effectiveness of the methodology for improving the technical readiness of female athletes of rhythmic gymnastics by means of folk stage dance proposed in the educational process.

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PECULIARITIES FOR THE ONLINE TEACHING PROCESS ORGANISATION AS A FORM OF PHYSICAL TRAINING LESSONS

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Purpose: to investigate modern approaches to the online teaching process during physical training lessons at schools.

Material and methods: analysis of scientific and methodological literature along with Internet informative data; questionnaire using google-forms; methods of mathematical statistics were applied, a survey of 95 secondary schools pupils in Kyiv and Bila Tserkva cities was organised.

Results: current state of this issue regarding the online teaching process organisation was analysed. It has been determined that the physical training lessons organisation has predominantly a formal nature, it is ineffective and must undergo fundamental changes; it cannot be an alternative to practical training in the gym, only as its addition. Assessment of pupils' satisfaction with physical training lessons provided justification for understanding the problems of online lessons organisation, the necessity for changes in approaches to teaching of physical education specialists, what exactly it would make sense to add to the physical training lessons organisation during online lessons in order to meet effectively the requirements of a modern student needs.

Conclusions: it was revealed that the level of satisfaction with physical training lessons among students in conditions of lockdown restrictions depends

directly on the interest, responsibility, professionalism of the mentor and active student-teacher feedback. The absence of the components mentioned before neutralises the harmonious development of a pupil and provokes negative consequences. The predominant pupils' interest to obtain knowledge, skills and abilities provided by physical training teachers was specified.

Keywords: physical education, lesson, distance learning, coronavirus.

Introduction

The lesson of physical culture is an important factor and one of the main components for the educational process in secondary schools because physical culture should be an integral part of every student's life [1, 4]. As a result of the economic conditions in many families of Ukraine and the lack of ability to pay for sports sections also as a result of danger for prolonged children staying at outdoor playgrounds, physical culture lessons are a solitary opportunity for harmonious physical development for many students [2]. The modern reality in the period of the current great world tragedy, called "coronavirus pandemic - COVID-19" dictates its conditions for organizing physical culture lessons at school during the educational process [3, 6, 8]. Due to the peculiarities of quarantine restrictions in schools and Ukrainian cities specialists are reasonably concerned by the distance education process organization and conducting of physical education lessons, which have a significant number of obstacles and prevent students from systematically receiving age-appropriate physical activity in the gym [4, 5, 9]. The problematic nature of the current situation is intensified by the possibility of the educational process outright failure during distance physical culture classes, the uncertainty of the deadline for distance education, and high probability of lockdowns repeating and, as a result, predicted negative consequences of general health state deteriorating among students [5, 6].

Experts, who were one of the first to present the results of their own researches on this issue emphasize the necessity to pay attention to teaching physical education,

taking into account special approaches and creative searching how to implement opportunities for physical activity in distance education [7, 10].

Several specialists in physical culture and sports, analyzing the state of distance education, note the necessity for effective learning taking into account possible demand for mixed learning in the future [7, 9-11].

Issues of distance education considering the experience of teachers and students who have understood and can compare the features of physical education lessons in the usual and distance forms are relevant today, they require diverse study, active discussion of scientists, and methodological proposals of practitioners.

Purpose: investigate modern approaches to the online teaching process during physical training lessons at schools.

Material and Methods of the research

Research group: 95 students from different schools in Kyiv and Bila Tserkva provided their own subjective assessment of their distance education and made suggestions to improve the educational process.

Organization of the study: the current state of the educational process during physical education classes in secondary schools was analysed, it was done with the help of a questionnaire on the formed google-form "Questionnaire to check students' satisfaction with physical education lessons during distance education" (https://forms.gle/mT5h39yhB5iMijxo8), advantages and weaknesses of distance education during physical education lessons conducted in the conditions of quarantine restrictions were clarified. The 20 questions of the questionnaire contained four relevant blocks:

- regarding the student's personality (5 questions);
- regarding the teacher's personality (5 questions);
- regarding the education organization (5 questions);
- regarding the quality of teaching, learning, and perception (5 questions).

In addition to these blocks, an open question was proposed to identify possible ways to improve the teaching process according to the respondents' opinion who

became direct participants in the distance education process during the compulsory corrections in distance physical education lessons introduced by the pandemic.

Research methods: analysis of scientific and methodological literature and informative data of the Internet; questionnaire using google-forms; methods of mathematical statistics.

Results of the research

Due to the questionnaire the peculiarities of specialists work during distance learning were determined, methods and means which were used were analyzed, the attitude of the main participants in the educational process, and their experience gained in the COVID-19 coronavirus pandemic were summarized.

The first question of the questionnaire about a student's feeling as a "full participant in the education process at physical education lessons during distance education" revealed that only about 22% of the students actively cooperate with the teacher in the current situation. 27% tend to believe that they are more likely to be involved in the process, but students who say "definitely not, rather not and difficult to answer" make up the majority. If a student does not feel pleasure from work at physical education lessons, there are no bases to count on the decision of tasks for improving healthy, educational, and training orientation at a high level.

The second question of the questionnaire reveals the essence of motivation and responsibility of students to physical education lessons during distance education in comparison with classes in the gym. The answers allowed to clarify that about 15% of the students are fully responsible for conducting lessons remotely. 22% of the students believe that they still have the same responsibility and motivation for lessons remotely as during face-to-face classes. It is important that the majority responded with rejection, showing a low level of positive indicators.

The third question was "whether children feel the effect of the lessons" and the answers have a broad red line because about 45% of the students either felt exactly or consider that they felt the effects of physical education during distance education however the other 45 % on the contrary that such lessons do not make sense and only

about 10% could not decide. The answers to this question emphasize the possibility for the effect of the lessons only with full motivation and mutual responsibility.

The fourth question considers the conscious attitude of students to physical education lessons during distance education. The answers "absolutely yes, rather yes" showed about 46% of the respondents, which is primarily a small difference with a negative result and shows that in fact, only every 2nd of the surveyed students is conscious in learning during distance education. About 54% of the students answered in the negative, which reveals the ineffective nature of modern distance education.

The fifth question determined the peculiarities of students' needs in physical education lessons during the forced quarantine. It was found that only 40% of the respondents consider them necessary, and about 60% in various forms denied their importance, which indicates the formality and negative experience.

The sixth question about the "high level of the teacher’s responsibility during physical education lessons in the distance format" opened a block of questions "about the teacher's personality." It was found that about 41% of the students rated the teacher's work as "a high level of responsibility" and 59% of the students answered, "definitely not, rather not and difficult to answer." The majority noted the teacher's indifference to conducting physical education classes so accordingly classes in this format do not give any result which in its turn reduces students' responsibility for learning and their health.

The seventh question identifies the opinion of students about the reasonability of conducting physical education classes during distance education if the teacher does not have sufficient computer literacy skills. The answers "absolutely yes, rather yes" were given by about 45% of the respondents and this result is positive because students consider physical education lessons to be important in any format. However, the majority of students about 55%, assessed the situation negatively, demonstrated the requirement for teachers according to current trends in school development, the need for improvement in the field of computer technology, and the demand for teacher advanced training.

The content of the eighth question contained the students' sense of the full value of their mentor professional abilities manifestation. 58% of the respondents believe that the manifestations of their teacher's professional abilities are defective, having answered "definitely not, rather not and difficult to answer" on the other hand 42% of the students answered "rather yes, absolutely yes", which indicated the variety of professionalism manifestation. The results of the study of the opinions on this issue form the general essence for the problem of practical lesson orientation and the complexity of the full manifestation of professional abilities during quarantine restrictions.

The ninth question concerned the level of the teacher's methodological approach to teaching. 52% of the students believe that their teacher has worked at a high pedagogical level but 48% of the students reported low scores. In fact half of the respondents are completely satisfied with the pedagogical level of teaching, others did not feel a sufficient manifestation of the pedagogical component. The obtained results determined a strong weakness of teaching because every 2nd student is unsatisfied with the teacher's attitude to the organization and conducting of physical education classes during distance education.

In the tenth question devoted to "teacher's indifference to the organization of physical education lessons during distance education", almost 62% of respondents indicated a positive orientation of the teacher to the organization and conducting physical education lessons and about 38% gave an indefinite or negative assessment. This shows that students notice and analyze the teacher’s diligence to teach a practical lesson in difficult circumstances.

The eleventh question regarding "the correspondence of physical education lessons with the student's requests during distance education" opened a block of questions regarding the organization of education. The answers of the respondents (59%) indicate the current inferiority of distance education which is a negative factor in the process of effective study of physical culture subject. Only 23% of students are completely confident in satisfying their own requests and 18% believe it is "rather yes." The results of the eleventh question gave a negative assessment and highlighted

the ineffectiveness of the distance learning system at physical education lessons, because in comparison with the usual forms of organization and conducting of lessons they lose and do not contribute to the necessary harmonious development.

The twelfth question reveals "accessibility, comfort, efficiency, productivity, and rationality of lessons conducted by the teacher remotely." It is important to note that about 30% of the students had a clear position on the relevant requirements and have a positive response to the lessons taught by their teacher, while about 13% consider - "rather yes", however, the overwhelming majority of 57% of the respondents rated signs of lesson effectiveness negatively. It is worth emphasizing that the rational interaction between a teacher and a student is lost during online lessons, as a result, classes have low efficiency.

The content of the thirteenth question regarding the necessity to conduct a physical education lesson through online conferences, constant communication, creative and educational tasks confirmed the importance of teacher-student interaction. Only 37% of the respondents have a positive approval, which cross-confirms the content of the results for the 5th questionnaire question, 63% of students answered negatively.

In the fourteenth question about the "feeling of full presence during a physical education class, even when performing certain physical exercises during distance learning" only about 31% of the students gave a positive answer, about 69% of the respondents answered, "definitely not, rather not and difficult to answer." The practical subject in the format of distance learning, having a significant number of requirements and rules for the organization of the educational process, does not meet them today which negatively affects the authority of the physical culture and sports field.

The fifteenth question allowed to determine the ability to compete between distance education lessons and lessons held in the gym. Naturally, only about 22% of students responded positively (there is a reason to believe that these are the students who were lucky enough to work with highly qualified teachers who quickly orientated in the features of online technology), and another 78% of respondents were

in favour of the usual form for education. It is advisable to generalize the negative aspects: the interaction, motivation, fullness of the lesson are lost, the teacher's authority is levelled down because of the naked shortcomings of teaching and the lesson becomes a formality.

The sixteenth question about conducting physical education lessons according to a schedule during distance education opened a block of questions regarding the quality of learning, teaching, and perception. It is important that the majority - about 60% of the respondents gave positive answers. The obtained results give certain hope that most specialists in the field of physical culture have not lost interest in quality pedagogical activities and diligently tried to avoid certain shortcomings in conducting physical education lessons during distance education.

The seventeenth question analyzed the relevance of teaching, perception of tasks, and teaching physical exercises proposed by the teacher during distance education in comparison with the ordinary lessons in the gym. About 39% of positive and 61% of negative feedback are natural results of non-perception of a practical subject remotely by the main participants in the educational process, namely the students.

The eighteenth question made it possible to find out the possibilities of harmonious exchange of lessons in the gym with the teacher for online lessons during distance education. 79% of the students determined that a physical education lesson in the gym during face-to-face training is indispensable and even fully non-competitive in the current situation of quarantine restrictions. There is a reason to note that the field of physical culture and sports is unprepared for such situations, and full-time education at school has not been able to inspire students and encourage them to self-improvement.

The nineteenth question summarized the students' acquisition of the same knowledge, opportunities for physical development, psychological qualities, and satisfaction of their own needs from conducting physical education lessons remotely. The answers of 32% of the surveyed students were positive but 68% of the students gave a negative assessment. It is appropriate to describe the general state of the issue

as follows - distance education in a practical subject is incomplete and a physical education lesson can not meet the needs of students in the necessary physical and spiritual development.

The final twentieth question of the questionnaire concerning the level of satisfaction with teaching physical education lessons remotely allowed to justify the results obtained in general: 48% of the students are satisfied with teaching (really high level of professionalism of the teacher, or because of irresponsible attitude to their own health students like a formality, indifference, and unprofessionalism of the teacher); 52% of the respondents are unsatisfied with teaching (do not like the responsibility as well as quality and professional approach of the teacher to the subject, really low level of the initial process because of the indifferent attitude of the mentor).

The last question of the questionnaire (open one) was offered to the respondents to find out their vision of ways for improvement because their own experience allows them to compare and analyze problematic issues, join efforts in creating modern approaches to teaching a practical lesson in quarantine, which already have a long term application and in the long run should be improved for the efficiency of the educational process. Considering and summarizing the answers to the questions, it is obvious that distance education has caused a number of negative judgments and consequences due to the inflexibility and unwillingness of the system to adapt quickly to the difficult situation that has arisen in Ukraine and the world.

Conclusions / Discussion

The results of the study confirmed the relevance of these discussed issues, as specialists in the field of physical culture and sports noted the necessity to study approaches to conducting physical education classes due to the high probability of repeating the forced quality assurance of the educational process in the future quarantine restrictions [5, 9]. The study of scientific and methodological literature and informative sources of the Internet provided grounds to generalize the necessity for quality training of specialists in physical culture and sports to forms of distance

learning, taking into account the necessity for changes in the attitude of all participants to the quality of education, forms, methods and means [2, 4, 11].

There is no information in the available literature on determining the level of satisfaction with conducting physical education lessons for students in a remote format. According to the results of the questionnaire and the organized survey of 95 students of various secondary schools in Kyiv and Bila Tserkva, it was determined that physical education classes are mostly formal, ineffective, and should undergo drastic changes, today they can not be an alternative to practical training in the gym but only their deliberate addition to the system of mixed education. Assessment of students' satisfaction with physical education lessons in different schools provided reasonable grounds to understand what problems the organization of distance learning has, what changes in approaches are necessary for the education sector and namely physical education professionals, and what is appropriate to add in the organization of physical education lessons during distance education for successful, effective and productive compliance with the requirements and needs of the modern student.

The results of the study show that the level of students' satisfaction with physical education lessons in the conditions of quarantine restrictions caused by a pandemic depends directly on the interest, responsibility, professionalism of the mentor and active teacher-student feedback, which is confirmed by influential experts [2, 4, 5, 9-11]. The absence of these components levels down the harmonious development of the student [1] and provokes negative consequences [6]. The predominant interest of students in acquiring knowledge, skills, and abilities is found out which are provided by the physical education teacher.

Prospects for further research implicate further definition of approaches and methods of organizing and conducting classes during distance education in order to understand mistakes and synthesize the benefits for the effective study of the subject of physical culture during the quarantine restrictions for the educational process.

Conflict of interest. The authors state that there is no conflict of interest that may be perceived as prejudicial to the impartiality of a state, public or commercial organization.

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MODEL CHARACTERISTICS OF LEADING FOOTBALL PLAYERS OF DIFFERENT POSITIONS

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Purpose: to establish the model characteristics of sports opportunities and competitive activities of highly qualified football players of different positions.

Material and methods: registration of technical and tactical actions was carried out on the example of games of participating teams in the 2019/2020 UEFA Champions League. A total of 203 games of the teams «Atalanta» (Bergamo, Italy), «Atletico» (Madrid, Spain), «Bayern» (Munich, Germany), «Barcelona» (Barcelona, Spain), «Leipzig» (Leipzig, Germany), «Liverpool» (Liverpool, England), «Manchester City» (Manchester, England), «Olympique» (Lyon, France), «Paris Saint-Germain» (Paris, France) were registered and analyzed. The following research methods were used to solve the tasks: analysis of scientific and methodological literature, registration of technical and tactical actions, methods of mathematical statistics.

Results: the article presents data characterizing the morphological features and features of the defensive and attacking TTA of the best players of different game specializations based on the results of the 2019/2020 UEFA Champions League games. Models of the best goalkeepers (Neuer M., Oblak J., Lopez A.), defenders (Davis A., Kimmich J., Alaba D., Upamekano D., Angelino, Van Dijk W.),

midfielders (Thiago A., Goretzka L., Muller T., De Bruyne K., Auar W., Zabitzer M., Marquinhos, Gomez A.) and forwards (Gnabry S., Lewandowski R., Mbappe K., Neymar, Messi L., Sterling R.) were developed.

Conclusions: the data of the study show differences in morphological parameters and the structure of the competitive activities of the best goalkeepers, defenders, midfielders and forwards in the games of the 2019/2020 UEFA Champions League.

Keywords: football players, model characteristics, age, height, weight, technical and tactical actions.

Introduction

Currently, the management of athletes' training is based on the use of different models [5, 19]. An analysis of the available literature suggests the existence of several definitions of the term «model». Thus, V.Platonov [17] defines the term «model» as a sample, standard or standard; in a broader sense – any sample of an object, process or phenomenon.

Thus V.Shamardin [19] characterizes the «model» as a mentally presented or materially realized system that reproduces the object of study and is able to replace it so that its study provides new information about this object.

In turn, V.Kostyukevich [4, 5] considers the model as a certain structure consisting of different indicators and reflects the result of sports or other human activities.

Models used in the practice of training and competitive activities are divided into three levels [17]:

- generalized model, which reflects the characteristics of the object or process, identified on the basis of a study of a large group of athletes of a certain sex, age and qualifications. Models of this level are global in nature and reflect the most general patterns of training and competitive activities in a particular sport;

- group models, which are based on the study of a specific set of athletes (or teams), which differ in specific features within a particular sport;

- individual models that are developed for individual athletes and are based on data from long-term research and individual forecasting of the structure of competitive activity and training of an individual athlete.

It is known that the management of the process of sports training requires as a necessary element the presence of model characteristics – normative indicators characteristic of a certain level of training and sports results [19, 22, 24].

Model characteristics are considered:

- as ideal characteristics of the athlete's condition, in which he can show record results;

- as indicators (tests), increasing the results of which leads to an increase in competitive achievements;

- as separate indicators that are part of the model.

To assess a particular model, many experts use both model characteristics [1, 6] and model indicators [4, 5]. It is noted [4, 5, 9, 10, 17] that the model indicators of football players allow to effectively manage their training.

Thus model indicators of football players are subdivided into:

1. Model indicators of sports opportunities. They include indicators that reflect the morphofunctional characteristics of the organism. Morphofunctional features of football players are assessed by indicators of age [11], overall body size [2, 3, 7, 13, 18, 25] and functional fitness [4, 12, 20, 27, 29, 30].

2. Model indicators of sportsmanship. They are based on the level of special physical, technical and tactical training of football players. In the practice of football to assess the level of fitness of athletes, the greatest attention is paid to the criteria of special physical fitness [6, 19, 26].

3. Model indicators of competitive activity. They, according to many experts, most fully characterize the level of training and skill of football players. Control of competitive activity of football players is carried out in two directions: control of motor activity [16, 21, 23, 28] and control of TTA [6, 8, 14, 15, 19].

Purpose of the study is to establish the model characteristics of sports opportunities and competitive activities of highly qualified football players of different positions.

Material and Methods of the research

Registration of technical and tactical actions was carried out on the example of games of participating teams in the 2019/2020 UEFA Champions League. A total of 203 games of the teams «Atalanta» (Bergamo, Italy), «Atletico» (Madrid, Spain), «Bayern» (Munich, Germany), «Barcelona» (Barcelona, Spain), «Leipzig» (Leipzig, Germany), «Liverpool» (Liverpool, England), «Manchester City» (Manchester, England), «Olympique» (Lyon, France), «Paris Saint-Germain» (Paris, France) were registered and analyzed. So the following TTAs were registered at goalkeepers: saves, claims, punches, shot passes and long passes. The field players registered such TTA: aerial duels, tackles attempted, interceptions, clearances, blocks, shots, dribbles, shot passes and long passes, crosses, through ball, key passes.

The following research methods were used to solve the tasks: analysis of scientific and methodological literature, registration of technical and tactical actions, methods of mathematical statistics.

Results of the research

Table 1 presents general data on the best players of 2019-2020.

The table shows that of the 23 players — 5 Germans, 3 French, 2 Austrians, 2 Spaniards, 2 Brazilians and 2 Argentines, 1 Slovenian, 1 Portuguese, 1 Canadian, 1 Dutch, 1 Belgian, 1 Pole and 1 Englishman.

«Bayern Munich» (9 players) has the largest representation in the symbolic team. «RB Leipzig» and «PSG» have 3 representatives each in the list of the best players of the Champions League of the 2019/2020 season. 2 representatives in this list have «Olympic» Lyon and «Manchester City». 1 player each – «Atletico», «Liverpool», «Atalanta» and «Barcelona».

The results of the table show that the age of the best players of the 2019/2020 season varied from 19 (Davis A.) to 33 years (Neuer M.).

Table 1

General information about the best players of the UEFA Champions League for the 2019/2020 season

Football player	Nationality	Club	Age	Month of birth	Height	Weight	Leading leg
Goalkeepers							
Neuer M.	Germany	«Bayern»	33	March	193	92	Right
Oblak J.	Slovenia	«Atletico»	26	January	188	87	Right
Lopez A.	Portugal	«Olympic»	29	October	184	81	Left
Defenders							
Davis A.	Canada	«Bayern»	19	November	183	75	Left
Kimmich J.	Germany	«Bayern»	24	February	177	70	Right
Alaba D.	Austria	«Bayern»	27	June	180	76	Left
Upamekano D.	France	«Leipzig»	21	October	186	79	Right
Angelino	Spain	«Leipzig»	22	January	171	69	Left
Van Dijk W.	Netherlands	«Liverpool»	28	July	193	90	Right
Midfielders							
Thiago A.	Spain	«Bayern»	28	April	174	65	Right
Goretzka L.	Germany	«Bayern»	24	February	189	79	Right
Muller T.	Germany	«Bayern»	30	September	185	75	Right
De Bruyne K.	Belgium	«MC»	28	June	181	76	Right
Auar W.	France	«Olympic»	21	June	175	70	Right
Zabitzer M.	Austria	«Leipzig»	25	March	177	70	Right
Marquinhos	Brazil	«PSG»	25	May	183	75	Right
Gomez A.	Argentina	«Atalanta»	31	February	167	68	Right
Forwards							
Gnabry S.	Germany	«Bayern»	24	July	176	72	Right
Lewandowski R.	Poland	«Bayern»	31	August	185	81	Right
Mbappe K.	France	«PSG»	21	December	178	73	Right
Neymar	Brazil	«PSG»	27	February	175	68	Right
Messi L	Argentina	«Barcelona»	32	June	170	67	Left
Sterling R.	England	«MC»	25	December	170	70	Right

Analysis of anthropometric indicators of this group of football players shows that the body length of the players varied from 167 (Gomez A.) to 193 cm (Neuer M.). Indicators of body weight of football players ranged from 65 (Thiago A.) to 92 kg (Neuer M.).

Table 2 shows the average morphological indicators of the best players of the Champions League season 2019/2020 of different game roles.

Table 2

Average age and anthropometric indicators of the best players of the UEFA Champions League of the 2019/2020 season of different game roles

Indicators	Goalkeepers (n=3)	Defenders (n=6)	Midfielders (n=8)	Attackers (n=6)	Total (n=23)
Middle age	29,3±2,0	23,5±1,4	26,5±1,2	26,7±1,7	26,1±0,8
Body length, cm	188,3±2,6	181,7±3,1	178,9±2,5	175,7±2,3	180,0±1,5
Body weight, kg	86,7±3,2	76,5±3,1	72,3±1,7	71,8±2,1	75,1±1,5

The obtained results are partially confirmed by previous studies [5, 7, 18], which show a tendency to reduce the age, length and body weight of players along the conditional line of players from their goal to the opponent's goal.

Thus, the average age of the best goalkeepers of the 2019/2020 season was 29,3±2,0 years, defenders – 23,5±1,4 years, midfielders – 26,5±1,2 years, strikers – 26,7±1,7 years.

Also in this group of goalkeepers were higher average body length (188,3±2,6 cm), relative to defenders (183,7±3,1 cm), midfielders (178,9±2,5 cm) and attackers (175,7±2,3 cm).

A similar situation is observed in terms of body weight. Thus, the average body weight of goalkeepers was 86,7±3,2 kg, defenders – 76,5±3,1 kg, midfielders – 72,3±1,7 kg, forwards – 71,8±2,1 kg.

Table 3 presents the average competitive performance of the best goalkeepers of the Champions League season 2019/2020.

Table 3

Competitive performance indicators of the best goalkeepers of the UEFA Champions League for the 2019/2020 season

Indicators	Football player		
	1	2	3
Touches, quantity	47,7	30,3	37,8
Saves, quantity	2,5	2,6	2,5
Claims, quantity	0,2	0,2	1,0
Punches, quantity	0,2	0,4	0,3
Shot passes, quantity	38,8	22,7	27,5
Efficiency of short passes, %	86,9	53,5	68,1
Long passes, quantity	11,2	18,2	15,2
Efficiency of long passes, %	56,9	41,2	44,7

Remark: 1 — Neuer M., 2 — Oblak J., 3 — Lopez A.

As a result of the study, it was found that the best goalkeepers in the games of this tournament on the field spent from 93 to 124 minutes. During the game, they performed from 15 to 69 touches to the ball.

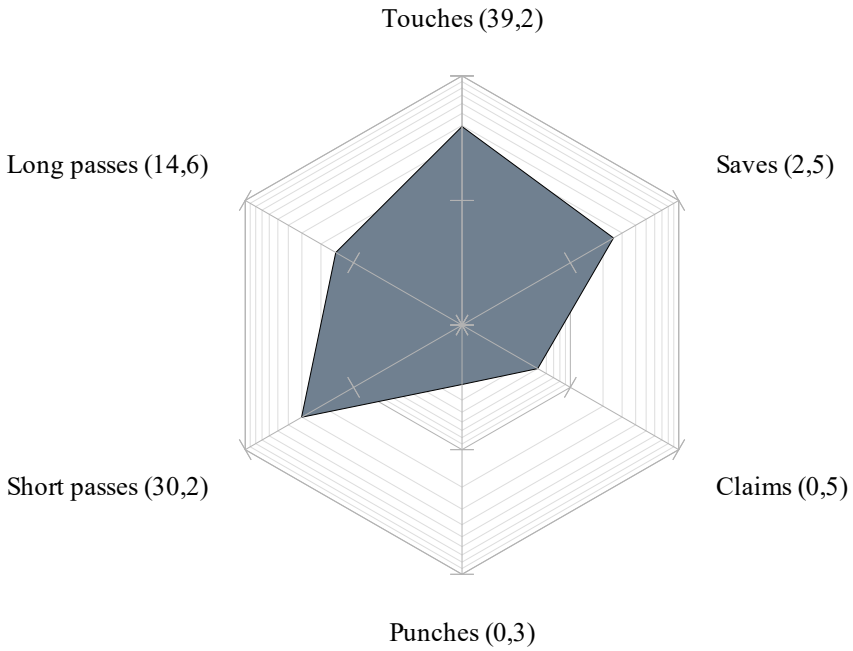

Figure 1. Model of competitive activity of the best goalkeepers of the teams participating in the UEFA Champions League of the 2019/2020 season (in parentheses – quantity)

Analysis of the TTD of the best goalkeepers shows that they played in the Champions League games of the 2019/2020 season:

- from 0 to 9 saves (2,5±0,4 actions);
- from 0 to 3 claims (0,5±0,2 actions);
- from 0 to 2 punches (0,3±0,1 actions);
- from 10 to 62 short passes (30,2±2,2 actions);
- from 3 to 46 long passes (14,6±1,6 actions).

Table 4 shows the average competitive performance of the best defenders of the Champions League season 2019/2020.

It is established that the best defenders in the games of the Champions League on the field spent from 22 to 124 minutes. The analysis of indicators of competitive activity of football players of the given game role shows that on the average for game they carried out:

touches, aerial duels, tackles attempted, interceptions, clearances, blocks, shots, dribbles, shot passes and long passes, crosses, through ball, key passes.

- from 31 to 144 touches (91,2±2,2 actions);
- from 0 to 7 aerial duels (1,6±0,2 actions);
- from 0 to 7 tackles attempted (1,6±0,2 actions);
- from 0 to 4 interceptions (1,1±0,2 actions);
- from 0 to 8 clearances (2,0±0,3 actions);
- from 0 to 2 blocks (0,2±0,1 actions);
- from 0 to 4 shots (0,8±0,1 actions);
- from 0 to 8 dribbles (1,2±0,3 actions);
- from 25 to 126 shot passes (68,9±3,7 actions);
- from 0 to 23 long passes (7,0±0,8 actions);
- from 0 to 15 crosses (2,6±0,5 actions);
- from 0 to 1 through ball (0,1±0,1 actions);
- from 0 to 7 key passes (1,1±0,2 actions).

Table 4

Indicators of competitive activity of the best defenders of the UEFA Champions League of the 2019/2020 season

Indicators	Football player					
	1	2	3	4	5	6
Touches, quantity	83,9	89,5	80,6	81,6	73,8	105,8
Aerial duels, quantity	1,3	0,6	0,9	2,3	0,8	4,1
Tackles attempted, quantity	2,3	1,4	0,9	3,1	1,0	1,1
Interceptions, quantity	1,3	0,9	0,8	1,5	1,2	1,1
Clearances, quantity	0,9	0,7	2,0	3,4	1,4	4,0
Blocks, quantity	0,0	0,2	0,3	0,5	0,0	0,1
Shots, quantity	1,0	0,5	0,6	1,0	0,8	1,1
Shots on target, quantity	0,0	0,4	0,1	0,4	0,4	0,1
Dribbles, quantity	3,3	0,6	0,3	1,9	1,0	0,1
Shot passes, quantity	56,5	67,7	73,3	66,4	51,0	92,0
Efficiency of short passes, %	88,7	88,0	89,7	86,7	80,8	88,7
Long passes, quantity	2,5	6,6	6,0	7,6	3,8	14,6
Efficiency of long passes, %	68,6	69,7	47,7	59,4	22,0	64,1
Crosses, quantity	2,3	6,7	0,5	0,1	5,2	0,0
Efficiency of crosses, %	15,4	19,4	83,4	0,0	21,9	-
Through ball, quantity	0,1	0,3	0,0	0,0	0,0	0,0
Efficiency of through ball, %	100,0	33,3	-	-	-	-
Key passes, quantity	1,1	2,5	0,5	0,1	1,2	0,5

Remark: 1 – Davis A., 2 – Kimmich J., 3 – Alaba D., 4 – Upamekano D., 5 – Angelino, 6 – Van Dijk W.

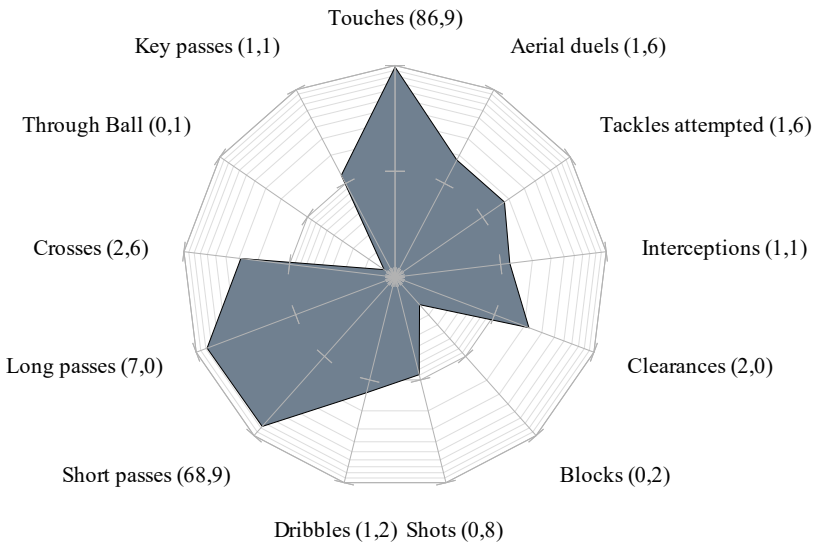

Figure 2 Model of competitive activity of the best defenders of the participating teams of the UEFA Champions League of the 2019/2020 season (in parentheses – quantity)

Table 5 shows the average competitive performance of the best midfielders of the Champions League season 2019/2020.

Table 5

Competitiveness indicators of the best midfielders of the UEFA Champions League season 2019/2020

Indicators	Football player							
	1	2	3	4	5	6	7	8
Touches, quantity	96,2	46,9	43,2	64,9	63,5	78,4	77,8	59,0
Aerial duels, quantity	1,3	0,9	1,0	0,7	0,5	0,7	3,0	0,0
Tackles attempted, quantity	3,4	1,9	1,5	1,1	1,8	0,7	2,0	0,7
Interceptions, quantity	2,3	1,3	0,5	0,9	0,6	1,0	1,5	0,7
Clearances, quantity	0,4	0,4	0,5	0,7	0,1	0,6	2,5	0,2
Blocks, quantity	0,0	0,3	0,0	0,0	0,3	0,1	1,1	0,1
Shots, quantity	0,7	2,4	2,0	2,3	1,1	2,4	0,6	1,8
Shots on target, quantity	0,1	0,4	0,9	0,9	0,6	1,0	0,3	0,8
Dribbles, quantity	1,3	0,4	0,5	2,0	4,4	0,6	0,1	1,8
Shot passes, quantity	83,2	35,4	30,2	41,9	37,6	58,7	65,1	38,2
Efficiency of short passes, %	91,0	87,8	79,3	76,3	78,7	82,8	85,3	84,9
Long passes, quantity	11,0	3,1	1,4	3,1	2,5	4,6	5,2	2,4
Efficiency of long passes, %	78,1	81,0	64,3	53,8	46,9	52,6	42,0	48,8
Crosses, quantity	0,0	0,3	2,2	8,7	1,3	4,9	0,1	5,4
Efficiency of crosses, %	-	50,0	22,3	26,2	25,0	30,6	100,0	24,0
Through ball, quantity	0,4	0,3	0,3	1,1	0,3	0,0	0,2	0,7
Efficiency of through ball, %	75,0	50,0	25,0	40,0	0,0	-	50,0	33,3
Key passes, quantity	1,5	0,3	2,5	3,9	1,4	1,2	0,2	2,0

Remark: 1 – Thiago A., 2 – Goretzka L., 3 – Muller T., 4 – De Bruyne K., 5 – Auar W., 6 – Zabitzer M., 7 – Marquinhos, 8 – Gomez A.

Analysis of the competitive performance of midfielders shows that the best representatives of this role in the UEFA Champions League games of the 2019/2020 season on the field spent from 4 to 101 minutes, with an average value of 85,2±2,6 minutes.

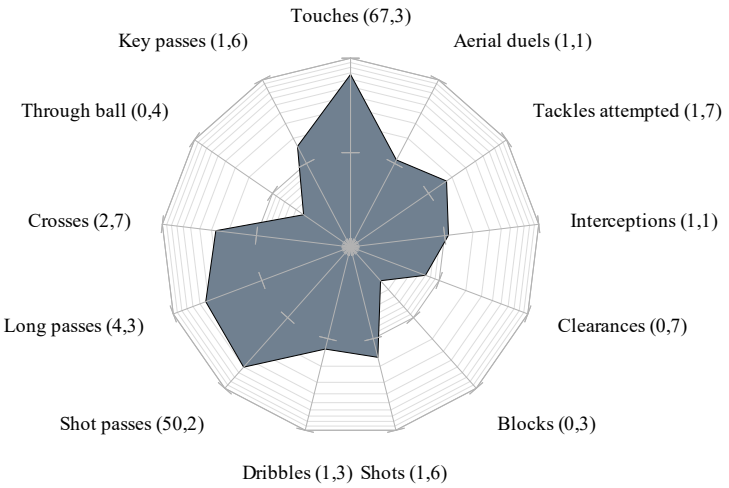

Figure 3 Competitive activity model of the best midfielders of the UEFA Champions League teams of the 2019/2020 season (in parentheses — quantity)

It is established that eight midfielders in the games of this tournament performed:

aerial duels, tackles attempted, interceptions, clearances, blocks, shots, dribbles, shot passes and long passes, crosses, through ball, key passes.

- from 3 to 132 touches (67,3±3,0 TTA);
- from 0 to 10 aerial duels (1,1±0,2 TTA);
- from 0 to 8 tackles attempted (1,7±0,2 TTA);
- from 0 to 5 interceptions (1,1±0,2 TTA);
- from 0 to 4 clearances (0,7±0,1 TTA);
- from 0 to 2 blocks (0,3±0,1 TTA);
- from 0 to 6 shots (1,6±0,2 TTA);
- from 0 to 8 dribbles (1,3±0,2 TTA);
- from 2 to 117 shot passes (50,2±2,8 TTA);
- from 0 to 15 long passes (4,3±0,5 TTA);

- from 0 to 17 crosses (2,7±0,5 TTA);

- from 0 to 3 through ball (0,4±0,1 TTA);

- from 0 to 9 key passes (1,6±0,2 TTA).

Table 6 presents the average competitive performance of the best strikers in the UEFA Champions League season 2019/2020.

Table 6

Indicators of competitive activity of the best forwards of the UEFA Champions League of the 2019/2020 season

Indicators	Football player					
	1	2	3	4	5	6
Touches, quantity	53,5	42,6	39,4	82,0	76,1	41,4
Aerial duels, quantity	0,5	2,8	0,3	0,3	0,4	0,2
Tackles attempted, quantity	2,1	1,0	0,4	1,0	0,1	0,7
Interceptions, quantity	0,5	0,2	0,1	0,3	0,3	0,7
Clearances, quantity	0,2	0,8	0,0	0,0	0,0	0,2
Blocks, quantity	0,0	0,0	0,0	0,0	0,0	0,1
Shots, quantity	2,7	5,2	3,0	3,4	4,0	2,7
Shots on target, quantity	1,6	3,3	1,8	1,0	1,9	1,4
Dribbles, quantity	1,2	1,2	1,5	6,1	7,7	2,0
Shot passes, quantity	36,3	24,8	24,4	46,6	49,1	23,9
Efficiency of short passes, %	84,4	77,5	84,8	73,6	81,5	77,6
Long passes, quantity	1,1	0,6	0,8	3,0	2,4	0,3
Efficiency of long passes, %	61,1	90,0	66,7	20,5	63,9	25,0
Crosses, quantity	2,5	0,6	1,3	3,4	2,0	0,9
Efficiency of crosses, %	14,6	30,0	8,3	14,3	20,0	16,7
Through ball, quantity	0,2	0,2	0,3	2,1	1,6	0,3
Efficiency of through ball, %	100,0	50,0	100,0	20,0	18,7	33,3
Key passes, quantity	1,2	2,1	1,3	2,3	2,3	1,8

Remark: 1 – Gnabry S., 2 – Lewandowski R., 3 – Mbappe K., 4 – Neymar, 5 – Messi L., 6 – Sterling R.

As a result of the study, it was found that the best forwards in the games of this tournament on the field spent from 20 to 101 minutes, with an average value of 81,0±3,3. Analysis of quantitative indicators of competitive activity shows that the players of the offensive line in the games of the Champions League season 2019/2020 carried out:

- from 7 to 113 touches (53,6±3,3 TTA);

- from 0 to 4 aerial duels (0,8±0,2 TTA);

- from 0 to 6 tackles attempted (0,9±0,2 TTA);

- from 0 to 2 interceptions (0,3±0,1 TTA);
- from 0 to 2 clearances (0,2±0,1 TTA);
- from 0 to 1 blocks (0,1±0,1 TTA);
- from 0 to 10 shots (3,5±0,3 TTA);
- from 0 to 15 dribbles (2,9±0,4 TTA);
- from 2 to 70 shot passes (32,8±2,2 TTA);
- from 0 to 7 long passes (1,4±0,2 TTA);
- from 0 to 7 crosses (1,8±0,2 TTA);
- from 0 to 5 through ball (0,7±0,2 TTA);
- from 0 to 6 key passes (1,8±0,2 TTA).

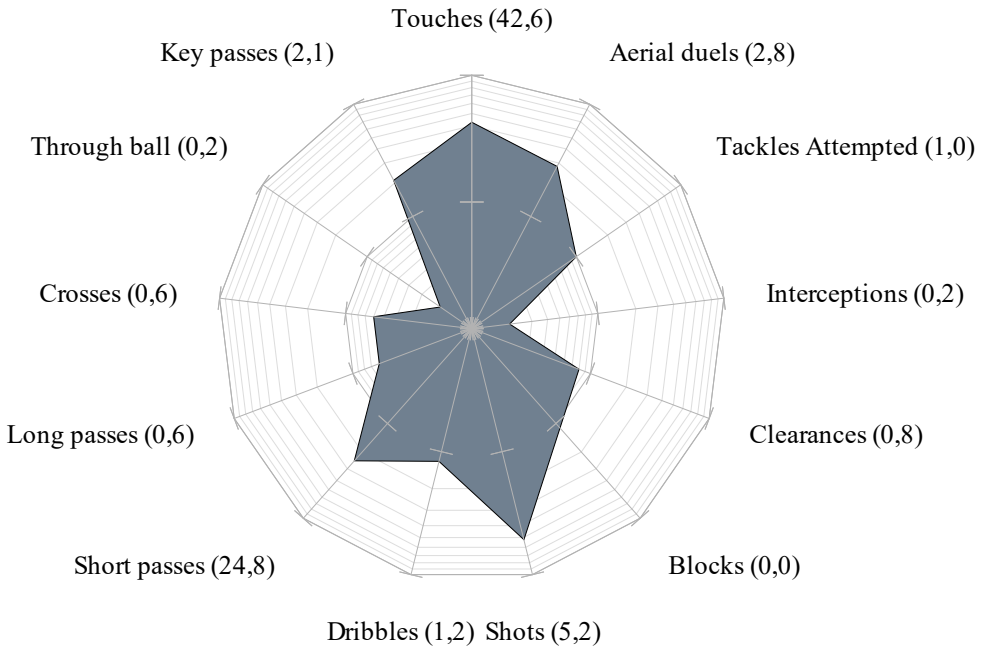

Figure 4 Model of competitive activity of the best forwards of the participating teams of the UEFA Champions League of the 2019/2020 season (in parentheses – quantity)

Table 7 shows the average performance of the best players of the UEFA Champions League season 2019/2020 of different game specializations.

As a result of a comparative analysis of the quantitative indicators of the TTA of the best players of the UEFA Champions League of the 2019/2020 season of

different roles, it was found that defenders significantly outperform midfielders in terms of touches (t=4,11; p<0,001), clearances (t=4,11; p<0,001), short passes (t=4,03; p<0,001) and long passes (t=2,86; p<0,01). In turn, midfielders on average during the game performed significantly more shots on goal (t=3,58; p<0,001) and through ball (t=2,12; p<0,05).

Table 7

Competitive performance indicators of the best players of the UEFA Champions League season 2019/2020 of different roles

Indicators	Defenders	Midfielders	Forwards
Touches, quantity	86,9±3,7	67,3±3,0	53,6±3,3
Aerial duels, quantity	1,6±0,2	1,1±0,2	0,8±0,2
Tackles attempted, quantity	1,6±0,2	1,7±0,2	0,9±0,2
Interceptions, quantity	1,1±0,2	1,1±0,2	0,3±0,1
Clearances, quantity	2,0±0,3	0,7±0,1	0,2±0,1
Blocks, quantity	0,2±0,1	0,3±0,1	0,1±0,1
Shots, quantity	0,8±0,1	1,6±0,2	3,5±0,3
Shots on target, quantity	0,2±0,1	0,6±0,1	1,9±0,2
Dribbles, quantity	1,2±0,3	1,3±0,2	2,9±0,4
Shot passes, quantity	68,9±3,7	50,2±2,8	32,8±2,2
Efficiency of short passes, %	87,5±0,7	83,5±1,0	80,3±1,3
Long passes, quantity	7,0±0,8	4,3±0,5	1,4±0,2
Efficiency of long passes, %	57,8±4,2	58,0±4,0	57,3±6,7
Crosses, quantity	2,6±0,5	2,7±0,5	1,8±0,2
Efficiency of crosses, %	22,7±4,9	28,6±5,4	16,3±4,4
Through ball, quantity	0,1±0,1	0,4±0,1	0,7±0,2
Efficiency of through ball, %	50,0±28,9	42,1±10,5	40,6±9,8
Key passes, quantity	1,1±0,2	1,6±0,2	1,8±0,2

We found even more significant differences in the TTA indicators of the best defenders and forwards of the UEFA Champions League for the 2019/2020 season. Thus, defenders on average per game made significantly more touches to the ball (t=6,72; p<0,001), aerial duels (t=2,83; p<0,01), tackles attempted (t=2,47; p<0,05), interceptions (t=3,58; p<0,001), clearances (t=5,69; p<0,001), short (t=8,39; p<0,001) and long (t=6,79; p<0,001) passes. On the other hand, the players of the attacking line significantly outperformed the defenders in terms of shots on goal (t=8,54; p<0,001), dribbles (t=3,40; p<0,001), through ball (t=2,68; p<0,01) and key passes (t=2,47; p<0,05).

Comparing the quantitative indicators of TTA of the best midfielders and forwards in the UEFA Champions League games, it was found that midfielders on average during the game performed significantly more touches to the ball ($t=3,07$; $p<0,01$), tackles attempted ($t=2,83$; $p<0,01$), interceptions ($t=3,58$; $p<0,001$), clearances ($t=3,54$; $p<0,001$), short ($t=4,89$; $p<0,001$) and long ($t=5,39$; $p<0,001$) passes. At the same time, the forwards surpassed the midfielders in terms of shots on goal ($t=5,27$; $p<0,001$) and dribbles ($t=3,58$; $p<0,001$).

Conclusions / Discussion

The data of the study show differences in morphological indicators and the structure of the competitive activity of the best players of different roles in the UEFA Champions League games of the 2019/2020 season.

The data (Kostyukevich V. 2006) concerning model indicators of sports opportunities of highly skilled football players of various game role are confirmed. Data were supplemented and expanded (Golomazov S., Chirva B., 2003, Martirosov E., Baluchi R., 2006, Shalenko V., Pertsukhov A., 2016, Perevoznik V., Pertsukhov A., 2018) on age and anthropometric indicators of highly qualified football players. The obtained data allow us to state that the peak of sportsmanship in football is in the age range from 25 to 29 years. There is a tendency to reduce the age, length and body weight of players along the conditional line of location of players from their goal to the opponent's goal. As a result of the study, it was found that the best players of the UEFA Champions League of different roles have a characteristic overall body size and a number of their differences.

The results of the study confirmed the information on quantitative and qualitative indicators of TTA field players of different qualifications. Data on the peculiarities of TTA performance by goalkeepers of different levels have been supplemented and expanded. Thus, this study notes the impact of game specialization of football players on the structure of competitive activities of individual football players and the team as a whole. For the first time, models of competitive activity of the best players of different roles in the UEFA Champions League games of the 2019/2020 season have been developed.

The main provisions and conclusions of this study can be taken into account in the formation of club and national teams of different levels and in the construction of technical and tactical exercises for players of different game specializations.

Prospects for further research. Further research will be devoted to establishing the peculiarities of the performance of team TTA by highly qualified players.

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FEATURES OF PHYSICAL DEVELOPMENT OF ATHLETES AS THE BASIS FOR DIFFERENTIATION OF LOADS IN THE TRAINING PROCESS OF YOUNG KICKBOXERS

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Purpose: to determine the indicators of physical development of athletes of the group of initial training in kickboxing.

Material and methods: the research was carried out on the basis of the Children's and Youth Sports School "KIPT", Kharkov. 28 kickboxers of 10-11 years old group of initial training of the first year of study were involved in the experiment. The following research methods were used in the work: theoretical analysis and generalization of scientific literature, anthropometric measurements, methods of mathematical statistics.

Results: visual and anthropometric examinations of the athletes' bodies were carried out according to the following indicators: body length and weight, chest circumference. Also, complex testing of athletes' motor qualities was carried out using control exercises provided for by state tests and standards for assessing the physical fitness of the population of Ukraine.

Conclusions: in the course of the study, anthropometric examinations of 10-11 years old youths who are engaged in kickboxing were carried out, which made it possible to establish the features of the body structure of athletes body mass and chest height indices were calculated, as well as the Pignet index to determine the somatic type of athletes. As a result of the study, it was revealed that according to the Quetelet index, the overwhelming number of students had a level of physical development of average and higher; according to the index of proportionality of the development of the chest - a narrow chest. According to the revealed value of the Pignet index, it was established that the majority of kickboxers belong to the asthenic type of constitution. The importance of using a differentiated approach in organizing the training process of athletes, taking into account their somatotype, was revealed. Athletes 10-11 years old of different somatotypes (asthenic, normosthenic and hypersthenic) have significant differences in terms of the development of physical qualities. These are the results of the study experimentally confirmed the need to search for new approaches to the system of physical training of athletes taking into account their individual characteristics.

Keywords: physical development, physical fitness, somatotype, differentiated approach, kickboxers, initial stage of training.

Introduction

Finding ways to individualize and differentiate physical training of athletes in different kinds of sport is the subject of research for many scientists. According to scholars, when applying a differentiated approach, the coach should take into account not only gender and age, but also the individual potential of athletes [12; 15]. This approach allows each sportsman to cope with physical load optimally and provides the best training effects [1; 6]. Regardless the fact that numerous data concerning means and methods of introducing differentiated approach have been registered, its practical implementation requires search for optimum differentiation criteria depending on the kind of sport (or physical activity) and the stage of long-term training. Traditionally, gender-age differentiation criterion is used. The latest

research has been instrumental in identifying other reasons for load differentiation, including physical condition, biological age, level of physical development, somatotype, level of physical fitness. Furthermore, additional criteria are nervous system characteristics, temperament type, cognitive features [5; 13].

One of the informative criterion of differentiation in training practice is sportsman's body type. This criterion has dissimilar informative value at different conditioning stages and is based on taking into account the natural diversity of morphofunctional parameters of an individual. The rationale of this statement is the discovery of the fact that representatives of different somatotypes are notable not only in terms of physical development but also in a number of nurophysical status characteristics including motor abilities. Therefore, it is necessary to know peculiarities of sportsmen's physical development and fitness as well as their body type features for reasonable planning of the loads during training sessions [2; 4; 14].

In the training of combat athletes, the identification of somatotype is of particular importance not only in terms of load differentiation criterion, but also as an important factor of biomechanical component of the technical activities implementation. That is why the definition and analysis of this criterion is worth carrying out at all stages of long-term training including initial training stage.

The work is accomplished according to initiating research project "Theoretical and methodological principles of differentiated approach during physical education classes and sports activities using information technologies" (state registration number 0120U105014) for 2020 – 2023.

Purpose of the study – to identify physical development indices of kickboxers in the initial training group.

Material and Methods of the research

The research has been carried out at the premises of "KhFTI" Children's and Youth Sports School. The study involved 28 kickboxers (boys) aged 10-11, first year students in the initial training group.

The following research methods have been used in the work: theoretical analysis and generalization of scientific literature, anthropometric measuring,

mathematical statistics methods.

Results of the research

The research included visual assessment and anthropometric measurements of body parameters in terms of the following indices: height and body mass, chest circumference. The examination has been done to identify the level of athletes' physical development and to establish compliance of the data of their basic anthropometric indices with the standards of physical development of children in the appropriate age group (table 1).

Table 1.

Compliance of anthropometric indices of kickboxers in the initial training group with age standards of physical development (10 years old, n=16, 11 years old, n=12)

Anthropometric indices		Athletes $\overline{X} \pm m$	Standard $\overline{X} \pm m$	t (p>0,05)
Height (cm)	10 y.o.	144,3±1,0	142,0±1,7	1,17
	11 y.o.	145,0±1,2	146,0±1,5	0,52
Body mass (kg)	10 y.o.	33,2±2,1	32,9±4,0	0,07
	11 y.o.	36,1±4,1	35,0±4,1	0,19
Chest circumference at rest (cm)	10 y.o.	69,4±1,7	68,4±3,6	0,25
	11 y.o.	70,4±3,4	69,3±3,9	0,21

The results of anthropometric examination indicate that the average group indices of athletes' physical development do not have significant differences with standard age norms [3; 10]. It allows us to consider physical development in this group of athletes as compliant with norms, and to plan training loads according to age standards.

More significant examination provided for anthropometric indices calculation – body mass and height (Kettle) and chest and height. Physical development of the athletes in this group has been determined based on the calculation (fig. 1).

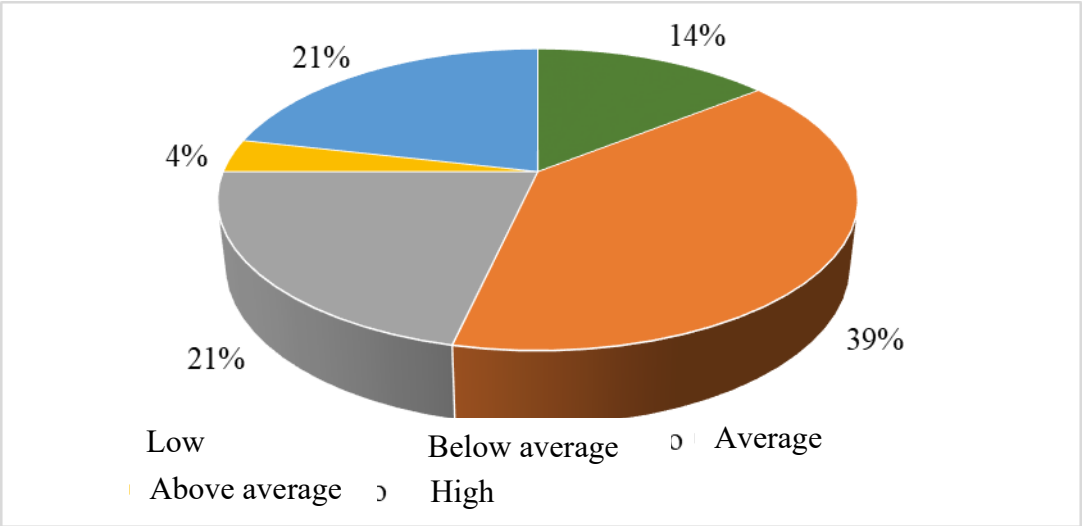

Figure 1. Percentage of boys aged 10-11 with different levels of physical development according to Kettle index

According to the Kettle index, 46% of patients presented with average and higher level of physical development of the athletes in this group. These results indicate satisfactory level of physical development of the examined kickboxers in the initial training group.

Calculation of chest-height index allowed to diagnose the chest development proportionality of the athletes and to determine whether the chest is narrow or broad, or the one that falls within the physiological norm (fig. 2). The examination has shown that the majority of athletes (79%) has narrow chest. These data indicate a lack of chest development proportionality of 10-11 years old boys, that can be attributed to age peculiarities of the child's body, specifically to heterochrony of longitudinal and lateral body size development. In this group of athletes, it may be appropriate to include well-aimed shoulder and chest exercises, both conditioning and related to the specifics of motor activity in kickboxing (back fist and body blocks).

One of the key characteristics in the individual-typological assessment of body development is the concept of body type or somatotype. In the modern sense, body type is a biological feature of the body, a set of morphological and functional characteristics, inherited and acquired, determining aspects of reactivity and body resistance to adverse factors of environment and internal medium. Morphological

presentation of person's body type is a somatotype reflecting the level and harmony of physical development. In the meantime, it is a criterion of human's health condition and physical activity.

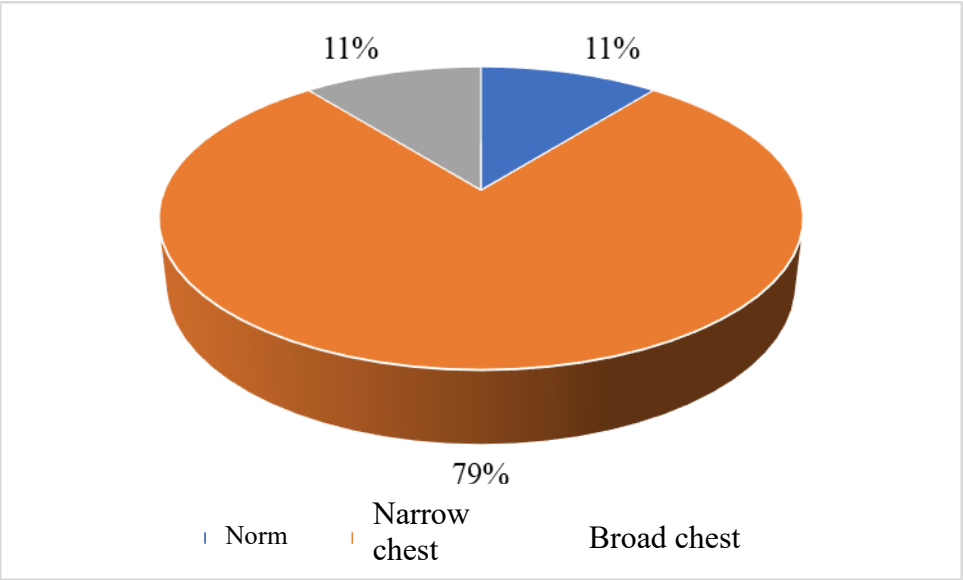

Figure 2. Percentage of boys aged 10-11 with different levels of proportionality of chest development according to chest development proportionality index

Classifications of V. V. Bunak. I. B. Halant, V. H. Shtefko and A. D. Ostrovskyi, Siho, Chaillu and McAuliffe are based on the visual assessment of the researchable object and comparing this assessment with descriptive characteristics of a particular body type. Methods including the assessment of somatotypes based on the calculations in terms of dimensional characteristics involve the research works of B. A. Nikitiuk, S. Sheldon, B. Heath - L. Carter. [9].

To avoid subjectivity when identifying individual constitutional type of the athlete we applied somatometric method that consists in measuring height (cm), body mass (kg) and chest circumference (cm).

These parameters were used to calculate Pinier index by the formula:

$$PI = L - (M + CC\,\text{exp.}),$$

where L – height (cm), M – body mass (kg); CCexp. – chest circumference during expiration (cm).

The Pinier index which is more than 30 points is indicative of asthenic (hyposthenic) somatotype, less than 10 – is of hypersthenic. Index in an amount of 10 to 30 points corresponds to the sthenic body type. The calculation of the Pinier index made it possible to assess the correctness of specification of the constitutional type of athletes by preliminary identification using the somatoscopic method [9].

Analyzing the Pinier index, it has been found that more boys aged 10-11 who are engaged in kickboxing have an asthenic somatotype, which corresponds to a weak body built (fig. 3). Children having weak body built need special careful selection of loads during studying and training process as well as constant monitoring by the coach. That is why training sessions with these students should be planned based on differentiated approach taking into account peculiarities of their physical development.

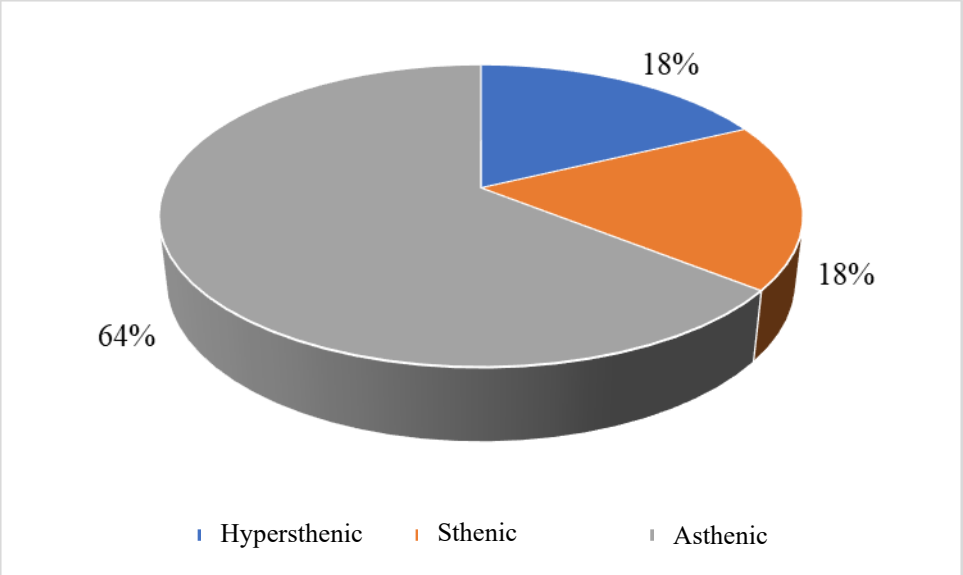

Figure 3. Percentage of 10-11 years old boys with different level of body built strength according to the Pinier index

Integrated testing of athletes' motor skills as a part of study has been conducted as a part of study. Level of physical fitness has been evaluated on the completion of muscular endurance test provided by national diagnostics and standards for assessing physical fitness of the population of Ukraine [11]. The results of physical fitness

testing were analyzed taking into account the somatotype of athletes, which was identified earlier (table 2).

Table 2.

Indices of physical fitness of the kickboxers of different somatotypes in the initial training group фізичної

Criteria	Asthenic (n=18)	Sthenic (n=5)	Hypersthenic (n=5)
Push-ups (rep.)	8,5±0,8	11,4±5,2	14,2±3,8
Modified pull ups (in lying position) (rep.)	1,6±1,2	2,5±0,7	3,8±0,9
Forward bend sitting (cm)	4,3±0,7	2,0±1,3	2,4±0,9
30 m run (s)	5,8±0,1	6,6±0,2	6,0±0,2
Steady running without reference to time (m)	720,0±48,9	933,3±36,2	840,0±97,9
Shuttle run 4×9 m (s)	11,8±0,1	12,2±0,3	11,9±0,3

Analysis of the test results has allowed to establish that the athletes with sthenic body type have significantly higher results in the exercises which require endurance (at the level of $p<0,05$). The athletes with hypersthenic body type showed the best results in the exercises imposing primary demonstration of strength qualities. It is worth mentioning that these differences in comparison with the results of the athletes of other somatotypes are not reliable ($p>0,05$). Asthenic athletes were the most successful in doing exercises demanding flexibility ($p>0,05$) and rapidity ($p<0,05$).

The findings of motor training of the athletes of different somatotypes show deviations of the results of asthenics and hypersthenics from the average group for a number of muscular endurance tests. For instance, hypersthenics have lower than average results in the following tests: forward bend sitting, 30 m run and 4×9 m shuttle run. Asthenics show similar peculiarities in the tests: push-ups, forward bend sitting, 4×9 m shuttle running. Meanwhile, the sthenics demonstrate average and higher level of development of all motor abilities in relation to the average group index.

Conclusions / Discussion

Resulting from the analysis basic morphological parameters of 10-11 years old kickboxers have been specified. Total body size of the examined kickboxers does not differ significantly from the weight and height of the average child of the appropriate age group.

The Kettle and the chest development proportionality indices were calculated. It has been found that according to the Kettle index the majority of the students had average and higher level of development; according to the chest development proportionality index – they had narrow chest. According to the identified values of the Pinier index, we can conclude that most kickboxers belong to the asthenic type of constitution.

As the result of study it has been found that the 10-11 years old kickboxers of three somatotypes in the initial training group (asthenics, sthenics, hypersthenics) have significant differences in terms of physical fitness parameters as well as primary development of physical qualities. The results of study experimentally confirmed the necessity of finding new approaches to improving the system of physical training of kickboxers, taking into account their individual characteristics.

Directions for future research are to develop differentiated approach to determining the amount and intensity of loads in the training process of kickboxers at the initial stage of training, taking into account the level of physical development and the somatotype.

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PSYCHOSOCIAL FUNCTIONING OF PUPILS OF THE BALLET STUDIO OF SENIOR PRESCHOOL AGE

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Purpose: identification of the psychosocial development features of senior preschool pupils of a private ballet studio in Kharkov.

Material and methods: the study involved 20 pupils of the Kharkov ballet studio at the age of 5 to 7 years, who have been practicing ballet from 10 months to 2 years. To obtain the results, we used the methodology of M. Jellinek and M. Murphy "List of childhood symptoms" PSC and Y-PSC in the Ukrainian adaptation of the "CC list of childhood symptoms" PSC-UKR and Y-PSC-UKR (OL Lutsenko, D.V. Shtrygol, N.G. Mikhanovskaya), namely the PSC version, which is filled in by the child's parents.

Results: the results of our research showed that, according to the assessment received from their parents, 45% of the pupils of the ballet studio have some psychosocial problems. At the same time, 25% have such problems on the scale of "internalization", and another 20% - on the scale of "externalization". Among 25% of the respondents who had some problems on the internalization scale, the most common answers were that the child gets tired quickly, is afraid of new situations, wants to be with his parents more than usual, feels bad and has less fun. Among the 20% of respondents who had some problems on the scale of externalization, the most common answers were that the child is restless, cannot sit still, is less interested in

school (in our case, in ballet classes), acts “like an instinct”, is easily distracted , flies too much in the clouds, doesn't follow the rules.

Conclusions: most of the pupils of the ballet studio have harmonious psychosocial development as assessed by their parents. Therefore, it can be assumed that ballet classes have a positive effect on the psychosocial development of older preschoolers.

Keywords: psychosocial development, senior preschooler, ballet studio, personality, PSC methodology, internalization, externalization.

Introduction

Recently, parenting communities often discuss the issue of disinterest or low and short-term interest of modern children in games, toys, communication with peers, the desire to do ordinary things that are age appropriate. Thus, doubts arise about the adequate psychosocial development of the younger generation. Research conducted under the guidance of A.R. Luria proved that a child needs to create special conditions for the formation of skills of self-control and arbitrariness, which subsequently determines the formation of personality [2].

The development of the preschooler's personal sphere, in addition to the leading activity - games, is very strongly influenced by physical activity. This was proved by such mastodons of child psychology as L. Vygotsky, Leontiev, B. Teplova and others. [1] Among foreign scientists, this problem was studied by Andersen K., Cale L., Corbin J [6,7].

A worthy alternative to sports training is teaching classical choreography, because this lesson requires students to be strictly disciplined, patient, and comply with various restrictions. But a pupil of any ballet academy receives not only an athletic and flexible body, but also all-round development.

Children begin to study classical ballet at the age of four, and from this age, the future artist must consciously fulfill the requirements of the teacher. In addition, there is a strict selection according to the physical parameters and abilities of children. And after passing the casting, many different restrictions begin in the child's life:

nutritional requirements, constant overcoming of pain, a tight schedule and lack of free time. Not all children, and not all parents are ready for this.

But despite the limitations, choreographic activity has a positive effect on the development of the child. Ballet classes contribute to the formation of posture, the development of muscles, and the maintenance of the body in good shape. It is very important that during the lessons children learn to understand their body, to listen to their own feelings [4].

Classes in the ballet class are aimed at regime, discipline, responsibility. The child adjusts to the general system of rules that must be observed. It is this consistency that brings up a socially adapted person who is able to overcome difficulties. Ballet school is, first of all, an excellent way of harmonious development of the psychosocial functions of a child who is able to master his own behavior and mental processes.

Thus, we can say that ballet classes bring up a prosperous personality. By this term we mean the following meanings: it is internal motivation and the presence of conditions that determine the realization of such human needs as achieving a result and self-actualization [8, 9].

Purpose of the study: identification of the psychosocial development features of senior preschool pupils of a private ballet studio in Kharkov

Material and Methods of the research

The aim of the study is to identify the features of psychosocial functioning and to investigate the level of internalization and externalization symptoms of the pupils of the ballet studio for preschool children.

The research method is the methodology of M. Jellinek and M. Murphy "List of Childhood Symptoms" PSC and Y-PSC in the Ukrainian adaptation of the "List of Childhood Symptoms" PSC-UKR and Y-PSC-UKR (A. Lutsenko, D. Shtrygol, N. Mikhanovsky) [3].

The "List of Childhood Symptoms" method was developed in 1988 to identify social dysfunction in children. Designed to recognize cognitive, emotional and behavioral problems and can be used to diagnose children from 4 to 18 years old.

The undoubted advantage of the technique is the availability of questions in the form of short statements that take into account the peculiarities of the child's psychosocial development in his daily life.

PSC has been adapted in many countries around the world. To answer the questions, the words "Never", "Sometimes" or "Often" are used, which translate into 0, 1 or 2 points. The total score is calculated as the sum of points for each of the 35 points. A value of 24 points or more for children 4-5 years old indicates the presence of behavioral or emotional problems. In addition, the test contains subscale indicators: internalization and externalization, which determine the nature of mental problems, if any.

The sum of the answers gives a quantitative characteristic. A good level of psychosocial functioning is indicated by an indicator of less than 8 points. The average level is in the range from 9 to 23 points. A lower level of psychosocial functioning corresponds to a result of 24 to 30 points, and a result higher than this indicator is considered to correspond to significant psychosocial dysfunction. Subscale indicators are taken into account separately: internalization and externalization.

The study of psychosocial functioning was attended by 20 pupils of the ballet studio of the city of Kharkov at the age of 5 to 7 years, who have been practicing ballet from 10 months to 2 years. To obtain the results, we used the PSC option, which is filled in by the child's parents. After all, the Y-PSC version is used by a child independently if he is already 10 years old.

Results of the research

Figure 1 shows the distribution of data on the scale "Internalization". As we can see, 75% of children have a sufficient level for this indicator. An increased level of internationalization corresponds to 25% of participants. This means that the overwhelming majority of the pupils of the ballet studio in the city of Kharkov do not have such internal symptoms as problems of leaving, withdrawal, somatic complaints, anxiety and depression in accordance with the theoretical model of T. Achenbach [5].

Figure 2 shows the distribution of data on the scale "Externalization". It can be seen that 80% of children have an acceptable level for this indicator. An increased level of internationalization corresponds to 20% of participants. External symptoms are characterized by delinquent and / or aggressive behavior, hyperactivity.

The methodology has limitations, because an assessment procedure is used, so respondents may underestimate or overestimate certain symptoms, subjectively evaluate the child. We talked with the parents of children who received increased results on the scale of "internalization", after that we talked with the trainer of the studio. It turned out that most parents are sensitive to any manifestations of their children's activity, their desire to sometimes skip classes, but the teacher makes no complaints about the behavior of these children.

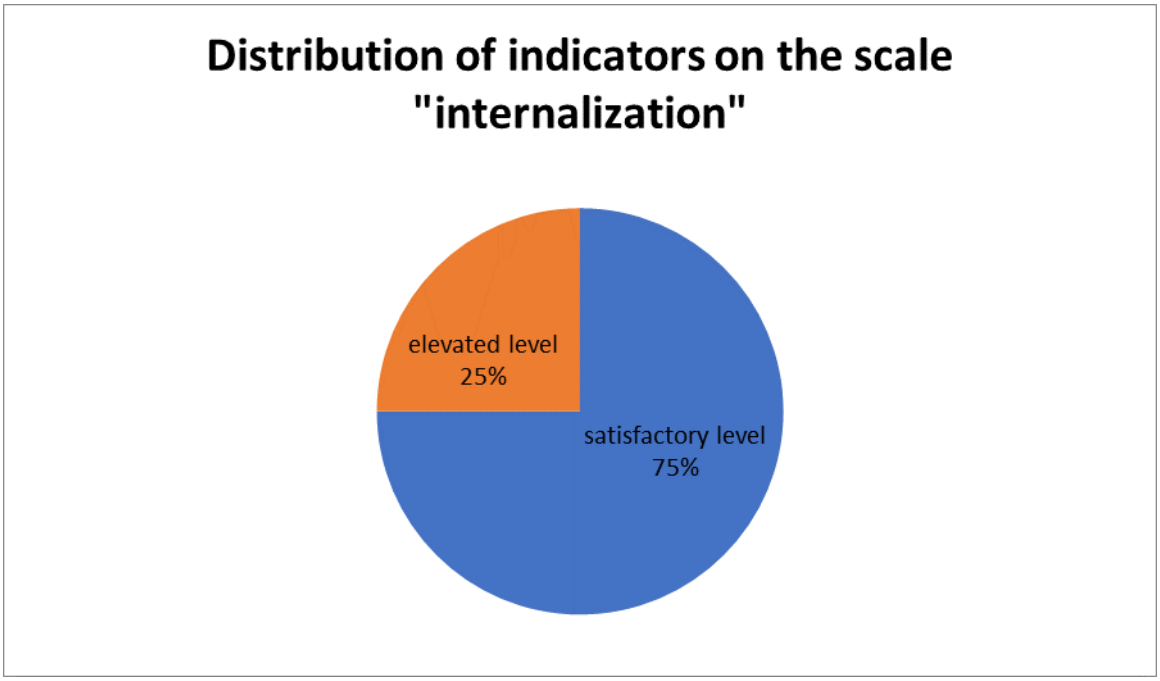

Figure 1 Distribution of indicators on the scale of "internalization" among the studied students of the ballet studio

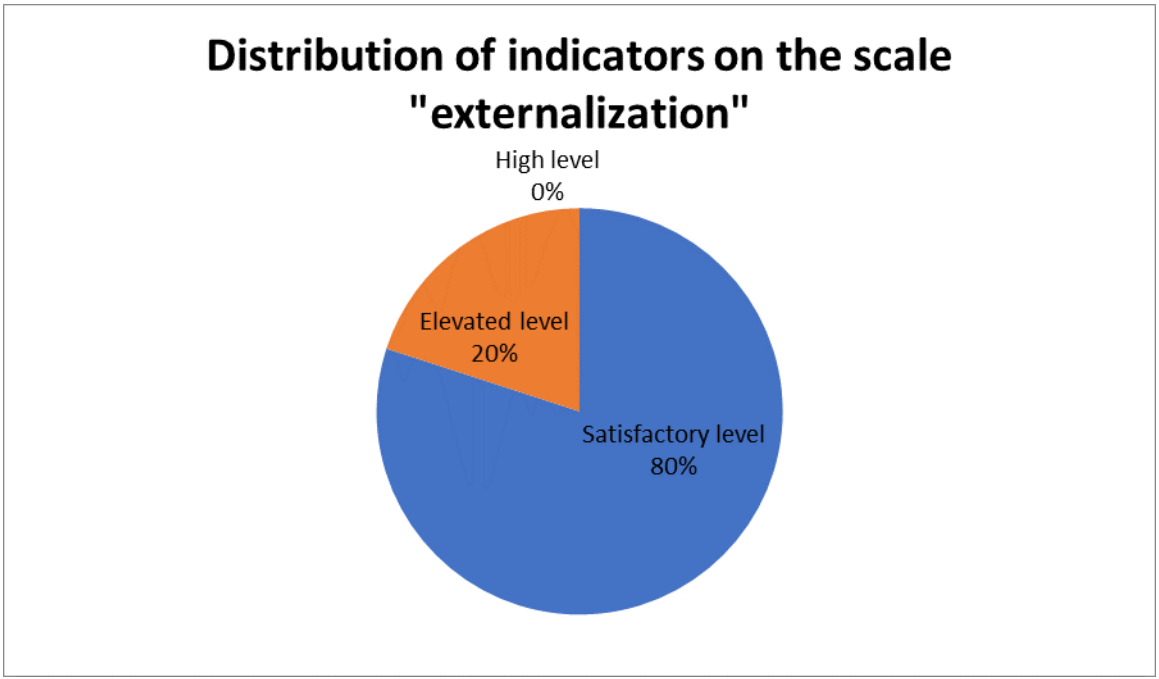

Figure 2 Distribution of indicators on the scale of "externalization" among the studied pupils of the ballet studio

So, 9 children (45%) - have some problems of psychosocial development. At the same time, 5 children (25%) have these problems on the scale of "internalization", and another 4 children (20%) - on the scale of "externalization".

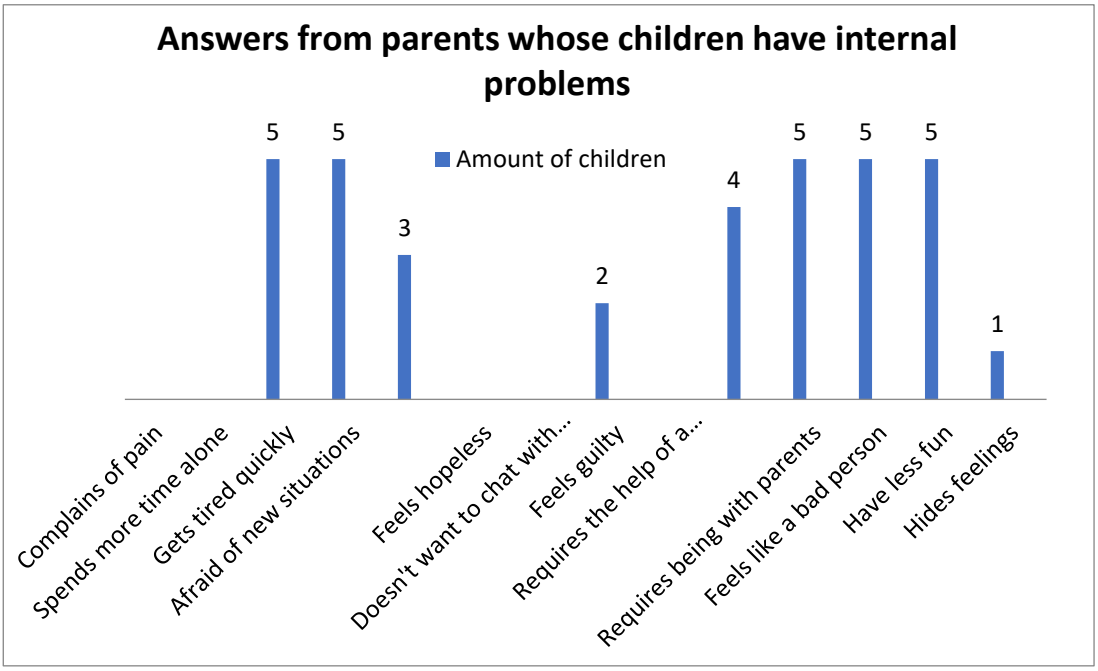

Figure 3 Answers from parents whose children have internal problems

So, the most common answers were: the child gets tired quickly, is afraid of new situations, wants to be with his parents more than before, feels like a bad person and has less fun. We remind you that parents can assess the child in different ways, sometimes even exaggerate the presence of symptoms.

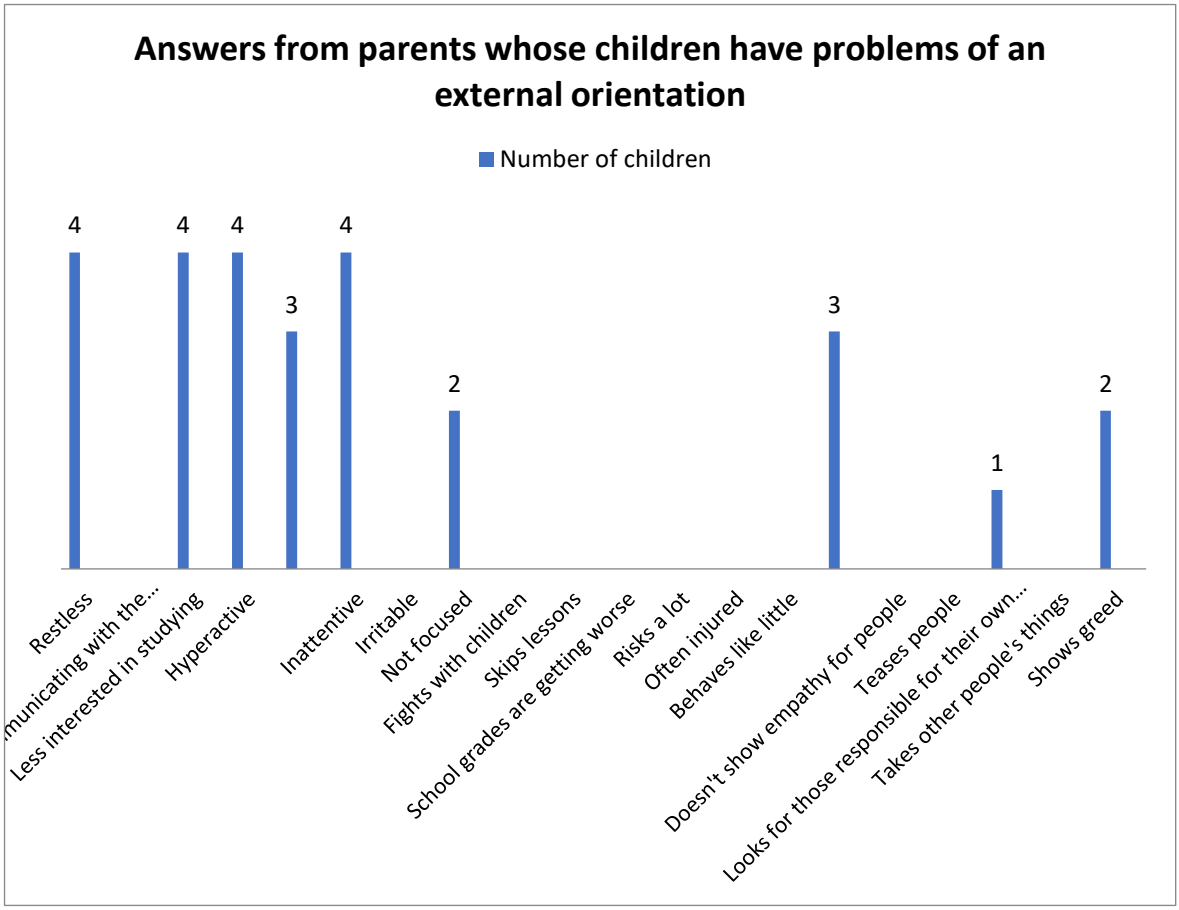

Figure 4 Answers from parents whose children have external problems

There are 20 questions on the externalization scale, which are shown in Fig. 4. Among 20% of the respondents, the most common answers were: the child is too active, less interested in school (ballet classes), easily distracted, dreams too much, ignores the rules.

Conclusions / Discussion

The results of our research confirm the opinion that physical activity, discipline during classes in a ballet studio have a positive effect on the development of the psychosocial sphere in childhood. [16; 7].

According to the results, most of the pupils of the ballet studio have a harmonious level of psychosocial development. Therefore, it can be assumed that ballet classes have a positive effect on the psychosocial development of older preschoolers. Almost half of the respondents have certain problems of an internal and external orientation. But we cannot be sure that the evaluation procedures of the methodology did not influence the results of the answers.

Prospects for further research. We plan to check the results of the study after some time, as well as apply additional methods for the study.

In addition, we plan to test the results of the study with an increasing number of participants.

Conflict of interests. The authors declare that no conflict of interest.

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INFLUENCE OF EXERCISES WITH A BALL ON COORDINATION ABILITIES OF 8-9-YEAR-OLD YOUNG SPORTSMEN, ENGAGED IN TABLE TENNIS

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Purpose: to develop approaches to improve the coordination abilities of young sportsmen in table tennis under the influence of specially selected exercises with a tennis ball.

Material and methods: two groups of young pupils at the age of 8-9 years in the total number of 24 persons (control group, n=12, experimental group, n=12) of the children's and youth sports school No. 11 in Kharkov took part in the research. The tests recommended by the curriculum for children's and youth table tennis sports schools were used to determine the indicators of coordination abilities. The pedagogical experiment lasted 3 months and consisted of the introduction into practice of the experimental group of specially selected exercises.

Results of introducing exercises with tennis balls aimed at developing coordination abilities into the educational and training process of the experimental group of 8-9-year-old pupils in table tennis, a reliable improvement in the indicators of test exercises were revealed: in hitting a tennis ball on a racket for 1 minute, on the inside and the outside of the racket and alternating the side of the racket, run

sideways around the table, running on the eight ($p<0,05$). No probable difference was found in tests: tossing and catching a tennis ball with two hands in 30s, transfer balls while moving in a 3-meter zone, ($p>0,05$).

Conclusions: the improvement of manifestations of coordination abilities in 8-9-year-old children of the experimental group who are engaged in table tennis, after the introduction of the specially selected exercise system into the training process, amounted to: in the test "Hitting a tennis ball on a racket for 1 minute on the inside" - 25,3%, "Hitting a tennis ball on a racket for 1 minute on the outside of the racket" - 27,3%, "Hitting a tennis ball on a racket for 1 minute on the inside and the outside of the racket in turn" - 39,0%, "Tossing and catching a tennis ball with two hands no higher than the head in 30s" - 5,5%, "Run sideways around the table" - 5,8%, "Running in the eight" - 2,5%, "Transfer of balls while moving in a 3-meter zone" – 2,7%.

Keywords: table tennis; coordination capacities; exercises with balls; exercises with a racket.

Introduction

Coordination abilities are difficult, complex psychophysical quality. They are related to the control function, which means that the central nervous system plays the main role in the manifestation of this quality. This circumstance is also because coordination capabilities are more versatile, flexible, and universal physical quality compared to others. R. Khudiets attributes table tennis to difficult coordination sports. The author notes that the player's actions depend on several factors: speed of the flight of a tennis ball, speed of the stroke, and the time required to make a decision when attacking the opponent [16].

The process of mastering any motor actions is much more successful if a sportsman hasn't only strong and fast muscles, flexible body, but also highly developed abilities to control his movements, his main characteristics. The high level of development of coordination abilities is the main base of mastery of new, more complex types of motor actions in sports activity [15].

The high level of coordination capacity is particularly important for children during the initial training phase. As advanced coordination allows a child to master new motor actions quickly, to be in movement, and to respond to changing environment quickly. By developing the coordination of young sportsmen, you can lay an important base for the formation of complex motor skills, as well as self-confidence, against the background of existing motor skills.

Such coordination abilities as the ability to differentiate muscle forces, sense of rhythm, rapid restructuring of motor activity, statokinetic stability, and the ability to harmonize movements are important in achieving high sports results and in owning effective technique for table tennis.

Kolomiytseva O., Radchenko Ya. It is noted that table tennis itself is a mean of developing coordination abilities. This is due to the performance of a large number of serves and various strokes during the match [5]. Hloba T.A. has a similar opinion, who proposes to use table tennis in the process of students' physical education classes to develop coordination abilities [2].

Roman Faichak, Serhiy Popel, Ivan Faichak improved the manifestation of the coordination abilities of those who were engaged at the end of the pedagogical experiment, which lasted 8 months during the school year, where students-tennis players used the proposed method for the development of individual components of coordination abilities, built on blocks of exercises, which were performed during warm-up for training and in self-study. Maleniuk T.V. proposed for students-tennis players the experimental method for the development of coordination abilities using blocks of exercises to improve the ability to control temporal, spatial, and power parameters of movement, to improve the ability to orient in space, the feeling of rhythm, and the feeling of a ball. The main provisions of the author's method for improving coordination abilities: training method - repeated; duration of exercises - short-term; the intensity of exercise performance is maximum or submaximal; rest intervals duration - full recovery; nature of rest intervals - passive or mixed; the number of repetitions - until tired. The pedagogical experiment continued during the school year. At the end of the experiment, the author notes a reliable improvement in

the result in indicators of orientation in space and accuracy of movements ($p<0,05$) [7].

We identified indicators of technical [1] and special physical fitness of sportsmen in the basic training group of table tennis [18] in the previous researches. The relationship of psychophysiological indicators and indicators of technical fitness of sportsmen in table tennis was considered.

Our previous researches focused on the adaptation of youth with musculoskeletal system disorders due to the development of coordination abilities in them [23, 24]. Indicators of coordination abilities of pupils of the Republic of China were studied [22]. The methodology for improving the technical preparedness of young handball players was developed and confirmed experimentally based on the use of coordination exercises on the high-speed coordination ladder [20]. The state of coordination abilities of basketball players of the student team was analyzed [11], and the method of its enhancement was tested due to the use of specially selected exercises with a ball [10]. The results of our previous researches made it possible to establish the level of indicators of the spatial orientation of 14-year-old female basketball players [21]. Indicators of 12-year-old basketball players' balance were studied, and a significant effect of exercises on the balancing platform on statokinetic stability of young players was established [12]. The obtained results provide some foundation for our approaches for this research.

According to the results of the researches, we can assume that the use of specially selected exercises with a tennis ball, a tennis racket, and exercises with elements of technical techniques of table tennis can increase the level of coordination motor actions of sportsmen.

Connection of the research with scientific programs, plans, topics. The research was carried out by the theme of the plan SW of Kharkiv state academy of physical culture "The improvement of the educational and training process in sports games" for 2019-2023.

The purpose of the research is to develop approaches to improve the coordination abilities of young sportsmen in table tennis under the influence of specially selected exercises with a tennis ball.

Research tasks:

1. To analyze the scientific and methodological literature on the selected topic.

2. To determine the level of development of individual coordination abilities of 8-9-year-old players who are engaged in table tennis.

3. To select and to prove experimentally the effectiveness of using specially selected exercises for the development of individual coordination abilities of tennis players.

Material and Methods of the research

Two groups of young pupils at the age of 8-9 years in the total number of 20 persons (control group, n = 10, experimental group, n = 10) of the children's and youth sports school No. 11 in Kharkiv took part in the research. Both groups are elementary education of the second year. The tests recommended by the curriculum for children's and youth table tennis sports schools were used to determine the indicators of coordination abilities [8]. The pedagogical experiment lasted 3 months and consisted of the introduction into practice of the experimental group of specially selected exercises. These are exercises in which a tennis ball was stroked from the wall (strokes from the wall with catching after applause behind the back, 360° rotation, squat after one hit on the floor); exercises with tossing a tennis ball with a hand and catching or with a hand or plastic cup (shifting a plastic cup from hand to hand, performing several shots in a row) while trying not to get out of place; hitting a tennis ball with the racket, changing the side of the racket, with right and left hand, both in place and in movement (moving frontward and back forward, with a side step to the right, to the left); throwing a tennis ball to the accuracy in squares are drawn on the tennis table, and strokes for accuracy with a racket in markings; strokes, loops from different angles of the table to given sectors; strokes in different ways for changing the tennis table (two tables stood side by side), etc. (Fig. 1). The proposed exercises were used at each training lesson in the preparatory and main parts. In the

preparatory part - general training exercises, in the main part - exercises related to techniques. The total number of training classes per week of the control and experimental groups was four for 90 minutes.

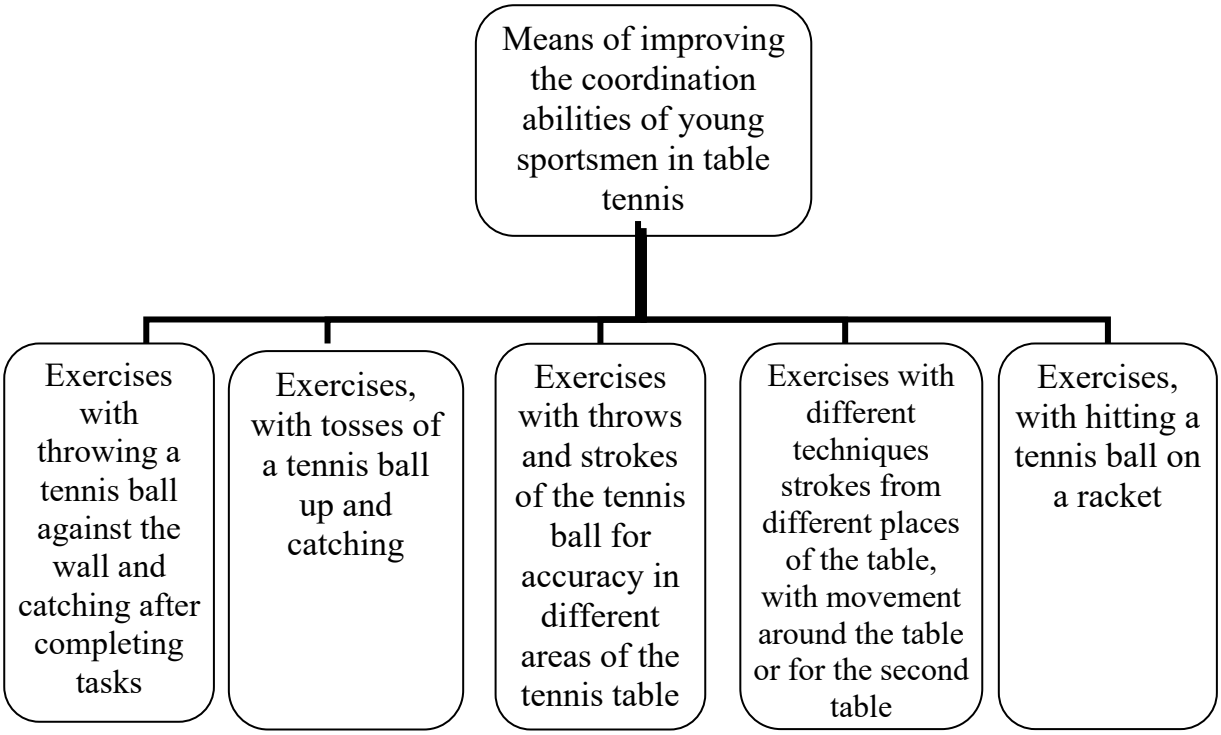

Figure 1. Means of improving the coordination abilities of 8-9-year-old sportsmen in table tennis

The Microsoft Excel application package was used to analyze the obtained information, the validity of the discrepancies was established based on the calculation of the Student criterion, at $p<0,05$.

Results of the research

At the beginning of the pedagogical experiment, the control and experimental groups probably didn't differ from each other in all indicators of testing the manifestation of coordination abilities (Table 1).

Table 1

The comparison of indicators of coordination abilities of 8-9-year-old tennis players of experimental and control groups before the pedagogical experiment

Tests		Indicators $\overline{X} \pm m$			
		EG(n=12)	CG(n=12)	t	p
Hitting a tennis ball on a racket for 1 min. (times)	on the inside of the racket	25,7±2,3	25,4±2,1	0,10	>0,05
	on the outside of the racket	12,8±1,1	12,1±1,7	0,35	>0,05
	on the inside and outside of the racket alternating	10,5±1,5	9,9±1,9	0,25	>0,05
Tossing and catching a tennis ball with two hands no higher than the head for 30 s (times)		9,1±0,2	9,6±0,3	1,39	>0,05
Run sideways around the table (s)		29,2±0,6	29,1±0,7	0,11	>0,05
Running in the eight (s)		36,3±0,5	37,0±0,6	0,90	>0,05
Transfer of balls while moving in a 3-meter zone (s)		48,4±0,3	48,9±0,4	1,00	>0,05

After the experiment, comparing the test results in the experimental group, a reliable improvement in the results of the tests was revealed: hitting a tennis ball on a racket for 1 minute on the inside and the outside of the racket and alternating the side of the racket, run sideways around the table, running in the eight ($p<0,05$). The probable difference wasn't found ($p>0,05$) in the tests - tossing and catching a tennis ball with two hands for 30 s, transferring the balls while moving in a 3-meter zone. The results are shown in Table 2.

Table 2

Indicators of the development of coordination abilities of 8-9-year-old tennis players of the experimental group before and after the pedagogical experiment

Tests		Indicators $\overline{X} \pm m$			
		Before the experiment (n=12)	After the experiment (n=12)	t	p
Hitting a tennis ball on a racket for 1 min. (times)	on the inside of the racket	25,7±2,3	32,2±2,1	2,09	<0,05
	on the outside of the racket	12,8±1,1	16,3±1,2	2,15	<0,05
	on the inside and outside of the racket alternating	10,5±1,5	14,6±1,3	2,07	<0,05
Tossing and catching a tennis ball with two hands no higher than the head for 30 s (times)		9,1±0,2	9,6±0,3	1,39	>0,05
Run sideways around the table (s)		29,2±0,6	27,5±0,5	2,18	<0,05
Running in the eight (s)		36,3±0,5	35,4±0,7	2,09	<0,05
Transfer of balls while moving in a 3-meter zone (s)		48,4±0,3	47,1±0,7	1,79	>0,05

The improvement in the manifestation of coordination abilities in 8-9-year-old children of the experimental group who are engaged in table tennis was: in the tests “Hitting a tennis ball on a racket for 1 minute on the inside of the racket” - by 25,3%, “Hitting a tennis ball on a racket for 1 minute on the outside of the racket” - by 27,3%, “Hitting a tennis ball on a racket for 1 minute on the inside and the outside of the racket alternating” - by 39,0%, “Tossing and catching a tennis ball with two hands no higher than the head in 30 s” - by 5,5%, “Run sideways around the table” - by 5,8%, “Running in the eight” - by 2,5%, “Transfer of balls while moving in a 3-meter zone” - by 2,7% (Fig. 2).

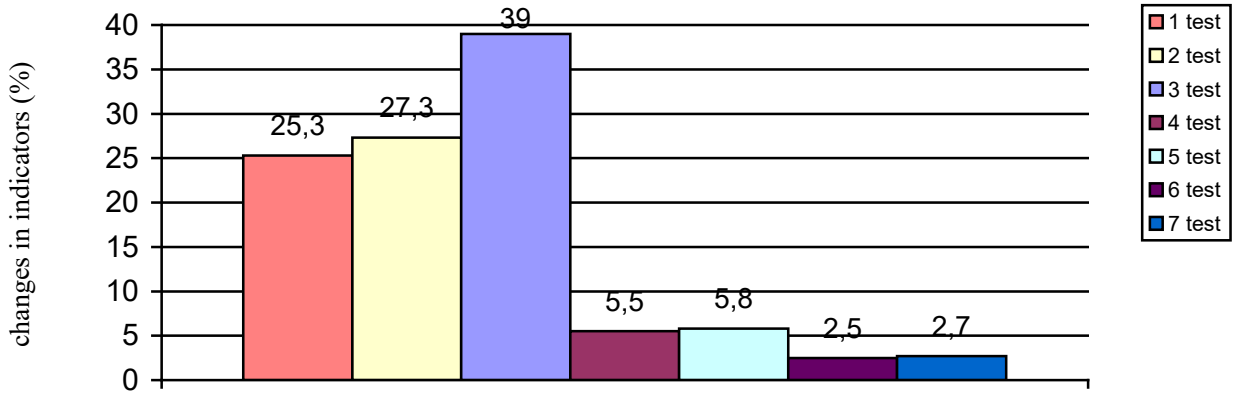

Figure 2. Qualitative indicators of changes in the manifestation of the coordination abilities of 8-9-year-old tennis players of the experimental group after the pedagogical experiment (percentages):

Test 1 - Hitting a tennis ball on a racket for 1 minute on the inside of the racket; Test 2 - Hitting a tennis ball on a racket for 1 minute on the outside of the racket; Test 3 - Hitting a tennis ball on a racket for 1 minute on the inside and the outside of the racket alternating; Test 4 - Tossing and catching a tennis ball with two hands no higher than the head in 30 s; Test 5 - Run sideways around the table; Test 6 - Running in the eight; Test 7 - Transfer of balls while moving in a 3-meter zone

It should be noted that the greatest changes in indicators of the manifestation of coordination abilities of young sportsmen of the experimental group occurred in test exercises related to hitting a tennis ball on a racket.

Conclusions / Discussion

Our research was carried out in the context of recommendations of other specialists on the need to maintain and to increase the level of physical fitness of young sportsmen, especially coordination abilities, which are the basis for mastering

the techniques. The authors Cherniaiev A. A. and Paikov M. B. proposed the methodology for developing the coordination abilities of young sportsmen in table tennis in the preparatory period, which consisted of 3 different sets of exercises that had a certain orientation. The authors selected additional exercises with and without a tennis racket and a ball, which allowed for 9 training microcycles to improve significantly the physical fitness of tennis players ($p<0,05$) [17]. Drobysh A. S. selected exercises aimed at developing the coordination abilities of 10-12-year-old young sportsmen who were engaged in table tennis. The main methodological technique in the development of coordination abilities by the author was the presence of a complication in the performance of exercises, which were implemented due to an increase in the number of used items. At the same time, the greatest increases in indicators of coordination abilities by the author were noted in the test “Flamingo” by 53,8%, in the test “Shuttle Run 3x10 m” by 4% [3]. Shyian V. M. noted that during the research, 12-14-year-old badminton players received naturally more significant individual absolute indicators of coordination abilities, compared with the average values of children of a certain age [19].

Results of our research continue several works on study and improvement of the process of development of coordination abilities of young sportsmen. The obtained results of our research are consistent with those of other researchers [4, 6, 15]. The authors note that regular table tennis classes, the use of exercises with a tennis ball and a racket positively affect the manifestation of coordination abilities [9, 13].

So, the developed by us system of selected exercises with a tennis ball improved the indicators of manifestation of coordination abilities of 8-9-year-old young pupils of the experimental group of the sports school who are engaged in table tennis. This is expressed in a reliable improvement in the results of the tests: hitting a tennis ball on a racket for 1 minute on the racket, on the inside and the outside of the racket and alternating the side of the racket, run sideways around the table, running along the eight ($p<0,05$). The results of our research allow us to recommend that coaches supplement the training process of table tennis groups with a system of

specially selected ball exercises to improve the manifestation of coordination abilities.

Prospects for further research. We see the influence of indicators of coordination abilities on the level of technical and tactical training of tennis players in the research.

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ANALYSIS OF EVALUATION OF THE QUALITY OF THE EDUCATIONAL PROCESS BY STUDENTS OF THE MASTER'S DEGREE PROGRAM IN THE SPECIALTY 227.01 – PHYSYCAL THERAPY

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Purpose: to determine the level of satisfaction and quality of students' educational process in the master's program in the specialty 227.01 - Physical Therapy.

Material and methods: to achieve this goal, we used the following research methods: analysis of scientific and methodological literature, special regulations governing the process of assessing the quality of education and Internet resources, a sociological survey in monitoring mode, analysis, synthesis and synthesis of data, methods mathematical statistics.

Results: thus, 164 students took part in the study of full-time masters of the Department of Physical Therapy. Occupational Therapy of NUUPES, the average age of the subjects was 27.6 ± 0.6 years. The predominant education level was - incomplete higher education (bachelor's degree) or higher education (already received

a master's degree, but in another specialty). We can say that students of the master's program of the Department of Physical Therapy and Occupational Therapy of NUUPES, in general, are satisfied with the quality, content, and methods of teaching the subjects of the above program. Students' disadvantages followed: problems with employment, low quality of material in some disciplines, lack of work with special equipment, and discrepancies in the information content of theoretical and practical classes.

Conclusions: the use of information and communication technologies during the survey and processing of its results increases communication efficiency between the subjects and objects of examination (quality of use of the method). It ensures the efficiency and clarity of its results.

Keywords: initial process, students, surveys, physical therapy.

Introduction

Ensuring the quality of education and developing an information educational environment was identified among the priority areas of research by the NAPS of Ukraine in the 2018–2022 years. [8]. Assessing the quality of education and diagnosing the existing problems is a multidimensional problem and outlines its pedagogical basis [5].

Analysis of a modern training process in higher education institutions shows that traditional methods of diagnosing the quality of training have many significant shortcomings and limitations, bringing to the leveling and equalization of all students as individuals and future professionals (M.B. Yetukh et al., 2010) [3].

Assessing the students' existing attitudes and perceptions of professionalism is important for successful curriculum development, most likely to improve professional behavior (G.F. Blackall et al., 2007) [9].

The quality of the higher education process is determined not only by the amount of knowledge but also by the parameters of personal, ideological, civic development, and the problem of quality is considered from the standpoint of the universal and social value of education (V.O. Zinchenko et al., 2010) [4].

Thus, the use of various innovative forms and methods in educational activities will improve the quality of students' learning process and provide adequate assessment methods.

Therefore, **the research aimed** to determine the level of satisfaction and quality of students' educational process in the master's degree program in specialty 227.01 - Physical Therapy using surveying.

Material and Methods of the research

To achieve this aim, we used the following research methods: analysis of scientific and methodological literature, special regulations governing the process of assessing the quality of education and Internet resources, sociological surveying in a monitoring mode, analysis and synthesis of the data, methods of the mathematical statistics.

According to the results of the analysis of world experience on the participation of students in assessing the provision of higher education institutions with the quality of educational activities and the quality of higher education in general [1, 15], the staff of the Physical Therapy and Occupational Therapy Department of the National University of Ukraine on Physical Education and Sport developed a questionnaire "Assessment of the quality of the educational process," consisted from the questions reflecting some aspect of theoretical or practical training of future masters degree students in physical therapy. Total surveyed 164 undergraduate students of Physical Therapy and Occupational Therapy Department of the National University of Ukraine to evaluate the national system for masters education process under the EU Erasmus + project "Innovative Rehabilitation Education - Introduction New Master's Degree Programs in Ukraine."

Results of the research

The launch of a new international educational project, "Innovative Rehabilitation Education - Introduction of New Master's Degree Programs in Ukraine" (REHAB), gives an opportunity to increase the professional potential of university teachers; creation of new resources for teaching/learning/assessment; creation of a particular educational infrastructure necessary for the implementation of

a new national professional program in physical therapy [12]. The approaches implemented within the REHAB project are innovative. Therefore, the development and implementation of new (pilot) educational master's degree programs in physical therapy contribute to the training in Ukraine of high-qualified professional specialists in physical therapy according to European Union standards. [6].

Today, many studies have been conducted, outlining various aspects of assessing the educational process's quality and the factors that affect them. M. Jalili, A. Mirzazadeh, A. Azarpira (2008) investigated an assessment of medical school graduates' performance on the quality of their educational program [11]. The authors found that about 77% of respondents believed that introductory science courses have no clinical significance. 61.2% of students believed that physiology is the most clinically significant course among other introductory science courses. About 70% of respondents reported that they were not taught enough clinical skills to prepare for future clinical practice. Only 33.3% of respondents believe that they have acquired adequate knowledge and skills to start studying at the residency.

L. Sibanda, C.G. Iwu, O.H. Benedict (2015) researched the main factors influencing students' academic efficiency were identified [14]. The study identified some factors responsible for success-failure, respectively. They influenced success factors to include regular training, regular attendance, and assignments seen as hard work products. Concerning failures, factors such as lack of effort, lack of commitment, failure to complete, or timely failure to perform tasks are high.

However, pedagogical practice shows that managing educational activities is not easy, especially in a period of significant social transformations, when traditional and new factors that affect the academic sphere and the behavior of its subjects change. (O.V. Hyliun, 2012) [2]. Such elements in the physical therapy area were followed: recognition of the profession of "physical therapy," corresponds to the European structure of the health workforce, reforming and restarting the educational process following current requirements of the EU and the World Physical Therapy (WCPT), and accordingly, a review of all curricula and academic standards in the area, with the needs and professional preferences of students.

At the same time, students' use as experts on the quality of higher education process is quite successfully combined with the principle of student-centeredness, i.e., with "student orientation in providing quality educational services and managing the activities of free educational institutions [7].

Surveys are among the most common approaches to assessing students' knowledge in many disciplines [10]. This method has long been in practice, but its heyday began with introducing information technology in the educational process [13].

One hundred sixty-four students took part in the survey of full-time masters degree students of the Department of Physical Therapy, Occupational Therapy of NUUPES, the average age of the subjects was 27.6±0.6 years, the predominant level of education was an incomplete higher education (bachelor's degree diploma) or complete higher education level (already received a master's degree diploma, but in another specialty).

We want to present the results that, in our opinion, have the most significant impact on the development of students as future practicing physical therapists.

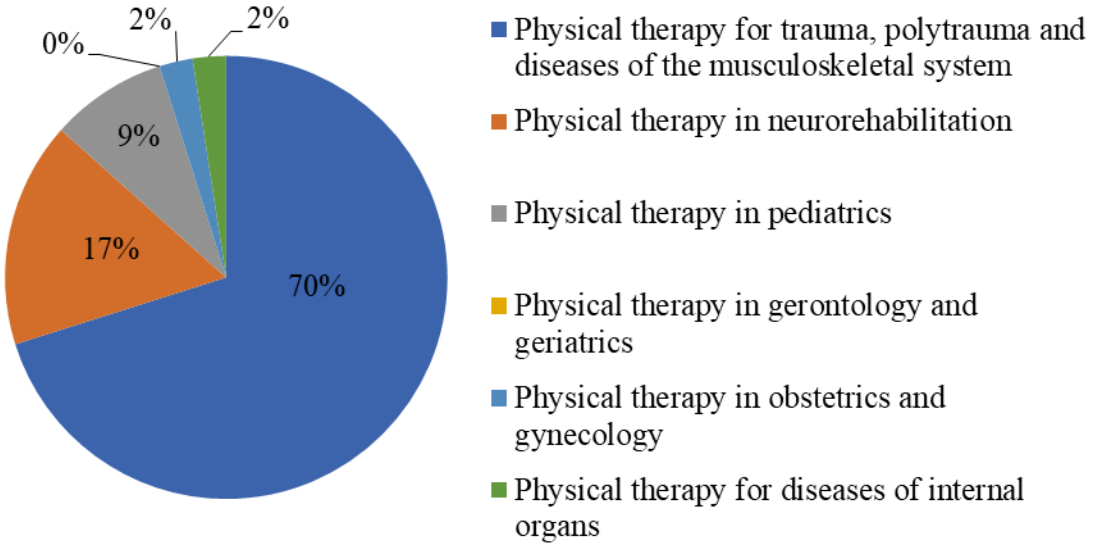

Figure 1. In what direction would you like to develop in the physical therapy and occupational therapy area?

To the question "Do you have experience in the physical therapy and occupational therapy area?" One hundred six respondents (64,6±0,3%) answered positively; 58 students, or 35.4±0.7%, gave a negative answer. It can be assumed that students who gave a positive response came to study in the master's degree program of NUUPES for additional knowledge and/or skills; students who gave a negative answer - want to gain entirely new skills and knowledge.

According to the data presented in Fig. 1, the majority of respondents chose a different theoretical and practical vector of development in the physical therapy in orthopedics and traumatology area (115 students), in neurology (27 students), in pediatrics (14 students), we assume that this is due to dominant publications, availability of specialized pieces of training and availability of materials in this field.

At the same time, a low number of students who have chosen the future field of interest in the followed area: physical therapy in gerontology (0 subjects), physical therapy in obstetrics and gynecology, and internal diseases (4 students, respectively), it's connected with a lack of scientific and practical information in this area.

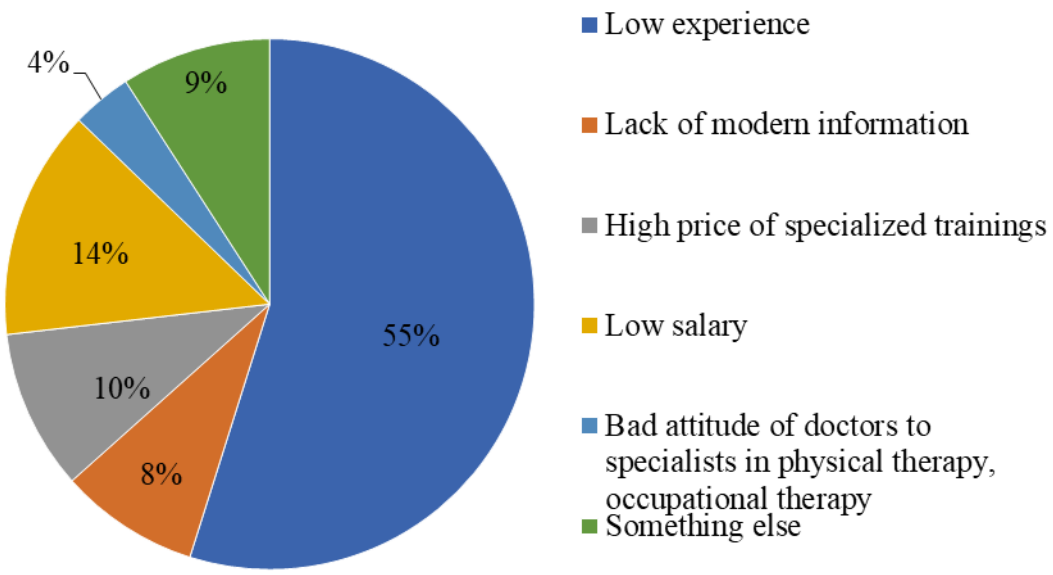

Figure 2. What prevents you from developing in the chosen physical therapy and occupational therapy direction?

The main reason that hinders the development of students who participated in the survey indicated "low experience" (90 students) due to lack of relevant practical experience in the area. The reason for the "low salary" was suggested by 23 respondents, which resulted from the preliminary review of a physical therapist's place in a medical institution. Since the lack of domestic specialists with relevant clinical experience is the reason for inviting foreign specialists to conduct training on the territory of Ukraine, which is quite a costly process, the reason for the "high price of specialized training" was indicated by 16 respondents. The answer "lack modern information" was cited as 14 students, which is due to the partial obsolescence of the content. Six respondents indicated the reason for the "bad attitude of doctors to specialists in physical therapy, occupational therapy," which is caused by the lack of understanding of some health professionals of the multidisciplinary approach to rehabilitation and the place of a physical therapist in this team. Among the "something else" answers were the following: lack of clinical practice and relevant experience, insufficient level of knowledge, long-term training, lack of structured information, little work experience.

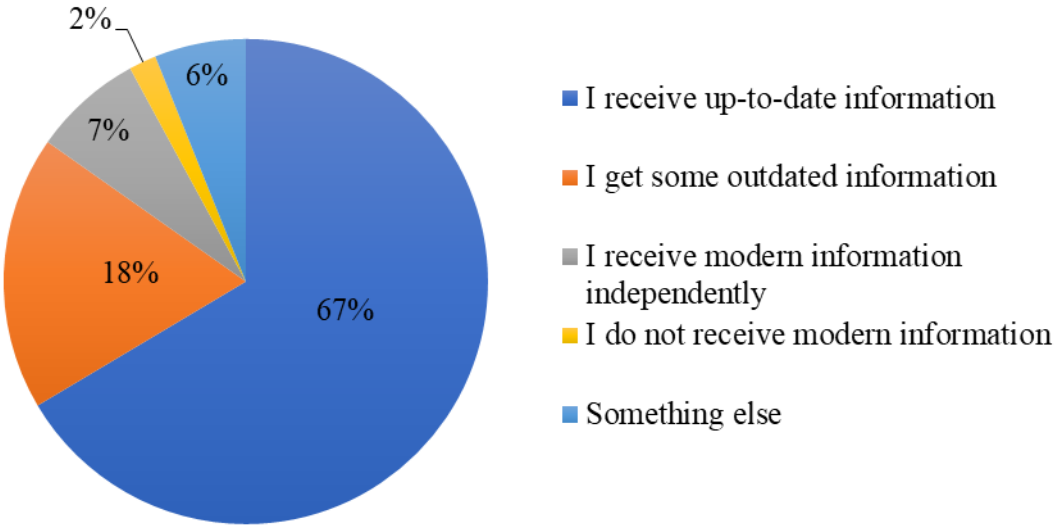

Figure 3. Do you receive up-to-date information on physical therapy and occupational therapy during your training?

One hundred nine respondents (67%) reported getting up-to-date information during education process and 30 students (18 %) said that the information they received during the study was a bit outdated, which resulted from existing changes in the preparation of masters in physical therapy. The answer "I receive modern information independently" was given by 12 students (7 %), resulting from a large amount of independent work involving ECTS. Three students (2 %) do not receive up-to-date information. Among the "something else" answers were the followed: the undesirable combination of outdated and new information, heavy workload from fundamental disciplines, low quality of teaching profile disciplines, lack of systematization (Fig. 3).

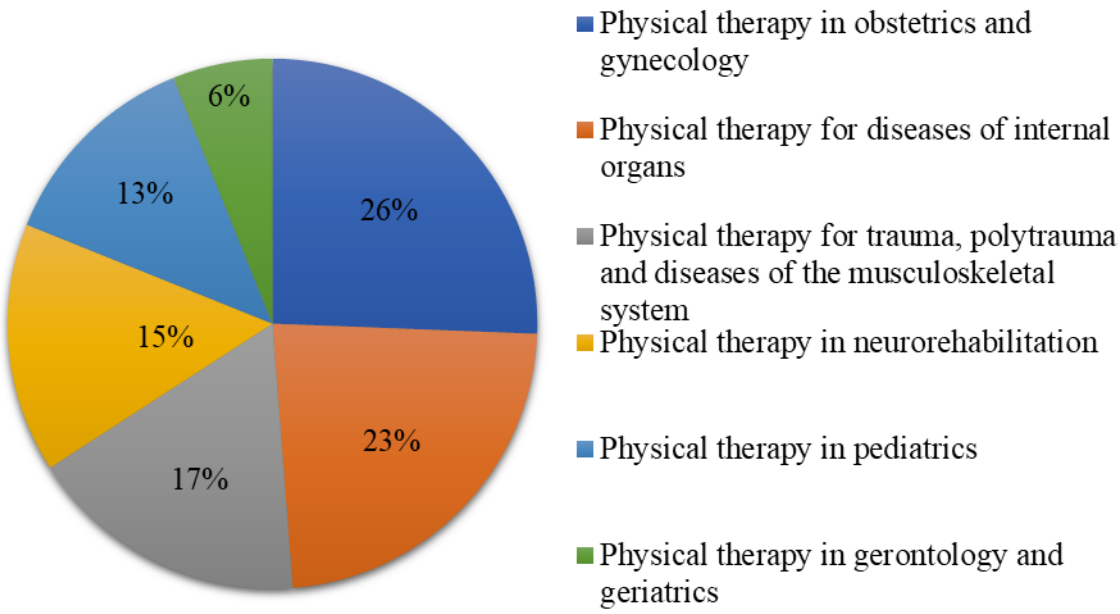

Figure 4. The least up-to-date information you receive in the field of study of such disciplines

The indicators presented in Fig. 4 are almost opposite to the data of Fig. 1. Thus, the least information surveyed students receive during the disciplines related to obstetrics and gynecology and diseases of the internal organs, 42 and 28 students (26 and 23 % respectively). This is due to the lack of physical therapy experience in these areas both in Ukraine and in the world. Almost identical indicators of the lack of modern knowledge were recorded in the disciplines related to physical therapy in

orthopedics and traumatology, neurology, and pediatrics. These disciplines were noted by 28 (17 %), 25 (15 %), and 21 (13 %) students, respectively. Lack of new information during the courses related to physical therapy in gerontology and geriatrics was noted by ten students (6%).

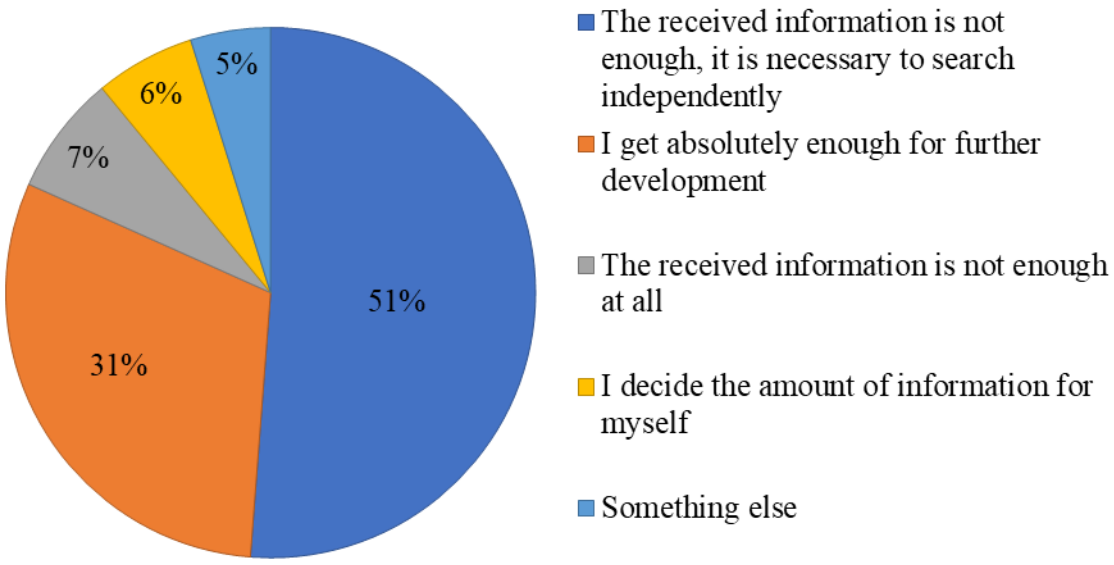

Figure 5. Is the provided theoretical and practical information enough for you to further develop in the physical therapy and occupational therapy area?

Based on the data presented in Fig. 5, the majority of respondents, 84 students (51 %), chose the answer "the amount of information received is not enough, you need to search independently," which can be explained by the large amount of independent work that ECTS has. Fifty students receive a sufficient amount of information (31 %). The research problem's subjective nature can be distinguished in the case of students' choice of answers "the amount of information is not enough at all" and "the amount of information I decide for myself." Among the "something else" answers were the following: lack of practical skills, difficulty to assess, the amount of information does not fully correspond.

During the survey, it was found that the same number of students, 67 (14 %) respectively, chose the answers that the theoretical information fully corresponds to

the practical skills in the classroom, and there is a slight discrepancy between the information in the theoretical and practical classes (Fig. 6).

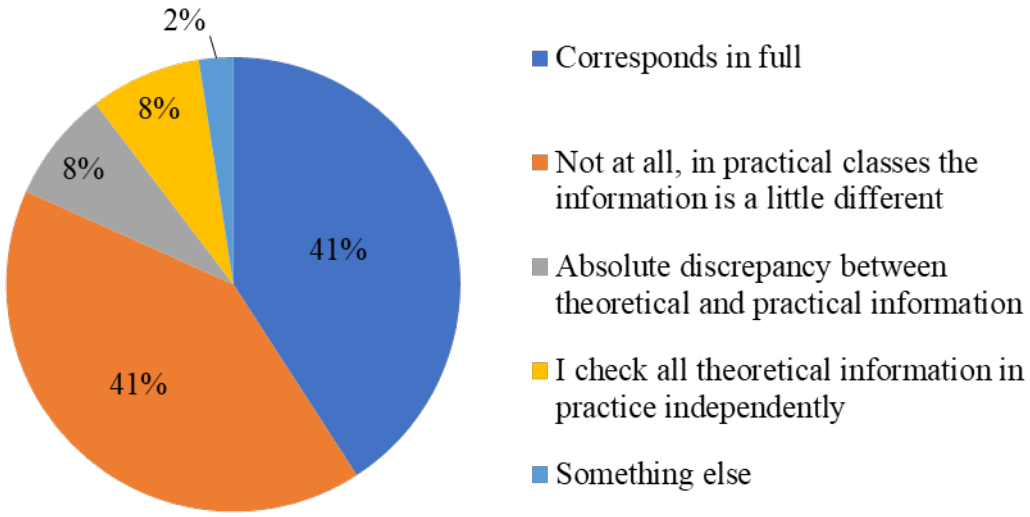

Figure 6. Is the theoretical information provided to you correspond to practical skills in physical therapy and occupational therapy?

This is due to the consistency and appropriate research and teaching qualifications, especially if several leads the same discipline.

The opposite was indicated by 13 students (8 %), according to whom there is a significant discrepancy between the information in theoretical and practical classes. Also, 13 students (8 %) indicated that all academic information is checked in their practice, which may indicate respondents' employment. Among the answers "something else" was the followed: lack of practical skills, difficulty to assess, expectations of clinical practice, the level of knowledge does not fully meet.

As the most effective training forms, the subjects noted situational tasks and test tasks in 116 and 24 cases (71 and 15 %), respectively (Fig. 7).

This may be due to similar tasks in the examination requirements for admission to the master's program and the requirements for state certification. Surveys and answers were selected in 17 cases (10 %) express control in 7 cases (4 %).

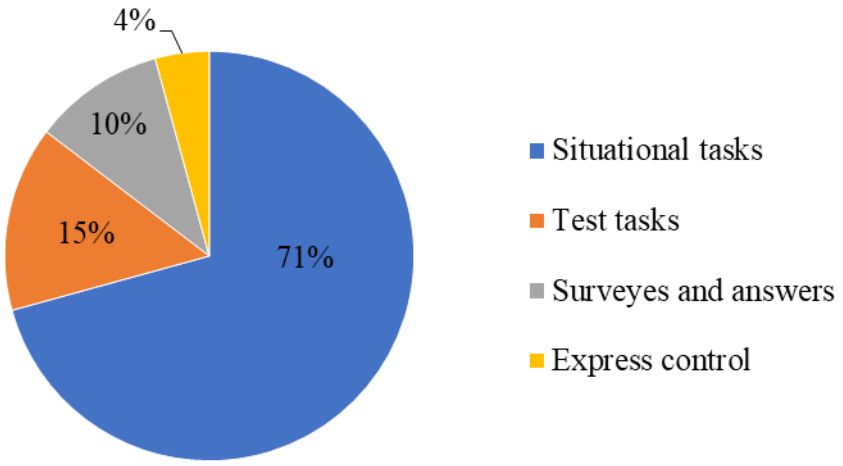

Figure 7. What form of practical training is most effective in the learning process?

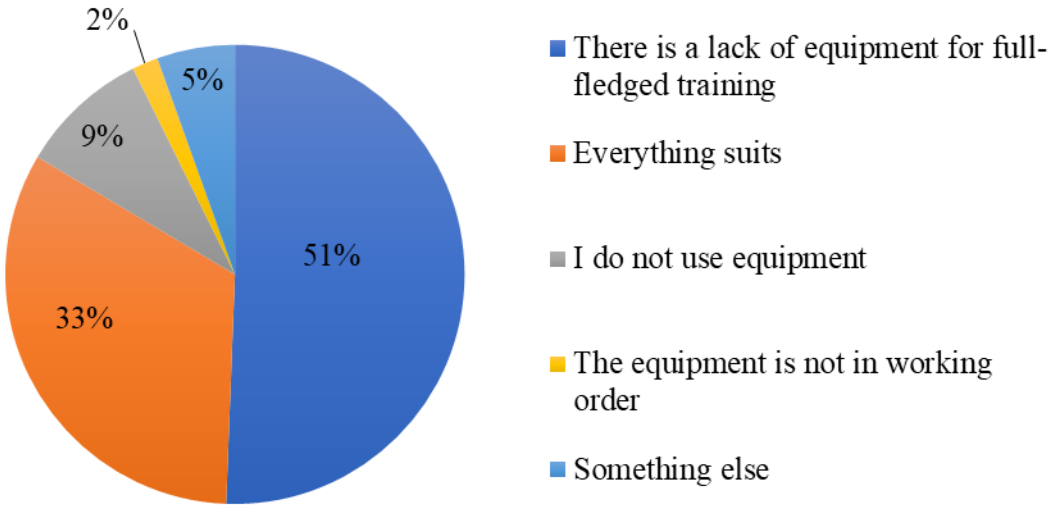

Figure 8. Are you satisfied with the quality and quantity of rehabilitation equipment for practicing practical skills at the university?

Eighty-three students (51 %) do not have enough equipment to sufficiently practice their skills; however, within the REHAB project framework, it is planned to purchase rehabilitation equipment that will meet international standards for rehabilitation care (Fig. 8). Students who noted that they are completely satisfied with the quality of the number of rehabilitation equipment in the initial process were 54 people (33 %). Respondents who do not use equipment in their educational process,

in our opinion, have not yet encountered clinical cases where the use of additional equipment is required.

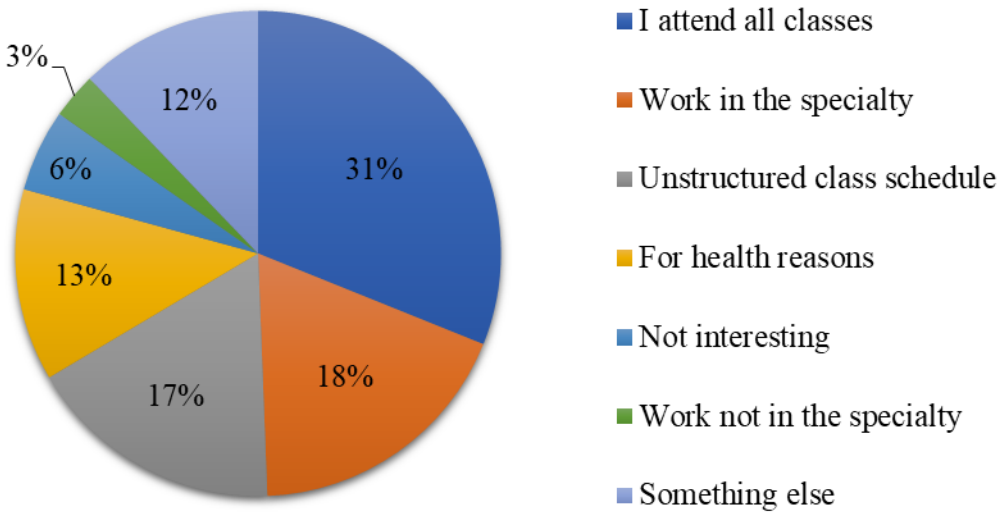

Figure 9. For what reasons do you mostly not attend classes?

As shown in Fig. 9, the main reason for their absence from classes students noted: "work in the specialty" in 30 cases (18%). Such an organizational shortcoming as "unstructured schedule" was stated by 28 respondents (17%). Twenty-one respondents (13%) missed classes due to their health condition. Also, among the reasons for absence from studies, students noted: "work outside the specialty" and lack motivation. Among the answers "something else" was the followed: personal affairs, family circumstances.

To the question, "Have you encountered a biased and disrespectful attitude on the part of teachers while assessing your knowledge in the learning process?" Sixty respondents gave a positive answer (37%), 104 (63%) showed a negative response.

Analyzing the data of Fig. 10, it can be concluded that currently, there are some problems with the employment of future physical therapists in Ukraine, despite a legal basis in the field. Thus, during the survey, 67 students (41%) indicated the main employment problem is inadequate working conditions. Fifty-two respondents (32%) said that their knowledge level does not allow them to hold the desired position.

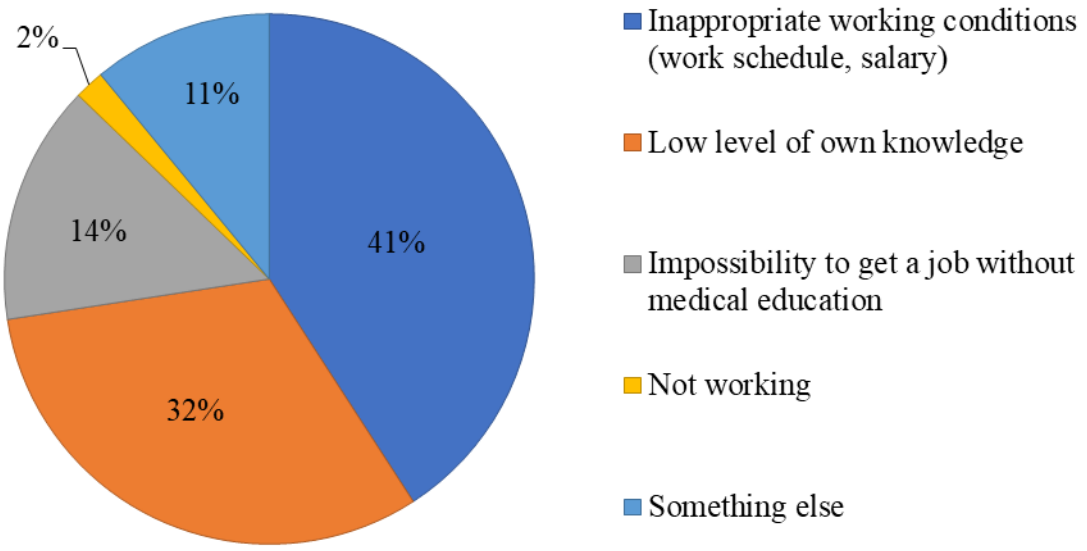

Figure 10. What problems did you face during the hiring?

The answer "impossibility to get a job without medical education," in our opinion, was indicated by those students who faced employment ignorance of employers with the legislative sphere in the physical therapy area. Among the answers "something else" was the followed: already working in the specialty, low salary, incomplete education, did not get a job, the coincidence of the work schedule with the educational process, the absence and/or did not face problems.

It is nice to note that despite all the negative aspects and the lack of specific knowledge and practical skills, 119 students (73%) want to work in Ukraine. Respondents who answered the question "Where do you plan to develop in the physical therapy and occupational therapy area?" answered "abroad" was 45 (27%).

At the time of the survey, 142 students (87%) showed a desire to develop in the physical therapy area, 15 people had no desire (9%), it was impossible to determine - 2 students (1%) (Fig. 11).

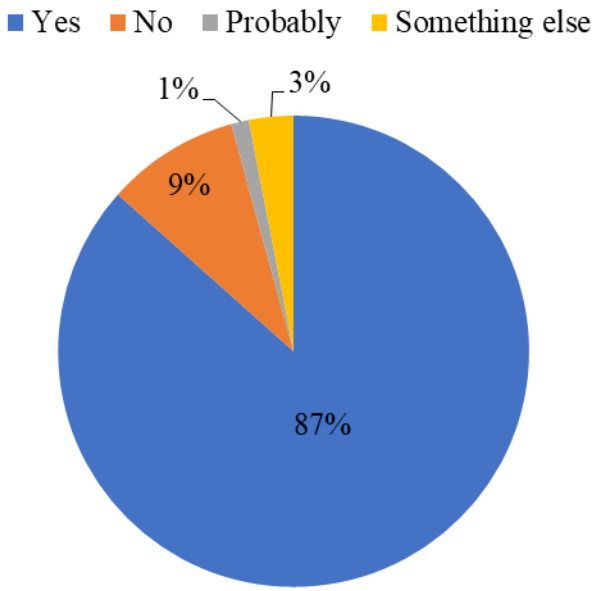

Figure 11. Do you want to develop in the physical therapy and occupational therapy area?

Among the "something else" answers was the followed: yes, but abroad, after additional training, the choice will depend on the situation in Ukraine.

So, summarizing the study, we can say that students of the master's degree program of the Department of Physical Therapy and Occupational Therapy NUUPES, in general, are satisfied with the quality, content, and methods of teaching the subjects of the above program. However, students also noted shortcomings; there are followed: problems with employment, low quality of material in some disciplines, the absence or inability to work with special equipment, and differences in the content of theoretical and practical classes.

Conclusions / Discussion

Under conditions when the social needs, interests, and values of young people are dynamically changing, when higher education in Ukraine has become widespread, and higher education institutions have become diverse not only in areas of training but also informs and quality of educational services, the selection process higher education, the future profession is becoming more pragmatic.

The detailed scientific and methodical literature analysis showed that students' survey is a universal, simple and effective component of assessing various parts of the educational process and factors influencing student success [9, 10, 15]. The data obtained during this study confirm the authors [1, 3, 4, 7] about student surveys are a universal tool for assessing education quality. However, during our research, we concluded that the creation, editing, and further modernization of educational programs in physical therapy should bring the following components, there are followed: academic motivation of students, transformations, and reforms in health care in Ukraine, and international experience and world standards [2, 6, 11].

The use of information and communication technologies during the survey and processing of its results increases communication effectiveness between subjects and objects of examination (quality of use of the method). It ensures the efficiency and clarity of its products [5, 13, 14].

Thus, monitoring and evaluating the learning process's quality is a mandatory procedure for monitoring the quality of the educational process and student satisfaction, allowing you to solve the educational process's problems quickly.

Prospects for further research are to assess the quality of clinical practice by students of the master's degree program.

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INCREASING THE DEVELOPMENT LEVEL OF STRENGTH ABILITIES OF ATHLETES AGED 10-11 IN ACROBATIC ROCK AND ROLL

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Purpose: to substantiate the effectiveness of the author's program for the development of strength abilities of athletes aged 10-11 engaged in acrobatic rock and roll.

Material and methods: the study was conducted in the period from September 2019 to October 2020 on the base of the acrobatic rock and roll club "SUMMIT" in Kharkiv. The study involved 20 young athletes from 10 to 11 years old (10 boys and 10 girls). All studied athletes were engaged in the group of preliminary basic training of the 1st year of training. The following methods were used in the work: analysis and generalization of scientific and methodological literature; pedagogical experiment; methods of mathematical statistics.

Results: considering the level of physical fitness of athletes, a training program was developed for the integrated development of strength abilities of young athletes aged 10-11 years, who are engaged in acrobatic rock and roll. The program provided for an increase in the level of development of the strength abilities of the muscles: arms, shoulder girdle, neck, torso, and legs. The introduction of the training program helped to increase the level of development of muscle strength: the upper shoulder

girdle by 17,5% in boys and 22% in girls; torso muscles by 12,6% in boys and 10,2% in girls; explosive force of leg muscles by 0,9% in boys and 0,6% of girls.

Conclusions: because of the ascertaining experiment with the use of a specially developed training program in young men there was a significant increase of the development strength abilities level of the muscles of the upper shoulder girdle and torso ($p < 0,05$-$0,001$). As for girls, because of the implementation of the developed training program, the development strength abilities level of the muscles of the upper shoulder girdle significantly increased ($p < 0,05$-$0,001$).

Keywords: acrobatic rock and roll; strength abilities; training program, strength training, stage of preliminary basic preparation.

Introduction

Acrobatic rock and roll is a relatively new sport not only in Ukraine but all over the world. The rapid development and growth of its popularity determines the need of the development and scientific-methodological substantiation of specific methods of various sections of training athletes, especially beginners, as initial skills have a decisive influence on further success.

V. Adashevskiy [6] believes that sports training in acrobatic rock and roll is complicated by the technique of performance and the need to learn a large number of complex motor actions performed in pairs with music. B. Blasing, B. Calvo-Merino [8] found that dance elements and figures are characterized by a special style of performance - it requires considerable coordination and the ability to coordinate movements with almost all parts of the body.

According to P.M. Kizim [3], the most important components of the training process are the physical and technical fitness of athletes, which requires a rational method of training.

Sufficient physical fitness of athletes ensures the integrity, consistency, and safety of the training process, and is a criterion for the compatibility of partners for sports dancing [2, 9].

Since the development of all components of strength training is very important in the training system of young athletes engaged in acrobatic rock and roll, and plays an important role in ensuring effective mastery of acrobatic rock and roll techniques, the problem of optimizing the construction of physical training, and strength training, is relevant.

Connection of work with scientific programs, plans, themes. The study was performed in accordance with the research topic of the Department of Gymnastics, Dance and Choreography: "Theoretical and methodological principles of development of system-forming components of physical culture (sports, physical recreation, fitness) (2020-2025)". State registration number 0120U101215.

Purpose of the study. To substantiate the effectiveness of the author's program of complex development of strength abilities of athletes aged 10-11 who are engaged in acrobatic rock and roll.

Material and Methods of the research

The study was conducted in the period from September 2019 to October 2020 based on the acrobatic rock and roll club "SUMMIT" in Kharkiv. The study involved 20 young athletes aged 10 - 11 years (10 boys and 10 girls), who were engaged in the group of preliminary basic training of the 1st year of study. The following methods were used in the work: analysis and generalization of scientific and methodical literature; pedagogical experiment; methods of mathematical statistics.

Results of the research

At the beginning of the study, to develop a training program, it was determined the correspondence of the physical fitness level of the studied athletes and their age characteristics (table 1).

Based on the obtained data, it was found that the degree of muscle strength development of the upper extremities and torso and leg strength corresponds to the average level (score 4 points).

On the basis of the received data, there was developed the training program of complex development of power abilities of young sportsmen aged 10-11 years who are engaged in acrobatic rock and roll and are at a stage of preliminary basic

preparation. The developed program was introduced into the educational and training process and included physical exercises, which were aimed at the complex development of speed-power and relative-power abilities. During the ascertaining and shaping experiment, a group of young athletes performed daily specially composed sets of physical exercises aimed at developing the strength of the upper extremities' muscles, muscles of the neck and torso and leg muscles.

Table 1

Assessment of the physical fitness level of athletes aged 10-11 years at the beginning of the experiment (n = 20) (by Senitsa A.I., 2010 [5])

Control tests	Normative indicators of the preparedness level for the curriculum for CYSS (points)			Average group indicators of strength training of the studied athletes	
	«5»	«4»	«3»	Number of times	mark
	boys (n=10)				
Pull-ups on the crossbar, number of times	6	5	4	5	4
Flexion and extension of the arms at lying down, number of times	12	10	8	9	4
Raising straight legs to an angle of 90° in the height of the back to the gymnastic wall, the number of times	10	8	6	8	4
Running 30 m from a high start, s	5,5	5,8	6,0	5,7	4
Long jumps from a place, cm	175	170	165	169	4
girls (n=10)					
Pull-ups on the crossbar, number of times	4	3	2	3	4
Flexion and extension of the arms at lying down, number of times	10	8	6	8	4
Raising straight legs to an angle of 90 ° in the height of the back to the gymnastic wall, the number of times	8	6	4	6	4
Running 30 m from a high start, s	6,5	6,7	7,0	6,7	4
Long jumps from a place, cm	160	155	150	156	4

In the main part of the training session, after solving the tasks of technical training, physical exercises were performed, specially aimed at the complex development of strength abilities. The first three days of the week (Monday, Tuesday, and Wednesday) there were used exercises aimed at developing speed and strength

abilities. At the end of the week (Thursday, Friday, and Saturday) exercises were used to develop relative strength abilities.

After the introduction of the experimental program of strength training of the studied contingent of athletes, significant changes in the indicators of the manifestation of strength abilities were determined (Tables 2, 3).

Table 2

Indicators of the development level of strength abilities of the studied boys during the study period (n = 10)

Control tests	Indicators		t	P
	at the beginning of the experiment n = 10	at the end of the experiment n = 10		
	$X_1 \pm õ$	$X_2 \pm õ$		
Pull-ups on the crossbar (number of times)	5,2 ± 0,8	6,3 ± 1,2	4,71	<0,01
Flexion and extension arms in emphasis lying (number of times).	9,4 ± 1,4	10,7 ± 1,7	4,99	< 0,001
Raising straight legs to an angle of 90 ° in the height of the back to the gymnastic wall (number of times).	8,3 ± 1,3	9,5 ± 1,7	4,81	< 0,001
Running 30 m from a height start (s).	5,71 ± 0,2	5,66 ± 0,2	1,46	> 0,05
Long jumps from the place (cm)	169,1 ± 2,8	170,6 ± 3,9	2,24	< 0,05

Note: t_{kr}. 2,23

The analysis of the obtained data revealed significant changes after the implementation of the experimental program (p <0,05-0,001) in the indicators of the manifestation of strength of the upper extremities' muscles, which were determined by flexion and extension of the arms in the supine position and pull-ups on the crossbar for both boys and girls.

As for boys, the applied experimental program had a positive effect on increasing the strength level of the torso muscles, as evidenced by significant improvements in the test results by raising the straight legs to an angle of 90 ° at the height of the back to the gymnastic wall (p <0,001).

When performing other test exercises, it was found that the results in both boys and girls tended to increase, but these differences were not significant (p> 0,05).

Table 3

Indicators of the development level of strength abilities of the studied girls during the study period (n = 10)

Control tests	Indicators		t	P
	at the beginning of the experiment n=10	at the end of the experiment n=10		
	$X_1 \pm õ$	$X_2 \pm õ$		
Pull-ups on the crossbar (number of times)	3,2 ± 0,8	4,1 ± 1,0	3,86	< 0,01
Flexion and extension arms in emphasis lying (number of times).	7,8 ± 1,6	8,9 ± 1,9	4,71	< 0,01
Raising straight legs to an angle of 90 ° in the height of the back to the gymnastic wall (number of times).	6,2 ± 1,5	6,9 ± 1,7	2,08	> 0,05
Running 30 m from a height start (s).	6,71 ± 0,2	6,68 ± 0,2	1,15	> 0,05
Long jumps from the place (cm)	156,2 ± 3,1	157,1 ± 3,1	2,08	> 0,05

To determine the impact of the developed training program, the increments level of speed-power development and relative-power abilities of the studied athletes were calculated (Figs. 1, 2).

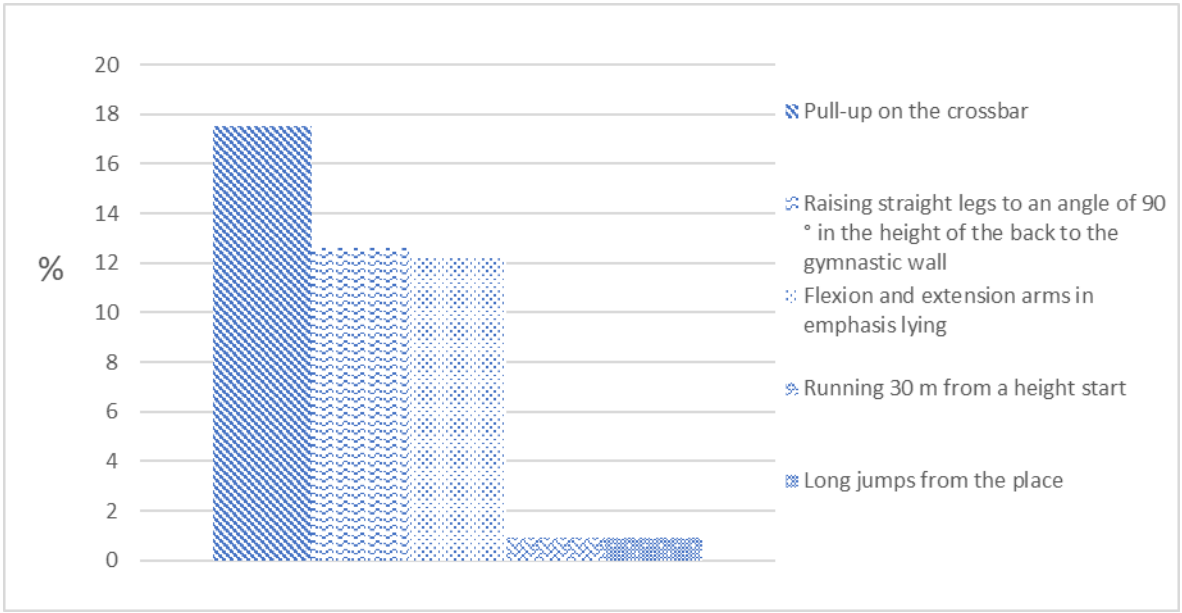

Figure 1. The increase in the level of speed-power development and relative-power abilities of the studied guys during the experiment

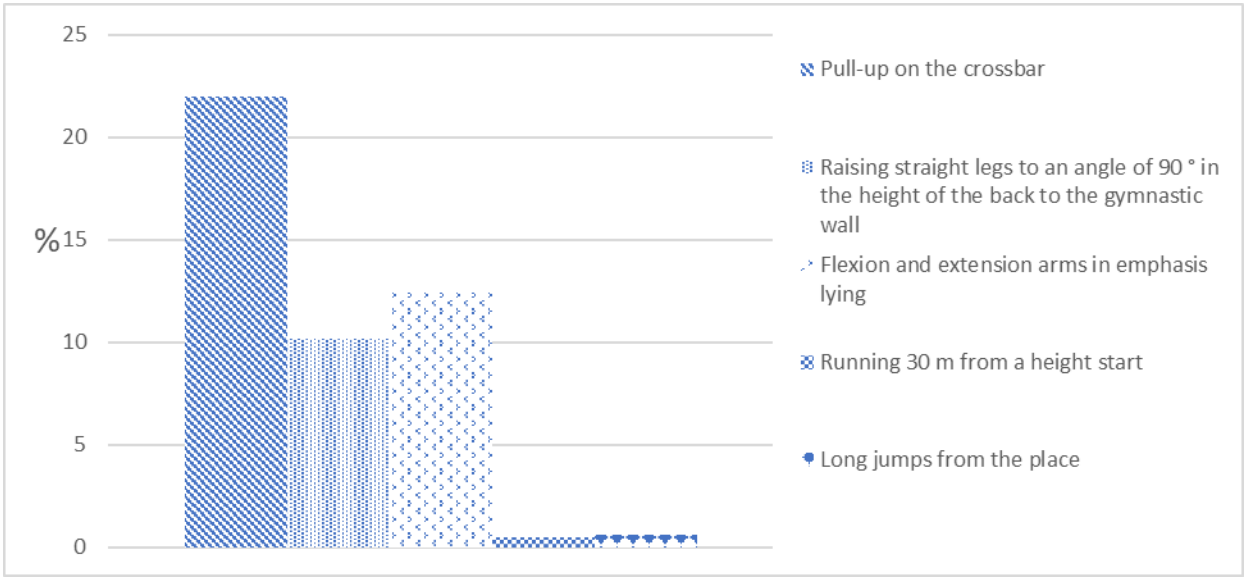

Figure 2. The increase in the level of speed-power development and relative-power abilities of the studied girls during the experiment

The analysis of the growth of the boys' results revealed the greatest influence of the developed program of strength training on the development level of strength abilities of the upper extremities' muscles by 17,5% and the torso by 12,6%. The developed training program had the least impact on the development level of boys' speed strength by 0.9%.

Analysis of the results of the increase in strength training of girls revealed the most effective influence of the developed program on the development level of strength abilities of the upper extremities' muscles by 22%. The smallest influence of the developed program as well as at guys was observed on the development level of speed force by 0,6%.

Conclusions / Discussion

The study confirmed the information of Lutsenko L.S., Bateeva N.P. [1, 4] of the importance of strength in training in acrobatic rock and roll. In the works of Anca I., Kim N. [7, 10] special attention is paid to the training of flexor muscles, as the development level of strength of these muscle groups largely depends on the success in mastering the technique of exercise, but the proposed strength programs training does not involve the integrated development of the strength of certain muscle

groups. The results of the study complement the information of Bateeva N.P., Kravchuk T. [1, 11] regarding physical training in acrobatic rock and roll.

Conducting a formative experiment using a specially designed training program for integrated development of strength abilities revealed that under the influence of systematic training and the applied experimental program in boys there is a significant improvement in muscle strength of the upper extremities, torso, and legs ($p < 0,05$-$0,001$), in addition to speed indicators ($p > 0,05$), and as a consequence of increasing its level from medium (4 points) to high (5 points).

In girls, because of the implementation of the developed training program, significantly improved muscle strength of the upper extremities ($p < 0,05$-$0,001$), and as a consequence of increasing its level from medium (4 points) to high (5 points). However, the level of development of torso and leg muscle strength ($p > 0,05$) remained at the starting position - average (4 points).

In boys, the developed training program had the greatest impact on the level of development of strength abilities of the upper extremities' muscles and torso, which are 17,5% and 12,6%, respectively. In girls, because of the application of the developed training program, the largest increases were observed in the level of development of strength abilities of the muscles of the upper extremities, which is a percentage of 22%.

Prospects for further research. It is planned to establish the relationship between the development level of speed-power and relative-power abilities and indicators of the technical training level in acrobatic rock and roll.

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