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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.
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CONTENT

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Main components of a long-term prediction structure when selecting and organizing sports activity for children at the initial stage of multi-year athletes' training

Abdulvahid DIshad Nihad

Koya University, Kay-Sandzhak, Autonomous Republic of Kurdistan, Iraq

Purpose: *systematize the existing criteria for the long-term diagnosis of the predisposition of children to the successful development of a specific feature of the arsenal of competitive exercises in sports gymnastics diagnosis of children's predisposition to the successful development of a specific feature of the arsenal of competitive exercises in gymnastics.*

Material & Methods: *material for this work was the empirical results obtained in the study, which, when presented in semantic spaces with a single measure introduced in them, give a certain ranked structure of their orderly representation. In this representation of empirical data, there are quite pronounced analytic relationships that allow us to establish general patterns of this ordering of data and to determine on the basis of general regularities individual features that affect the variability of the behavior of general laws. Main method is the statistical processing of empirical data on the basis of which geometric constructions were carried out, which were approximated by analytical expressions and their subsequent analysis.*

Results: *based on the conducted studies and the subsequent analysis of the structure of long-term criteria for the evaluation of the measure of prospects, based on the phylogenetic characteristics of their manifestation, a set of necessary sufficiency of these criteria.*

Conclusion: *in the existing structure of long-term criteria for selecting and orienting children for gymnastics, along with a successful decision to assess the kinematic and dynamic characteristics of motor activity in determining the significance of their share participation in performing competitive exercises remain unaccounted for and lack reliable criteria for assessing motor abilities and motor properties, which significantly reduces the effectiveness of long-term prognosis.*

Keywords: *long-term prognosis, selection, biological age, physical qualities, properties, abilities.*

Introduction

In any kind of professional activity, the problem of selecting and predicting the level of learnability is the determining factor in the formation of human resources. In sports this problem is most systematically presented in the works of V. N. Platonov [1]. However, regardless of the type of professional activity, the person remains at the heart of this problem – an obligatory component that participates in ensuring the effectiveness of obtaining a result in the system "person – object of management – environment". In all cases, the successful resolution of the issue of human reliability in this system requires an ergographic description of the requirements imposed on the person by the component components of the system – the object of control, the environment. In the overwhelming majority of cases, this kind of information is achieved purely empirically, as a result of prolonged natural selection. There is no general theory for solving this problem [2; 3].

The most characteristic feature in this direction is a comprehensive study of man as an element of the general system "person – object of management – environment" from the standpoint of reliability facts in these systems, which reflects his suitability for the relevant professional activity. Accumulated experience in the research of this area has allowed identifying the main components determining the professional suitability of a person regardless of the nature of professional activity. To such constituent components are the features of the physical development of the individual; his physical health and current functional condition; mental capabilities that provide the necessary stability of a person to work in special and extreme conditions in the appropriate environment of professional activity. The set of these characteristics reflects the necessary requirements that determine the individual readiness for the appropriate level of complexity of performing professional activities, which must necessarily be supplemented by sufficient conditions for professional training.

In turn, professional preparedness, in addition to the predisposition to its implementation, is determined by the available level of its assimilation and the speed at which it is achieved. In most cases, these components do not have reliable methods of determination, which is the reason for the decrease in the reliability of the long-term prognosis of professional reliability [4].

Relationship of research with scientific programs, plans, themes. The research was carried out in accordance with the summary plan of scientific research works in the field of physical culture and sports for 2011–2015 on the topic 2.6 "Theoretical and methodological basis for improving the training process and competitive activities in the structure of long-term training of athletes," the state registration number 01110001168.

The purpose of the research: systematize the existing criteria for the long-term diagnosis of the predisposition of

children to the successful development of a specific feature of the arsenal of competitive exercises in sports gymnastics diagnosis of children's predisposition to the successful development of a specific feature of the arsenal of competitive exercises in gymnastics.

Objectives of the study:

1. Identify the main components in the system of long-term forecasting in selecting and targeting the sport of children at the initial stage of long-term training of athletes.

2. To consider the reliability of existing selection criteria and their full presence in the existing system of long-term forecasting in the selection and orientation of children for gymnastics in the system of long-term training of athletes.

3. Identify the main components of long-term selection, which determine the professional suitability of the individual for mastering the specificity of the motor activity of the arsenal of competitive exercises in gymnastics and assess the completeness of the entire system of components used in the reliability of its functioning.

Material and Methods of the research

Signed semantic spaces were used with a single measure of comparison of the parameters being compared; statistical processing of empirical material and its analysis on the basis of the statistical principle of achieving an equifinal final result; geometric representation of the obtained data in semantic feature spaces with the subsequent approximation by their corresponding analytical expressions.

Results of the research and their discussion

The bases for building long-term criteria for predicting the selection of children for gymnastics are phylogenetic abilities that determine individual biological development and characterize its biological age. Validity of the choice of these criteria is determined by the fact that the structure of the somatotype lies at the basis of the kinematic characteristics of the construction of motion.

Distribution of body weight according to biokinematic links, their dimensions, with the corresponding type of body shaping, determines dynamic efforts corresponding to their movement. Since any movement characteristic is possible at a certain static stress, which provides the working posture necessary for the appropriate kind of displacement, the constitution of the body structure is the most indicative for long-term selection to the appropriate specificity of the arsenal of competitive exercises of the sport in question [5].

In the case of an ergographic description of the motor activity of a selected sport, its structure includes characteristics of the motor qualities: dynamic and statistical force, the speed of its development, the duration of the conservation of the intensity of the characteristic motor activity, amplitude of the manifestation of movements of the biokinematic links of the body, the accuracy of the coordination of the elements of motion in the sequence of their execution and the simultaneous implementation of the complicated coordination structure of their construction. If, to achieve a final equifinal result of the motor actions performed, there is a choice of different options that may be more preferable to achieve the goal, then the ability not only to accurately assess the preference of the necessary choice but also the speed of this choice. In general, the ergogram includes a shared description of the motor qualities necessary to implement a specific form of motor activity in a selected sport. In all cases, to accomplish this task, it is necessary to reflect all six motor qualities that form the corresponding species motor activity of the athlete [6].

Opened in the research features of the manifestation of the motor quality of the force in connection with its division into two constituent components – dynamic force and static stress led to the need for their evaluation and testing of the features of the manifestation of these characteristics. Dynamic force is characterized by the rapidity of its development per unit time, the static stress of its magnitude and its variation by the angle of extension and the possible duration of conservation of this effort. This feature of its manifestation characterizes the presence of statistical stress pulsations during cyclic exercises. The range of this type of pulsation depends on the amplitude of the change in developmental conditions between the operating biokinematic links, which is a characteristic of the preservation of the working posture of the motor action. Consequently, any motor act is characterized by a strict consistency between static stress and dynamic forces for their performance. Energy total expenditure for the motor act performed is distributed in the limit of these components. Greater the value of the static voltage, the less the fraction of the energy potential remains for the dynamic effort. Representation of the interdependence of these characteristics in the performance of specific motor actions specific to a particular sport in all cases has a pulsation of the dynamic force, static voltage pulsation, the average statistical value of the energy cost of the performed motion and the amplitude of the oscillation of these characteristics. Reflection of these data in the semantic character space makes it possible to build the structure of energy supply characteristic for the sport in question, and the reflection of the nature of the manifestation of energy expenditure by a particular individual, when implemented, reflects the measure of its compliance with the chosen sport. If the nature of the energy supply to the motor activity of a selected sport is a factor of environmental selection, then the individual characteristic of this indicator, being conditioned by phylogenetic predispositions of biological development, determines the measure of the conformity of the made choice. When this ratio tends to unity, the long-term value of the forecast made for this indicator is determined [7].

The complete structure of the components of the long-term forecast for all parameters that determine the obtaining of an equifinal final result depending on the accuracy of its required evaluation is represented in the structure of the generalized characteristic space with a single measure in it of the evaluation of the available set of components under consideration. An essential feature of the construction of such a space is the definition of a general criterion for comparing the individual indicator of a particular component with the average statistical value of its manifestation at a specific chronological age of the entire surveyed population, regardless of the chosen type of sports. If there is no such quantity, it can be replaced by a conditional mean, which in the structure of necessary constructions is justified in the theory of mathematical statistics [8].

Thus, it is possible to construct a semantic space for repre-

senting the mutual correspondence of the degree of physical preparedness of the child to the motor activity of the environmental impact of physical exercises.

For any sport, whatever feature of the motor activity it does not have, an initial basic training is required, which is the basic arsenal of the motor activity of general gymnastics and athletic gymnastics. This kind of initial training can be defined as a basic or universal.

Universal training represents an integral indicator of an equally possible, multidirectional motor activity, which gives an effective result. Each of the motor qualities has a range of its manifestation. The range in which all motor qualities have their presence can be characterized as a zone of universality of motor activity. Like any phenomenon, the universal motor activity has a qualitative expression and the strength of its manifestation. For the forecasting of prospects, an important role is played by the qualitative structure of universal preparedness, which includes a certain set and sequence of components characteristic for a given phenomenon and the magnitude of their manifestation. The structure of this qualitative representation is shown in the Figure.

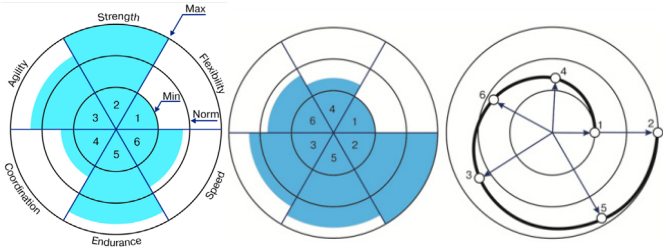

Fig. Sequence of representation of transformation of the petal diagram into a spiral diagram with reflection of the ranked expression of the controlled features that determine the individual qualitative characteristics of the motor activity

An analogous structure of the qualitative representation of the characteristics of the motor activity of an ergographic description of the specifics of a particular sport allows one to justify the child's predisposition to engage in a specific type of sport activity.

Peculiarity of constructing this kind of diagram is its expansion in the number of indicators to be compiled, depending on the necessary completeness of the reflection of the prognostic characteristics and the detailing of the individual and species ergographic representation of sports activities. From the available components of the long-term forecast used in the structure for selecting and targeting children for the selected sport at the initial stage of the multi-year training, the entire aggregate of them can be systematized into three categories: somatic indicators of physical development; trophic indicators of physical health; mental indicators reflecting the competitive reliability of the individual.

An analysis of the completeness of the necessary criteria for long-term prognosis has made it possible to determine their insufficiency, which sharply reduces the effectiveness of the developed system in the reliability of its long-term prognosis. In the existing system of long-term selection there are no indicators such as the speed of learning and the level of accessible learning. The absence of these evaluation criteria explains the fact that individuals who succeed at the first stages of long-term training of athletes in the vast majority do not become in the future highly qualified athletes. Of the total number of such a result, no more than 5% [1].

Main factor in this case is the individual level of learning, which was found out as a result of using the method of natural pedagogical experiment, developed and introduced into scientific research in pedagogy and psychology by A. F. Lazursky. Revealed regularity of natural environmental selection of the most adequate to the requirements of the increasingly complicated conditions of highly qualified sports activities was shown, that the bulk of those who involved in sports have a limit of accessible learning ability corresponding to the level of the first category and possibly the CMS. It should be noted that the effectiveness of long-term selection is determined not by the sum of the full set of characteristics, but by their product. The reliability index can theoretically be equal to one or 100% only when each criterion is also 100% accurate. In reality, the reliability of the forecast of each of the criteria only tends to unity, and the uncertainty of the indicators of the speed of learning and the level of learning, by virtue of their absence, reduces this forecast to the level of training of the average mass of those who involved in sports, excluding the most gifted individuals.

Conclusions

In the existing structure of long-term criteria for selecting the orientation of children for gymnastics, along with a successful decision to assess the kinematic and dynamic characteristics of motor activity in determining the significance of their equity participation in performing competitive exercises remain unaccounted for and do not have sufficiently reliable criteria for assessing motor abilities and motor properties that determine the speed of training and the level of marginal learning, which significantly reduces the effectiveness of long-term prognosis.

The study of these components and the development of the necessary tests for their numerical determination is a **further task** in the performance of scientific work.

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Information about the Authors

Abdulvahid Dlshad Nihad: *Koya University, Kay-Sandzhak, Autonomous Republic of Kurdistan, Iraq. URL: http://koyauniversity.org/*
ORCID.ORG/0000-0002-0011-5655
E-mail: dlshad_dubai@mail.ru

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Flexibility development among 5–6th grade schoolchildren under the influence of cheerleading activity

Oleksandr Aghyppo
Tetiana Bala

Kharkiv State Academy of Physical Cultur, Kharkiv, Ukraine

Purpose: *to determine the degree of change in the level of development of the flexibility of 5–6th grade schoolchildren under the influence of cheerleading activity.*

Material & Methods: *103 schoolchildren of 10–11 years took part in the research. Methods: theoretical analysis and generalization of scientific and methodological literature, pedagogical testing, pedagogical experiment and methods of mathematical statistics.*

Results: *the indicators of the level of development of flexibility are presented, as well as the degree of their change under the influence of cheerleading activities among schoolchildren of the 5th and 6th grades of the general education school.*

Conclusion: *the use of cheerleading activity positively influenced the degree of manifestation of the flexibility of schoolchildren of middle classes in all the parameters studied.*

Keywords: *flexibility, cheerleading, middle school students.*

Introduction

Care for the health of the nation should be central to Ukrainian society. According to the Ministry of Health in Ukraine over the past decade, there has been a trend towards deteriorating health status of schoolchildren. So, only 50% of children belong to the main medical group. It is known that one of the main tasks of physical education is the preservation and strengthening of schoolchildren's health. However, analysis of the literature suggests that the level of physical fitness, physical health and physical performance of students is at an unsatisfactory level [1; 10; 17; 18; 21; 34].

According to experts, in order to improve the health status, increase the level of physical preparedness of the population of Ukraine, first of all it is necessary to improve the training of the younger generation [14; 15; 24; 36] through the use of various innovative means of physical education [2; 3; 8; 22; 25; 33].

It should be noted that one of the innovative means of physical education is cheerleading activity. Cheerleading includes a wide arsenal of various intensive movements that contribute not only to strengthening physical and spiritual forces, the education of aesthetic taste, the formation of interest in a healthy lifestyle [4; 12; 35], but also improves the elasticity of muscles and ligaments, and also increases the mobility of the joints, which is important in the daily life of a person [7; 9; 13; 23].

A number of scientific papers are devoted to the study of the development of flexibility through the use of a variety of means, methods and approaches [19; 20; 26 and etc.]. Thus, in the works of A. V. Fedoryaki, N. V. Bachinskaya (2016), the positive influence of rhythmic gymnastics on the development of the flexibility of girls aged 7–8. O. Smolyar (2011) notes that the use of modern dances has a positive effect on physical preparedness and especially on flexibility. V. M. Favoritov, K. A. Silyavina (2014) indicate that the use of exercise complexes that represent springy flexion-extension, flies, static tension, as well as overcoming resistance in paired exercises and simulators, effectively influence the flexibility parameters girls 6–7 years old, engaged in gymnastics. G. V. Tolcheva (2015) revealed an improvement in the flexibility and coordination abilities of university students in the process of hatha yoga classes during the school year. In turn, T. M. Bala, I. P. Maslyak (2011, 2014) note the positive impact of cheerleading exercises on the indices of flexibility of middle-class girls, and N. V. Krivoruchko (2015) in her study – the positive effect of cheerleading activities on level of development of flexibility among female students of higher education institutions of the I–II level of accreditation.

Thus, analysis of modern literature indicates a sufficient number of studies devoted to the study of the development of flexibility through the use of various innovative tools. However, we note that the question of the effect of chiding exercises on the level of development of the flexibility of schoolchildren aged 10–11 years remains insufficiently studied, which is of particular relevance in detailed consideration.

Relationship of research with scientific programs, plans, themes. The research was carried out according to the thematic plan of the Kharkov State Academy of Physical Culture, the scientific theme "Improvement of the process of physical education in educational institutions of different profile" for 2016–2020. (State Registration No. 0115U006754).

The purpose of the research: to determine the degree of change in the level of development of the flexibility of 5–6th grade schoolchildren under the influence of cheerleading activity.

Material and Methods of the research

The research was carried out on the basis of the secondary school No. 119 in Kharkov. 103 schoolchildren of grades 5–6 took part in them, of which two experimental groups and two control groups. All the children who took part in the experiment were practically healthy and were supervised by the school doctor.

In the course of the study, the schoolchildren of the control groups were engaged only in the generally accepted program for general educational institutions "Physical culture. 5–9 class ", and the educational process on the physical education of schoolchildren of experimental groups was supplemented by the variational module" Cheerleading "developed by us, which included such elements as: high V, low V, T motion, half T, muscleman, touchdown, tuck, spreadeagle, doublehook, Thighstand, Staddlelift, Suspendedsplit and other [11]. Specially selected exercises cheerleading made the content of the lessons of the module "Cheerleading", and also included in the preparatory part of the lesson of other variational modules, into the system of organized changes and were offered in the form of homework assignments.

Research methods: theoretical analysis and generalization of scientific and methodological literature, pedagogical testing, pedagogical experiment and methods of mathematical statistics.

To determine the level of development of the flexibility of schoolchildren of grades 5–6, the tests presented by L. P. Sergienko [28] and V. A. Romanenko [27] were used, namely: the inclination of the angle body d from the initial sitting position (cm), side split (cm) and twists hands with a gymnastic stick (cm).

Results of the research and their discussion

Analyzing the obtained data of the primary study, the absence of reliable differences in the indices of schoolchildren of control and experimental groups for all investigated parameters (p>0,05).

When comparing the results in the age aspect, improvement in the results with age was found in terms of the performance of the angle body and the side split, as well as worsening of the results according to the performance of arm twisting, both in schoolchildren of control and experimental groups. It should be noted that these age differences are mostly unreliable (p> 0,05), with the exception of the results of the torso tilt forward, where the differences are mostly reliable (p<0,05–0,001).

As a result of the obtained data, the dominance of the results of girls over the boys' indices on all the parameters studied was revealed. It should be noted that, based on the results of the angle body and side split, the observed differences are mostly reliable (p<0,01; 0,001), and according to the results of the execution of hand-wrenching – unreliable (p> 0,05), with the exception of the indicators of boys of the 5th grade, where the differences are reliable (p<0,01).

Comparing the results of the angle body with the norms presented by L. P. Sergienko [28], it was found that the results of schoolchildren of 5 and boys of 6 grades correspond to an evaluation of 1 point, girls of 6 grades – 2 points.

Comparing the results of the performance of the side split with the normative estimates presented by V. A. Romanenko [27], it was found that in boys they correspond to an evaluation of 3 points, and in girls – 4 points.

When comparing the results of the performance of arm twists with the norms presented by V. A. Romanenko [27], it was revealed that the data of schoolchildren of grades 5–6 correspond to an average level of mobility in the shoulder joints, which according to the scoring scale corresponds to 2 points respectively.

Thus, in schoolchildren aged 10–11 years, on average, the level of development of flexibility below the average.

Investigating obtained data after the application of specially selected cheerleading exercises in the process of physical education (Table 1), it was found that the students of all experimental groups showed the level of development of flexibility significantly and these changes are, as a rule, reliable (p<0,05–0,001).

Table 1

Indicators of the level of development of the flexibility of schoolchildren in experimental groups before and after the experiment

Period of study	Grade 5 Indicators, $\bar{X}\pm m$		Grade 6 $\bar{X}\pm m$	
Boys				
Angle body d from the initial sitting position (cm)				
Before experiment	(n=13)	3,2±0,60	(n=13)	3,9±0,68
After experiment		7,1±0,65		8,9±0,86
t		4,34		4,55
p		<0,001		<0,001
Side split (cm)				
Before experiment	(n=13)	28,3±2,53 2,53	(n=13)	27,4±1,90
After experiment		20,9±1,65		18,0±1,52
t		2,44		3,85
p		<0,01		<0,001
Wriggled hands with a gymnastic stick (cm)				
Before experiment	(n=13)	61,0±3,97	(n=13)	63,8±4,50
After experiment		58,1±3,16 3,16		59,5±3,49
t		0,56		0,76
p		>0,05		>0,05
Girls				
Angle body d from the initial sitting position (cm)				
Before experiment	(n=15)	6,3±0,90	(n=14)	9,2±1,64
After experiment		11,1±1,01		14,2±1,57
t		3,51		2,20
p		<0,001		<0,01
Side split (cm)				
Before experiment	(n=15)	16,3±3,16 2,59	(n=14)	14,9±1,45
After experiment		8,9±1,72		8,1±1,34
t		2,38		3,43
p		<0,01		<0,001
Twists hands with a gymnastic stick (cm)				
Before experiment	(n=15)	47,8±2,37	(n=14)	57,8±1,77
After experiment		45,8±1,70 1,70		54,6±1,38
t		0,69		1,43
p		>0,05		>0,05

Only exception is the results of the execution of the twists by the hands of all age groups studied, where the improvement of the results is not valid (p>0,05).

So, according to the angle body, in the boys of the 5th and 6th grades, the above indices improved more than twice; girls of the 5th grade – on 77,8%; 6th grade – on 54,3%. According to the results of the side split in boys of the 5th grade, the results improved by 26,1%; 6th grade – by 34,3%; in girls – by 45,3% and 45,7% respectively. According to the results of twists by the hands results, the boys of the 5th grade improved by 4,7%; 6th grade – by 6,8%; in girls, respectively, by 4,2% and by 5,6%.

Thus, the most significantly improved the results of schoolchildren of the 5th grade in terms of mobility of the spinal column and boys of the 6th grade according to mobility data in the shoulder joints.

Comparing the results of the schoolchildren of the experimental and control groups obtained after the expiration of the experiment (Table 2), the predominantly reliable prevalence of the results of the schoolchildren of the experimental groups over the control.

Considering the data of repeated studies of schoolchildren of experimental groups in the age and sex aspects, it should be noted that the tendency of differences remained unchanged compared to the initial data.

When analyzing the indicators of schoolchildren of control groups obtained after the experiment, it was found that they also changed somewhat, however, these changes are not significant and, as a rule, are not reliable (p>0,05).

So, according to the angle body, in boys of the 5th grade the results improved by 31,9%; 6th grade – by 20,6%; girls respectively 29,6%; 20,9%. According to the results of the angle body boys 5th grade results have improved by 9,4%; 6th grade – by 9,5%; in girls – by 8%; 11,9% respectively. According to the twists by the hands results, the boys of the 5th grade improved by 3,9%; 6th grade – by 1,3%; girls respectively – by 1,2%; 0,5%.

In the age and sex aspects, the results of schoolchildren in the control groups showed no significant changes in comparison with the baseline data.

When comparing the results of the angle body from the initial sitting position of schoolchildren of experimental groups with the norms presented by L. P. Sergienko [28], revealed that the results of girls of the 5th grade improved by 2 points and began to correspond to 3 points; boys of grades 5–6 improved by 1 point and began to correspond to 2 points; girls of the 6th grade improved by 2 points and began to correspond to 4 points.

Comparing the repeated indices of the schoolchildren of the experimental groups with the norms given in the work of V. A. Romanenko [27], it is determined that the results of performing the side split of the boys of all study groups improved by 1 point and began to correspond to the 4 points; the rates of girls of the 6th grade increased by 1 point in the same way and corresponded to 5 points; girls of the 5th grade, despite a significant increase, remained unchanged on the assessment scale, and also, as before the experiment, correspond to an assessment of 4 points.

When comparing the results of the performance of handwringing, it was revealed that the indicators of girls of the 5th grade increased from below the average to the average level and began to correspond to 3 points, the improvement in the indicators of boys of the 5th, schoolchildren of the 6th grades was not reflected on the scoring scale and they also and before the experiment, correspond to below average and low level of mobility of shoulder joints of schoolchildren of middle classes.

An analysis of the results obtained by schoolchildren in control groups revealed no changes in the level of development

Table 2

Indicators of the level of development of the flexibility of schoolchildren in experimental and control groups after the experiment

Grades		Group				t	p
		n	Experimental	n	Control		
		Indicators, $\bar{X}\pm m$					
Angle body from the initial sitting position (cm)							
5 grade	B	13	7,1±0,65	16	4,1±0,60	3,35	<0,001
	G	15	11,1±1,01	9	7,8±1,14	2,16	<0,05
6 grade	B	13	8,9±0,86	13	4,9±0,66	3,68	<0,001
	G	14	14,2±1,57	10	9,8±1,00	2,37	<0,01
Side split (cm)							
5 grade	B	13	20,9±1,65	16	26,8±2,22	2,10	<0,05
	G	15	8,9±1,72	9	15,1±2,03	2,32	<0,01
6 grade	B	13	18,0±1,52	13	24,3±2,48	2,17	<0,05
	G	14	8,1±1,34	10	13,3±1,63	2,48	<0,01
Twists hands with a gymnastic stick (cm)							
5 grade	B	13	58,2±3,16	16	64,1±1,97	1,59	>0,05
	G	15	45,8±1,70	9	53,9±2,06	3,03	<0,01
6 grade	B	13	59,5±3,49	13	65,5±1,33	1,59	>0,05
	G	14	54,6±1,38	10	62,0±2,55	2,56	<0,01

of flexibility in the study of all age groups for all studied parameters.

Thus, after using cheerleading activity at physical culture lessons, the indicators of the level of development of flexibility have significantly improved in schoolchildren of experimental groups. The most significant increase in the results is observed in boys and girls 10 years.

Consequently, the results of the study allow us to draw the following conclusions.

Conclusions

1. Data of the primary study of the level of flexibility development of schoolchildren of grades 5–6 in comparison with normative criteria correspond to an assessment of 2 points ("below average").

In the age aspect, in the main there is a significant improvement in the results with age in both boys and girls in the study groups ($p<0,05–0,001$). In the sexual aspect, the dominance of the results of girls over the data of boys ($p<0,01; 0,001$).

2. Inclusion in the process of physical education of cheerleading exercises positively influenced the level of development of the flexibility of schoolchildren of experimental groups, which corresponded to the average level of 3 points. The greatest increase in the indicators was registered among schoolchildren for 10 years. Indicators of the level of development of the flexibility of the children of the control groups after the experiment did not undergo significant changes.

Analysis of the results of repeated studies in the age and sex aspects did not reveal significant changes in comparison with the initial data.

3. Conducted researches testify to the positive influence of the complexes of cheerleading exercises offered by us on the level of development of students' flexibility of the 5th and 6th grades, which makes it possible to recommend physical education teachers to include in the educational process of physical education of middle school students the exercises for cheerleading.

Prospects for further research in this direction can be carried out by determining the degree of influence of cheerleading activities on the level of development of the speed of schoolchildren in the middle classes.

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Information about the Authors

Oleksandr Aghyppo: *Doctor of Science (Pedagogical), Professor; Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0001-7489-7605
E-mail: aghyppo@yandex.ua

Tetiana Bala: *PhD (Physical Education and Sport); Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-5427-6796
E-mail: tanya.bala2206@gmail.com

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Theoretical and applied aspects of the formation of ecological culture of schoolchildren in the process of physical education

Olena Andrieieva
Inna Holovach
Inna Khrypko

National University of Physical Education and Sports of Ukraine, Kyiv, Ukraine

Purpose: *scientifically substantiate and develop a program of classes using ecological tourism for primary school age children, aimed at the formation of ecological culture of schoolchildren.*

Material & Methods: *pedagogical experiment was carried out in the form of ascertaining (191 schoolchildren: 96 boys, 95 girls) and formative (50 schoolchildren). The level of ecological culture of schoolchildren was assessed by the method of A. V. Asafova. The assessment of the level of physical health was carried out according to the method of G. L. Apanasenko.*

Results: *model of ecological culture of schoolchildren of primary school age is theoretically grounded and developed, which includes the following components: axiological, motivational, activity, cognitive, and the basic criteria and levels of its formation in schoolchildren. The low level of ecological culture of schoolchildren is revealed. It is established that effective forms of ecological tourism are the ecological lesson, the ecological path, the ecological game, the ecological trip of the day off, the ecological excursion, the ecological camp. These funds were used to build a program of physical preparedness.*

Conclusion: *positive influence of the developed program of ecological tourism on the indicators of physical condition, formation of ecological culture, organization of useful leisure and active recreation of children of primary school age.*

Keywords: *program, ecological tourism, ecological culture, schoolchildren, physical education.*

Introduction

In modern conditions, one of the strategic tasks of the education system is the formation of a person with a high level of ecological culture. One of the most important periods for the formation of the foundations of an ecological culture of the individual, according to many authors, is the younger school age. Work on the formation of ecological culture of younger schoolchildren is of great importance for the formation and further development of the student's overall culture of personality.

Theoretical analysis of the data of special literature and advanced world experience on the research problem made it possible to establish that in the process of physical education of school-age children by researchers [1, 2; 6; 11; 13; 14] proposed to use a wide range of different means of motor activity, the direction of which is determined by the need to solve general and special problems. Despite the fact that scientists are intensively engaged in multifactorial research of ecological culture, the tasks of environmental education of schoolchildren in the process of physical education are given insufficient attention [8].

The state of ecological literacy of schoolchildren is characterized by significant gaps in education. An analysis of school practice shows that the modern education system does not provide a systemic impact on the student's personality in order to overcome excessive pragmatism in relation to the environment. The elementary school needs effective technologies aimed at harmonizing relations in the system of "schoolchildren – the environment", the result of which should be the formation of children's respect for nature [7; 8; 13].

The existing problems in the general education school, the lack of information about the state of the environment, the outdated material base lead to the formation of an inadequate worldview of schoolchildren. This situation causes a lack of basis for the formation of motivation for a careful attitude not only to the surrounding nature, but also the manifestation of indifferent behavior towards one's own health [12]. Therefore, the use of ecological tourism facilities, which have a universal, interdisciplinary nature, will increase not only the level of ecological culture of younger schoolchildren, but will also improve the indicators of physical condition. The need to intensify activities in this direction is also targeted by well-known foreign specialists [10; 14]. It should also be noted that the methods of combining motor activity, physical exercises and loads of various orientation in physical recreation by means of ecological tourism, the principles of drawing up extracurricular programs for the physical education of schoolchildren by means of ecological tourism remain insufficiently investigated. The need to substantiate theoretical approaches to the development of a program using ecological tourism in the extra-curricular work on physical education of schoolchildren in primary school age, aimed at the formation of ecological culture of students and the increase of their physical state, determined the choice of the research topic.

Relationship of research with scientific programs, plans, themes. The study was carried out in accordance with the plan of scientific work of NUPESU for 2016–2020 in accordance with the theme of the Department of Health, Fitness and Recreation "Theoretical and methodological foundations of recreational and recreational motor activity of various population groups" (state registration number 0116U001630).

The purpose of the research: scientifically substantiate and develop a program of classes using ecological tourism for primary school age children, aimed at the formation of ecological culture of schoolchildren.

Material and Methods of the research

To solve the tasks set in the work, generally accepted scientific methods of research were used. Theoretical analysis and generalization of special scientific and methodological literature was conducted with a view to studying in detail the features of the organization of physical education of schoolchildren, approaches to the formation of their ecological culture. The pedagogical experiment was carried out in the form of ascertaining (191 schoolchildren: 96 boys, 95 girls) and formative (50 schoolchildren). The duration of the formative experiment was one academic year. To participate in the pedagogical experiment, schoolchildren were invited (given that the children involved in primary school age participated in the research, the consent was obtained from the parents of schoolchildren).

Assessment of the level of physical health was carried out according to the method of G. L. Apanasenko [3]. For the diagnosis of environmental settings of the personality, a survey was carried out among schoolchildren of the lower grades according to the verbal associative method "EKPB" [10]. Questionnaire "Naturofil" [10] was used to diagnose the level of development of intensity of subjective attitude to nature. Diagnosis of attitude towards nature was assessed using the questionnaire "My Attitude to Nature" [10]. Studying the motives of schoolchildren's participation in the activity was carried out with the help of L. V. Bayborodov's method [5]. Level of ecological culture of junior schoolchildren was evaluated according to the method of A. V. Asaf [4] in the modification I. I. Golovach. Obtained results are treated by the methods of mathematical statistics [9]. Method of peer review was used in the form of a survey of a group of experts on the need and expediency of introducing the technology of forming an ecological culture of schoolchildren in the activities of general educational institutions. As experts, teachers-methodologists of physical culture of general educational institutions of Kyiv were involved (12 people). The degree of consistency of opinions of the interviewed experts was checked by calculating the concordance coefficient.

Results of the research and their discussion

Analysis of the assessment data of school motivation indicates that only 12% of respondents have an excellent (first) level of school motivation. A good (second) level has 14% of the studied students. 36% of schoolchildren perceive the school positively (third level), but the school of such children attracts mainly as an object of extracurricular activities. A third of children (28%) have a low (fourth) level of school motivation and in 10% of students (the fifth level), general school disadaptation. Results of the analysis of the physical condition of schoolchildren in primary school age indicate a decrease in individual indicators with age. Thus, in terms of physical health indicators, there is a decrease in the number of children with an average level of physical health from the second to the fourth grade, a similar picture is observed for indicators that characterize physical performance. There is also a decrease in the volume of motor activity among fourth-grade students (both boys and girls). Tendency to deterioration of the indicators of adaptive-reserve capabilities of the body (disruption of adaptation was observed in 44,12% of girls and 33,33% of boys in the fourth grade compared to 25,93% in girls in the second grade and 27,59% in boys), the number of days missed due to illness (in the second grade – 5,1, the third – 9,8, in the fourth grade – 16,1 days per student). The obtained results testify to the worsening also of the indicators of physical development (the number of children that have a disharmonious development has increased – in the second class 60,34% of students have a harmonious physical development, in the third – 50,81%, and in 4 classes the percentage of children having a harmonious physical development is reduced to 38,8%).

According to the results of the research, it is established that the dominant type of installation of junior schoolchildren about nature is aesthetic (girls – 43,8%, boys – 30,4%), when nature is perceived as an object of beauty, that is, environmental settings are formed through perceptive-emotional channels. next most rated cognitive setting is when nature is perceived as an object of study and an object of protection. This setting dominates in 29,5% of boys. Ethical setting dominates in 25,8% of boys. Only a small part of schoolchildren in the lower grades have a pragmatic attitude, that is, they treat nature as an object of benefit: girls – 18,8%, boys – 14,3%.

Results of the questionnaire and the findings of the ascertaining experiment testify to the potential opportunities for younger schoolchildren to form environmentally appropriate behavior. Schoolchildren have a certain degree of knowledge about the norms and rules of behavior in nature, the dependence of health on the state of the environment, but not all consider it necessary to comply with environmental requirements in everyday life. In school practice, the formation of this characteristic occurs sporadically, without proper methodological support.

Model of ecological culture of schoolchildren of primary school age is developed, which includes the following components: axiological (the system of value attitude to natural objects, moral-willed qualities, attitude to health as a value), motivational (presence of motives for environmentally appropriate behavior, emotional background of environmental activity, interest in environmental tourism), actionable (adequacy of environmental behavior, level of motor activity) and cognitive (depth and consistency of environmental knowledge, ability to transfer environmental knowledge in an environmental situation), and identified the main criteria and levels (very low, low, below average, average, above average, high, very high) of its formation in younger schoolchildren.

Consistency of opinions of experts (concordance coefficient $W=0.81$ ($p<0,05$), indicates the advisability of introducing into the process extra-curricular work on physical education of younger schoolchildren of means of ecological tourism. Experts determined the most effective forms of ecological tourism for children of primary school age: ecological lesson – 19 points, ecological path (25 points), ecological game (30 points), ecological weekend trip (43 points), and ecological excursion (45 points), ecological camp (62 points). Received data testify to the need to include in the process of ecological education of younger schoolchildren of environmental-development situations, various methods and forms of work with children in organizing lively communication with nature, development of the perception of natural beings, the disclosure

of the values of nature through the organization of systematic observations, make it possible to realize the uniqueness of the natural world, the education of relations to the natural world, taking into account the structure and mechanisms of the development of ecological consciousness. Based on the analysis of the specialized literature and the results of the research, the set of organizational and pedagogical conditions for raising the level of ecological education of primary school children (an integrated approach to the use of educational opportunities for cycles of academic disciplines and reserves of extracurricular activities; rational combination of traditional and innovative forms and methods of accumulating experience of ecologically ethical behavior; appropriate didactic-methodical and staffing, etc.).

Basis for the development of the program of classes using the means of ecological tourism includes knowledge of the initial level of indicators of physical condition, environmental education, and motivation of children of primary school age. The main goal of the proposed program is to promote the development of a harmonious personality, to promote the adaptation of schoolchildren to intensification of the educational process, the organization of leisure and active recreation, the education of the ecological culture of schoolchildren. Program consists of theoretical and practical material, designed for 216 hours, aimed at the acquisition of basic knowledge and hiking skills, local history, sports orientation, focused on the child and takes into account their interests, is directed to a harmonious all-round education of the individual. Program provides for the following activities: educational, environmental, research, practical, cultural, entertainment, recreational, information.

Content of the extracurricular program for children of primary school age in the control group does not contain separately identified environmental activities. According to a smaller number of practical classes of environmental orientation and information activities. Younger schoolchildren of the control group have more thematic classes of special physical and tourist training. The program of extracurricular activities of the tourist and local lore profile is designed for 216 hours a year (6 hours a week).

Results of the conducted pedagogical experiment proved the effectiveness of environmental tourism taking into account the positive impact on the indicators of physical condition, the formation of ecological culture, the organization of useful leisure and active recreation for children of primary school age. There was a significant improvement in the indicators of the functional state, physical preparedness, level of ecological knowledge. So, there was an improvement in the results in the Rufieu trial with 7,5 conv. units up to 6,4 conv. units ($p<0,05$), the adaptive-reserve capabilities of the body (ARC) increased by 2,19%, the indicators of power, speed and speed-strength indices improved, the health indicators, increased activity and mood in children of primary school age in the experimental group after experiment. In the control group, we also observe a tendency to improve the physical state after the experiment, but the changes in the indices have no significant differences ($p>0,05$). In terms of the incidence rate of children of primary school age in the experimental group, the number of absences and cases of acute respiratory illnesses decreased during the school year, however, the overall pattern of the incidence of the subjects studied after the experiment did not change. The students of the control group also showed a tendency to improve in reducing the number of days missed due to illness. Significant changes occurred in the indicators characterizing the ecological education of schoolchildren in the experimental group. So, it significantly influenced the level of ecological culture of the study group of the experimental group: it is determined that more than 40% of students have deep knowledge and have the skills to apply this knowledge in practice in various situations, characterizing a very high level of development of ecological culture, 45% of schoolchildren possess the basics of environmental knowledge and skills and the ability to give them a certain interpretation (high level) 12% had above the average level of ecological culture, 3% had an average level characterized by the presence of elementary ecological knowledge that the schoolchildren does not always know how to correctly apply. Low and very low levels in the experimental group were not detected, in contrast to the control group, 18% of whom had extremely limited volume of environmental knowledge and weak skills and the desire to independently apply them in practice.

So, it can be stated that the program of classes using the means of ecological tourism has proved to be effective due to the improvement of physical preparedness and physical readiness, a reduction in the level of acute morbidity, an increase in the level of ecological culture.

Based on the results of the research, the structure was established and the content of "school environmental monitoring" was developed in the course of extra-curricular physical education classes, which included the diagnosis of the ecological education of primary school children, the level of adaptation-reserve capabilities, physical activity and physical health of schoolchildren.

Monitoring structure includes (Table):

– assessment of the initial level of indicators of physical condition (definition of indicators of morbidity, physical development, physical readiness, physical performance, level of physical activity, physical health, adaptive-reserve capabilities);

– comparison of obtained data with normative indicators;

– diagnostics of ecological education of children of primary school age;

– determination of value orientations to regular exercise, attitude towards nature;

– assessment of the ecological culture level.

Results of environmental monitoring can be used to develop a program of classes using the means of ecological tourism and serve as criteria for the effectiveness of the program.

Conclusions

On the basis of the analysis of professional scientific literature, it is revealed that the problems of using the potential of physical education in the process of forming an ecological culture of schoolchildren have not been practically solved. It has significant opportunities in the field of formation of ecological consciousness and behavior of schoolchildren, first of all, in relation to their own organism as an object of environ-

Content of the stages of school environmental monitoring

Stages	Indicators	Techniques
Assessment of definition of morbidity indicators	class of illness; the number of illnesses per academic year; duration of each disease	a copy from medical cards, a visit log and medical certificates. The class of illness was determined according to ICD-10.
Determining the level of physical performance	Ruffie's index	Ruffie's test
Assessment of the adaptive-reserve capabilities of primary school children	indices of Rohrer, Robinson and Kerdo	Screening of the ARC (N. Polka, 2014)
Evaluation of the baseline level of indicators of physical condition:		
Evaluation of physical development	body length, body weight, chest circumference	Anthropometric methods
Evaluation of the functional state of the respiratory system	VC (ml)	Using a portable spirograph according to a conventional technique
Evaluation of the functional state of the cardiovascular system of the body	HR_{reast}, AP_{syst}, AP_{diast}	Palpation method by Korotkov method (tonometer "Omron-M1")
Evaluation of physical health	Physical Health Index	Express assessment of the level of physical health G. L. Apanasenko
Evaluation of physical activity level	Index of motor activity	Framingham method
Evaluation of the level of school motivation	Level of school motivation	Method of N. Luskanova "Assessments of the level of school motivation"
Diagnosis of environmental education	Intensity of the subjective attitude to nature	Method "Diagnosis of environmental education "Naturofil"
Determination of value orientations	Motives for schoolchildren to participate in environmental activities	Analysis of ecological installations "EKPB" L. V. Bayborodova Methodology "Motives of schoolchildren's participation in activities"
Evaluation of the relationship to nature	Relation to nature	Questionnaire "My attitude to nature", A. Kozin's and A. Stepanyan's "Attitude of schoolchildren to the surrounding nature"
Evaluation of ecological culture level	Definition of environmental education, environmental awareness and environmental activities	Methodology for assessing the level of ecological culture

mental concern. Complications of the educational process in general educational institutions require the active introduction into the daily life of schoolchildren of physical education for the restoration of physical and spiritual forces. Main forms of ecological tourism are walks, ecological trails, excursions, trips and hikes, relay races, competitions, rallies, expeditions. Implementation of ecological and tourist activities in general educational institutions is a pedagogical process of purposeful systematic influence on schoolchildren by physical exercises and environmental factors with the aim of ecological education, physical recreation, health promotion and development of physical qualities. It is problematic to study and determine the necessary organizational and resource support for classes on various types of ecological tourism in the conditions of general education schools. The potential of tourism and local lore studies for establishing intersubject connections in the process of teaching schoolchildren is not fully utilized. When developing the program, we used traditional and innovative forms of classes' organization. Taking into account the recommendations of experts on the advisability of using the forms of organization of classes for environmental tourism for primary school children, assessing the best world and domestic experience, and own experience in conducting classes, we recommend the following forms: ecological paths, ecological games; environmental quizzes. Effectiveness of the developed program of classes using the means of ecological tourism is proved in the pedagogical experiment, as evidenced by the obtained results.

Prospects for further research in this area are the development of a scientifically based system of classes using the means of ecological tourism for schoolchildren of different age groups.

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Information about the Authors

Olena Andrieieva: *Doctor of Science (Physical Education and Sport), Professor; National University of Physical Education and Sports of Ukraine: Fizkultury st., 1, Kyiv, 03150, Ukraine.*
ORCID.ORG/0000-0002-2893-1224
E-mail: olena.andreeva@gmail.com

Inna Holovach: *PhD (Physical Education and Sport); National University of Physical Education and Sports of Ukraine: Fizkultury st., 1, Kyiv, 03150, Ukraine.*
ORCID.ORG/0000-0002-8994-263X
E-mail: innagolovach@rambler.ru

Inna Khrypko: *PhD (Physical Education and Sport); National University of Physical Education and Sports of Ukraine: Fizkultury st., 1, Kyiv, 03150, Ukraine.*
ORCID.ORG/0000-0001-9969-5954
E-mail: inna.khrypko@gmail.com

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An improvement powerlifters' training process with the use of information technology

Volodymyr Ashanin
Anatoliy Rovnyi
Vladlena Pasko
Ganna Poltoratska
Maksim Voitenko

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *improving the training process powerlifters' with use of information technologies.*

Material & Methods: *analysis and generalization of the literary sources and data of the Internet, pedagogical observations and the method of information modeling.*

Results: *computer program "Bench Press" has been developed for the organization and management of the training process.*

Conclusion: *developed an innovative software product that allows you to plan training loads based on the proposed sets of exercises.*

Keywords: *powerlifting, training process, information technology.*

Introduction

Analysis of the literature shows that the researchers used different approaches to improve the training process of athletes [6; 9; 11; 15; 16; 18–22]. Powerlifting is the youngest among athletic sports – weightlifting, bodybuilding, kettlebell lifting. Popularity of powerlifting is explained by the simplicity, accessibility of this sport, rapid growth of results and favorable influence on the health of the athlete. Powerlifting exercises help to increase the level of muscle strength, strengthen the joints, help develop endurance, flexibility and other useful qualities, nurture the will, self-reliance, increase the working capacity of the whole organism. Achievement of high sports results in powerlifting, as in any other sport, is possible only on the condition of systematic training aimed at comprehensive physical development, the formation of strong-willed qualities, the desire for constant improvement in the technique of performing various kinds of exercises. Main task of powerlifting is the development of strength indicators – the ability to raise the maximum weight at one time in three basic exercises [2; 5; 17].

Analysis of scientific literature shows that at the present stage of the powerlifting development, athletes combine in the training process a variety of exercises aimed at developing maximum strength, in particular, plyometric exercises [4; 23].

Increasing the effectiveness of the training process in powerlifting depends on the rational planning of physical activities and the formation of techniques of competitive exercises. A particular problem for coaches is the individualization of the techniques of competitive exercises, but the anthropometric and physiological characteristics of powerlifters, the level of physical readiness, the features of the development of motor qualities and the formation of knowledge and skills. That is why a clear application of physical loads in the rational construction of the training process should be carried out taking into account the individual features of powerlifters.

Building a program for the physical training of powerlifters requires the analysis of a large number of individual indicators. One of the directions of solving this problem is the use of various computer technologies that help improve the management of the training process and optimize the obtaining of the necessary information [1; 8; 10; 12; 13]. The main arguments in favor of computer learning technologies are individualization, visibility, interactivity, the possibility of using combined forms of information representation and the implementation of independent learning, at the end affects the speed of mastering the material [3; 11; 14]. Given the above, we can assume that the introduction of computer technology is an actual and effective means of improving the training process of powerlifters.

Relationship of research with scientific programs, plans, themes. The research was carried out in accordance with the theme of the scientific research work of the Kharkov State Academy of Physical Culture 1.1 "Scientific and methodological foundations of the use of information technologies for the training of specialists in the field of physical culture and sports", the state registration number 0111U003130.

The purpose of the research: improving the training process powerlifters' with use of information technologies.

Research task is to develop a computer program "Bench Press".

Material and Methods of the research

To solve the problems, the following research methods were used: analysis and generalization of the literary sources and data of the Internet network, pedagogical observations and the method of information modeling.

Results of the research and their discussion

1. When drawing up a training program in powerlifting for the development of strength, it is necessary to determine the maximum weight that an athlete can lift in each of the three basic exercises. For athletes, a program of light, medium and heavy workouts, where work is performed with different weights (for example, light workout – work with 50% of the maximum indicators, average – 65%, heavy – 90%).
2. The "Bench Press" program is designed for athletes of powerlifters and coaches. With its help, you can define a set of exercises for training, whose goal is to increase the maximum limit in exercise "Bench press" [7].

Program includes an information block, which lists the main literature on the technique of bench press. Function of generating a training complex, which is an integral part of computer development, will help beginners with the definition of a training program.

One of the functions of the program is the ability to pick up exercises for a certain cycle and teach them how to do it. To solve this problem created animations and descriptions for them, significantly simplify learning and help master the terminology.

Main component of the program is the corresponding record of training. When compiling a training program through recorded training, you can choose the weight, the number of approaches and times, based on the tonnage diagram and the number of bar lifts per workout. With the help of the program it is possible to conveniently monitor the observance of the regularity of variation of the load, which will greatly improve the training cycle and will avoid overtraining of the athlete.

When you start the program, you enter the main window (Figure 1), which contains the "Main Menu" and two lines for writing the login and password. If there is no account, you need to click on the "Register" button, and then the registration window will appear.

In this window you can register an account by selecting your login and password. After logging in to the account, it becomes possible to keep personal records. They will be available in the main menu.

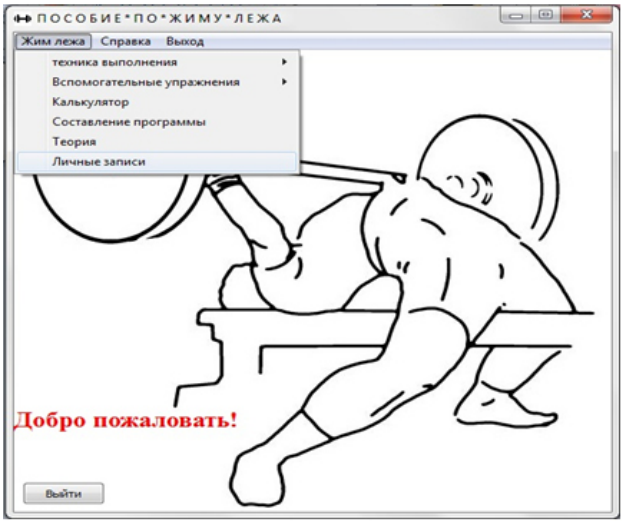

Fig. 1. Main menu of the program

After going to "Personal Records" (Figure 2), a window with four buttons appears. The first button "Training" – adds a template for one training day. It contains: Date, Number of bar lifts, Tonnage and Exercises / approaches are fields for filling.

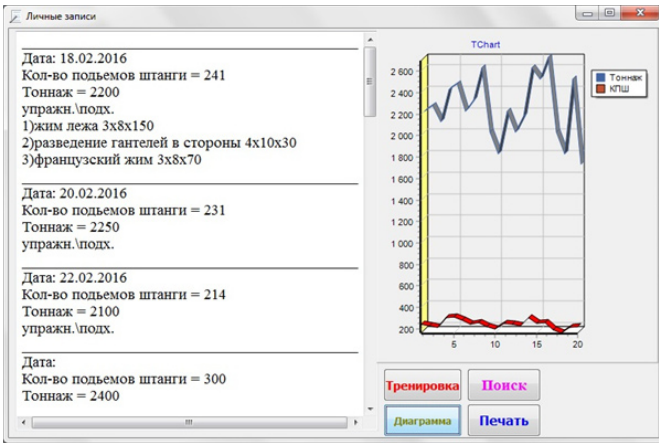

Fig. 2. Personal records

The second button "Search" is designed to make a request. When you click OK, a search is performed among the available workouts.

With the help of the third button "Diagram" you can build a diagram of the number of lifts of the bar and tonnage. It is necessary for the analysis of cycles and the convenience of viewing the performance of training.

When you press the fourth "Print" button, the workout program is output to the printer. In the main menu in the "Technique of performance" tab there are two items (Figure 3).

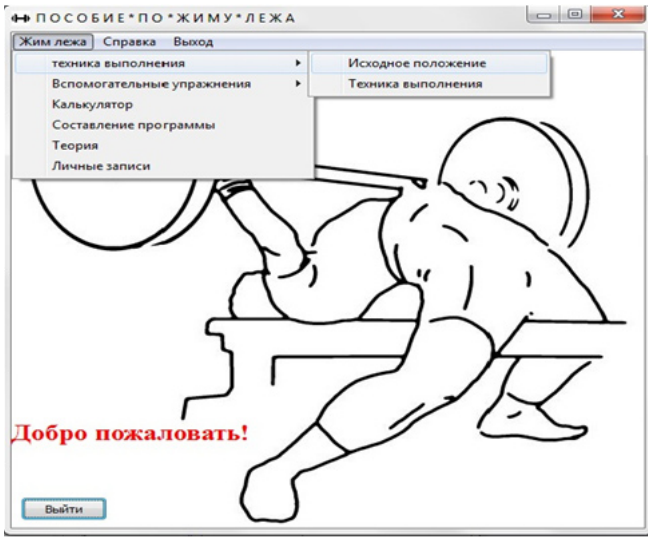

Fig. 3. Transition tab "technique of execution"

1. "Starting position" – when you click on the start, you will see in detail and explain the setting of the bridge during the exercise.

2. "Technique of execution." It consists of two foreshortenings of the exercise "Bench Press" and a text describing the technique of doing this exercise.

In the main menu there is also a tab “Auxiliary exercises”, which consists of three points (Figure 4):

1. “Phase of a muscle mass set”. It consists of a set of exercises (animation) accompanied by a textual description of the technique of performing movements.

2. “Intermediate phase”. It consists of a set of exercises (animation) accompanied by a text description of the technique of execution.

3. “Phase of preparation for the competition”. It consists of a set of exercises (animation) accompanied by a text description of the technique of execution.

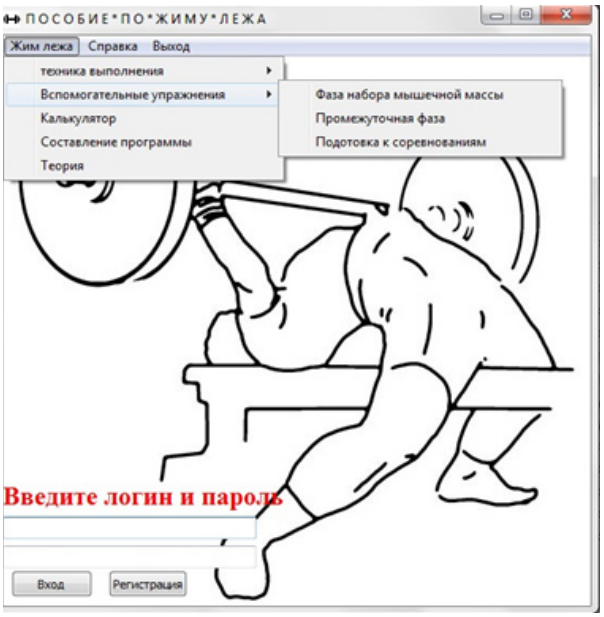

Fig. 4. Transition tab “assistance exercises”

In the main menu when you click on the tab “calculator for the bench press,” a transition is made to the calculator window (Fig. 5).

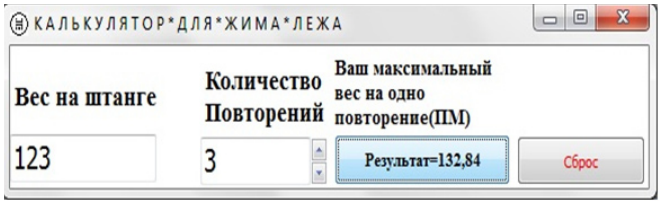

Fig. 5. Calculator window

In it, you need to enter the weight on the rod and the number of repetitions with this weight. When you click on the “Calculate” button, this button displays the result with your repeated maximum (RM). By clicking on the “Training program” tab, a window appears in the main menu where you can generate an approximate training program using the “Number of workouts per week” and “Dead point” survey (Fig. 6). Also, there is a note with an approximate range of training.

By clicking on the “Literature” tab of the window for playing books and a list of books will appear in the main menu (Fig. 7).

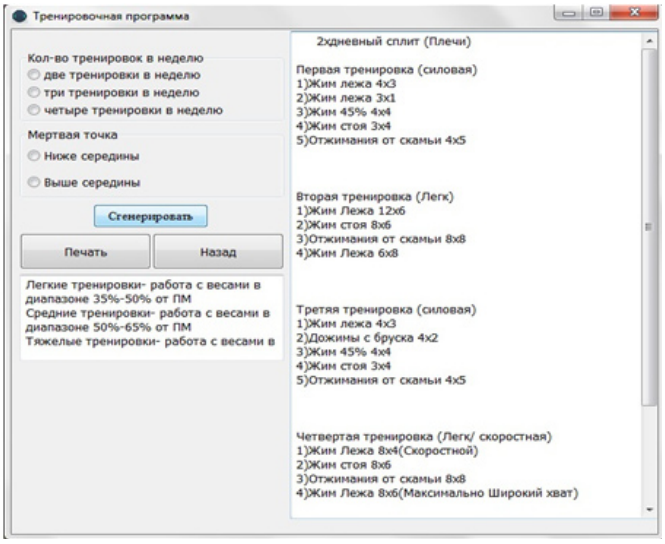

Fig. 6. Window training programs

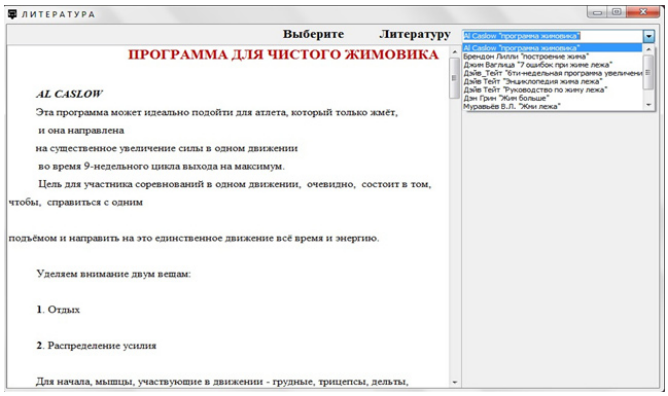

Fig. 7. Window literature

Thus, computer simulation has been carried out; it has been possible to develop a software product that has enough functions to optimize the training process of powerlifters. Computer program “Bench Press” allows the coach to keep a record of individual and group sessions of physical, technical and competitive preparedness, on the basis of which the coach can receive recommendations on the use of complexes of special exercises in the individual training program for each athlete.

Conclusions

Conducted computer programming allowed to develop an innovative software product that allows you to plan training loads based on the proposed sets of exercises. Function of the program, with which you can follow the patterns of variation in load, makes it convenient to use and leads to an increase in the level of strength preparedness of athletes-powerlifters. Computer program “Bench press” can be applied in the practical activity of trainers with the aim of increasing the efficiency of the training process.

Prospects for further research are the introduction of the computer training program “Bench Press” in the training process for powerlifting to improve its quality and efficiency.

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Information about the Authors

Volodymyr Ashanin: *PhD (Physics-Mathematics), Professor; Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-4705-9339
E-mail: ashaninv@mail.ru

Anatoliy Rovnyi: *Doctor of Science (Physical Education and Sport), Professor; Kharkiv State Academy of Physical Culture: Klochkovska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0003-0308-2534
E-mail: rovniyas@mail.ru

Vladlena Pasko: *PhD (Physical Education and Sport); Kharkiv State Academy of Physical Culture: Klochkovskaya str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0001-8215-9450
E-mail: vladlenap05@gmail.com

Ganna Poltoratska: *senior lecturer of the department of informatics and biomechanics; Kharkiv State Academy of Physical Culture: Klochkovskaya str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-0076-4727
E-mail: Anna5061984@rambler.ru

Maksim Voitenko: *senior lecturer of the department of informatics and biomechanics; Kharkiv State Academy of Physical Culture: Klochkovskaya str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-9026-547X
E-mail: maxvoitenko111@gmail.com

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An influence of initial swimming training technology on technical preparedness indicators of children with consequences of cerebral palsy

Vasiliy Bosko

Sumy State Pedagogical University name is A. S. Makarenko, Sumy, Ukraine

Purpose: *to develop an innovative technology of elementary swimming training in the backstroke way of children with the consequences of infantile cerebral palsy (ICP) and to evaluate its effectiveness.*

Material & Methods: *methods were used: analysis of scientific and methodological literature, pedagogical experiment, expert evaluation, statistical methods. The pedagogical experiment involved 29 children diagnosed with cerebral palsy, of which two groups were formed: an experimental group consisting of 14 children, 6 of them with spastic diplegia and 8 with a hemiparetic form, and a control group of 15, of which 6 – with spastic diplegia and 8 – with a hemiparetic form of cerebral palsy. After the experiment, we conducted an expert survey in order to identify the experts' opinion on the level of mastering the technique of swimming by backstroke way of children with the consequences of infantile cerebral palsy.*

Results: *main means of implementing the technology is the web-based information system "SwimCP (Swimming with Cerebral Palsy)" developed by us, which promotes the effective learning of the swimming of children with the effects of infantile cerebral palsy in the initial stage of sports training by selecting and recommending an orienting set of exercises, in accordance with the specific form of infantile cerebral palsy and the stage of learning motor action.*

Conclusion: *with the help of expert assessment confirmed that the proposed technology is the initial training to swimming by backstroke way to children with consequences of cerebral palsy is effective.*

Keywords: *swimming technique, backstroke way, information technology, infantile cerebral palsy, expert assessment.*

Introduction

A widely accepted opinion in modern society is the importance of rehabilitation, socializing, adaptive, integrative function of sports for people with disabilities. Usually their implementation is complicated by various problems of financial, material, medical, psychological, technological, methodological nature [3; 4; 6]. In the field of physical education and sports, scientists unanimously note that the training of athletes with disabilities is complicated by the physical and psychological characteristics of such athletes [8; 16].

Today, great competition in the Paralympics sport requires constant improvement of the training process of swimmers with limited abilities. There is a significant number of both foreign [12; 13; 14; 15], and domestic scientific works [2, 11], devoted to the study of this problem. However, the problem of teaching the technique of sporting methods for swimming children with consequences of infantile cerebral palsy (CP) at the initial stage of preparation remains insufficiently resolved [5; 7; 10; 17]. In our time, the use of information technology in the training process of swimmers will achieve an effective solution to the above problem [1; 9]. This testifies to the urgency of the problem of developing an innovative technology for primary education in sporting methods of swimming for children with consequences of cerebral palsy.

Relationship of research with scientific programs, plans, themes. The research is carried out according to the plan of research work of the Sumy State Pedagogical University name is A. S. Makarenko for 2011–2015. Within the framework of the topic "Raising the level of health and physical preparedness of various groups of the population by means of physical culture" (state registration number 0111U005736) for 2016–2020 within the framework of the theme "Optimization of the training process of athletes in a multi-year training system" (state registration number 0116U000898).

The purpose of the research: to develop an innovative technology of elementary swimming training in the backstroke way of children with the consequences of infantile cerebral palsy (ICP) and to evaluate its effectiveness.

Material and Methods of the research

The pedagogical experiment involved 29 children diagnosed with cerebral palsy, from which two groups were formed: an experimental group consisting of 14 children, of which 6 with spastic diplegia and 8 with hemiparetic form, and control group – the number of 15 people, of which 6 – with spastic diplegia and 8 – with a hemiparetic form of cerebral palsy. At the beginning of the study, we analyzed and summarized the data of the scientific and methodological literature, which made it possible to determine the state of the study of the problem. After the experiment, we conducted an expert survey in order to identify the experts' opinion on the level of mastering the technique of swimming in the backstroke way of children with the consequences of infantile cerebral palsy. Statistical processing of research materials was carried out using the Microsoft Excel 2010 software package using well-known methods of mathematical statistics.

Results of the research and their discussion

The innovative technology of elementary education in swimming for children with consequences of cerebral palsy is un-

derstood as a scientifically grounded system for mastering the method of organizing and conducting swimming training using information technologies, practical skills in the use of methods and tools in accordance with the general pedagogical principles of education, taking into account the anatomical and physiological and psychological characteristics of children, with the help of which it is ensured the attainment of the stated goal of teaching sports methods of swimming of children with the consequences of cerebral palsy at the initial stage with the greatest efficiency with the minimum possible period for achieving it.

The basis for the creation of the technology of elementary swimming training by the backstroke way of children with the consequences of cerebral palsy:

– theoretical generalization and systematization of the information of scientific and methodical literature on the problem of teaching sports methods of swimming of children with consequences of CP at the initial stage of preparation;

– analysis of the results of questionnaires of trainers working with athletes with cerebral palsy;

– based on the analysis of literary sources, the features of motor disorders of children with spastic diplegia and the hemiparetic form of cerebral palsy;

– kinematic characteristics of the technique of swimming on the back of qualified athletes with the consequences of cerebral palsy are definied;

– observation of the training process swimmers with the consequences of cerebral palsy.

Technology developed by us allows the trainer to organize a process of initial training of the children's by the backstroke way of swimming with spastic diplegia and a hemiparetic form of cerebral palsy based on the account of motor disorders. Technology includes four structural components: the target (the purpose and objectives of the activity of the trainer and children with the consequences of cerebral palsy during the initial stage of learning swimming by the backstroke way), basic (especially the motor disorders of children with consequences of cerebral palsy and their influence on the process of learning movements in the aquatic environment and the biokinematic characteristics of the technique of swimming of qualified athletes with consequences of cerebral palsy), methodological (forms, methods and means of swimming training) and control (methods of control and criteria for assessing the effectiveness of the developed technology of elementary education for children with consequences of cerebral palsy).

So, before each training session, the trainer should prepare such a set of physical exercises from the ones recommended by us and in such sequence individually for each child, so that he assists in the assimilation of swimming movements, promotes the development of the child's motor skills and stimulates the growth of his sports achievements. In this case, the coach must take into account the motor disabilities and deviations that swimmers have with the consequences of cerebral palsy. In order for the specialist not to search each time for the recommended set of exercises, we propose to do this using a modern Web-oriented information system in accordance with the level of mastering the technique of swimming. Therefore, we have developed a Web-based information system "SwimCP (Swimming with Cerebral Palsy)", which is appropriate to use both for learning to swim by the backstroke way of children with the consequences of cerebral palsy during the initial stage of sports training, and to improve the skills of coaches working with such children. With the help of this system, the forms, means and methods of teaching the swimming by the backstroke way of child are selected individually for each child, taking into account the forms of cerebral palsy, the available motor disabilities in accordance with each individual training session, the stage of training the motor actions, the technical element of training and all the features initial training.

In order to test the effectiveness of the technology of swimming training by the backstroke way, we conducted an expert survey on the level of mastering the technique of backstroke way of swimming by children with cerebral palsy. The experimental group (EG) learned to navigate the developed technology, which included the use of the Web-based information system "SwimCP (Swimming with Cerebral Palsy)", and in the control group (CG) the training process was built using traditional, most common methods. It should be noted that at the beginning of the formative experiment, the absence of statistically significant differences between the groups ($p>0,05$). To determine the effectiveness of training in swimming techniques, experts were offered control cards and evaluation criteria separately for children with spastic diplegia and hemiparetic form of cerebral palsy in a differentiated way. Expert evaluation of the technique of backstroke way of swimming was carried out using the following components: the position of the swimmer's body, movement of the legs, movements of the hands, coordination of movements, which are the basic indicators of effective techniques of swimming. Experts evaluated each criterion separately. As a result of their work, each child received the appropriate scores, and then the questionnaires were checked and translated into a differentiated-total score, that is, after determining the effectiveness of the technique of each element of the swimming method, an overall assessment of the swimming technique.

To determine the statistical criterion for the reliability of the differences between the parameters of the control and experimental groups, the normality of the distribution of the score was studied using the traditional technique and the technology developed by us. Considering the number of elements in the samples, one can use the usual approximation and estimate the degree of discrepancy between the samples mean scores by the Wilcoxon-Mann-Whitney criterion (Table 1).

Table 1

Comparison of the results of expert assessment of the level of mastery of the swimming technique of EG and CG at the end of the experiment

Characteristic	CG (n=15)	EG (n=14)
	$\bar{X}\pm S_{\bar{x}}$	
Body position	3,91±0,25	4,56±0,19
Leg movements	3,69±0,30	4,44±0,14
Hand movements	3,96±0,40	4,78±0,19
Coordination of movements	3,59±0,29	4,49±0,25
Generalized evaluation of techniques	3,79±0,28	4,57±0,18
Differences (B)	0,78	
Reliability of differences (W_{emp})	4,45	
Significance level (p)	<0,05	

The empirical value of the Wilcoxon-Mann-Whitney criterion of the technique of swimming by the crawl is W_{emp}=4,45. We have that W_{emp}=4,45>$W_{0,05}$=1,96, that is, at the significance level of 0,05 we accept the alternative hypothesis that there is a significant difference between the average scores of the samples. This means that the difference in the average points of the level of mastery of the technique by backstroke way of swimming on the back of children with cerebral palsy of the control and experimental groups can not be explained only by random factors, and the reliability of the differences in the samples that were compared is 95%.

The difference in scores received by children with consequences of cerebral palsy of the control and experimental groups by body position is 14%. For the technique of leg movements, the children of the experimental group received 17% more points than the children of the control group. For the technique of hand movements, this difference is 17%. The coordination of the movements of the children of the control group was estimated to be 20% less than that of the experimental group. Overall score of the level of mastering the technique by backstroke way of swimming for the children of the control group is 3,79 ± 0,28, and for the children of the experimental group – 4,57±0,18. Children of the control group received the highest scores for hand movements, and the lowest ones for the consistency of movements. Children of the experimental group received the highest scores for hand movements, and the lowest points for movements with their feet (Figure 1).

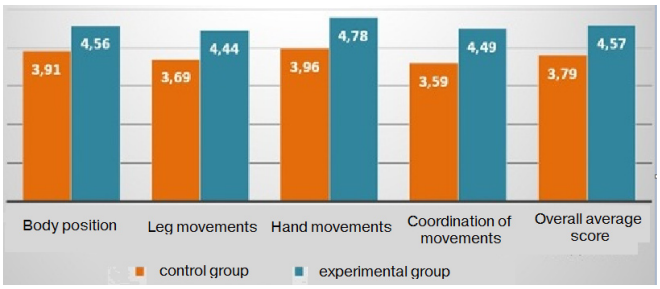

Fig. 1. Comparison of the level of mastering the technique by backstroke way of swimming of the control and experimental groups after the experiment

So, during the experiment it was confirmed that the level of mastering the swimming technique of children who studied according to the developed technology was objectively higher by an average of 20% of the same index in the group that studied by traditional, most common methods.

We also calculated the average score of the level of mastery of swimming technique, obtained by each swimmer of both groups from six experts for each method of navigation. According to these data, a generalizing table was constructed (Table 2).

The primary analysis of the data in Table 2 shows that children with a hemiparetic form of cerebral palsy are better at mastering sports swimming styles than children with spastic diphtheria. This difference is 8%. For the children of the experimental group, the same trend persists; the difference is about 7%. To determine the reliability of the differences between the indicators of children of different forms of cerebral palsy, the degree of discrepancy between the selective average scores by the criterion of Cramer-Welch. For sample points, statistical

Table 2

Comparison of the results of expert assessment of the level of mastering the technique of swimming of EG and CG of different forms of cerebral palsy at the end of the experiment

Form of CP	CG (n=15)	EG (n=15)
	$\bar{X}\pm S_{\bar{x}}$	
HF	3,82±0,25	4,70±0,22
SD	3,55±0,21	4,39±0,26

Remark. *SD – spastic diplegia; HF – hemiparetic form of cerebral palsy.*

calculations were performed for the null hypothesis that there were no differences between the indices of groups of children with spastic diplegia and the hemiparetic form of cerebral palsy and an alternative hypothesis about the nature of differences between the indices of groups of children with spastic diplegia and hemiparetic form of cerebral palsy. For the control group T_{emp}=1,76<T_{cr}=1,96, so at the significance level of 0,05, we accept the hypothesis that the characteristics of the swimming techniques of the crawl on the back of children with spastic diplegia and the hemiparetic form of cerebral palsy. For the experimental group T_{emp}=2,5>T_{cr}=1,96, so the reliability of the differences in the characteristics of swimming techniques by backstroke way of children with spastic diplegia and hemiparetic form of cerebral palsy is 95%.

So, in the control group, children with both forms of cerebral palsy took possession of the swimming technique at the same level, and in the experimental group, children with hemiparetic form of cerebral palsy acquired better swimming skills than children with spastic diphtheria.

The consistency of the experts' opinions on the level of mastering the technique of swimming was also determined by statistical methods (the concordance coefficient was calculated). For the control group of children with consequences of cerebral palsy, it is equal to W=0,94, and for the experimental group – W=0,94. Since the values of the concordance coefficients for both groups are greater than 0,9 and close to 1, the obtained data indicate a high degree of agreement between the experts' opinions on the level of mastering the swimming techniques by backstroke way by children with consequences of cerebral palsy of the control and experimental groups.

The statistical reliability of the concordance coefficient was estimated using the Pearson criterion χ^2. Because the χ_P^2=79,09> χ_T^2=29,14, then we make a conclusion about the statistical significance of the concordance coefficient for the control group of children with the consequences of cerebral palsy, there is an examination took place. For the experimental group of athletes with the consequences of cerebral palsy χ_P^2=72,57> χ_T^2=27,69, also conclude that the concordance coefficient is statistically significant, that is, there is a consistency of opinions of experts and an examination was also held.

Conclusions

1. Developed by us technology for teaching swimming techniques by backstroke way of children with cerebral palsy allows us to optimize the process of technical training for beginner swimmers.

2. Main means of implementing the technology is the Web-based information system developed by us "SwimCP (Swimming with Cerebral Palsy)".

3. Effectiveness of the proposed technology of initial swimming training by backstroke way of children with cerebral palsy is confirmed by expert evaluation and statistical methods.

Prospects for further research in this area are the expansion of the functionality of the developed system "SwimCP" for use in the training of swimmers with severe forms of cerebral palsy and training in swimming techniques by other sports methods.

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Information about the Authors

Vasiliy Bosko: *Sumy State Pedagogical University name is A. S. Makarenko: Romenskaya str. 87, Sumy, 40002, Ukraine.*
ORCID.ORG/0000-0002-8796-2362
E-mail: bosko87@ukr.net

SLOBOZANS'KIJ NAUKOVO-SPORTIVNIJ VISNIK

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Modern technologies used in the process of physical education and rehabilitation for violations of posture and flat feet in children of older preschool age

Sergey Futornyi
Natalia Nosova
Tetiana Kolomiiets

National University of Physical Education and Sports of Ukraine, Kyiv, Ukraine

Purpose: *analyze and summarize scientific information on the problem of technologies that are used in the process of physical education and rehabilitation for violations of posture and flat feet in children of older preschool age, according to special scientific and methodological literature.*

Material & Methods: *theoretical analysis and generalization of literary and documentary sources included the use of a number of the following methods: the method of reconstruction, the method of apperceptions, aspect analysis, hermeneutic analysis, problem analysis.*

Results: *despite a significant number of scientific studies on the prevention and correction of human posture disorders, recent results and their undoubted value for science and practice, it can be stated that the proposed technologies and methods do not fully allow to effectively cope with the steadily growing number of children senior preschool age with various functional disorders of the locomotor system.*

Conclusion: *every year the number of children of senior preschool age with functional disorders of posture increases. Inadequate efficiency of health-improving measures for violations of the posture of children of senior preschool age by many researchers is due to the insufficiently developed technology for assessing her condition. Obtained data indicate the need to develop a technology for measuring and analyzing the level of the biogeometric profile of the posture of children aged 5–6 years in the frontal and sagittal planes.*

Keywords: *posture, children of senior preschool age, physical rehabilitation, physical education.*

Introduction

A healthy child is the main goal of the nearest and remote future of any country, as the prospects for social and economic development, a high standard of living, science and culture [6; 7; 13; 21].

In modern conditions of urbanization, computerization, exacerbation of social problems, unsatisfactory ecological condition in Ukraine, the full-value physical development of children, the increase in the level of adaptive capabilities of their organism [9; 13]. Of particular concern is the prevalence among children of 5–6 different functional disorders of the musculoskeletal system (MSS) [1; 8; 10; 11; 12].

Today the range of proposed technologies, techniques and programs for determining the state of posture is quite wide and multifaceted.

Relationship of research with scientific programs, plans, themes. Article is made according to the topic Consolidated Plan of research in the field of physical culture and sports for 2011–2015. Ministry of Ukraine for Family, Youth and Sports on the topic 3.7. "Perfection of biomechanical technologies in physical education and rehabilitation taking into account individual characteristics of human motor skills" (state registration number 0111U001734) and the plan for the research work of the National University of Physical Education and Sports of Ukraine for 2016–2020. on the topic 3.13 "Theoretical and methodological foundations of health-forming technologies in the process of physical education of various population groups" (state registration number 0116U001615).

The purpose of the research: to analyze and summarize scientific information on the problem of technologies that are used in the process of physical education and rehabilitation for violations of posture and flat feet in children of older preschool age, according to special scientific and methodological literature.

Material and Methods of the research

Theoretical analysis and generalization of literary and documentary sources provided for the use of a number of the following methods: the method of reconstruction, the method of apercipyium, aspect analysis, hermeneutic analysis, problem analysis.2

Results of the research and their discussion

When organizing the physical culture and health work in a preschool institution, as noted by S. P. Ryzhova [23], it is necessary to pay attention to the issue of preventing children's flatfoot and clubfoot, while taking an integrated approach, the main means of prevention of which is special gymnastics aimed at strengthening soft intramuscular -binding apparatus of the feet and shin. The author suggests using specially organized classes on the type of physical culture.

E. V. Makarova [19] emphasizes that in the rehabilitation of children with MSS disorders it is necessary to take into account the functional characteristics of children with impaired posture, their rapid fatigue in the process of activity, it is necessary to exercise special care in terms of the magnitude and volume of the loads, use breathing exercises to eliminate fatigue. Specialist for the treatment of early manifestations of scoliosis in combination with the hypermobility syndrome for children 5–6 years developed a comprehensive program of physical rehabilitation. A special feature of the physical rehabilitation of this contingent of children, according to the author, is the 24-hour observance of the orthopedic regime, the upbringing and fixing of the habit of correct posture in special occupations and throughout the day, daily therapeutic curative gymnastics, therapeutic swimming, therapeutic choreography, massage and electric stimulation procedures of soft muscles [19].

For the purpose of correcting postural and flatfoot disturbances, A. A. Potapchuk [22] suggests using both physical exercises and hygiene factors. In his conception the author gives an important role to the statodynamic regime of children, both in the pre-school institution and at home. In the rehabilitation and strengthening exercises, the author recommends including story-role games with musical accompaniment, which increases the interest of children in their studies [22].

To correct the violations of the MSS in the employment of a specialist [22] also included fitball-gymnastics, which allows to use an individual approach and naturally to form a habit of correct posture, and also to make emotional coloring.

Differentiated corrective programs for the rehabilitation of children with functional and static deformities of the feet, including complex therapy, contribute to the normalization of the motor function, the strengthening of the musculoskeletal apparatus of the foot and the harmonious development of children, developed and tested by Mohammed Amro [20].

The first program involves the use of hydrokinesiotherapy with the inclusion of classical and segmental massage, procedures for therapeutic gymnastics and orthopedic exercises [20].

The second comprehensive program with elements of yoga gymnastics consists of traditional oriental shiatsu massage, therapeutic gymnastics and orthopedic activities [20].

Of interest is the system of prevention and correction of MSS deviations in children by means of physical education, scientifically founded by G. I. Narskinim [27]. The developed system of prophylaxis and correction of deviations of MSS of children allows to systematically carry out work on revealing and elimination of possible deviations by means of physical education. The author developed an algorithm consisting of modules for analysis, correction, control and prevention. According to the author, the module is a relatively independent part of the developed algorithm in preventing deviations from the MSS.

The basis of the prevention module is physical exercises aimed at: normalization of trophic functions of the responsible structures of the spinal column; development of mobility in all joints; formation of a muscular corset; flatfoot prevention [27].

As the author [27] notes, if the analysis of the MSS shows that the child has deviations from the norm, he is recommended to use the means of physical education of the correction module, based on corrective exercises. In view of the existing deviations from the MSS, exercises aimed at: inhibition of pathogenesis mechanisms are selected; correction of existing deviations in the MSS state; formation of a muscular corset; biomechanics and trophism of the spinal column.

For children with functional disorders of the MSS in the process of physical education, Gasemi Behhnam [4] suggests using a comprehensive course of training and corrective gymnastics and massage up to 1,5–2 months. During the year it is necessary to carry out 2–3 such courses. Therapeutic gymnastics consists of general development exercises for various muscle groups; special exercises for strengthening and training the muscular corset with and without objects, using orthopedic balls; relaxation and breathing exercises; games of medium mobility to consolidate the achieved skills of correct posture [4].

The method of prevention and correction of violations of the MSS of preschool children, which allows integrating educational and health problems in the process of physical education, presupposes the division of the occupation into 6 blocks: stretching; running and jumping performed on a soft support; a complex of general development exercises with the primary use of the starting positions, standing on the front of the foot, maintaining balance; training in basic movements; development of physical qualities; relaxation exercises developed by G. G. Lukin [18].

S. A. Kastyunin [14] suggests combining therapeutic exercise with swimming in the case of postural disorders. Classes are planned in such a way, implying for the child an active physical load, the creation of a muscle corset, the formation of a correct posture. The complex of exercises on the water allows you to protect the growth zones of the vertebral bodies, to unload the spinal column.

Correction and health improvement program of physical education on the basis of a differentiated approach to diagnosis and correction of various signs of postural disorders in children aged 6–7 years was developed by T. A. Guterman [5]. The main notable features of this program are:

– a complex combination of two times a week of physical fitness training and one lesson on corrective aqua aerobics;

– inclusion in the basic part of the increased (up to 33%) volume of special corrective exercises;

– inclusion in the variable part of the program three courses a year of therapeutic and health-improving massage, phytotherapy, physiotherapy, psycho-correction classes, individual work on assignment in working conditions with parents;

– availability of methodical and organizational approaches to the correction of posture defects that provide for the complex nature of the influence of the means used to correct posture disorders, the consideration of various signs of postural disorders and their gradation in terms of the degree of defect development, individual tasks and the optimal distribution of the share of recreational physical education means throughout the year.

In the work of L. N. Timoshenko, S. G. Lavrenyuk, T. P. Zhukovs-

kaya [24], a valid system of measures aimed at the prevention and correction of MSS disorders in preschool children. When composing the complexes of morning exercises, complexes of exercise therapy, the authors relied on the program "Be Healthy, Baby", the State Basic Program, the Basic Component.

In the experimental study of I. S. Krasikova [16] the problems of formation of posture in preschool children are considered. The specialist offers the author's complexes of gymnastic exercises aimed at the formation of proper posture, contribute to the formation of skills necessary in everyday life, as well as the development of physical qualities.

O. N. Bondar [2] substantiated and developed the technology of correction of posture disorders for children of senior preschool age, taking into account the spatial organization of their body. The technology consists of a correction-prophylactic macrocycle, which includes three stages – retracting, correcting, supporting-improving, and provides for the use of special physical exercises in the starting positions that facilitate the unloading of the spine, complexes of corrective physical exercises that take into account deviations in the parameters of the goniometry of the children's body, as well as exercises aimed at forming the skill of statistical dynamical posture.

A component of the developed technology is pedagogical monitoring, which allows observing, measuring and evaluating the indices of the biogeometric profile of the posture, the functional state of the MSS, as well as the biostatical indices of the body of children of the senior preschool age in the process of physical education [2].

A. S. Filimonova [25] substantiated the program of physical education of children of senior preschool age, taking into account the state of MSS on the basis of fitness. The structural construction of the program provides for four interrelated blocks: projective, informative, procedural, control and accounting.

I. A. Bichuk [3] developed a technology for preventing flat feet in preschool children. The author has referred to the main components of the technology the block diagram of the technology (diagnostics, substantiation of program content, practical implementation, control); subjects of technology implementation (instructors of physical culture, educators, parents, children); the content of the flatfoot prevention program (goal, tasks, principles, methods, means, methods of training, forms of training, implementation stages, control, result) stages of program implementation (preparatory, main, final) program implementation results. The main functions of technology – management, health, information, forecasting [3].

The flatfoot prevention program provides for training in the form of morning exercises, physical education classes, walks and homework [3].

Kord Makhnaz [15] based on the analysis of literature sources, the experience of leading specialists and the results of the previous study, a program of physical rehabilitation has been developed that is based on the pedagogical principles and the principle of differentiation of special-purpose physical exercises that affect individual muscle groups, depending on the localization of the lesion and character changes in the stato-dynamic stereotype. The program consists of three periods – adaptation, correction and stabilization. In the complexes of therapeutic gymnastics, the author used special exercises performed in the training mode with a dosage of 10–12 repetitions, to strengthen the muscular corset in conjunction with performing exercises to strengthen the muscular-joint feeling on the balancing platforms, pillows and paths for proprioception in combination with the method of automyorelaxation [15].

A. N. Kudyashevoy [17] for the first time the method of rehabilitation and prevention of child's posture disorders based on the use of therapeutic physical culture with elements of hatha yoga and swimming has been theoretically developed and experimentally substantiated, it allows to correct the violations of the posture of those engaged, to develop the functional capabilities of their body systems and to effectively enhance level of physical readiness.

Y. V. Kozlov [26], on the basis of the revealed relationships between the support-spring properties of the foot and the biogeometric profile of the posture, the content and direction of the correction technology for non-fixed violations of the locomotor system in children aged 5–6 years with the use of physical rehabilitation in preschool general educational institutions, a distinctive feature of which is the availability of variable and basic components. Specialist scientifically methodologically valid variational and basic component of the technology of correction of non-fixed violations of MSS in children 5–6 years old, including corrective gymnastics using exercises aimed at the development of vestibular function, massage, electrostimulation with biofeedback in conditions of pre-school general educational institutions [12; 26].

Conclusions

Today, there is no doubt that posture, as a whole phenomenon, is a complexly organized object whose state is determined by the interaction of several factors: the morphological development of the MSS, the effective functioning of life support systems, the system of pedagogical influence on physical development to the exercising process.

Despite a significant amount of scientific research on the prevention and correction of human posture disorders, recent results and their undoubted value for science and practice, it can be stated that the proposed technologies and methods do not fully allow effectively cope with the steadily growing numbers people with various functional disorders of the MSS.

Every year the number of children of senior preschool age who have violations of the posture of functional disorders of the MSS of children of senior preschool age increases. Inadequate efficiency of health-improving measures for violations of the posture of children of senior preschool age by many researchers is due to the insufficiently developed technology for assessing her condition.

The obtained data indicate the need to develop a technology for measuring and analyzing the level of the biogeometric profile of the posture of children aged 5–6 years in the frontal and sagittal planes.

Prospects for further research will be related to the development of technology for assessing the state of the biogeometric profile of the posture of children aged 5–6 years in the process of physical rehabilitation.

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Information about the Authors

Sergey Futornyi: *Doctor of Science (Physical Education and Sport), Associate Professor; National University of Physical Education and Sports of Ukraine: Fizkultury st., 1, Kyiv, 03150, Ukraine.*
ORCID.ORG/0000-0001-9216-4691
E-mail: sergfut@gmail.com

Natalia Nosova: *PhD (Physical Education and Sport), Associate Professor; National University of Physical Education and Sports of Ukraine: Fizkultury st., 1, Kyiv, 03150, Ukraine.*
ORCID.ORG/0000-0002-3226-0435
E-mail: nnosova75@gmail.com

Tetiana Kolomiiets: *university teacher; National University of Physical Education and Sports of Ukraine: Fizkultury st., 1, Kyiv, 03150, Ukraine.*
ORCID.ORG/0000-0002-7715-7394
E-mail: taty2405@ukr.net

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Aggressive behavior prevention in a dance duet

Olena Gant
Serhii Tkachov
Eduard Valiuh

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *to study the features of aggression and the main directions of prevention of aggressive forms of behavior, among athletes engaged in sports dancing in the preliminary basic training.*

Material & Methods: *analysis of scientific and methodological literature, "Personal aggressiveness and conflictness".*

Results: *a theoretical analysis of the problem of aggressive behavior in sports dance duets. Level of aggressiveness of athletes of sports dances at the stage of preliminary basic training is determined. Reasons for the formation of aggressive behavior among young athletes are revealed. Areas of preventive and psychocorrectional work with aggressive athletes are singled out.*

Conclusion: *a high level of aggression was detected in 19 (31,67%) of the study participants. Determinants of aggressive behavior in sport ballroom pair appear particularly family upbringing style and pedagogical activity of the trainer. Correction of aggressive behavior of young athletes should have a complex systemic character and take into account the main characterological features of aggressive athletes.*

Keywords: *sports dances, interpersonal interaction, aggressive behavior, conflict.*

Introduction

Formation of communicative competence among athletes engaged in ballroom dancing is one of the necessary factors for their formation as professionals. Task of the trainers is to give the athletes a correct idea of the communicative properties of the personality that are necessary for a highly qualified specialist and to form and improve these qualities [1; 7].

Sources of communicative competence are innate personality traits, upbringing, life experience, general erudition and special teaching methods. Professional communicative competence can not be formed spontaneously, special work and psychological conditions are necessary.

Competence in communication presupposes readiness and ability to build contact at different psychological distances – both distant and close. Difficulties can be associated with the inertia of the position – the possession of any one of them and its implementation everywhere, regardless of the nature of the partner and the uniqueness of the situation. Flexibility in the adequate replacement of psychological positions is one of the essential indicators of competent communication [12; 22].

At the present time in psychological sports science there are no systematized notions about the regularities in the formation of mechanisms for the effectiveness of interpersonal interaction among ballroom dancers at the stage of preliminary basic training. Practically unexplored the question of the formation of adequate behavior in the pair and ways to regulate in it conflict situations. The urgency of the research is also conditioned by the need for scientific development of psychological tools for a comprehensive assessment of communicative potential and prevention of aggressive forms of behavior of ballroom dancers at the stage of preliminary basic training and scientific substantiation of a program of psychological correction of their communicative competence.

Communicative competence is the basis of a person's practical activity. A. A. Rean notes that a specially organized process of formation of communicative competence does not only guarantee the formation and development of basic personalities, but also the emergence of higher levels of socialization and effectiveness in activities [20].

In studies conducted on the basis of the Kharkov State Academy of Physical Culture, it is shown that the process of formation of effective motivation for communication and constructive ways of behavior occurs in indissoluble connection with the enhancement of athletic skill and the dynamics of relations in a dance pair, while maintaining a high dependence on the success or failure of competitive activity [1; 2; 6; 10].

Sports' dancing refers to such sports, in which it is generally impossible to avoid situations with high mental stress, which are often repeated. The intensity of the training and competition process and the constant, not always effective contact with the partner, lead to uncontrollable emotional reactions from the athletes. In the works of V. I. Voronova, I. A. Zhavoronkov, it was shown that athletes who have adequate methods of conflict management are more active, have less anxiety, greater confidence in their forces and partner (partner) strengths, striving for rivalry and willingness to mobilization of all forces for victory [7; 8; 12].

A feature of communication among athletes engaged in sport dancing is the motivation and improvement of communication in its various forms. In the sports dance, the leading is emotional-personal communication, as sports dancing, being on the verge of art and sports, like no other sport approaches art. It is in sports dancing that emotional emotions are a great

influence on the spirituality and morality of children, not only in connection with successes or failures in competitions and performances, but also in connection with direct relations with a male partner (female partner) [1; 2].

Peculiarity of communication among sportsmen engaged in ballroom dancing can be the manifestation of sympathies or antipathies, the degree of realization of subjective, informal relations, the emotional experience of sporting situations, and so on. Specificity of this sport requires the dancers to interact in all its manifestations and to contribute to the success of the pair [2; 8; 10].

S. A. Zimel'ova, A. V. Kiselev note that inability to find a way out of conflict situations, to overcome everyday difficulties faced by a person, in the process of communication and joint activities lead to emotional stress that undermines physical and mental health [14; 16]. In the works of S. N. Enikolopov, the idea is traced that behind any act certain goals are hidden, and behind the conflict is the incompatibility of the goals and desires of the participants in the conflict [5]. In sports activities, the loss of interest in training, and especially its absence – is a factor that leads a dancer athlete to conflict, because the degree of fatigue with the same energy loss depends on the emotional attitude to training. G. P. Artemyeva proves in her works that the negative attitude causes the athlete personal aggressiveness, negative emotions, tension, does not allow to relax, to forget the past troubles. As a result, nervousness accumulates, and stress occurs. And the conditions for its emergence is that the need for interesting performances at competitions is not being met, and there is no way to achieve an important goal – self-realization [1; 2].

Important psychological components of conflict is the desire of the parties, the strategy and tactics of their behavior and their perception of a conflict situation, ie the information models of conflict are available in each of the parties and in accordance with which opponents are organizing their behavior in conflict [18; 22].

Analysis and generalization of the special literature made it possible to establish that the harmonious interaction of partners in ballroom dances, the high level of wear and compatibility with the individual psychological characteristics of the personality of dancers is crucial in achieving high results in competitions. In the opinion of G. P. Artemevoy, V. I. Voronova, a big role in creating a stable pair is played by joint actions of partners, participation of trainers and parents [1; 2; 7; 8].

Formation in young athletes of the ability to adequately express their emotions and the ability to take responsibility can be the key to effective interpersonal interaction in a dance duo.

At present, psychological and pedagogical science lacks the algorithms for developing harmonious partner relations in sport dance, so it is important and timely to study the characteristics of emotional intelligence, namely, the characteristics of the aggressive behavior of young athletes as a determinant of their productive interpersonal interaction in pairs, and determined the relevance of our work.

Relationship of research with scientific programs, plans, themes. The research was carried out in accordance with the thematic plan of the research work of the Kharkov State Academy of Physical Culture for 2016–2018 on the theme "Modern diagnostic technologies and means of preserving the psychological health of athletes".

The purpose of the research: to study the features of aggression and the main directions of prevention of aggressive forms of behavior, among athletes engaged in sports dancing in the preliminary basic training.

According to this purpose, the following tasks are solved:

– to conduct a theoretical analysis of the problem of aggressive behavior in sports dance duets;

– to determine the aggressiveness level of athletes in sports dances at the stage of preliminary basic training;

– to reveal the reasons for the formation of aggressive behavior of sportsmen in sports dances at the stage of preliminary basic training;

– to establish the directions of preventive and psychocorrectional work with aggressive athletes at the stage of preliminary basic training.

Material and Methods of the research

Athletes aged 10–12 years were studied in the number of 60 people who are engaged in sports dances during the preliminary basic training. To substantiate the relevance of the topic, a theoretical and methodological analysis of the problem was carried out. To study the indicators of aggressive behavior, the "Personal aggressiveness and conflictness" [19].

Results of the research and their discussion

First stage of our study was the study of the level of aggression and conflict of sportsmen engaged in sports dancing at the stage of preliminary basic training.

The results of the study of the level of conflictness and aggressive behavior of athletes engaged in sports dancing at the stage of preliminary basic training using the method "Personal aggressiveness and conflictness" is presented in Table 1

As shown in Table 1, 12 (20,00%) of the participants in the study have a low level of aggression, of which 6 (21,42%) are boys, and 6 (18,75%) are girls. As A. A. Rean points out, a low level of aggressiveness usually indicates the insincerity of the respondent's answers, his desire to meet the social norm [20]. According to S. L. Soloviev, such indicators are found in individuals with low self-criticism and overestimated claims [22].

According to the results of our study, an average level of aggressiveness occurs in 29 (48,33%) of the surveyed athletes, 14 of them (50,00%) are boys and 15 (46,87%) are girls. A. A. Rean, considering the problem of aggression, notes that the average level of aggressiveness of a person is expressed in spontaneity, some anonymity and a weak ability to inhibit. Of course, this level of emotional response is due to spontaneous aggression and is associated with the inability to switch aggression to activities and inanimate objects [20].

A high level of aggression was detected in 19 (31,67%) of the

Table 1

Distribution of athletes engaged in sports dancing at the stage of preliminary basic training, according to the levels of aggression

Level of aggression	Points	Boys (n=28)		Girls (n=32)		Whole group (n=60)	
		Abs. val.	%	Abs. val.	%	Abs. val.	%
Low	≤35	6	21,42	6	18,75	12	20,00
Average	36–44	14	50,00	15	46,87	29	48,33
High	≥45	8	28,57	11	34,37	19	31,67

study participants, of whom 8 (28,57%) were boys and 11 (34,37%) were girls. It is these athletes, whose level of aggression is high, constitute a risk group for interpersonal interaction in a pair, and require special attention from the coach and sports psychologist [3; 10; 11]. American psychologist B. Baron highlights the following characterological peculiarities of a person with a high level of aggressiveness:

– perceive a wide range of situations as threatening, hostile to them;

– supersensitive to negative attitude towards themselves;

– pre-configured for negative perception of oneself by others;

– do not assess their own aggression as aggressive behavior;

– always blame the environment for their own destructive behavior;

– in the event of intentions of aggression, there is no sense of guilt or fault found very weakly;

– do not take responsibility for their actions;

– have a limited set of reactions to the problem situation;

– in a relationship show a low level of empathy;

– poorly developed control over their emotions;

– weakly aware of their emotions, except anger;

– afraid of unpredictability in the behavior of parents and coaches;

– have neurological deficiencies: unstable attention, weak memory, unstable memorization;

– do not know how to predict the consequences of their actions (emotionally stuck on a problem situation);

– positively relate to aggression, because of aggression they gain a sense of their own importance and strength.

Obviously, the above character traits, if they manifest themselves in young athletes, lead to conflict situations in a pair. The training of the conflicting couple is filled with negative emotions, which, as scientists have proved, hinders the memorization and assimilation of material, and certainly deprives the meaning of dance itself, as the expression of certain relationships: what we feel, then we dance [18]. To achieve high results in a sports pair, there must be mutual understanding, complementarity and mutual support. To prevent the development of aggressive forms of behavior among young athletes, coaches and parents should be aware of the reasons for the formation of such behaviors (Table 2). It is also advisable for sports psychologists to understand the main directions of preventive psychological correction of the aggressive behavior of athletes engaged in sports dancing at the stage of preliminary basic training (Table 3).

N. I. Koritchenkova, M. P. Quadritsius in their works on the issues of personality development in communication, note that the formation of aggressive forms of behavior is strongly influenced by the conditions of family upbringing [15; 17]. Negative personal behavior is reinforced by unfavorable relationships with teachers and trainers who do not have the skills to communicate with “difficult” children. Confrontation, unceasing long-term conflicts and mutual emotional dislikes cause verbal aggression among young athletes on coaches and physical aggression on their partners [10].

To optimize the educational process, in the pedagogical principle of the unity of the requirements for the child, coaches and parents of young athletes should know and understand what their gesture and actions lead to aggressive emotional reactions. The determinants of the formation of aggressive behavior are presented in Table 2 .

Analyzing psycho-pedagogical literature, we can conclude that the formation of aggressive tendencies in children 10–12 years old, as patterns of behavior, completely depends on the conditions in which a young athlete is brought up. And here it should be remembered if a young athlete demonstrates aggression, then this form of behavior is necessary for him to “survive”. According to the theory of A. Maslow, the needs of the individual are the driving force of his activity, in this case the gesture and actions of the young athlete, therefore, the manifestation of aggression is, on the one hand, the struggle for survival (the realization of the need for security) or the opportunity to attract attention (the realization of the need for attention and love), if other ways to attract the attention of meaningful adults or peers do not work [13; 20].

In working with young athletes who demonstrate a high level of aggressiveness, one should always ask the question: “Why is it necessary for a person? (What need does the person now satisfy through this form of behavior?)”. Depending on the answer to this question, two directions for further psychocorrectional work with aggressive athletes who engage in sports dances during the preliminary basic training stage can be identified (Table 3).

Prevention and psychological correction of the aggressive behavior of athletes engaged in sports dancing at the stage

Table 2

Determinants of the formation of aggressive behavior

Reasons for the formation of aggressive behavior	
In family	**In training**
Authoritarian style of education	
Demonstration of aggressive forms of behavior	
Prohibition of manifestation of "undesirable" feelings and emotions	
Assessing only the result of an activity, not a process	
Prohibition to make mistakes	
Use of orders and decrees as leading methods of education	
Parents and coaches put the child (athlete) mutually exclusive requirements	
Basic educational means: punishment (often physical), deprivation of privileges, introduction of restrictions and absence of rewards	
Comparison of the child (athlete) with other children (athletes)	
Indifference to the emotional state of the child (athlete)	
Emphasis on mistakes, and the child's successes are considered appropriate	
Destroyed emotional attachments between parents and children (Especially between parents and sons)	Formality of emotional contact between the coach and the athlete
Parents do not share the values and interests of the child	Coach shares only the sports interests of a young athlete
Indifference of parents to the social success of the child	Indifference of the coach to the success of an athlete outside sports
Conscious deprivation of love and care in case of guilt	Public punishment
Frequent isolation of children	Emotional ignoring of small successes in training activity

Table 3

Directions of preventive and psychocorrectional work with aggressive athletes who are engaged in sports dances at the stage of preliminary basic training

When implementing the security needs	When you realize the need for attention and love
Optimization of the level of personal anxiety of young athletes	Formation of an adequate level of self-esteem in young athletes
Permission to display anger in acceptable forms	Development of empathy in young athletes
Training of young athletes techniques of control over negative emotional states, verbalization of unfavorable emotions	Evaluation of the process of the activity of an athlete or his individual elements, and not just the result
Development of self-regulation skills	To react emotionally to the successful actions of a young athlete, not just mistakes
Formation of constructive patterns of behavior in problem situations for athletes	Implementation of the rule: – accept the athlete; – understand; – recognize.

of preliminary basic training should be of a complex systemic nature and take into account the main characterological characteristics of aggressive athletes: lack of control over your emotions; inadequate self-esteem, a limited set of behavioral responses in problem situations for them, lack of empathy, as well as a high level of personal anxiety. To form an ability for adequate forms of behavior and controlled manifestations of emotions in young athletes, preventive and psychocorrectional work should be aimed at developing their emotional intelligence, adequate self-esteem and the formation of simple communication skills [9; 12].

Considering the fact that the ability of an adult to own himself is the best guarantor of adequate behavior for children, it is appropriate for parents and coaches of young athletes to adhere to the following rules:

– switch attention from fixation to the negative behavior of a young athlete to his own uncontrolled negative emotional states;

– to master techniques of constructive, positive communication with the aim of eliminating the corresponding aggressive behavioral reaction from young athletes or reducing the already existing (Table 4).

Table 4

Methods of effective and constructive interaction with aggressive athletes

Method	Examples and explanations
Talk to the athlete about your feelings and experiences of the language of the inner "I", in the language of "I-messages."	– I am pleased when you behave this way; – I am annoyed by such actions; – I find it difficult to work in such conditions.
"Actively listen" to the child's inner world, the world of his feelings.	Pay attention to nonverbal signals (proximics, the ratio of levels in the vertical plane, posture, facial expression, sight, tactics) and paralinguistic signals (expressiveness of speech, intonation, voice loudness, pitch, speech speed.
Evaluate the behavior, not the personality of the young athlete, talk about undesirable and desired his actions.	– this is a «bad" act, and not you «bad"; – this act is not worthy of you, – this act worthy of you;
Try to see in the words and actions of the child a positive attitude and good intentions.	If a young athlete has committed some kind of inappropriate act, ask yourself: why does he need it?
Regulate your emotional state.	To regulate your emotional state, you must follow the following algorithm of actions: – to be aware of my condition (I'm angry, I'm afraid, I'm worried, etc.) – to recruit their emotions (say aloud about their emotional state «I'm angry because of this behavior", instead of screaming and reproaches).

On the part of the psychologist, painstaking work is needed to assist parents in developing clear rules and requirements, as well as the responsibilities of their child (young athlete). Since it is in the family that the primary socialization of the individual occurs, the clarification of the rules of interaction with other people: what can, but can not be done; the establishment of social norms of behavior [15; 17].

In the formation of athletes engaged in sports dancing in the preliminary basic training phase, the ability for effective interpersonal interaction with partners, it is appropriate to develop in them a sense of empathy, a better understanding of oneself and others. It is necessary to create opportunities for self-expression, the formation in young athletes of the know-how of practical possession of expressive movements – the means of human communication (facial gesture, gesture, pantomime). The development in young athletes of communication skills in various life situations and adequate evaluation activity aimed at analyzing one's own behavior and the actions of surrounding people will act as a preventive mechanism of their aggressive behavior. It is also important to form positive traits in young athletes engaged in sports dances during the preliminary basic training phase, which promote better mutual understanding in communication. It will be extremely necessary to increase the level of self-control in relation to one's emotional state in the course of communication, the formation of tolerance for the opinion of one's partner, in turn, will establish relations between the athlete and the trainer.

Conclusions

1. Trainers and parents of young athletes should remember that aggressive behavior is a kind of SOS signal, a cry for help, attention to one's inner world, in which there are too many destructive emotions, with which the individual can not independently cope.

2. According to the results of our study, a high level of aggression was detected in 19 (31,67%) of the study participants, of whom 8 (28,57%) were boys and 11 (34,37%) were girls. It is these athletes, whose level of aggression is high, constitute a risk group for interpersonal interaction in a pair, and require special attention from the coach and sports psychologist.

3. The following factors can be the determinants of aggressive behavior in a sports ball pair: authoritarian style of upbringing, demonstration of aggressive forms of behavior by parents and coaches, prohibition of manifestation of "undesirable" feelings and emotions, evaluation only of the result of activity, not process. And also indifference to the emotional state of the child (athlete), the formality of emotional contact, public punishment.

4. Prevention and psychological correction of the aggressive behavior of athletes engaged in sports dancing at the stage of preliminary basic training should be of a complex systemic nature and take into account the main characterological characteristics of aggressive athletes. Helping young athletes in realizing their real self, developing potential opportunities, responding to internal conflicts and fears, reducing anxiety and guilt, as well as elementary training in good-will rules will give a socially acceptable way out of aggressiveness and other negative feelings.

The prospect of further research in the development of a program for the prevention of aggressive behavior of athletes in sports dancing at the stage of preliminary basic training in order to form an effective interaction in a dance duo.

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Information about the Authors

Olena Gant: *PhD (Psychology), Associate Professor; Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0001-7729-4914
E-mail: lena.gant@mail.ru

Serhii Tkachov: *Doctor of Science (Pedagogical), Professor; Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0001-8130-4193
E-mail: tkachsi2015@ukr.net

Eduard Valiuh: *Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-5367-176X
E-mail: edonsan93@gmail.com

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Physical health condition and physical organism readiness levels of sports veteran wrestlers

Oleksiy Goncharov
Larysa Ruban
Kostiantyn Ananchenko

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *study and an assessment of the physical state of health and the degree of physical fitness of the organism among active veteran wrestlers.*

Material & Methods: *participants: 16 active veteran athletes, 7 of them judoka and 9 sambo wrestlers aged 36–45. Sports qualification of athletes: MS – 10 people, MSIC – 6 people. The stability of the organism to the conditions of hypoxia and hypercapnia was assessed by the results of the Stange and Genci tests. To determine the statistical balancing, the Bondarevsky trial was used. The degree of physical readiness was evaluated by the results of the distance traveled on the treadmill of Kettler, comparing it with the Cooper table. To assess the level of physical state, the formula was used by E. A. Pirogova.*

Results: *investigation determined that the actions of the wrestlers – sports veterans of the body's resistance to the conditions of hypoxia and hypercapnia, as well as the indicator VC indices correspond young people. Indicators of statistical balancing among the acting veterans of judoists and sambo wrestlers corresponded to those of 20–30-year-old people. Level of physical condition (LPC) of health in 71,4% of veteran-judoists at the average level and only 28,6% is of a high level. Sambo veterans observed the following: 44,4% of sportsmen of the LPC are above the average; 33,3% have an average level of physical health; in 11,1% of athletes the average LPC and 11,1% of the judo veterans have indicators corresponding to the level below the average.*

Conclusion: *conducted step-by-step medical and pedagogical control allowed to reveal some violations of the adaptive mechanisms of the cardiovascular system, which once again confirms the possibility of using the data of heart rate, blood pressure, Cooper's test for studying and analyzing the physical state of health and the degree of physical preparedness, as well as forecasting the health status of veterans sports.*

Keywords: *veterans of sports, cardiovascular system, Cooper test, Bondarevsky test.*

Introduction

Modern sport, and in particular, the sport of veterans, is characterized by high training and competitive loads, which impose increased demands on all systems of the athletes body. The level of physical and psychological load, accompanying the preparation and participation of athletes in responsible competitions, is often on the verge of disrupting the functional capabilities of his body. In this regard, the search for objective criteria for determining the physical state of health and the degree of physical preparedness of athletes, and especially active veterans of sports, at different stages of the training process remains relevant [1; 2].

Sport practice shows that the potential of an athlete accumulated in the training process is realized with the preservation of a high level of all aspects of his preparedness, and the success of realizing the potential of an athlete's readiness for competitive activity is determined by the effectiveness of medical and pedagogical observations at different stages of training athletes. N. D. Graevskaya argues that the maintenance of a sports form is promoted by a good health condition, the variability of loads and switching, ensuring a full recovery, an individual approach, a healthy lifestyle, regular medical and pedagogical control [1].

To date, there is a sufficiently large number of scientific studies devoted to the study of medical and biological support of the training process in such types of wrestling as sambo and judo, but for the most part these works have a pedagogical orientation aimed at studying the structure of competitive and training activities, planning and organizing a year-long competitive training course for wrestlers, as well as increasing the level of special training of judo and sambo wrestlers. However, little attention has been paid in the literature to medical and pedagogical observations of active veterans of sports. Taking into account the specifics of this sport, it is necessary to develop and implement the most effective programs for examining veteran athletes as an important component of step-wise medical control [1; 3–7].

From the existing forms of medical examinations of athletes in more detail I would like to focus on the study of the functional state and physical fitness of veteran wrestlers, using the Cooper test, which is based on physical exertion, which presents sufficient requirements for the cardiovascular system. If the body copes well with such loads, we can talk about the good functional state of the cardiovascular system and its high resistance to the development of diseases [10; 14; 15]. And, on the contrary, if the body does not cope with these loads – it indicates insufficient training of the cardiovascular system and can contribute to the emergence of various diseases, and especially at the age of 35 years [8]. Loads in Cooper's test are so-called "global" in nature, that is, when they are put into operation, more than 2/3 of the muscle mass. Thus, these loads affect not only the muscular apparatus, but also the systems

that provide muscular activity, primarily on the cardiovascular and respiratory systems. With the help of Cooper's 12-minute running test, the physical fitness of the organism is estimated based on the distance (in meters) that a person can run (or pass) in 12 minutes Analyzing the tolerability of loads in the performance of the Cooper test, we can assess the functional state of the cardiovascular and respiratory systems [8].

The purpose of the research: to study and an assessment of the physical state of health and the degree of physical fitness of the organism among active veteran wrestlers.

Material and Methods of the research

Participants: 16 acting veteran athletes, including 7 and 9 judo wrestlers aged 36–45 years. Sport athletes qualifications: MS – 10 people, world-class athlete – 6 people.

The research was conducted on the basis of the problem scientific laboratory of the Kharkov State Academy of Physical Culture. When organizing the study, the following methods were used: morpho-functional indices (body length, body weight, heart rate, vital capacity, blood pressure, dynamometry), functional sample and tests (Stange sample, Genci sample, Bondarevsky sample, Cooper's test); methods of mathematical statistics.

Cooper Test conducted on a treadmill company "Kettler". Athletes for 12 minutes performed running, independently regulating the running speed (12–16 km·h^{-1}). Order of the studies included recording the heart rate (heart rate, 1 minute), BP measurement before the start of the run, at the 1st minute of recovery, then every next minute until complete recovery. Calculation of pulse pressure (PP). The degree of physical readiness was assessed by the results of the distance traveled, comparing it with the Cooper table.

To assess the level of physical condition (LPC) used the formula E. A. Pirogova [12]:

$$X = \frac{700 - 3 \times HR_r - 2{,}5 \times BP_{av} - 2{,}7 \times Age + 0{,}28 \times Weight}{350 - 2{,}6 \times Age + 0{,}21 \times Height},$$

where HR_r – heart rate (beats min^{-1}) at rest;
BP_{av} – BP average, calculated by the formula:
BP_{av} = BP diastolic + 1/3 x BP pulse;
BP pulse = BP systolic – BP diastolic.

Obtained value is evaluated in accordance with the data in the tables. Statistical analysis of the results was carried out using the EXCEL tables. For parameters that meet the criteria for normal distribution, parametric statistical methods were used. Thus calculated arithmetic mean – $\bar{X}$; average error arithmetic mean value – ±m [7].

Results of the research and their discussion

As a result of evaluation of morpho-functional indices, both groups were homogeneous (Table 1).

Stability of the organism to the conditions of hypoxia according to the results of the Stange sample was 645±6,65 s, to the hypercapnia conditions according to the results of the Genci test – 44,4±3,54 c

To determine the statistical balancing (SB) – the index of the state of the musculoskeletal system, the coordination of movements and the stability of the psychological attitude to achieve the best result, all athletes were tested Bondarevsky samples. Static balancing is one of the key tests in the method for determining biological age and characterizes the functional state of many body systems, as well as the interactions between them. Indicators SB in the acting veterans of judoists and sambo wrestlers corresponded to the indicators of 20–30-year-old people, namely the time of standing on one leg with the eyes closed was 35 to 40 seconds.

Table 1
Morpho-functional indicators of veteran wrestlers, $\bar{X}$±m

Indicators	Judo veterans	Sambo veterans
Height, cm	177,27±2,23	176,34±2,36
Weight, kg	72,45±2,12	73,28±2,18
BMI, kg·cm^{-2}	23,02±0,42	23,56±0,37
Dynamometry (right), kg	52,55±2,25	53,78±2,16
Dynamometry (left), kg	47,46±2,15	48,16±2,24
CE, cm	5,34±1,18	5,61±1,12
VC, ml	5050±0,08	5048±0,11

Cooper test all the athletes studied for 12 minutes run, independently adjusting the speed of run (12–16 km·h^{-1}), breaking the distance from 2390 to 2780 m, which according to the Cooper table for men aged 30 to 39 years corresponds to a good and an excellent degree of physical readiness.

Figure 1 shows the results of the Cooper test.

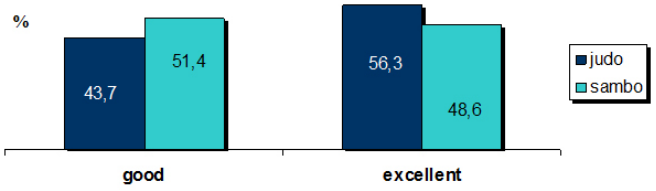

Fig. 1. Assessment of the degree of physical readiness of the acting veterans – judoists and sambo wrestlers (%)

During the Cooper load test, all veteran athletes did not make any complaints, but the analysis of the HR and BP measurement before the test, during the test, the recovery time of the HR and BP after the load, revealed the tension by the adaptation mechanism of these athletes. The obtained results once again confirm the importance of controlling HR and BP in the active wrestler's veterans of sports and allow them to recommend them for monitoring the functional state of the cardiovascular system during medical and pedagogical observations.

In our study, it was of interest to calculate the level of the physical state, for which the formula E. A. Pirogova was used by.

The obtained indicators are presented in Table 2.

The data in Table 2 indicate that 71,4% of the average LPC veteran athletes and only 28,6% have a high level of physical condition. Veteran sambo wrestlers observed the following: in 44,4% of athletes LPC are above average; 33,3% have an average level of physical health; 11,1% of athletes – the average LPC and 11,1% of the judo veterans have indicators cor-

Table 2

Indicators of BP and HR at rest, the level of physical health among wrestler's veterans

No.	HR_r (beats·min^{-1})	BP_{av} (mm Hg)	Means	Level of physical health (range of values)
Judo veterans				
1.	68	93	0,632	average (0,526–0,675)
2.	72	87	0,615	average (0,526–0,675)
3.	66	77	1,468	high (0,826 and above)
4.	78	88	0,552	average (0,526–0,675)
5.	81	80	0,604	average (0,526–0,675)
6.	76	86	0,596	average (0,526–0,675)
7.	66	78	0,779	high (0,826 and above)
Sambo veterans				
1.	72	70	0,788	above average (0,676–0,825)
2.	64	78	0,615	average (0,526–0,675)
3.	60	75	0,802	above average (0,676–0,825)
4.	68	86	1,077	high (0,826 and above)
5.	71	102	0,523	below the average (0,376–0,525)
6.	76	85	0,617	average (0,526–0,675)
7.	66	92	0,661	average (0,526–0,675)
8.	64	78	0,784	above average (0,676–0,825)
9.	70	73	0,771	above average (0,676–0,825)

responding to the level below the average.

Similar studies are often found in the scientific literature. Thus, I. E. Kumantsova (2009) investigated the features of the functional state of the cardiovascular system and the correction of its borderline changes in highly trained individuals using a diagnostic integrated approach, including the measurement of heart rate, blood pressure, resting ECG, and found that intense physical activity not only leads to physiological adaptation changes in the functioning of the cardiovascular system, but also to the expressed adaptation disorders.

A. H. Talibov (2011, 2013) studied the physiological parameters of hemodynamics in sports veterans depending on the motor activity and came to the conclusion that veterans of sports continuing to engage in age-related changes in the cardiovascular system are experiencing age-related changes, but there are still ways to adapt to physical load, as well as at a young age. What confirms the informative nature of heart rate and blood pressure monitoring [14].

L. V. Podrigalo, A. A. Volodchenko, O. A. Rovnaya, L. A. Ruban, K. M. Sokol (2017) confirmed the importance of using load tests and control of heart rate and blood pressure in athletes-athletes to assess the functional state cardiovascular system, the level of its adaptation and compliance with certain physical loads, which allowed to recommend them for monitoring the physical state of health [21].

Cemal Ozemek, Mitchell H. Whaley, W. Holmes Finch & Leonard A. Kaminsky (2017) used the results of load tests to assess the state of the cardiovascular system. In conditions of monitoring, the possibility of predicting the state of health according to the heart rate [20].

Conclusions

The conducted research has established that among active athletes-veterans of sports the resistances of the organism to the conditions of hypoxia and hypercapnia, as well as the index of VC correspond to those of young people. Indicators of the SB of the acting veterans of judo and sambo wrestlers corresponded to those of 20–30-year-old people.

Level of physical health in 71,4% of veteran-judoists at the average level and only 28,6% are of a high level. Sambo veteran wrestlers observed the following: in 44,4% of LPC athletes are above the average; 33,3% have an average level of physical health; in 11,1% of athletes the average LPC and 11,1% of the judo veterans have indicators corresponding to the level below the average.

Prospects for further research. Carried out a stage-by-stage medical and pedagogical control allowed to reveal some violations of the cardiovascular adaptation mechanism, which once again confirms the possibility of using the data of heart rate, blood pressure, Cooper's test for studying and analyzing the physical state of health and the degree of physical preparedness, as well as forecasting the health status of veterans of sports.

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Information about the Authors

Oleksiy Goncharov: *Kharkiv State Academy of Physical Culture: Klochkivska Street 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0002-2012-6298
E-mail: aionaskr89@gmail.com

Larysa Ruban: *PhD (Physical Rehabilitation); Kharkiv State Academy of Physical Culture: Klochkivska Street 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0002-7192-0694
E-mail: slarisaruban@gmail.com

Kostiantyn Ananchenko: *PhD (Physical Education and Sport); Kharkiv State Academy of Physical Culture: Klochkivska Street 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0001-5915-7262
E-mail: ananchenko_@bk.ru

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An influence of aerobic activities on special endurance of students in groups with a sports orientation (sectional activities) of table tennis

Vitaliy Hrynko
Viktoriya Kudelko

Kharkiv Institute of Finance of Kyiv National University of Trade and Economics, Kharkiv, Ukraine

Purpose: *experimentally to reveal the influence on the special endurance of aerobic activities (cross training and basic aerobics), which are included in the program of higher educational institutions of groups with sports orientation (sectional occupations) table tennis, and to explore the need to include these classes in the curriculum for physical education.*

Material & Methods: *analysis and generalization of literary sources, pedagogical observation, pedagogical experiment, modeling. In the experiment, 106 first-year students took part: (53 – control group and 53 – experimental).*

Results: *technique of revealing the influence of aerobic training on the special endurance of students of groups with a sports orientation was tested; the effectiveness of the experimental technique of training for increasing special endurance was developed and proved.*

Conclusion: *at this stage of the experiment, the effectiveness of the program was substantiated and proved with the inclusion of aerobic activities (cross training and basic aerobic elements) in the training groups on sporting orientation (sectional occupations) table tennis.*

Keywords: *aerobic classes, cross training, basic aerobics, special endurance, simulated data, sectional occupations.*

Introduction

The problem of increasing the effectiveness of physical education of student youth has been and is most significant in recent times. In theory and in practice, the issues of differentiation, individualization and profiling of education, the integration of the content of education, the ideas of optimization and modernization of the educational system were actively developed [8]. In the opinion of specialists, it is necessary to abandon rigid normativeness, obligatory and authoritarianism, adjusting to the standard set from outside, to form an interested attitude of the student to the subject, to arouse interest in the possibility of building a healthy body, forming one's own health [7].

All this indicates the need to find new ways to improve the physical, mental and moral state of student youth [17]. In our previous research on the results of the survey, students assessed the importance of developing physical qualities as follows: 1) endurance, 2) strength, 3) dexterity, 4) flexibility, 5) coordination, 6) speed. And their own level of physical readiness was estimated as follows: 1) strength, 2) coordination, 3) speed, 4) flexibility, 5) dexterity, 6) endurance [2]. These facts show that students understand the important influence of endurance and its importance in solving the tasks of preparation for work, and they realize that it is this physical quality that most of them develop worse [2; 7]. Issues of improving the physical preparation of students in recent years have been considered in the works of a large number of researchers [3; 6]. There are a lot of works where such physical quality as endurance is studied, but there are not enough works to improve special endurance in groups with a sports orientation (sectional session), in particular table tennis. A work to improve the special endurance means of cross training and with the help of basic aerobics in groups with a sports focus (sectional occupations) in recent years generally does not occur. Based on this, we have developed and justified a program based on cross training and elements of basic aerobics for groups with a sports orientation (sectional occupations) table tennis [3; 6], which should significantly improve physical quality such as special endurance.

The purpose of the research: experimentally to reveal the influence on the special endurance of aerobic activities (cross training and basic aerobics), which are included in the program of higher educational institutions of groups with sports orientation (sectional occupations) table tennis, and to explore the need to include these classes in the curriculum for physical education.

Material and Methods of the research

Analysis and generalization of literary sources, pedagogical observation, pedagogical experiment, modeling. In the experiment, 106 first-year students participated (53 – control group and 53 – experimental). The research was carried out on the basis of the Simon Kuznets Kharkiv National University of Economics and Kharkov Institute of Finance of Kiev National Trade and Economic University.

To test the hypothesis, the *first stage* was:

– studied the level of physical preparedness of students;

– developed and justified the program of physical training for students of groups with a sports orientation (sectional occupation) table tennis.

On the *second stage*:

– a comparative pedagogical experiment was conducted to check the effectiveness of the developed program.

The experiment was conducted during the academic year from October 2015 to June 2016. Students of the control group were engaged in the program of a higher educational institution for groups with a sports orientation (sectional occupation) table tennis, and students of the experimental group on the program developed by us to increase the level of special endurance, which combines a program for special sports training (table tennis – 75%) and aerobic exercise (cross training and elements of basic aerobics – 25%). The program was based on the program of the higher educational institution for groups with a sports orientation (sectional occupation) table tennis and included in it for every fourth session – aerobic exercise (cross training and basic aerobics). By the middle of December, while weather conditions allowed, the students of the experimental group each fourth session were engaged in cross-training in the open air, then moved to the hall where, in the experiment, they continued to engage in every fourth session already with basic aerobics, and at the end of March they again took to fresh air, where they continued to study every fourth session by cross training. At the beginning and at the end of the experiment, table tennis competitions were held in the control and experimental groups, as checking the level of endurance in game sports, in particular in table tennis, is better manifested in competitive conditions [6] (each pair played five games, in each batch was considered the number of mistakes made).

To check the level of special endurance at the beginning and at the end of the experiment, statistical and comparative analyzes of the experimental and control group data were made to find out how aerobic activities (cross training and basic aerobics) affected the level of special endurance. For this, the pairwise regression model was used [1] (F – Fisher and t – Student criteria were analyzed for the linear regression equation [11; 16], linear coefficients of pair correlation, determination and average error of approximation were calculated [4; 15], estimated statistical significance of regression and correlation parameters [9; 18], residual dispersion is determined, confidence intervals are calculated [12]).

Results of the research and their discussion

As a result of using the pair regression method, such equations were found for the experimental group at the beginning of the experiment (October).

Calculation of the parameters of the linear regression equation for the experimental group at the beginning of the experiment (October) is presented in the calculation table (Table 1).

We find estimates of the parameters of the regression equation:

$$b = \frac{\overline{(xy)} - \bar{x}\bar{y}}{\overline{x^2} - (\bar{x})^2} = \frac{18{,}67 - 5{,}74 \cdot 3}{11 - (3)^2} = \frac{1{,}45}{2} = 0{,}73$$

$$a = \bar{y} - b\bar{x} = 5{,}74 - 0{,}73 \cdot 3 = 3{,}55$$

We obtain the regression equation: $\hat{y}_x = a + bx$.

On this basis, we see that with an increase in the number of games played by at least one, the average number of errors increases on average by 0,73:

$\hat{y}_1 = 3{,}55 + 0{,}73 \cdot 1 = 4{,}28;$

Table 1

Calculation of the parameters of the linear regression equation for the experimental group at the beginning of the experiment (October)

No. i/o	X	Y	$\hat{y}_x$	$y - \hat{y}_x$
1.	1	4,24	4,28	–0,04
2.	2	5,0	5,01	–0,01
3.	3	5,9	5,74	0,16
4.	4	6,49	6,47	0,02
5.	5	7,09	7,2	–0,11
Total	15	28,72	28,7	0,02
Average	3	5,74	5,74	0,004

Remark. *Here and below: X – set number, Y – number of errors, $\hat{y}_x$, $y - \hat{y}_x$ – additional values for finding linear regression parameters.*

$\hat{y}_2 = 3{,}55 + 0{,}73 \cdot 2 = 5{,}01;$
$\hat{y}_3 = 3{,}55 + 0{,}73 \cdot 3 = 5{,}74;$
$\hat{y}_4 = 3{,}55 + 0{,}73 \cdot 4 = 6{,}47;$
$\hat{y}_5 = 3{,}55 + 0{,}73 \cdot 5 = 7{,}2.$

The tightness of the linear connection is estimated by the correlation coefficient:

$$\sigma_x^2 = \overline{x^2} - \bar{x}^2;\ \sigma_x = \sqrt{\sigma_x^2};$$

$$\sigma_y^2 = \overline{y^2} - \bar{y}^2;\ \sigma_y = \sqrt{\sigma_y^2};$$

$$r_{xy} = b\frac{\sigma(x)}{\sigma(y)} = 0{,}73\frac{1{,}41}{1{,}04} = 0{,}99.$$

Since the value of the correlation coefficient is greater than 0.9, there is a fairly close linear relationship between the number of played set and the number of errors committed.

We find the coefficient of determination:

$$r_{xy}^2 = 0{,}99^2 = 0{,}98.$$

This means that 98% of the variation in the errors (y) is due to the variation of the factor x – the number of played sets.

Having the regression equations $\hat{y}_x = 5{,}74 + 0{,}73 \cdot x$, t is possible to predict the number of errors for the sixth sets:

$\hat{y}_6 = 5{,}74 + 0{,}73 \cdot 6 = 7{,}93.$

As can be seen from the equation, the error for the sixth set will increase slightly, but the calculation error does not exceed 10%.

The calculation of the parameters of the linear regression equation for the experimental group at the end of the experiment (May) is presented in the calculation table (Table 2).

Table 2

Calculation of the parameters of the linear regression equation for the experimental group at the end of the experiment (May)

No. i/o	X	Y	$\hat{y}_x$	$y - \hat{y}_x$
1.	1	4,02	4,1	–0,08
2.	2	4,45	4,4	0,05
3.	3	4,81	4,7	0,1
4.	4	5,04	5	0,04
5.	5	5,19	5,3	–0,11
Total	15	23,51	23,5	0
Average	3	4,7	4,7	–

Thus, having the regression equation $\hat{y}_x=3,8+0,3\cdot x$, we can predict the number of errors for the sixth set:

$\hat{y}_6=3,8+0,3\cdot 6=5,6.$

As can be seen from the equation, the error for the sixth set will increase slightly, but the calculation error does not exceed 10%.

After statistical processing of the data, let us make a comparative analysis of the numerical data of the experimental group for October and May (Figure 1).

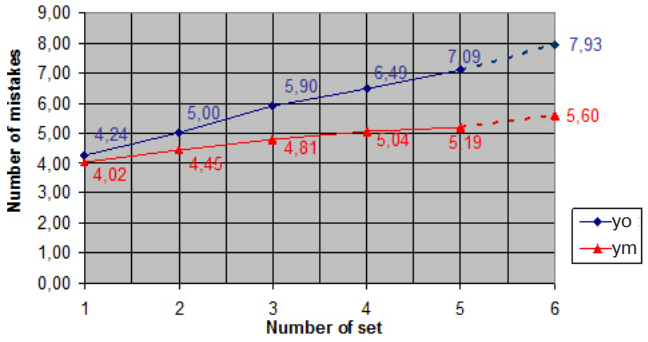

Fig. 1. Comparative analysis of the numerical data of the experimental group when playing table tennis in October and May: *yo – data for October, ym – data for May.*

As we see, the numerical data of the experimental group at the end of the experiment have a significant improvement: during the first set by 0,22; during the second by 0,55; during the third by 1,09; during the fourth by 1,02; during the fifth by 1,9; with a projected sixth set of 2,33. The level of reliability of the model is high, since the average error of approximation does not exceed 5% (in October, A=1,14%, and in May A=1,66%).

Calculation of the parameters of the linear regression equation for the control group at the beginning of the experiment (October) is presented in the calculation table (Table 3).

Table 3

Calculation of the parameters of the linear regression equation for the control group at the beginning of the experiment (October)

No. i/o	X	Y	$\hat{y}_x$	$y-\hat{y}_x$
1.	1	4,25	4,3	–0,05
2.	2	5,11	5,02	–0,09
3.	3	5,79	5,74	0,05
4.	4	6,42	6,46	–0,04
5.	5	7,15	7,18	–0,03
Total	15	28,72	28,7	0,02
Average	3	5,74	5,74	0,004

Thus, having the regression equation $\hat{y}_x=3,58+0,72\cdot x$, we can predict the number of errors for the sixth set:

$\hat{y}_6=3,58+0,72\cdot 6=7,9.$

As can be seen from the equation, the error for the sixth set will increase slightly, but the calculation error does not exceed 10%.

Calculation of the parameters of the linear regression equation for the control group at the end of the experiment (May) is presented in the calculation table (Table 4).

Table 4

Calculation of the parameters of the linear regression equation for the control group at the end of the experiment (May)

No. i/o	X	Y	$\hat{y}_x$	$y-\hat{y}_x$
1.	1	3,94	3,99	–0,05
2.	2	4,43	4,44	–0,01
3.	3	4,94	4,9	0,04
4.	4	5,4	5,36	0,04
5.	5	5,79	5,82	–0,03
Total	15	24,5	24,51	–0,01
Average	3	4,9	4,9	–

Thus, having the regression equation $\hat{y}_x=3,52+0,46\cdot x$, we can predict the number of errors for the sixth set:

$\hat{y}_6=3,52+0,46\cdot 6=6,28.$

As can be seen from the equation, the error for the sixth set will increase slightly, but the calculation error does not exceed 10%.

After statistical processing of the data, let us make a comparative analysis of the numerical data of the experimental group for October and May (Figure 2).

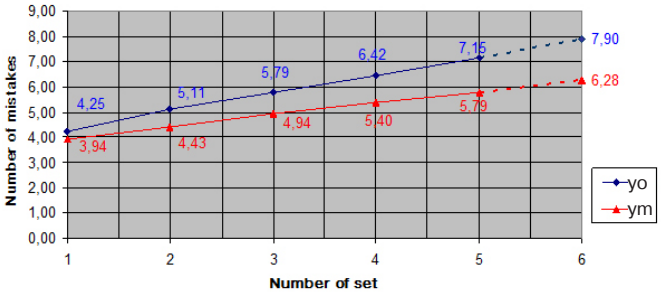

Fig. 2. Comparative analysis of the numerical data of the control group when playing table tennis in October and May: *yo – data for October, ym – data for May.*

As we see, the numerical data of the experimental group at the end of the experiment have a significant improvement: during the first set by 0,31; during the second by 0,68; during the third by 0,85; during the fourth by 1,02; during the fifth by 1,36; with a projected sixth set of 1,62. The level of reliability of the model is high, since the average error of approximation does not exceed 5% (in October A=0,97%, and in May A=0,71%).

Thus, for the first time: the effectiveness of a methodological approach to the development of a physical education program for students of groups with a sports orientation, combining the conventional means of developing physical qualities with an emphasis on special endurance; justified the program of physical education for students of groups with a sports orientation (sectional occupations) table tennis with the inclusion of aerobic activities (cross training and basic aerobics).

Obtained results supplement scientific data on aerobic occupations and their influence on special endurance [6; 10; 14].

These results confirm the opinion that in the correct ratio of the physical fitness classes for students of groups with a sports orientation (sectional occupations) and the inclusion of aerobic activities (cross training and basic aerobics), the special endurance of students can be significantly improved [14].

Conclusions

1. Analysis of literature sources showed that the problem of studying the influence of aerobic exercises for improving special endurance in groups with a sports orientation (sectional occupations) table tennis is not sufficiently studied.

2. At this stage of the experiment it was proved that the inclusion of aerobic table tennis (cross training and elements of basic aerobics) in the experimental group included in the training program on sporting orientation (sectional occupations) significantly influenced the special endurance of the students than those engaged in the ordinary program (control group).

3. Program on physical education on the basis of cross training and elements of basic aerobics for groups with a sport orientation (sectional occupations) table tennis has been developed and justified, which essentially improves such physical quality as special endurance.

4. With the improvement of special endurance, mobility and reaction rate improved.

Prospects for further research. Proceeding from the above, further studies are planned to be carried out in the direction of increasing the level of special endurance of students by improving and introducing into the educational process of higher educational institutions a program of exercises with aerobic exercises (cross training and basic aerobics) for groups with a sports orientation (sectional occupations).

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Information about the Authors

Vitaliy Hrynko: *Kharkiv Institute of Finance, Kyiv National University of Trade and Economics, lane Pletnevsky, 5, Kharkiv, 61000, Ukraine.*
ORCID.ORG/0000-0002-5118-9558
E-mail: vngrinko78@mail.ru

Viktoriya Kudelko: *PhD (Physical Education and Sports), associate professor; Kharkiv Institute of Finance, Kyiv National University of Trade and Economics, lane Pletnevsky, 5, Kharkiv, 61000, Ukraine.*
ORCID.ORG/0000-0001-9252-8563
E-mail: vikikudelko@mail.ru

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An influence of interval hypoxic training on physical readiness indicators of trained mountaineers

Andrii Kyiko
Viacheslav Mulyk

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *determine the influence of interval hypoxic training (IHT) on the indices of physical preparedness at the stage of precompetitive preparation for overcoming Mount Elbrus.*

Material & Methods: *to determine the level of manifestation of physical qualities, the exercises recommended for the training of climbers and methods of mathematical statistics with the calculation of well-known indicators were used to establish the correlation dependence and the reliable difference between the group indices.*

Results: *the conducted studies made it possible to establish that the use of the regime of discontinuous hypoxia 15–15 with breathing through the system into a closed space in the training process of the precompetitive period contribute to an increase in the indices of physical fitness of climbers.*

Conclusion: *the results of the conducted studies indicate that the use of IHT in the 15–15 mode in the period before the ascent to the city of Elbrus allows to significantly increasing the indices of physical preparedness (mainly exercises with a delay in breathing) and the anaerobic and aerobic endurance of skilled climbers in the pre-competition stage.*

Keywords: *climbers, hypoxic training, physical preparedness.*

Introduction

Mountaineering combines the use of two types of sporting activities - mountain tourism (movement with cargo along gentle slopes) and rock climbing (overcoming steep rocky rocks with the use of special equipment) in conditions of increasing hypoxia.

Therefore, in comparison with other types of sports activities', mountaineering has its own specific features associated with staying in the mountainous area [7; 8].

When constructing a summer macrocycle in sports practice, it is recommended to take into account the phenomenon of "transformation is understated", which implies an increase in efficiency and the formation of motor qualities, which decrease somewhat after the athlete fulfills the corresponding loads, and the peak of the increase in results does not coincide with the most significant increase in the volume of the load [2; 5]. In this connection, it is necessary to significantly increase the volume of the load, which will take some time before the volumes of training loads are transformed into an increase in physical performance and the achievement of sports results [3]. Thus, the increase in the volume of loads plays a leading role in the formation of the foundation for the following achievements, and intensification plays a leading role in the realization of sporting achievements on the basis of the fulfilled volume of loads [6; 9].

The preparatory period is of great importance for the successful overcoming of the planned mountain ascents, especially the stage of pre-country walk preparation [4].

The purpose of the research: determine the influence of interval hypoxic training (IHT) on the indices of physical preparedness at the stage of precompetitive preparation for overcoming Mount Elbrus.

Material and Methods of the research

To determine the level of manifestation of physical qualities, the exercises recommended for the training of climbers and methods of mathematical statistics with the calculation of well-known indicators were used to establish the correlation dependence and the reliable difference between the group indices.

Results of the research and their discussion

Our analysis of the content of pre-country walk training (analysis of literature sources and questionnaires) determined the contribution of the types of climbers training in preparation for overcoming mountain peaks (Fig. 1).

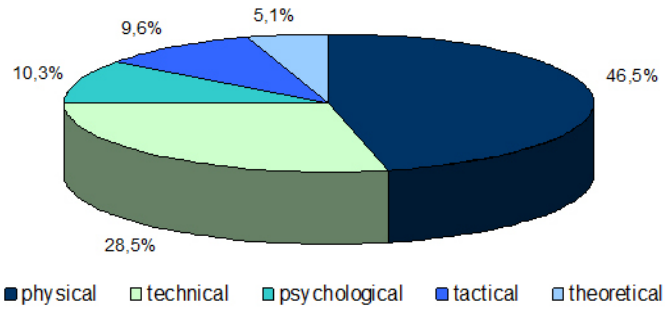

Fig. 1. Contribution of the types of climbers training in preparation for overcoming mountain peaks

As evidenced by the results obtained, the greatest contribution is made by physical training, consisting of general preparatory and special exercises.

The most significant quality is endurance, which is primarily associated with the movement under hypoxic conditions; other motor qualities are less evident (Fig. 2).

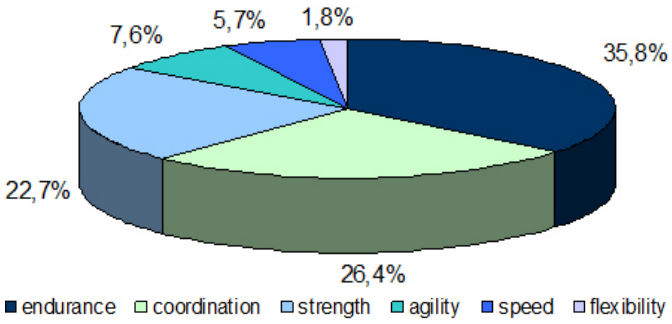

Fig. 2. Motor qualities that make up the physical preparedness of climbers

Correlation analysis that we carried out made it possible to determine the relationship between general preparatory and special-preparatory exercises used in mountaineering (Table 1).

The results of the correlation analysis indicate that the greatest connection is with the exercises connected with pulling-ups – push-ups (r=0,47), arm dynamometry (r=0,44), hang on the bent hands (r=0,48), hang on one bent arm (r=0,52), hang in the block (r=0,50), flexion of the hand with burdening (r=0,57).

Perfoming exercise flexion and extension push-ups interconnected with the hang on the bent hands (r=0,46),), hang on one bent arm (r=0,53), hang in the block (r=0,48) and flexion of the hand with burdening (r=0,61). Arm dynamometry correlates with the hang on the bent hands (r=0,56), hang on one bent arm (r=0,62), hang in the block(r=0,44), flexion of the hand with burdening (r=0,49).

Result of hang on the bent hands requires high indicators in pulling-up (r=0,48), push-ups (r=0,46), arm dynamometry (r=0,56), hang on one bent arm (r=0,64), hang in the block (r=0,51) and flexion of the hand with burdening (r=0,50). In turn, an exercise that requires the greatest manifestation of strength (hang on one bent arm) has significant correlation with pull-ups (r=0,52), push-ups (r=0,53), arm dynamometry (r=0,62) hang on the bent hands (r=0,64).

Performing amount of flexion of the hand with burdening correlated with indicators of exercises carried out at the expense of muscle groups of the upper limbs and trunk: pull-ups (r=0,57), push-ups (r=0,61), arm dynamometry (r=0,49), hang on the bent hands (r=0,50), hang on one bent arm (r=0,58) and hang in the block (r=0,52).

The result of the test determining endurance (interval run 6x1,4 km) has a weak correlation with exercises that are performed due to the muscles of the lower limbs – standing long jump (r=0,41) and squatting on one leg (r=0,40).

Obtained results allow us to take into account the interrelationship and influence of various exercises on the formation of motor qualities in the construction of the training process, using first the general preparatory tools, which are basic, and then the preparatory ones at the preparatory stage, which allowed the development of the contents of the pilot training program for mountaineers in the preparatory period.

Fundamental in the planning of training loads is the development of anaerobic-aerobic endurance, which is the basic basis for the overcoming of mountain peaks and against which the development of other motor qualities takes place.

At the same time, it is determined [1], the quality of endurance depends on the functioning of the respiratory system. Therefore, in the training program of the study groups, interval hypoxic training was additionally included, using two regimens: 15–15 (experimental group) and 30–30 (control group).

Studies about the features of the use of funds climbers training in individual mesocycles precompetitive stage, which define the factor structure of the types of training and the correlation relationship between the individual means of GDP and SDP it possible to determine the content of the preparatory period to overcome Elbrus(5642 m).

The preparatory period begins in November and ends in July before the beginning of the ascent (June and August are the most favorable period for overcoming Elbrus). Period consists of a retracting, basic (GDP), a base (SDP) and precompetitive mesocycle.

The highest in terms of load is planned in the base mesocycle (impact microcycle), and the intensity of the exercise – in the pre-competition mesocycle (control-preparatory).

The introduction into the training process of the experimental group of additional interval hypoxic training in the 15–15 mode with breathing through the system into a confined space with an adjustable composition of inhaled air in the complex train-

Table 1

Correlation interrelation of indicators of general and specially-preparatory exercises of qualified climbers (n=26)

Indicators	1	2	3	4	5	6	7	8	9	10	11
1		0,11	0,29	0,14	0,12	0,40	0,39	0,44	0,48	0,22	0,14
2			0,52	0,16	0,20	0,18	0,17	0,12	0,14	0,17	0,41
3				0,15	0,12	0,09	0,11	0,15	0,12	0,14	0,40
4					0,47	0,44	0,48	0,52	0,50	0,57	0,21
5						0,20	0,46	0,53	0,48	0,61	0,15
6							0,56	0,62	0,44	0,49	0,08
7								0,64	0,51	0,50	0,09
8									0,52	0,58	0,11
9										0,52	0,10
10											0,09

Remark. *Indicators: 1 – lifting the legs on the crossbar; 2 – standing long jump; 3 – squatting on one leg; 4 – pull-ups; 5 – push-ups; 6 – arm dynamometry; 7 – hang on the bent hands; 8 – hang on one bent arm 9 – hang in the block; 10 – flexion of the hand with burdening; 11 – interval running (6x1,4 km).*

ing process of climbers with the regime of application, presented in Table 2, allowed to obtain better results of indicators of special physical preparedness than in the control group with the 30–30 regime. So, if at the beginning of the study there was no significant difference between the groups, they were investigated, there were no indicators in the indicators, then after the use of IHT they were obtained.

In performing hang on the bent hands difference were 4,2 s (t=2,86; p<0,05), hang on one bent arm 7,2 s (t=3,12; p<0,01), hang in the block 3,6 s (t=2,58; p<0,05), interval run 6x1,4 km on 11,0 s (t=6,96; p<0,001) (Table 2).

In terms of general physical preparedness, the advantage of climbers of the experimental group is less pronounced (Table 3). Reliably the best figures are obtained in performance lifting the legs on the crossbar (t=2,16; p<0,05) and push-ups (t=2,15; p<0,05). Along with this, in both groups the majority of indicators obtained significant changes, but in the experimental they are more significant.

Conclusions

The use at the pre-competition stage of preparation for the overcoming of the mountain peaks of Elbrus by interval hypoxic training in the 15–15 mode with breathing through the system into the closed one simply allows to significantly increasing the results of exercises that are performed with a delay in breathing when the cardiovascular system is operated in anaerobic-aerobic regime.

Prospect of further research is to determine the influence of IHT on the climatic parameters of climbers during the Elbrus mountain crossing (5642 m).

Table 2

Data of the special physical readiness of the climbers of the control (n=14) and experimental (n=12) groups of the level of SP1 at the beginning and at the end of the pre-competition period

Types of tests	Measurements	CG $\bar{X}_1 \pm m_1$	EG $\bar{X}_2 \pm m_2$	Estimate of probability t	p
Hang on the bent hands, s	Before	25,8±1,01	25,2±1,00	0,42	p>0,05
	After	29,6±1,03	33,8±1,05	2,86	p<0,05
		t=1,94; p>0,05	t=5,24; p<0,001		
Hang on one bent arm (sum), s	Before	29,7±1,04	29,4±1,03	0,21	p>0,05
	After	36,3±1,57	43,5±1,70	3,12	p<0,01
		t=3,51; p<0,01	t=7,09; p<0,001		
Hang in the block, s	Before	73,8±0,80	72,9±1,08	0,67	p>0,05
	After	75,2±0,80	78,8±1,14	2,58	p<0,05
		t=1,23; p>0,05	t=3,76; p<0,01		
Flexion of the hand with burdening, number of times	Before	15,2±0,6	16,1±0,4	1,53	p>0,05
	After	17,0±0,5	18,1±0,3	1,84	p>0,05
		t=2,31; p<0,05	t=4,00; p<0,01		
Interval running (6x1,4 km), s	Before	2034,0±1,16	2032,0±1,18	1,20	p>0,05
	After	2028,0±1,15	2017,0±1,09	6,96	p<0,001
		t=3,68; p<0,01	t=9,32; p<0,001		

Table 3

Indicators of the data of the general physical readiness of climbers of the control (n=14) and experimental (n=12) groups of the level of SP1 at the beginning and at the end of the pre-competition period

Types of tests	Measurements	CG $\bar{X}_1 \pm m_1$	EG $\bar{X}_2 \pm m_2$	Estimate of probability t	p
Lifting the legs on the crossbar, number of times	Before	10,7±0,86	10,4±0,85	0,24	p>0,05
	After	12,6±0,94	15,5±0,96	2,16	p<0,01
		t=1,50; p>0,05	t=3,98; t=0,01		
Standing long jump, s	Before	263,7±4,2	262,7±4,1	0,17	p>0,05
	After	268,5±4,3	273,8±4,2	0,88	p>0,05
		t=0,80; p>0,05	t=1,89; p>0,05		
Squatting on one leg, number of times	Before	14,7±1,1	14,9±1,3	0,12	p>0,05
	After	18,2±1,3	20,7±1,4	1,31	p>0,05
		t=2,06; p>0,05	t=3,04; p<0,05		
Pull-ups, number of times	Before	16,2±0,5	16,0±0,2	0,25	p>0,05
	After	18,2±0,6	19,7±0,7	1,63	p>0,05
		t=2,56; p<0,05	t=5,07; p<0,001		
Push-ups, number of times	Before	44,7±0,9	45,1±1,0	0,30	p>0,05
	After	51,6±1,2	55,4±1,3	2,15	p<0,05
		t=4,60; p<0,001	t=6,28; p<0,001		
Arm dynamometry, kg	Before	56,0±0,6	54,7±0,8	1,23	p>0,05
	After	61,3±1,1	62,5±0,9	0,85	p>0,05
		t=4,24; p<0,001	t=6,50; p<0,001		

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Information about the Authors

Andrii Kyiko: *Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-6248-3576
E-mail: dryu.volkova@gmail.com

Viacheslav Mulyk: *Doctor of Science (Physical Education and Sport), Professor; Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-4441-1253
E-mail: mulik_v@mail.ru

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An influence of classical dance on a technical preparedness level of athletes in acrobatic rock and roll at the preliminary basic training stage

***Petro Kyzim*[1]**
***Serhii Humeniuk*[1]**
***Nataliya Batieieva*[2]**

[1]*Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine*
[2]*Kiev National University of Culture and Arts: E. Konovaitsia, Kiev, Ukraine*

Purpose: *experimentally substantiate the technique for improving the technical training of acrobatic rock'n'roll athletes with classical dance at the stage of preliminary basic training.*

Material & Methods: *the following research methods were used: theoretical analysis and generalization of data from special scientific and methodological literature; pedagogical observation; pedagogical testing; method of expert evaluation; methods of mathematical statistics. Expert assessment of 12 sports couples (12 male partners and 12 female partners) before and after the research.*

Results: *on the basis of the evaluation scale (Rules of the WRRC, 2017), the estimated results of the performance of the competition program were obtained. Dynamics of the level of technical mastery of performance of competitive programs is determined separately for each sports pair of athletes.*

Conclusion: *found that the use of classical dance means significantly affect the level of technical training of athletes in acrobatic rock'n'roll.*

Keywords: *acrobatic rock'n'roll, competitive program, athletes, classical dance.*

Introduction

Classical dance is one of the main types of choreographic preparation in various sports of dance direction. More attention is paid to the influence of classical dance on the criteria for evaluating competitive exercises and the competitive program in general [3; 6]. Of great importance is the classical dance in the structure of posture construction of athletes of artistic gymnastics, their technical mastery of performing competitive compositions at all stages of preparation. The same effect classical dance has in technical training in acrobatic rock'n'roll. However, as the analysis of scientific and methodical literature in acrobatic rock'n'roll has shown, the classical dance in the technical training of athletes is not at the proper level. The rapid development of world sports constantly requires a relentless search for increasingly effective means, methods and forms of training athletes [4]. Despite this, our study of the impact of classical dance on the level of technical training of athletes in acrobatic rock'n'roll is actual [1; 2].

The purpose of the research: experimentally substantiate the technique for improving the technical training of acrobatic rock'n'roll athletes with classical dance at the stage of preliminary basic training.

Objectives of the study:

1. To study the problem of improving the technical training of acrobatic rock'n'roll athletes by means of classical dance at the stage of preliminary basic training.

2. To substantiate the effectiveness of the technique for improving the technical training of acrobatic rock'n'roll athletes by means of classical dance and to analyze the dynamics of indicators of the level of technical preparedness of athletes of acrobatic rock'n'roll.

Material and Methods of the research

Research methods: theoretical analysis and generalization of data from special scientific and methodological literature; pedagogical observation; pedagogical testing; method of peer review; methods of mathematical statistics.

The study involved 12 athletes (6 male partners and 6female partners) aged 10–12 years of the control group (CG) and 12 athletes (6 partners and 6 partners) 10–12 years of the experimental group (EG).

Results of the research and their discussion

At the beginning of the pedagogical experiment, statistical indicators were obtained for expert assessments of the performance of competitive programs of sports pairs of acrobatic rock'n'roll 10–12 years (EG, n=12), (CG, n=12).

On the basis of the Rules of the WRRC (2017) [7], we have estimated the scores of the components of the criteria of the competitive program (the component "Rhythm" (criterion "main move") in the table is missing).

Statistical indicators of the performance of competitive programs of sports pairs of acrobatic rock'n'roll CG are shown in Table 1.

In all components of the criteria of the competitive program, the control group was homogeneous. Closer to the maximum result in the percentage ratio are the component *complexity* –

Table 1

Statistical indicators of the performance of competitive sports couples programs at the beginning of the pedagogical experiment (CG, n=12)

Sports couples	Main move, points (10+10; male partner + female partner)				Dance figures, points (max 25)			Criterion	Ranking
	Foot work, points (max 6,2)	Posture, points (max 4,6)	Hands work, points (max 4,6)	Lines, points (max 4,6)	Difficulty, points (max 10)	Accuracy, points (max 7,5)	Diversity, points (max 7,5)	"Composition", points (max 20)	
1	3,8	3,7	3,5	4,3	9,3	6,8	5,9	14	6
2	3,9	3,8	3,6	3,4	9,1	5,5	5,5	13	5
3	4,3	4,1	4,2	3,9	9,6	6,6	6	15	2
4	3,6	3,5	4,5	4,3	9,0	6,7	6,8	15	3
5	4,1	3,9	3,9	4,1	9,1	7,4	6,7	14	4
6	4	3,9	3,9	4,2	9,7	7	7,1	16	1
$\bar{X}$	3,95	3,82	3,93	4,0	9,03	6,67	6,33	14,5	
σ	0,24	0,20	0,37	0,34	0,29	0,64	0,62	1,05	
V, %	6,1	5,2	9,4	8,5	3,1	9,6	9,8	7,2	

90,3% (criterion "dance figures") and the line component – 86,9% (criterion "main move"). More than the average value of the components are *working hand* is 85,4% (the criterion "main move") and the component *accuracy* is 85,3% (criterion "dance figures"). Closer to the average are the *posture* component – 83,0% (criterion "main move") and component *diversity* – 82,6% (criterion "dance figures"). The lowest average values in the group from the maximum result are the "composition" criterion – 72,5% and the component of the *foot work* – 63,7% (criterion "main move").

The difference in the results of sports couples in components: *foot work* – from 3,6 points to 4,3 points (V – 6,1%); *posture* – from 3,5 points to 4,1 points (V – 5,2%); *hand work* – from 3,5 points to 4,5 points (V – 9.4%); *lines* – from 3,4 points to 4,3 points (V – 8,5) *complexity* – from 9,0 points to 9,7 points (V – 3,1%); *accuracy* – from 5,5 points to 7,4 points (V – 9,6%); *diversity* – from 5,5 points to 7,1 points (V – 9,8%), "*composition*" criterion – from 13,0 points to 16,0 points (V – 7,2%).

Statistical indicators of the performance of competitive sports programs for acrobatic rock'n'roll EG are shown in Table 2.

The small coefficient of variation showed that the experimental group is homogeneous, except for the component *diversity* (criterion "dance figures") (V –11,1%). Closer to the maximum result in the percentage ratio are the component *complexity* –92% (criterion "dance figures") and the component *work of hands* –91,3% (criterion "main move"). More than average, the *line* component is 89,1% (criterion "main move") and the component accuracy is 88,0% (criterion "dance figures"). Closer to the average, the component has a *diversity* of – 84% (criterion "dance figures") and the *posture* component – 80,4% (criterion "basic move"). The lowest average values in the group from the maximum result are the "composition" criterion – 71% and the *foot work* component – 64,2% (criterion "main move").

The difference in the results of sports couples in components: *foot work* – from 3,5 points to 4,3 points (V – 7,8%); *posture* – from 3,5 points to 4,1 points (V – 7,6%); the *hands work* – from 3,9 points to 4,5 points (V – 5,5%); *lines* – from 3,9 points to 4,5 points (V – 5,9%); *complexity* – from 9,2 points to 9,7 points (V – 5,9%); *accuracy* – from 5,7 points to 7,4 points (V – 8,3%); *diversity* – from 5,4 points to 7,2 points (V – 11,1%), the criterion "*composition*" – from 13,0 points to 15,0 points (V – 11,1%).

Based on the pedagogical experiment, we developed a technique for improving the technical training of athletes of sports

Table 2

Statistical indicators of the performance of competitive sports couples programs at the beginning of the pedagogical experiment (EG, n=12)

Sports couples	Main move, points (10+10; male partner + female partner)				Dance figures, points (max 25)			Criterion "Composition", points (max 20)	Ranking
	Foot work, points (max 6,2)	Posture, points (max 4,6)	Hands work, points (max 4,6)	Lines, points (max 4,6)	Difficulty, points (max 10)	Accuracy, points (max 7,5)	Diversity, points (max 7,5)		
1	4,3	3,5	4,3	4,5	9,1	6,6	5,8	14	5
2	3,8	3,7	4,0	3,9	8,2	5,7	5,4	13	6
3	4,0	3,7	4,3	4,1	9,7	7,4	6,7	15	1
4	3,5	3,3	4,5	4,3	9,2	6,7	6,8	14	4
5	4,3	4,1	4,4	4,0	9,6	6,6	5,9	15	2
6	4,0	3,9	3,9	3,9	9,5	6,9	7,2	14	3
$\bar{X}$	3,98	3,7	4,2	4,1	9,2	6,6	6,3	14,2	
σ	0,31	0,28	0,23	0,24	0,55	0,55	0,70	0,75	
V, %	7,8	7,6	5,5	5,9	5,9	8,3	11,1	5,3	

Table 3

Statistical indicators of performance of competitive sports couples programs after pedagogical experiment (CG, n=12)

Sports couples	Main move, points (10+10; male partner + female partner)				Dance figures, points (max 25)			Criterion "Composition", points (max 20)	Ranking
	Foot work, points (max 6,2)	Posture, points (max 4,6)	Hands work, points (max 4,6)	Lines, points (max 4,6)	Difficulty, points (max 10)	Accuracy, points (max 7,5)	Diversity, points (max 7,5)		
1	4,1	4	3,8	3,6	9,3	5,6	5,7	14	6
2	3,9	3,9	3,7	4,4	9,4	6,9	6,2	15	5
3	4,3	4	4	4,2	9,2	7,4	6,9	15	4
4	3,7	3,6	4,5	4,4	9,2	6,8	7	16	3
5	4,4	4,3	4,5	4,1	9,2	6,7	6,3	16	2
6	4,1	4,1	4,2	4,1	9,7	7,2	7,2	17	1
$\bar{X}$	4,08	3,98	4,12	4,13	9,33	6,77	6,55	15,50	
σ	0,26	0,23	0,34	0,29	0,20	0,63	0,58	1,05	
V, %	6,4	5,8	8,3	7,0	2,1	9,3	8,8	6,7	

couples of acrobatic rock'n'roll for 10–12 years using classical dance. It included exercises of classical dance in the form of exercise at the support and in the middle of the hall.

The technique for improving the technical training of athletes sports couples aged 10–12 years, we used in the experimental group. The training process in the control group was conducted according to the traditional method of training athletes of sports couples. Exercises of classical dance were used in the preparatory and final parts of the training.

We obtained statistical indicators of the performance of competitive programs of sports pairs of acrobatic rock'n'roll after the pedagogical experiment.

Statistical indicators of the performance of competitive programs of sports pairs of acrobatic rock'n'roll CG after the pedagogical experiment are shown in Table 3.

The coefficient of variation showed that the group is homogeneous. Closer to the maximum result in the percentage ratio are the component *complexity* – 93,3% (criterion "dance figures") and component *accuracy* – 90,3% (criterion "dance figures"). More than average, the *line* component is 89,8% (the criterion is the "main move") and the component of the *hand work* is 89,6% (criterion "main move"). Closer to average have a component of the *diversity* – 87,3% (criterion "dance figures") and the component of *posture* – 86,5% (criterion "main course"). The lowest average values in the group from the maximum result are the "*composition*" criterion – 77,5% and the component of the *foot work* – 65,8% (criterion "main course").

The difference in the results of sports couples in components: *foot work* – from 3,7 points to 4,4 points (V – 6,4%); *posture* – from 3,6 points to 4,3 points (V – 5,8%); *hands work* – from 3,7 points to 4,5 points (V – 8,3%); *lines* – from 3,6 points to 4,4 points (V – 7,0) *complexity* – from 9,2 points to 9,7 points (V – 2,1%); *accuracy* – from 5,6 to 7,4 points (V – 9,3%); *diversity* – from 5,7 points to 7,2 points (V – 8,8%), the criterion "*composition*" – from 14,0 points to 17,0 points (V – 6,7%).

Statistical indicators of performance of competitive programs of sports couples, acrobatic rock 'n' roll EG shown in the Table 4.

Coefficient of variation showed that the group is homogeneous. Closer to the maximum result in the percentage ratio are the *posture* component – 97,2% (criterion "main move") and the component *hand work* – 94,1% (criterion "main move"). Component of the *line* has a more average value – 93,9%

Table 4

Statistical indicators of performance of competitive sports couples programs after pedagogical experiment (EG, n=12)

Sports couples	Main move, points (10+10; male partner + female partner)				Dance figures, points (max 25)			Criterion "Composition", points (max 20)	Ranking
	Foot work, points (max 6,2)	Posture, points (max 4,6)	Hands work, points (max 4,6)	Lines, points (max 4,6)	Difficulty, points (max 10)	Accuracy, points (max 7,5)	Diversity, points (max 7,5)		
1	5,6	4,5	4,3	4,5	9,4	6,6	5,8	16	5
2	5,8	4,5	4,2	4,4	8,8	5,9	6,4	15	6
3	5,9	4,5	4,3	4,2	9,7	7,4	6,7	19	1
4	5,7	4,4	4,5	4,3	9,3	6,7	6,8	17	4
5	5,8	4,4	4,4	4,3	9,7	7	6,9	18	2
6	5,9	4,5	4,3	4,2	9,6	6,9	7,2	17	3
$\bar{X}$	5,78	4,47	4,33	4,32	9,42	6,75	6,63	17	
σ	0,12	0,05	0,1	0,12	0,34	0,5	0,48	1,41	
V, %	2,1	1,1	2,3	2,7	3,8	8,3	9,0	8,3	

Table 5

Statistical indicators of the level of technical preparedness of acrobatic rock'n'roll athletes at the beginning of the pedagogical experiment (P<0,05)

Criterion, components	Control group (n=12)	Experimental group (n=12)	t	t_{cr}	P
	$\bar{X}$±m				
1. Foot work, points	3,98±0,09	3,95±0,07	0,26	2,2	>0,05
2. Posture, points	3,7±0,08	3,82±0,06	1,20	2,2	>0,05
3. Hand work, points	4,2±0,07	3,93±0,11	2,07	2,2	>0,05
4. Lines, points	4,1±0,07	4±0,1	0,82	2,2	>0,05
5. Complexity, points	9,2±0,16	9,03±0,09	0,93	2,2	>0,05
6. Accuracy, points	6,6±0,16	6,67±0,19	0,28	2,2	>0,05
7. Diversity points	6,3±0,2	6,33±0,18	0,11	2,2	>0,05
8. Criteria "Composition", points	14,2±0,22	14,5±0,32	0,77	2,2	>0,05

(criterion "main move") and the component – *complexity* of 94,2% (criterion "dance figures"). Closer to the middle, the *foot work* component has 93,2% (criterion "main move") and the component *accuracy* is 90,0% (criterion "dance figures"). The smallest average values in the group from the maximum result have a *diversity* component – 88,4% (criterion "dance figures") and the criterion "composition" – 85%.

Difference in the results of sports pairs in components: *foot work* – from 5,6 to 5,9 points (V – 2,1%); *posture* – from 4,4 points to 4,5 points (V – 1,1%); the *hands work* – from 4,2 points to 4,5 points (V – 2,3%); *lines* – from 4,2 points to 4,5 points (V – 2,7%); *complexity* – from 8,8 to 9,7 points (V – 3,8%); *accuracy* – from 5,9 points to 7,4 points (V – 8,3%); *diversity* – from 5,8 to 7,2 points (V – 9,0%). Criteria *composition* – from 15,0 points to 19,0 points (V – 8,3%).

Statistical indicators of the level of technical preparedness of acrobatic rock'n'roll athletes EG (n=12) and CG (n=12) at the beginning and after the pedagogical experiment are shown in Tables 5, 6.

Using the methods of mathematical statistics, we can say that: the difference between mean values across the experimental group increased by 12,3%; the difference in mean values across the control group increased by 4,2%. Difference between the mean values of the experimental and control groups is 7,8%. With the help of the proposed technique for improving the technical training of acrobatic rock'n'roll athletes by means of classical dance, the experimental group significantly improved the indices of the differences in the mean values as a percentage: component *foot work* – 45,2%; component of *posture* – by 20,8%; component *hand work* – by 3,1%; component the *line* – by 5,4%; component *complexity* – by 2,4%; component *accuracy* – by 2,3%; component *diversity* – by 5,2%; criterion of "composition" – by 19,7%. High percentages show a significant influence of classical dance instruments on the level of technical skill in the components of foot work, posture and the "composition" criterion. The control group shows a much worse result: component *foot work* – by 3,2%; component of *posture* – by 4,1%; component *hand work* – by 6,8%; component the *line* – by 3,2%; component *complexity* – by 3,3%; component *accuracy* – by 1,5%; component *diversity* – by 3,5%; criterion of "composition" – by 6,9%, which confirms the effectiveness of the proposed methodology for improving the technical training of athletes of acrobatic rock'n'roll by means of classical dance in the experimental group during the pedagogical experiment. The results of the statistical indicators of sports pairs from the acrobatic rock'n'roll of the experimental and control groups before the study were compared with their indicators after the study. Comparative statistics of sports couples from acrobatic rock'n'roll experimental and control groups are shown in Figure 1, 2.

Conclusions

1. Analysis of scientific and methodical literature showed that the level of studies of the influence of classical dance on the technical training of athletes in acrobatic rock'n'roll was insufficient at the stage of preliminary basic training.

2. A technique was developed aimed at increasing the level of technical excellence in the performance of competitive programs by sports couples in acrobatic rock'n'roll at the stage of preliminary basic training.

Table 6

Statistical indicators of the level of technical preparedness of acrobatic rock'n'roll athletes after of the pedagogical experiment (P<0,05)

Criterion, components	Control group (n=12)	Experimental group (n=12)	t	t_{cr}	P
	$\bar{X}$±m				
1. Foot work, points	5,78±0,04	4,08±0,08	19,01	2,2	<0,05
2. Posture, points	4,47±0,02	3,98±0,07	6,73	2,2	<0,05
3. Hand work, points	4,33±0,03	4,12±0,1	2,01	2,2	>0,05
4. Lines, points	4,32±0,04	4,13±0,09	1,93	2,2	>0,05
5. Complexity, points	9,42±0,1	9,33±0,06	0,77	2,2	>0,05
6. Accuracy, points	6,75±0,15	6,77±0,19	0,08	2,2	>0,05
7. Diversity points	6,63±0,14	6,55±0,17	0,36	2,2	>0,05
8. Criteria "Composition", points	17±0,42	15,5±0,31	2,87	2,2	<0,05

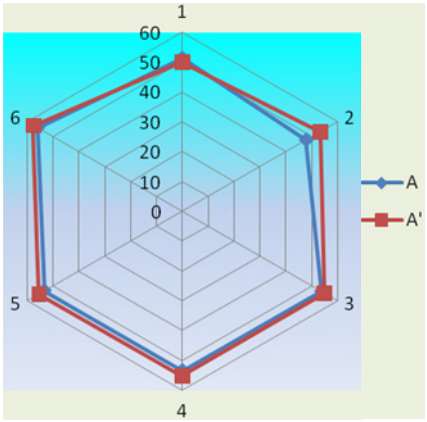

Fig. 1. Comparative statistics of sports couples in acrobatic rock'n'roll (CG):
A – statistical indicators at the beginning of the pedagogical experiment;
A' – statistical indicators after the pedagogical experiment.

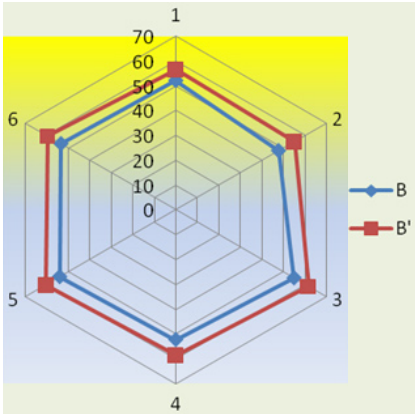

Fig. 2. Comparative statistics of sports couples in acrobatic rock'n'roll (EG):
B – statistical indicators after the pedagogical experiment;
B' – statistical indicators after applying the experimental technique during the pedagogical experiment.

3. Statistical indicators of the level of technical preparedness of acrobatic rock'n'roll athletes as a percentage were determined: the difference in the mean values over the entire experimental group increased by 12,3%; the difference in mean values over the entire control group increased by 4,2%; the difference in the mean values of the experimental and control groups of the pedagogical experiment is 7,8%.

With the help of the proposed technique for improving the technical training of acrobatic rock'n'roll athletes in the experimental group, the indices of the differences in mean values as a percentage. In the control group, a much worse result is shown, which confirms the effectiveness of the proposed technique for improving the technical training of athletes of acrobatic rock'n'roll by means of classical dance in the experimental group during the pedagogical experiment.

Prospects for further research will be directed to the search for new means and methods for the special physical and technical training of athletes in acrobatic rock'n'roll.

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Information about the Authors

Petro Kyzim: *Associat Professor; Kharkov State Academy of Physical Culture: Klochkovskaya 99, Kharkov, 61058,Ukraine.*
ORCID.ORG/0000-0001-5094-3988
E-mail: petrkyzim@i.ua

Serhii Humeniuk: *senior teacher; Kharkov State Academy of Physical Culture: Klochkovskaya 99, Kharkov, 61058,Ukraine.*
ORCID.ORG/0000-0003-3414-0629
E-mail: petrkyzim@i.ua

Nataliya Batieieva: *PhD (Physical Education and Sport), Associate Professor; Kiev National University of Culture and Arts: E. Konovaitsia, 36, Kiev, 01133, Ukraine.*
ORCID.ORG/0000-0001-8575-5506
E-mail: petrkyzim@i.ua

UDK 796.41+796.412.001.37-053.5

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Fundamental factors of long-term criteria and selection of children at the first stage of multi-year sports training in gymnastics and dance sports

***Larysa Lutsenko*[1]**
***Galyna Artemyeva*[2]**
***Mariia Chichkunova*[2]**

[1] *Yaroslav the Wise Law University, Kharkov, Ukraine*
[2] *Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine*

Purpose: *to determine objective methods of selection and vocational guidance of children 6–7 years of age for practicing acrobatic rock'n'roll.*

Material & Methods: *studies were conducted on a contingent of children Sports School No. 13 in the amount of 125 people. To write this work, the following research methods were used: pedagogical observation, medical and biological methods of assessing physical development, methods of mathematical statistics.*

Results: *results of the conducted studies and the analysis of many years of experience with the children's contingent engaged in acrobatic rock and roll allowed to generalize the features of the physical development of children and their success in mastering the arsenal of motor actions from the preparatory complex of physical exercises, available for a given age; to systematize the constitutional features of a child's somatotype and a specific group of physical exercises that are more successfully mastered by them; to establish the priority of the motor qualities that are inherent in performing complex coordinated actions of a certain group of physical exercises in acrobatic rock'n'roll; set the compatibility condition for the possibility of complete sets of sports pairs.*

Conclusion: *determining factor for the successful development of a specialized type of motor activity, characteristic of competitive exercises in gymnastic and dance sports, are the phylogenetic features of individual physical development.*

Keywords: *physical development, phylogenetic conditioning, long-term selection criteria.*

Introduction

Sport of high achievements is characterized by specific motor activity. This is the main factor in the natural selection of those who, according to their morphofunctional endowments, meet the requirements of the motor activity of the corresponding sport to the maximum extent. First of all, in this case we are talking about biokinematic features of the constitutional characteristics of the athlete's somatotype. They must correspond to the kinematic characteristics of the motor activity under consideration, to their dynamic efforts and the static stresses of the chosen sport. Accordingly, this kind of specific motor activity must correspond to its energy supply, which closely depends on the specific course of trophic processes [1; 2].

Thus, the long-term selection criteria that are imposed on athletes in accordance with the requirements of the chosen sport should be based on a phylogenetic basis of congenital ancestors. This category of selection criteria is of a special nature and requires in its development for each type of sport activities an independent decision.

Regardless of the specific nature of the direction of competitive motor activity, a common feature for all sports is the reliability of competitive activity, which is determined by the athlete's resistance to extreme and special conditions of its course. Despite the fact that this task concerns the whole variety of sports and professional activity, it has the least degree of its resolution. The main reason for this state of the matter is the lack of the necessary adequate methods for solving it.

Relationship of research with scientific programs, plans, themes. The performed work was carried out in accordance with the Consolidated Plan of research works in the field of physical culture and sports for 2011–2015 on theme 2.6 "Theoretical and methodological principles for improving the training process and competitive activities in the structure of long-term training of athletes" (state registration number 0111U001168).

The purpose of the research: to determine objective methods of selection and vocational guidance of children 6–7 years of age for practicing acrobatic rock'n'roll.

Objectives of the study: 1. Establish general provisions of the determining factors that should ensure the reliability of choosing long-term criteria for children's defense at the first stage of long-term sports training. 2. Identify the characteristics of individual physical development and physical readiness, which affect the variability of the manifestation of predisposition of children to various types of specific motor activity. 3. Identify the characteristic components of competitive motor activity in acrobatic rock'n'roll, defining the ergographic structure of this sport.

Material and Methods of the research

Research methods: analysis and generalization of scientific and methodological literature generalization of the experience of the coaching contingent's practical work, working with children's groups in acrobatic rock'n'roll, natural pedagogical experiment, methods of mathematical statistics, construction of

special semantic spaces.

Results of the research and their discussion

The problem of selection and orientation of athletes in the system of long-term training, despite a large number of publications, remains open, as there is no scientifically based methodology. Available literature is a generalization of the empirical observation of the coaching contingent (V. N. Platonov, 2014). The construction of any system of selection is always connected with the necessity of environmental characteristics of knowledge, which should take place the upcoming activities. It is a factor of the individual suitability for staying there. Realizing the sport of high achievements as environmental selection, it is necessary first of all to know what the individual should be prepared for and what inherent predisposition lies in his physical development, which should be the main one in his success in mastering this environment.

A group of gymnastic and dance sports have fairly close ergographic characteristics and in this respect they can to some extent be considered as related types of motor activity. Based on the analysis of the nature of the motor activity performed in acrobatic rock'n'roll, we can speak of the need for high coordination ability in the sequential execution of complex motor actions. In this case, it becomes necessary to assess the accuracy of the binding of the motor actions performed and their available complexity. No less significant quality of the motor activity performed is the rapidity of their course. Despite the high dynamics of motor activity in acrobatic rock'n'roll, a characteristic feature of its performance is the constant presence of static tension, which ensures the preservation of the working posture in the performance of dynamic efforts. It is static efforts that are most tedious and require special attention for the development of endurance quality. Naturally, large amplitude of performed motor activity assumes the presence of adequate mobility in the joints. The magnitude of the manifestation of these motor qualities and, most importantly, their share ratio is the determining factor in the selection and orientation of children for acrobatic rock'n'roll training in the system of long-term training of athletes [5; 6].

In practice, the evaluation of motor qualities has a fairly well-developed method for their determination, but the absolute units of their measurement do not allow us to evaluate the qualitative relationship of the structure of their interaction in the organization of the specificity of their share ratio in providing specialized motor activity of the group of related sports. The solution of this problem was achieved due to the developed method of compiling various characteristics of the motor activity in the semantic spaces with the uniform measure of these characteristics introduced in them [7].

The main task for their use was the need to obtain the average statistical characteristics of the manifestation of motor qualities in a large contingent of subjects of the same chronological age engaged in gymnastic and dance sports. The necessary material was collected on the basis of the contingent of persons engaged in these sports in the Sports School No. 13. Based on the received material, a standard was defined for each of the motor qualities.

These characteristics were a unit of comparison, with respect to which the individual indicator of each quality was compiled, respectively, with its unit of comparison. If there was a deviation from the average statistical value, then it was measured in terms of sigma relative to its unit radius vector. Since all the average statistical standards of comparison are taken as a unit, assigning them a specific number can be evenly distributed in a circle with a unit radius. In this case, any deviations from its standard are noted on the corresponding radius vector. The points obtained are connected with each other by line a segment, which gives a certain broken line. The next step in constructing a qualitative analysis of the share of measured characteristics in ensuring the specificity of professional motor activity is that the minimal manifestation of any characteristic and the maximum deviation from its norm of another characteristic are deposited in one direction. Then a logarithmic spiral is traced from the end of the radius vector of the maximum value of the other characteristic. After that, each radius vector of all other characteristics is arranged in such a way that their ends touch the line of the spiral. The resulting sequence of the ranked distribution of radius vectors is a qualitative structure of the share of the controlled characteristics in the construction of the motor activity. This characteristic is phylogenetically conditioned and does not change throughout life. The physical state and age change the magnitude of the manifestation of the trait, but do not affect the qualitative structure of their relationship. The general structure of the construction of the described passport with a long-term selection criterion is shown in Fig. 1.
Such constructions are applicable for comparing the anthropo-

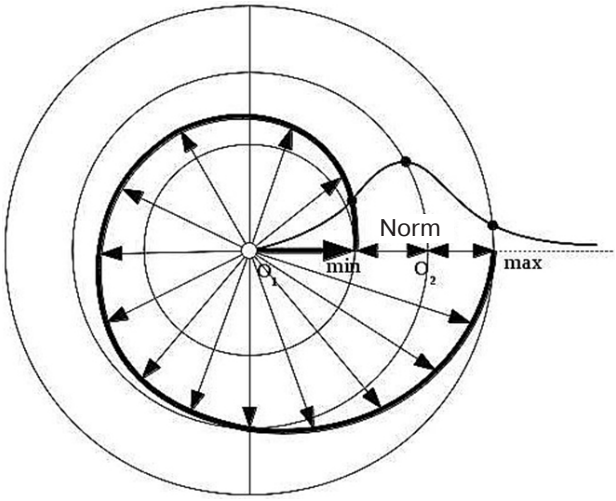

Fig. 1. Representation of the structure of the characteristics of motor activity in the form of a ranked distribution of controlled indicators in a semantic character space with a single measure of their relations introduced

metric characteristics of the physique, which reflects the individual specificity of the manifestation of physical development; for the evaluation of physiological parameters, which reflects the specific nature of the course of trophic processes [1].

In addition to physical development, trophic activities that determine the degree of predisposition to stay in a certain formative environment and reflect a specific feature of fitness for the performance of a specific character of motor activity, a special role in achieving high sports results is played by a mental state that acts as a nonspecific component in ensuring a quality such as competitive reliability. The methods for estimating this characteristic are well developed in aviation and space medicine, in engineering psychology and are based on

psychophysical patterns of the behavior of the sensory system and the growth of permissible errors in various states of emotional arousal and emotional unrest [3].

In the theory of sports this question remains insufficiently developed, but using the nature of the obtained dynamics of the error behavior it was established that in the contingent being examined the existing variability of the allowed errors has a systematic shift and an increase in the variability of the error with respect to this displacement. Regarding different sensory systems, the degree of errors allowed to assess their specific coordination activities is different, but the nature of the change in the systematic error and its variation relative to it for all sensory systems of a particular individual remains the same. In various functional states, disturbances in sensory perception involve changes in the evaluation of the strength of the perceived effect, its spatial location, and the time taken to perceive the effect. The numerical characteristics of such changes in sensorics are of an individual nature, which makes it extremely difficult to compare their measurements with different individuals when coordinating the coordination regulations of their joint activities [4; 8].

Using the semantic spaces in the analysis of the sensory perception of the environmental changes obtained as a result of the survey of the same contingent, in complete analogy to the above-described process of assessing physical development and physical condition, the average statistical standards of the measured characteristics. It is possible to obtain a ranked series of equity participation activity ratio different sensory systems in providing individual coordination interaction with the environment in which the structure and the partner is included. The very dynamics of changes in sensory perception in the coordination activity of the movement for all types of sporting activity is of a nonspecific nature in ensuring competitive reliability. However, the structure of the significance of the share participation of sensory systems in achieving an equifinal result of the coordination of motor activity in each sport activity has its own specific analysis and is a criterion for a long-term evaluation in the selection system for practicing a specific type of gymnastic or dance sports.

To solve the main task of selecting and predicting the success of any gymnastic or dance sport, it is necessary to have a fairly clear comparison standard for comparing the individual characteristics of the criteria for evaluating the characteristics of physical development, physical condition (trophic health), and sensory activity, reflecting the psychosomatic features of behavior, the totality of which reflects, depending on the measure of the coincidence of the standards, with a comparable individual characteristic, which will indicate the prospects and reliability of the selection at the initial stage of long-term training of the athlete.

Since the specific motor activity of each sport acts as a factor of natural selection, which leaves on the sports arena as its qualification requirements become more complicated only those for whom these exercises are available, the only method of determining the necessary comparison standard is the method of natural experiment introduced into the practice of pedagogical research by A. F. Lazursky.

The essence of this methodology is that the process of adaptation in a more complex environment of residence, screening out those who are incapable of consistency with the level of its complexity, and leaves individuals who have the same criteria for ensuring the equifinal end result of the structures of the characteristic parameters that ensure its achievement. This effect is achieved by the principle "remove different, allocate a common." Based on this method, a standard was defined for comparing individual fitness data to acrobatic rock'n'roll. From the total number of beginners to engage in the relevant sport as the requirements of the highest level of the qualification scale of sports results become more complicated, it reaches no more than 0,02%. Determination of their passport data in the assessment of physical development, the specificity of the course of trophic processes and psychosomatic features of behavior in special and extreme situations is the desired standard of comparison. The features of the process are shown in Fig. 2.

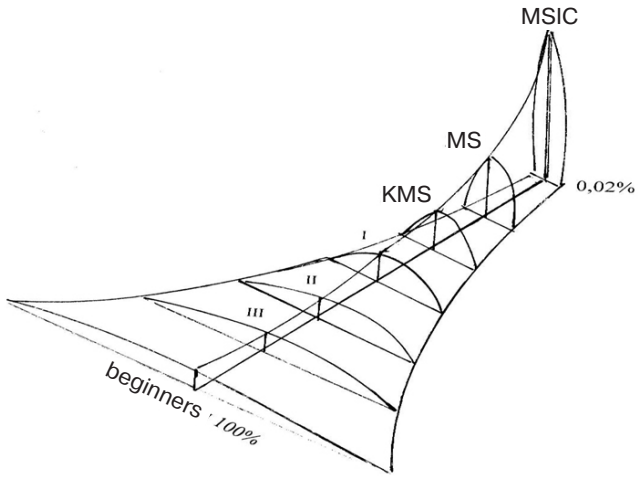

Fig. 2. The distribution of the ranked number of athletes of different levels of sports qualification

The final structure of long-term selection criteria for the success of mastering the complexity of tasks in long-term sports training in gymnastic and dance sports will be achieved by establishing the criteria for the rate of mastery and the level of individual learning.

Conclusions

1. Determining factors of long-term selection criteria for children are not the first stage of long-term sports training for the successful development of specialized motor activity, characteristic of competitive exercises in gymnastic and dance sports, are phylogenetically conditioned features of individual physical development, physical condition and psychological characteristics of individual behavior.

2. The standard of comparison of fitness for employment in the chosen orientation of sports activity are the criteria of physical development, physical condition and psychosomatics of athletes who have reached the highest level of sports qualification.

Prospects for further research. In the conducted studies, such indicators as the learning speed and the available level of learning were not taken into account, which is an important factor in the selection system and needs to be taken into account in the overall research structure of selection problems. This focus represents a purpose for continuing research in this direction.

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Information about the Authors

Larysa Lutsenko: *PhD (Physical Education and Sport), Associat Professor; Law University named after Yaroslav the Wise: Pushkinskaya Str.77, Kharkov, 61000, Ukraine.*
ORCID.ORG/0000-0001-6459-8564
E-mail: L.S.lutsenko@mail.ru

Galyna Artemyeva: *PhD (Physical Education and Sport), Associate Professor; Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.*
E-mail: galina9767@gmail.com
ORCID.ORG/0000-0003-3121-2754

Mariia Chichkunova: *Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0003-0646-1134
E-mail: maria.djaiia@gmail.com

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Individual program of running activity of track-and-field athletes during training sessions to improve sports skills in the preparation for a cross season

Tetiana Maleniuk

Central Ukrainian state pedagogical university name Volodimir Vinnichenko, Kropyvnytskyi, Ukraine

Purpose: *to develop an individual program of running work of athletes, specializing in running for long distances, during the preparation for the autumn-winter cross season.*

Material & Methods: *study was conducted in the group of improving sports skill in athletics of the faculty of physical education of the Pedagogical University. It was attended by 4 athletes, specializing in running for long distances at the age of 19–20 years.*

Results: *the individual program of running work of a track and field athlete on the basis of a system of mesocycles and microcycles is presented. The structure and content of running work in each mesocycle is disclosed. Trends in the growth of running loads in mesocycles are determined.*

Conclusion: *proved the effectiveness of the introduction of this program in the training process of training athletes for the cross season on the basis of improving the result of the competitive exercise and improving athletic qualifications for track and field cross.*

Keywords: *running for long distances, cross, running load, program, training.*

Introduction

Problem of rational construction of the training process for long distance runners at all stages of athletic training is quite complex, as it should ensure the directional development and high degree of readiness of athletes to the planned results. The questions of planning the training process of athletes specializing in cyclic athletics at the various stages of long-term training are currently being studied by specialists in the field of physical education and sports (F. P. Suslov, 1995; B. N. Yushko, 1995; V. N. Platonov, 2004, 2008; A. Bondarchuk, 2007; T. V. Samolenko 2011, 2012; V. Borzov, 2014; S. I. Karaulova, M. B. Sinyugin, 2016 and others).

According to the results of research by scientists V. I. Bobrovik, A. V. Krivoruchenko, A. K. Kozlova [1], it is proved that the construction of a training process for qualified athletes specializing in short, medium, long distances and hurdling must be carried out on the basis of the system-structural method of planning summer preparation.

Specialists D. V. Pyatnichuk and G. A. Pyatnichuk [11] proposed a typical program of training runners for medium and long distances in the conditions of the plain. The structure and duration of the preparatory period of the annual cycle of training of runners are revealed. T. V. Samolenko [13] developed and introduced in practice training microcycles in the autumn-winter preparatory period of high-qualified runners for medium distances. N. F. Petrenko [8] gives recommendations on the best cross-country loads weekly microcycle qualified runners-stayers. T. V. Malenyuk [6] developed a program for the summer cycle of training young athletes, specializing in running for medium distances.

In the opinion of V. M. Platonov [9], the modern construction of the training process should be carried out on the basis of taking into account the objective indicators of physical, technical and functional preparedness, individualization of the training process, the rational correlation of training aids of different preferential orientation, typological features of the nervous system and temperament.

In the scientific and educational work of specialists [2, 5, 9; 15] it is noted that at the stage of specialized basic training the individual characteristics of athletes are clearly manifested, this factor allows for a differentiated approach to the choice of means, their volume and intensity, forms and methods of training influence. At this stage it is advisable to create homogeneous groups in the departments and for each of them to develop appropriate training programs.

Thus, A. Orel [7] analyzed the structure and content of runners' training for long distances in the mesocycle induction training for the cross season. After all, runners for long distances at the end of the summer competition period quite often take part in competitions in track and field cross. This factor determined the choice of the topic of our study.

Analysis of modern publications showed single studies on planning the training process of runners for long distances during the preparation for the cross season at the stage of specialized basic training in the conditions of training in higher education, which determined the relevance of this work.

Relationship of research with scientific programs, plans, themes. This work was carried out in accordance with the plan of the research work of the Department of Theory and Methods of Olympic and Professional Sports of the

Central State Pedagogical University named after Vladimir Vinnichenko (Kropivnitsky).

The purpose of the research: to develop an individual program of running work of athletes, specializing in running for long distances, during the preparation for the autumn-winter cross season.

Objectives of the study:

1. To study the structure and tasks of the preparatory period for the first macrocycle of summer training for female students specializing in running for long and cross distances.

2. Develop and implement in the training process an individual program of running work for athletes in preparation for the cross season.

3. Determine the effectiveness of the individual program of running work of track-and-field athletes in preparation for the athletics cross season.

Material and Methods of the research

The pedagogical experiment was organized at the Physical Education Department of the Central State Pedagogical University named after Vladimir Vinnichenko during the 2016–2017 school years. In the study, athletes of not high qualification (I category, KMS) aged 19–20 years, specializing in running for long and cross courses, members of the regional team in track and field athletics, in the number of 4 persons participated.

During the research, the following methods were used: analysis of literary sources, pedagogical experiment, pedagogical testing.

Results of the research and their discussion

The construction of a one-year cycle of training athletes, specializing in running for long distances, is carried out within the framework of two relatively independent macrocycles. The first – autumn-winter macrocycle – is aimed at training athletes for the championship of Ukraine in track and field cross-country (Belaya Tserkov, in 2016), and the second – spring-summer – for the Ukrainian Track and Field Championships, in particular, for running for long distance (Kropiwnicki, 2017).

In the structure of each macrocycle, preparatory, competitive and transitional periods are distinguished, which are represented by the corresponding mesocycles.

Preparatory period of the autumn-winter macrocycle lasted for 3 months (from July to October) and was aimed at the solution of the following tasks: the formation of a functional "base", raising the level of general and special physical readiness, improving technical and tactical skills, special efficiency and mental stability the increasing value of the running load. The structure of the preparatory period for the first macrocycle of training athletes, specializing in running for long and cross distances, are presented in Table 1.

Stage of general preparation is presented to the retracting of mesocycles. The main task of the stage is to create the prerequisites for the entry of the sports form due to a gradual increase in the volume of the training load.

Stage of special preparation is presented by the basic developing and basic stabilizing mesocycles. The main task of the stage is to increase the level of fitness for athletes; development of special endurance; Improvement of competitive technique and formation of tactical skills.

Pre-competition stage is represented by the control-preparatory mesocycles. The main task of the stage is the completion of the formation of the sports form. Sports' training acquires a pronounced special focus.

In this scientific work there is presented an individual program of running athletes (sports qualification – I level with cross-run, and runway for long distances – 3000 m) in preparation for the autumn-winter cross-country season. This program is represented by a system of mesocycles and microcycles of the training process of runners for long distances.

The retracting mesocycle was planned for late July and early August 2016 and is aimed at cross training. The volume and intensity of the load is planned taking into account the individual indicators of the special physical preparedness of athletes, the functional capabilities of his body, the experience of training and competitive activities.

The key task of this mesocycle was to overcome the crossing distance of 125 km with an intensity of no more than 4.30 min·km^{-1}. Scheduled running load athlete performed during the summer holidays and in the diary fixed the time to overcome the distance. This allowed obtaining experimental data on the performance of the volume of the running load, compliance with the intensity and duration of its implementation. Table 2 shows the structure and content of running work in the retracting mesocycle.

The retracting mesocycle consisted of five one-week microcycles: three retracting and two impacts. Running work was represented by cross-country running, there was a "retraction" of the body in a large volume of work with stable rates of intensity of its implementation. There was an increase in the volume of running work from 2000 to 6000 m. The volume of the running load within the microcycles increased from 18 to 36 km. The total volume of the running load was 125 km, and the intensity of the running load corresponded to the task (4.30 min·km^{-1}).

Basic developing mesocycle consisted of four one-week mi-

Table 1

Structure of the preparatory period of sports training of runners for long and cross distances

Period	Preparatory			
Stages	General training	Special training		Pre-competition training
Mesocycles	Retractor	Basic developing	Basic stabilizing	Control and preparation

Table 2

Structure and content of running work in the retracting mesocycle

Retracting mesocycle						
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Retracting microcycle						
2000 m – 8 min 58 s	3000 m – 13 min 30 s	4000 m – 17 min 45 s	3000 m – 13 min 10 s	2000 m – 8 min 58 s	4000 m – 17 min 45 s	Day-off
Retracting microcycle						
4000 m – 17 min 44 s	2000 m – 8 min 57 s	4000 m – 17 min 47 s	4000 m – 17 min 44 s	5000 m – 22 min 28 s	4000 m – 17 min 42 s	4000 m – 18 min
Retracting microcycle						
4000 m – 17 min 48 s	4000 m – 17 min 44 s	5000 m – 22 min 41 s	5000 m – 22 min 39 s	5000 m – 22 min 28 s	Day-off	5000 m – 22 min 30 s
Impact microcycle						
5000 m – 22 min 29 s	5000 m – 22 min 31 s	4000 m – 17 min 45 s	5000 m – 23 min	6000 m – 29 min	6000 m – 29 min	5000 m – 22 min 31 s
Impact microcycle						
4000 m – 17 min 40 s	4000 m – 17 min 42 s	5000 m – 22 min 41 s	5000 m – 22 min 39 s	6000 m – 29 min 15 s	6000 m – 9 min 20 s	6000 m – 29 min

crocycles: two retracting and two impacts. Within each microcycle, a cross-country run was widely used in combination with a smooth running interval method on segments from 100 to 1000 m.

So, running work on Tuesday, Thursday and Saturday was aimed at cross training lasting from 15 to 30 min and intensity of 80–85% of the maximum personal result of the athlete. This work contributed to the development of general and special endurance, aerobic and aerobic-anaerobic capabilities, and strong-willed qualities. Running work on the remaining days of the week was performed by an interval method, the duration of the work, the intensity of its implementation, the length of the rest intervals are given in Table 3.

Basic stabilizing mesocycle consisted of four one-week microcycles: one retractor and three impacts. In each microcycle, a combination of cross-country running with smooth running by an interval method was continued. The planning of running activity in this mesocycle by load components is presented in Table 4.

An individual program of athletics running has been developed in the basic developing and basic stabilizing mesocycles. It is very similar to the construction of the training process with the Moroccan system, following which athletes do three hard trainings per week, and crosses run the rest of the days. Crosses, as a rule, begin with intensity 4 min·km^{-1} and grow to 3.05–3.15 min·km^{-1}, have duration of up to 1 hour. These jogs are the basis for the development of endurance athletes. Thus, the results of our study fully coincide with the data of many specialists: A. A. Poleshchuk [4], D. Prisyajnyuk and R. Romanenko [10], N. Semenets [14] and other specialists who studied the experience of foreign schools running for long distances. In addition, running work was performed by an athlete with an intensity of at least 80% of the maximum personal result, fully confirms the results of A. Kozlova's research [3].

Control and preparation mesocycle consisted of intermediate and competitive microcycle. In the underwater microcycle a decrease in the volume of running work was observed, which acquired a special character, as close as possible to the competitive activity.

The last hard workout was conducted no later than 5 days before the start. Therefore in the competitive microcycle a day before the start it was planned only morning training. On the eve of the competition, light weight training was conducted. Such a construction of the training process on the eve of the competition, in the opinion of T. V. Samolenko [12], is the most effective.

In the competitive microcycle the sportswoman took part in the auxiliary competitions "Sports games on track and field cross-country among teams of districts and cities" (Alexandrovka settlement). Competitive exercise – cross-country running 3000 m, which the athlete overcame for 12.00 min, fulfilled the candidate's standard for a master of sports (CMS) and was selected for the Ukrainian Championship in track and

Table 3

Structure and content of running work in the basic developing mesocycle

Basic developing mesocycle						
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Retracting microcycle						
Run 4x200 after 4 min rest (80%)	Cross – 20 km	Run 4x400 m after 5 min rest (75%)	Day-off	Run 150x200x300x200x150 (80%)	Cross – 20 min	Day-off
Retracting microcycle						
Run 8x100 m after 3 min rest (80%)	Cross – 20 min	Run 3x800 m after 7 min rest (75%)	Cross – 20 min	Run 2 series 4x100 m after 1–2–3 min rest (85%)	Cross – 30 min	Day-off
Impact microcycle						
Run 4x400 m after 7 min rest (90%)	Cross – 20 min	Run 4x300 m after 5 min rest (85%)	Cross – 15 min	Run 2 series 4x100 m after 3–2–1 min rest (90%)	Cross – 30 min	Day-off
Impact microcycle						
Run 4x400 m after 5 min rest (85%)	Cross – 30 min	Run 2x1000 m after 9 min rest (85%)	Day-off	Run 2 series 4x100 m after 3–2–1 min rest (90%)	Cross – 30 min	Day-off

Table 4

Structure and content of running work in the basic stabilizing mesocycle

Basic stabilizing mesocycle						
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Retracting microcycle						
Run 4x200 m after 3–4 min rest (85%)	Cross – 20 min	Cross – 30 min	Day-off	Run 2 series 4x100 m after 2–3 min rest (90%)	Cross – 30 min	Day-off
Impact microcycle						
Run 4x800 m (200 m – maximum, 100 m – slowly) after 5 min rest	Cross – 20 min	Cross – 45 min	Cross – 45 min	Day-off	Cross – 15 min	Day-off
Impact microcycle						
Run 4x800 m after 5 min rest (90%)	Cross – 20 min	Run 3x400 m after 5 min rest (80%)	Day-off	Cross – 30 min	Cross – 20 min	Day-off
Impact microcycle						
Run 4x100 m after 1–2–3 min rest (90%)	Cross – 20 min	Run 10x400 m after 3 min rest (80%)	Cross – 45 min	Cross 6 km (500 m – maximum, 500 m – slowly)	Cross – 45 min	Day-off

Table 5

Structure and content of running work in the control and preparation mesocycle

Control and preparation mesocycle						
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Intermediate microcycle						
Run 5x400 m after 200 m short steps run (90%)	Cross – 15 min	Run 5x500 m after 5 min rest (85%)	Cross – 30 min	Run 10x100 m after 3 min rest (90%)	Cross – 15 min	Run 2 series 3x150 m after 5 min rest (80%)
Competitive microcycle						
Day-off	Small load	Auxiliary competitions				

field cross (Belaya Tserkov) (Table 5).

The results of the performance of the athletes in the auxiliary starts testify to the effectiveness of the developed individual program of running athletics, specializing in running for long distances and preparing for the cross season. This program should be adjusted by each specialist depending on the level of physical and functional preparedness of the athletes, training conditions and planned results.

Conclusions

1. It is determined that in the planning structure of the training process runners for long distances plan a double summer training cycle. The preparatory period of the first macrocycle of preparation for the cross season contains three stages – general, special and pre-competitive training.

2. Developed and implemented in practice, an individual program of running athletics, specializing in running for long distances and preparing for the cross season. This program is presented on the basis of a system of mesocycles and microcycles. The structure and content of individual running work in each mesocycle is disclosed.

3. The main tendencies of the growth of the running loads in each mesocycle are determined: in the retracting mesocycle, an increase in the volume of the race loads while maintaining the intensity of their performance; in the basic developing mesocycle, an increase in the proportion of specific running loads and the intensity of their performance; in the basic stabilizing mesocycle – stabilization of the volume of specific running loads with increasing intensity of their performance; in the control-preparatory mesocycle – reducing the volume of specific running loads.

4. Effectiveness of the introduction of this program in the practice of the training process of athletes, specializing in running for long distances, in preparation for the cross season on the basis of increasing speed indicators of the athlete (from 4.30 min·km^{-1} to 4.00 min·km^{-1}), improvement of the individual result in the competitive exercise – cross 3000 m (12.00 min) and increase of sports qualification on track and field cross (CMS).

Prospects for further research will be directed to the development of a further individual program of running work of female athletes specializing in long distance running, in the competitive and transitional periods of the first macrocycle of summer training.

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Information about the Authors

Tetiana Maleniuk: *PhD (Physical Education and Sport), Associate Professor; Central Ukrainian state pedagogical university name Volodimir Vinnichenko: Shevchenko str.1, Kropyvnytskyi, 25009, Ukraine.*
ORCID.ORG/0000-0003-2966-1382
E-mail: tmaleniuk@gmail.com

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Structure and content of competitive programs for trained athletes in acrobatic rock'n'roll

Viacheslav Mulyk
Yuliya Lutsenko
Larysa Taran

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *to determine the structure of competitive programs of qualified "B" class athletes in acrobatic rock'n'roll.*

Material & Methods: *pedagogical, sociological and methods of mathematical statistics were used. In the experimental part of the study, specialists of various categories and qualifications participated, an analysis of the video materials of the competitions of qualified athletes performing in the "B" class.*

Results: *the content and the structure of the competitive compositions of qualified athletes in acrobatic rock'n'roll have been studied, the components of the competitive program indicators are compiled.*

Conclusion: *main structural components characterizing the competitive program of qualified athletes in acrobatic rock'n'roll are highlighted. Their components, number and time of execution are determined. It is established that a variety of acrobatic elements, competitive moves, dance figures, design tools and the consistency of the construction of the entire competitive composition with high quality of performance characterizes the winning couple.*

Keywords: *acrobatic rock'n'roll, competitive program, qualified athletes, class "B".*

Introduction

Currently, in complex coordination sports associated with the art of movements, the leading trends in development are the increasing complexity of competitive programs, the search for new original elements, bringing technical skill to the level of virtuosity. Athletes lay in their competitive programs the maximum elements of the highest difficulty and perform them technically [2; 5; 7; 9 and etc.].

Constantly growing competition in the international arena of skilled athletes in acrobatic rock'n'roll poses new challenges in their preparation. One of the priority areas is the improvement of competitive sports couples programs in a short time and at a high quality level, as well as demonstrating the stability and reliability of their performance in the conditions of competitions. In this case, the championship will be won by athletes who will be able to combine in their performances a variety of complexity, impeccable technique of performing original acrobatic tricks with elements of modern choreography in a holistic competition composition with special expressiveness and artistry [1; 6; 8; 10 and etc.].

In this connection, the criteria for evaluating the qualitative characteristics of competitive programs, such as the culture of movements, virtuosity, efficiency and harmony, artistry and musicality [3; 4; 11; 13 and etc.].

Relationship of research with scientific programs, plans, themes. The work was carried out in accordance with the Summary Plan of Research Work in the Sphere of Physical Culture and Sport for 2016–2018. Within the framework of the theme: "Psycho-sensory regulation of the motor activity of sportsmen of situational sports".

The purpose of the research: to determine the structure of competitive programs of qualified "B" class athletes in acrobatic rock'n'roll.

Objectives of the study:

1. Based on the analysis of scientific and methodological literature, competitive activities and generalization of the leading practical experience, to highlight the contemporary problems of constructing competitive programs of qualified athletes in acrobatic rock'n'roll.

2. To study the structure and content of competitive programs of qualified athletes in acrobatic rock'n'roll.

Material and Methods of the research

Using a set of scientific research methods: pedagogical methods of research (analysis and generalization of data from scientific and methodological literature, analysis of documentary materials, analysis of video materials, pedagogical observation) sociological research methods (questioning and questioning); methods of mathematical statistics, studied the output data and made the corresponding conclusions.

The study was conducted on the basis of sports clubs in Ukraine, which are engaged in the preparation of sports couples class "B". In the experimental part, qualified sportsmen of the "B" class took part. In the course of the research, video recordings of competitive programs of qualified "B" class athletes, who compete at various competitions.

In the study, the following indicators were recorded: the duration of the competition program (minutes, seconds, "bits"); the total number of elements and the number of elements of a certain orientation; the number of elements in each acrobatic bundle; the amount of the main move in the dance band; the

number of repetitions of elements in the composition; performance of dance connection within the musical square [4; 13].

To determine the structure and content of the competitive programs "Acrobatics" of qualified "B" class athletes in acrobatic rock'n'roll, an analysis was conducted on the video materials of official competitions. It is based on the requirements for building programs that are described in the rules of the competition for acrobatic rock'n'roll and special literature on the compilation of exercises in gymnastic and dance sports (Table 1).

Results of the research and their discussion

Basis for the construction of a competitive program in acrobatic rock'n'roll is regulated by the rules of the competition musical material, which corresponds to the swing rhythm at a rate of 48-50 cycles per minute for the program "Acrobatics", which lasts from 1 min 30 s to 1 min 45 s. For the "Technique of Legs" program, the music tempo is 50–52 cycles per minute, and the duration of the composition is from 1 min to 1 min 15 s.

The results show that the average duration of the program "Acrobatics" for qualified athletes of class "B" is 95–105 seconds, which meets the requirements of modern rules of the competition. Of these, an average of 43 to 46 seconds accounted for elements of acrobatics and their connections. On the main course the average is spent from 12 to 16 seconds. Dance figures are performed 17,8 seconds. Expressive movements and movements without the main move in the pair have a design character – the choreography of the program, and are performed on average for 22,74 seconds.

Calculating the percentage of the time for performing various movements in the competition composition, it is established that on average 45% of the main time of the competition program is spent on the elements of acrobatics and their connections, the remaining (55%), make up the dance series (18% – dance figures, main move – 14%, and the rest of the time is occupied by the choreography of the program (main course, variations of the main move, motions in the pair without the main stroke and expressive movements) 23% (Figure 1).

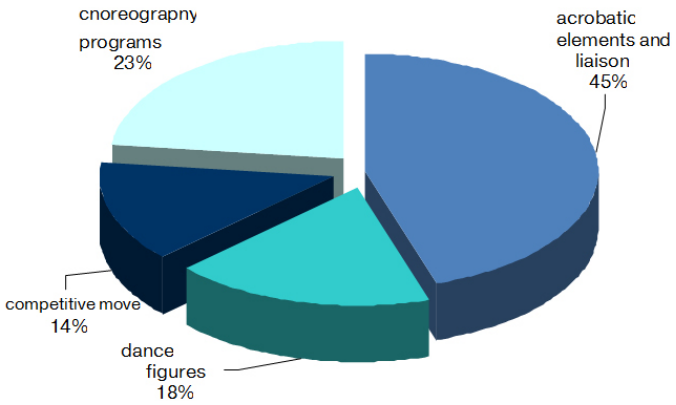

Fig. 1. Percentage of time and content of the structural components of the competitive programs of qualified "B" class athletes in acrobatic rock'n'roll

Analysis of our studies showed that the competitive program of qualified athletes of acrobatic rock and roll consists of introduction (intro), 6 blocks and finale (outro) – the final pose of the composition. In one block the sports couple demonstrates the dance series, entering the acrobatic element or the acrobatic bunch, performing it and exiting it. So, in 6 blocks the sports pair performs: 1) dance series – the optimal number (6) of full competitive moves and variation of the competitive course, dance tracks, elements and movements of modern choreography, classical (ander, andedan) and rock and roll (use of an accented spring on the "re-le-ve") revo-

Table 1

Indicators determining the structure of the competitive program "Acrobatics" of qualified athletes of "class B" in acrobatic rock'n'roll

No. i/o	Group of indicators	Indicators	Requirements for indicators
1.	Acrobatics*	4 groups of obligatory elements and 2 liaison movement	– front flip; – backflip; – "Todes"; – rotation; – other elements
2.	Foot technique	Main course	– performance of swing rhythm; – "spring"; – footwork; – posture and work of the hull; – direction of shots; – hand movements;
3.	Dance figures	simple; complex; rotation in a pair	– complexity; – clarity; – diversity; – quality of performance; – dance lines; – originality
4.	Choreography	– main course in contact and with changing places / directions – variants of the main stroke; – movement in a pair without the main course; – all the rest (rotation, jumping, other styles)	– logic; – harmony; – aesthetics; – accents in the production; – colorfulness

Remark. ** – all acrobatic elements are performed in contact, except for the elements "Staff" and "Bettarni" [11].*

lutions, jumps, dynamic changes in the positions of partners relative to the second and specific dance figures, successfully highlighting the accents of musical accompaniment by expressive poses; 2) acrobatic elements – 4 groups of obligatory acrobatic elements (somersault forward, back somersault, "Todes", rotation) and two liaison movement.

Thus, the main content of competitive compositions in acrobatic rock'n'roll from qualified "B" class athletes consists of introduction (intro), six blocks and final (outro) (Figure 2).

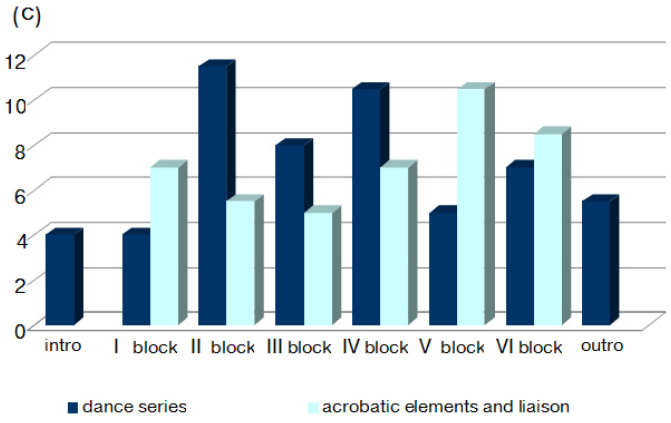

Fig. 2. Structure of the competitive program of qualified "B" class athletes in acrobatic rock'n'roll

When compiling and correcting competitive programs in acrobatic rock'n'roll, it is necessary to take into account the quantitative composition of the indices shown by the rules of the competition of this sport, the quality of the structural elements of the composition and the logical distribution of all components that combine the original, amplitude movements with the expressiveness of performance in competitive program. Each sports couple applies different variants of performance of competitive exercises depending on special and technical preparedness.

Conclusions

Analysis of the video material allowed evaluating the effectiveness of the training process, determining the level and direction of correction of competitive compositions of qualified athletes in acrobatic rock'n'roll.

Analysis of the content of competitive programs of qualified athletes of class "B" in acrobatic rock'n'roll, allowed to determine the structure and components of the content, the number and time of their implementation. It is established that the competitive compositions of qualified "B" class athletes in acrobatic rock'n'roll consist of introduction (intro), 6 blocks and finale (outro). In one block the sports couple demonstrates the dance series, the west on the acrobatic element or the acrobatic connection, performing it and exiting it. It is revealed that most of the time of the whole program is occupied by acrobatic elements and their ligaments – 44,5 seconds (45%), the main move is from 12 to 16 seconds (14%). Dance figures on average run 17.8 seconds (18%). A considerable part of the time is occupied by the choreography component, which has an ornamental character of 22,74 seconds (23%). Thus, the content of the competitive program for qualified athletes in acrobatic rock'n'roll of class "B" should be logically distributed across all blocks that combine complex acrobatic tricks, original, amplitude movements with the expressiveness of performance.

In the future, further studies are planned to study the special and technical preparedness of qualified "B" class athletes in acrobatic rock'n'roll.

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Information about the Authors

Viacheslav Mulyk: *Doctor of Science (Physical Education and Sport), Professor; Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-4441-1253
E-mail: mulik_v@mail.ru

Yuliya Lutsenko: *Kharkov State Academy of Physical Culture: Klochkovskaya 99, Kharkov, 61058,Ukraine.*
ORCID.ORG/0000-0001-6443-0470
E-mail: yulia.m.lutsenko@gmail.com

Larysa Taran: *PhD (Physical Education and Sport), Associate Professor; Kharkov State Academy of Physical Culture: Klochkivska st. 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0001-8141-443X
E-mail: taranlarisa11@gmail.com

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Investigation of the relationship between the indicators of physical preparedness and the basic technique elements of young water-slalom athletes

Daria Okun
Kateryna Mulyk

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *to determine the relationship between the indicators of physical fitness and the basic technical elements of young water-slalom athletes.*

Material & Methods: *theoretical analysis and generalization of data from scientific and methodological literature, pedagogical control tests (tests), methods of mathematical statistics.*

Results: *it found to achieve successful results in water-slalom, the level of development of motor qualities is of great importance. It identified the most important lessons for the water-slalom motor quality (speed-strength, power).*

Conclusion: *during preparation of athletes in water-slalom, in the first place, these motor qualities must be taken into account.*

Keywords: *water slalom, training, technical elements, motor qualities.*

Introduction

Training of beginners is characterized by a variety of means and methods, a wide application of exercises from various sports. It is advisable to build up the movement of athletes in the initial training process using a wide range of preparatory exercises in order to prevent the formation of technically incorrect stable motor skills. This approach is the basis for improving athletes in the first stages of many years of preparation [9]. The problem of finding general preparatory exercises with the aim of effectively influencing the development of physical qualities of beginners, mastering the technique of the sport, and the optimal balance of general and special physical training at each stage of long-term training of athletes is relevant.

According to experts, the training process of beginners is expedient to build with the definition and application of such general preparatory exercises that positively affect the development of special motor qualities [1; 3; 5; 9].

Analysis of special literature suggests that at the stage of initial training of athletes the selection of such general training exercises and methods and their application is relevant, which contribute to the development of special physical qualities and the effective mastery of the sport technique [2; 4; 8; 9].

Therefore, in the process of initial training of athletes, it is expedient to search for such exercises, the application of which will be most effective for developing physical qualities and optimizing the mastery of technique in the chosen sport.

The rapid increase in the level of achievements in world sports requires the search for new effective means, methods and organizational forms of training sports reserves [4; 8].

A characteristic feature of modern canoe slalom is a significant increase in the difficulty of competitive distances with the steady growth of sports results. High competition in canoe slalom led to increased requirements for the athletic qualities of athletes [1; 5; 6].

The analysis of the scientific and methodological literature and the generalization of the best practices of the trainers make it possible to state that up to the present time there is no single developed and generally accepted method for the initial training of young canoe slalom athlete, which would contain clear physiological and anthropometric indicators, a complex of tests and a system for evaluating the results. n connection with this, increasing the effectiveness of initial training of children for canoe slalom is one of the actual problems of the modern system of sports training of oarsmen.

Relationship of research with scientific programs, plans, themes. The work is carried out in accordance with the Consolidated Plan of Research in the field of physical culture and sports for 2011–2015, on topic 2.8 “Improving the training of athletes in certain groups of sports” (registration number 011U003125).

The purpose of the research: to determine the relationship between the indicators of physical fitness and the basic technical elements of young water-slalom athletes.

Objectives of the study:

1) Identify the level of physical preparedness of children who are engaged in canoe slalom in the initial training group.

2) To study the significant interrelations between the indicators of the physical preparedness of children and the leading technical elements during the initial preparation.

Material and Methods of the research

The study involved 28 boys 10–11 years of age who are en-

gaged in canoe slalom in the sports section of the Sports School "Mayak+" in Kharkov in the group of initial training. We determined the indicators of their physical readiness.

Determination and assessment of physical and technical preparedness was carried out according to the regulations established for water-slalom athletes at the initial stage of preparation. Techniques for testing and processing of testing results are presented in the works of Y. O. Vorontsov [1] and L. P. Sergienko [8]. The correlation analysis of the links between the leading technical elements and physical preparedness in the course of the study made it possible to establish the dependence of the success of the performance of technical elements on the level of development of motor qualities. The most interdependent indicators were determined which had a higher correlation coefficient between the obtained results. Using the coefficient of rank correlation, conditionally evaluate the tightness of the relationship between the signs, considering the coefficient values at 0,3 and lower than the weak linkage indicators; the value is greater than 0,4, but less than 0,7 – the average linkage, and the value 0,7 or more – indicators of high communication. Table 1 shows the correlation between the test scores of water-slalom athletes 10–11 years.

Methods of research:

1. Theoretical analysis and generalization of data from scientific and methodological literature.
2. Pedagogical control tests (tests).
3. Methods of mathematical statistics.

Results of the research and their discussion

The results shown in Table indicate a significant influence of the level of development of power, speed-strength and coordination qualities on the manifestation of the qualities of technical skill in canoe slalom, and therefore there is the expediency of using exercises for their development.

Correlation analysis of the dependence of motor performance indices of young men of 10–11 years revealed the presence of direct and inversely proportional relationships between them. Thus, the results of the correlation links of exercise 8 laps in 1 min have a weak connection between the indices run at 30 m (r=–0,13), Cooper test (r=0,27); average connection with jump over rope (r=0,51) and sit-up (r=0,47); high connection with push-ups (r=0,79) and pull-ups (r=0,86).

Found a weak correlation between the indicators of pass right gate and left gate and sit-up (r=0,37, r=0,29), pull-ups (r=0,81, r=0,9), push-ups (r=0,65, r=0,51) and jump over rope (r=0,41, r=0,49).

Indicators of time to pass the distance of 100 m have a weak connection between run at 30 m (r=–0,31), Cooper test (r=–0,34) and jump over rope (r=0,28), and also correlated with performing push-ups (r=0,68), sit-up (r=0,47) and pull-ups (r=0,71).

Thus, the data elements and technical indicators of physical qualities of young men aged 10–11 years have a correlation relationship with the results of the change in one exercise (Pull-ups, push-ups) varies another indicator (8 laps in 1 min, pass right gate and left gate).

The study of the correlation between technical elements and test indicators has a high level of tightness of links – 8,6%, average – 26,9%, weak – 65,4%. Thus, the results of the study indicate that there is an interference between the test of motor abilities of athletes specializing in water slalom and technical elements.

Conclusions

1. Obtained data in the course of the research showed that the level of physical preparedness of children aged 10–11 years, engaged in water slalom, is in accordance with the regulations presented in the program of the Youth Sports School for water slalom.

2. As a result of the research, we found that to achieve successful results in rowing slalom, the level of development of motor qualities is of great importance: speed-strength, power. This gives grounds to assert that during the training of athletes in water slalom, these motor qualities must first of all be taken into account.

3. The revealed correlation interrelations enable us to purposefully use physical exercises for mastering individual elements of technology in water slalom.

In the **perspective of further research**, it is planned to develop a training program for the purposeful development of motor qualities necessary for mastering the basic elements of the technique of water slalom in the initial training phase.

Correlation links between the indices of physical training and the main elements of the technique of the young men of the water-slalom athlete of 10–11 years by the method of Spearman (n=28)

	Indicators	1	2	3	4	5	6	7	8	9	10
1.	8 laps in 1 min	1									
2.	Right gate	0,621854	1								
3.	Left gate	0,510766	0,076163	1							
4.	Time to pass the distance of 100 m (rowing)	–0,74428	0,051798	0,221978	1						
5.	Run at 30 m	–0,13854	–0,134593	–0,1567	–0,31871	1					
6.	Push-ups	0,79993	0,650075	0,513042	0,689448	0,048804	1				
7.	Pull-ups	0,86484	0,81677	0,91699	0,71515	0,240174	–0,0794	1			
8.	Cooper test	0,279609	0,1712	0,096599	–0,34246	–0,25749	0,124018	0,008984	1		
9.	Jump over rope	0,518454	0,41843	0,4983	0,28357	0,049179	–0,04936	0,111579	0,038464	1	
10.	Sit-up	0,47044	0,37419	0,296562	0,47027	0,002259	–0,22396	–0,18431	–0,1319	0,01325	1

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Information about the Authors

Daria Okun: *Kharkiv State Academy of Physical Culture: Klochkovskaya 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-0639-5846
E-mail: dariaokun@gmail.com

Kateryna Mulyk: *Doctor of Science (Pedagogical), Associate Professor; Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-6819-971X
E-mail: kateryna.mulyk@gmail.com

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Model characteristics of sensorimotor reactions and specific perceptions of trained wrestlers

***Rostislav Pervachuk*[1]**
***Yuriy Tropin*[2]**
***Vyacheslav Romanenko*[2]**
***Anton Chuev*[2]**

[1]Lviv State University of Physical Culture, Lviv, Ukraine
[2]Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *to develop the model characteristics of sensorimotor reactions and specific perceptions of trained wrestlers.*

Material & Methods: *analysis of scientific and methodological information, generalization of best practical experience, psychophysiological methods of research, methods of mathematical statistics. The study involved 26 trained wrestlers engaged in different kinds of wrestling (freestyle, Greco-Roman), aged 17 to 24 years old.*

Results: *an assessment of simple, complex motor reactions and specific perceptions of wrestlers was performed. Based on the results obtained, the model characteristics of sensorimotor responses and specific perceptions of trained wrestlers.*

Conclusion: *this analysis and the models presented were the basis for the development of evaluation criteria specific sensorimotor reactions and perceptions of the trained wrestlers.*

Keywords: *model characteristics, sensorimotor reactions, specific perceptions, trained wrestlers.*

Introduction

Ability to conduct a large number of complex technical and tactical actions, taking into account possible actions of an opponent in a duel, making bold and instant decisions in extreme situations against the impact of confounding factors – all this is a prerequisite for success in the competitive activity of fighters and reflects the level of their psychological preparedness [3; 6; 7; 9; 21].

Psychophysiological functions of a person depend on the characteristics of the higher nervous system that characterize the process of formation and improvement of special motor skills in conditions of sports activity [11; 18; 19].

Objective criteria for the current functional state of the central nervous system are the parameters of sensorimotor reactions of varying degrees of complexity [1].

Time of sensorimotor reactions is one of the simplest, accessible and at the same time fairly accurate neurophysiological indicators that reflect the dynamics of the speed of nervous processes and their switching, motor coordination, overall performance and activity of the central nervous system during various periods of sports training [14; 17].

Training and competitive activities in martial arts contribute to the formation of a complex of specific reactions and perceptions among athletes. They are based on the threshold of perception of stimuli entering various sensory systems. The main role in this is played by the levels of muscular-motor, visual, vestibular and auditory sensations. Higher the level of athletic skill athlete, the higher the level of the value of psychophysiological functions to achieve a competitive result [8; 10; 13; 22].

The purpose of the research: to develop the model characteristics of sensorimotor reactions and specific perceptions of trained wrestlers.

Objectives of the study:

– to reveal psychophysiological features of wrestlers on the basis of the analysis of the methodical literature and generalization of the best practical experience;

– to develop the model characteristics of sensorimotor reactions and specific perceptions of trained wrestlers.

Material and Methods of the research

26 qualified sportsmen engaged in various types of wrestling (freestyle, Greco-Roman), aged from 17 to 24, took part in the research. Evaluation of sensorimotor reactions and perceptions of specific tests conducted with the help of the complex, designed for tablet PCs [1; 19]. Tests were divided into three groups: assessment of simple sensorimotor reactions; assessment of complex sensorimotor reactions; assessment of specific perceptions.

Research methods: analysis of scientific and methodological information, generalization of best practical experience, psychophysiological methods of research, methods of mathematical statistics.

Results of the research and their discussion

The analysis of methodical literature and the generalization of best practical experience made it possible to establish that the specificity of the competitive activity of martial artists influences the level of development of sensorimotor reactions and specific perceptions that ensure a high sports result [19; 20; 21].

Based on the test results obtained, the model characteristics of sensorimotor responses and specific perceptions of quali-

fied wrestlers were developed (Table 1).

Analysis and models presented were the basis for the development of evaluation criteria for sensorimotor responses and specific perceptions of qualified wrestlers (Table 2). They allow differentiating the evaluation and management of the training process in sports wrestling.

It is established that the planning of training loads must be carried out taking into account the modern requirements of competitive activity, which is associated with raising the level of special working capacity of athletes, improving their technical and tactical actions. This is also confirmed by the results of research presented in scientific papers (A. A. Novikov, 2012; B. V. Dagbaev, 2013; S. Latyshev, G. Korobeynikov, L. Korobeynikova, 2014).

Supplemented data (Z. L. Kozina, I. M. Demura, 2010, V. V. Shatskikh, 2012, V. Miarka, 2016) on the problems of psychophysiological control in martial arts.

Conclusions

1. Analysis of methodical literature and generalization of best practical experience made it possible to establish that the specifics of competitive activity of an athlete leaves its imprint on the level of development of leading sensorimotor reactions that ensure high sports achievements.

2. In the course of the study, the following indicators were obtained: the level of simple sensorimotor reactions (tests: “Simple motor skills and resistance to confounding factor”, “Simple visual-motor reaction”, “Simple visual-motor reaction”), level of complex sensorimotor reactions (tests: “Selection reaction from static objects”, “Reaction discrimination”, “Reaction to a moving object”, “Reaction selection on dynamic objects”), level of specific perceptions (tests: “Evaluation of the sense of tempo”, “Evaluation of reproduction accuracy of a given line”, “Evaluation of the perception of the change in the size of the object”).

3. Developed model characteristics of sensorimotor reactions and specific perceptions of trained wrestlers who may eventually become the basis for the creation of rapid diagnostics readiness of wrestlers for competitions.

Further research will be aimed at determining the relationship between psycho-physiological indicators and the special physical preparedness of wrestlers.

Table 1

Model parameters of sensorimotor reactions and specific perceptions of trained wrestlers (n=26)

No.	Indicators of sensorimotor reactions and specific perceptions	$\bar{X}$	δ	m
	Simple reactions			
1.	Simple motor skills (number of clicks per 10 s)	25,37	1,54	0,30
2.	Resistance to confounding factor (%)	80,48	5,82	1,14
3.	A simple visual-motor reaction (ms)	230,48	15,81	3,10
4.	A simple visual-motor reaction (ms)	212,22	14,69	2,88
	Complex reactions			
5.	Selection reaction from static objects (ms)	637,24	68,19	13,37
6.	Reaction to a moving object (ms)	19,75	7,02	1,38
7.	Reaction discrimination (ms)	282,79	18,36	3,60
8.	Reaction selection on dynamic objects (ms)	366,43	38,05	7,46
	Specific perceptions			
9.	Evaluation of the sense of tempo (80 beats min^{-1}) (ms)	37,35	13,80	2,71
10.	Evaluation of reproduction accuracy of a given line (mm)	0,45	0,12	0,02
11.	Playback speed of the preset line (mm s^{-1})	97,05	43,43	8,52
12.	Evaluation of the perception of the change in the size of the object (s)	0,89	0,15	0,03

Table 2

Evaluation criteria of sensorimotor reactions and specific perceptions of trained wrestlers

No.	Indicators of sensorimotor reactions and specific perceptions	High level	Medium level	Low level
	Simple reactions			
1.	Simple motor skills (number of clicks per 10 s)	>26,91	26,91–23,83	<23,83
2.	Resistance to confounding factor (%)	>86,30	86,30–74,66	<74,66
3.	Simple visual-motor reaction (ms)	<214,67	214,67–246,29	>246,29
4.	Simple visual-motor reaction (ms)	<197,53	197,53–226,91	>226,91
	Complex reactions			
5.	Selection reaction from static objects (ms)	<569,05	569,05–705,43	>705,43
6.	Reaction to a moving object (ms)	<12,73	12,73–26,77	>26,77
7.	Reaction discrimination (ms)	<264,43	264,43–301,15	>301,15
8.	Reaction selection on dynamic objects (ms)	<328,38	328,38–404,48	>404,48
	Specific perceptions			
9.	Evaluation of the sense of tempo (80 beats min^{-1}) (ms)	<23,55	23,55–51,15	>51,15
10.	Evaluation of reproduction accuracy of a given line (mm)	<0,33	0,33–0,57	>0,57
11.	Playback speed of the preset line (mm s^{-1})	>140,48	140,48–53,62	53,62
12.	Evaluation of the perception of the change in the size of the object (s)	<0,74	0,74–1,04	>1,04

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Information about the Authors

Rostislav Pervachuk: *PhD (Physical Education and Sport), Lviv State University of Physical Culture; Kostyushkast., 11, Lviv, 79007, Ukraine.*
ORCID.ORG/0000-0003-1261-4053
E-mail: r.pervachuk@gmail.com

Yuriy Tropin: *Phd (Physical Education and Sport); Kharkiv State Academy of Physical Culture: Klochkovskaya st., 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0002-6691-2470
E-mail: tyn.82@ukr.net

Vyacheslav Romanenko: *PhD (Physical Education and Sport); Kharkov State Academy of Physical Culture: Klochkovska Street 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0002-3878-0861
E-mail: slavaromash@gmail.com

Anton Chuev: *postgraduate student; Kharkiv State Academy of Physical Culture: Klochkovskaya st., 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0003-1261-4053
E-mail: adrenalinsc2016@gmail.com

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Efficiency of developing 15–17-year weightlifters' training process for a one-year macrocycle with the use of various speed and strength training methods

Oleksandr Piven
Tetiana Dorofieieva

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *developed and experimentally tested the construction of the training process of weightlifters of 15–17 years during a one-year macrocycle with the use of various speed and strength training methods.*

Material & Methods: *to the experiment were attracted 30 young weightlifters at the age of 15–17 years, they all had II and III sports categories.*

Results: *it was found that the athletes of the experimental group who used the unconventional training method, using different training regimes – isokinetic, plyometric, half-dynamic, impact method with speed-strength training, which included jumping with various devices in depth and jumping out, after the experiment, they improved their strengths in the amount of the duathlon by 16,5 kg, and also set their own records in contrast to the control group that trained by the traditional method and improved the power results by 7,2 kg.*

Conclusion: *it is established that the use of non-traditional methods for the development of speed-strength qualities of weightlifters, namely, different training regimes – isokinetic, plyometric, half-dynamic, shock method, contributes to the more efficient development of speed-strength qualities, and, consequently, leads to an increase in sports performance in weightlifting.*

Keywords: *training weightlifters, year-long macrocycle, shock method, speed-strength training, and athletic result.*

Introduction

The modern system of training requires constant improvement of the technical preparedness of athletes weightlifters, aimed at implementing effective technical actions of young weightlifters in preparation for competitive activities. Strengthening competition in the competition requires coaches and athletes to search for new ways to increase the effectiveness of competitive activities (V. M. Platonov, 2015).

Weightlifting exercises are very difficult in the technique of execution, since the lifting of the maximum weight is associated with the maximum tension of the muscles of the trunk and extremities, the rapid change in the mode of their work, and most importantly the preservation of equilibrium in the supporting phases of the movement of young athletes. For equipment performing weightlifting exercises also influence the constitution and typological features of the structure of the body of young weightlifters. (N. A. Laputin 2004; Y. Gaverdovskii, 2007).

Speed-strength training in weightlifting sport occupies a leading position, as the level of development of power-speed in the majority determines the achievement of good results in the classical exercises, or weightlifters must have not only high strength, but also the ability to express it in a short time.

To develop strength in weightlifting, at the present time, mainly dynamic exercises are used, mainly with large burdens. As shown in the studies of well-known scientists (Y. V. Verkhoshanskii, 2013; L. S. Dvorkin 2005), with a 120 kg spurt the athlete performs thrust with a weight of 130–140 kg. In this case, a large weight increase provides an increase in the strength of the muscles, but does not contribute to the development of the ability to rapidly reduce them.

It is generally believed that with the help of large weights, we increase the muscle power potential necessary for the development of a high speed of movement. But, as shown by the studies of famous Russian scientists (N. A. Laputin, 1973, A. S. Medvedev, 1980, V. G. Oleshko, 2011), in explosive phases of snatching and jerking (undermining and pushing from the chest) working soft muscles do not have time to exercise maximum power. This indicates that a weightlifter needs higher speed-strength training to achieve higher sports results [4; 5; 8;11]

It should be noted that the scientific and methodological literature does not adequately address the problem of constructing the training and training process of speed-strength training for weightlifters, which determined the relevance of the chosen research topic.

Many researchers found that the development of speed-strength qualities are most effective in adolescence under 16 years. (M. S. Ippolitova 1975, V. S. Farfel, 1963, S. I. Filin, 1970 and others). On the basis of experimental data, V. S. Filin (1970) made the following conclusions: the means and methods for the development of speed-strength qualities among athletes aged 15–17 are highly effective at the stage of preliminary basic training [14 ;15].

Development of speed-strength abilities of weightlifter begins with mastering the technique of weightlifting exercises. To do this, it is necessary to achieve accuracy, economy of movements, performed first at a slow pace, and then – at the

maximum. As mastering the technique of lifting the bar is the task of increasing its weight while maintaining the speed and accuracy of the exercises [7].

Shock method of developing the explosive force of muscles is based on a sharp (shock) mechanical stretching of strained muscles, preceding their active working contraction. As a factor stimulating the activity of muscles, it does not use encumbrances, but the kinetic energy of the fall of the body of an athlete or training apparatus (Y. V. Verkhoshanskii, 2013). Positive effect of stretching strained muscles on the following work effect of their reduction was shown in a number of experimental studies by leading domestic [6; 18] and foreign scientists [20–23].

Relationship of research with scientific programs, plans, themes. The scientific research was carried out on the theme of the Consolidated plan of research work in the field of physical culture and sports for 2011–2015. On the topic 3.7 "Methodological and organizational-methodological basis for determining the individual norm of a person's physical condition" (state registration number 0111U000192).

The purpose of the research: developed and experimentally tested the construction of the training process of weightlifters of 15–17 years during a one-year macrocycle with the use of various speed and strength training methods.

Material and Methods of the research

In this study, the students of the Youth Sports School "KhTP" took part. The experiment involved 30 young weightlifters aged 15–17 years, all of whom had II and III sports categories. Participants were distributed according to sports qualification into two groups – control and experimental. Participants of the experiment practiced 5–6 times a week.

Experiment was carried out at the training base of the municipal enterprise Youth Sports School "KhTP" short-circuit during the year macrocycle (2015–2016).

To realize the purpose, the sportsmen of the control group performed the training assignments for the weight-lifting program for the Youth Sports School, without using the means of speed-force direction, experimental – according to the author's method of constructing the training process of weightlifters of 15–17 years during a one-year macrocycle using speed-strength means. In the construction of the training process of the experimental group athletes to apply recommended (Y. V. Verkhoshansky, 2013; L. S. Dvorkina, 2005) the principles of integrated use of methods of development of speed-strength.

Taking into account the recommendations of the leading experts in the field of building the process of training athletes at the stage of preliminary basic training (V. M. Platonov, 2004, L. P. Matveev, 1999), it is justified to construct a two-cycle training of weightlifters of 15–17 years during a one-year macrocycle using speedy power tools orientation at the stage of preliminary basic training.

Methods of research: according to the methodological approach to solving the problem and tasks, the research program included a set of research methods: analysis of scientific and methodological literature, determination of special physical preparedness through pedagogical testing of young weightlifters, pedagogical testing of the training process and methods of mathematical statistics.

Results of the research and their discussion

In our study, the construction of a one-year macrocycle for training weightlifters is based on the generally accepted theory of periodization (V. M. Platonov 2015), which provides for the separation of the macrostructure into preparatory, competitive and transitional periods.

Thus, the first macrocycle of the experimental group (lasting 24 weeks), (June 2015 – December 2015) had in its structure a preparatory period (June – October 2015), which consisted of two general and special preparatory stages, where the training load was performed in sequential increase.

Planning of the training process in the general preparatory stage (duration of 12 weeks) included one retractor and two basic mesocycles. The tasks of the mesocycle included the creation of prerequisites for further intensive work, directly related to the improvement of the training process and the improvement of strength indicators through the use of speed-strength training. The structure of the special preparatory stage (duration 4 weeks) had a formative character and included a "control-preparatory" mesocycle.

The special preparatory stage is characterized by the predominant use of highly specialized exercises and the use of special operating modes (static-dynamic, isometric, plyometric) and the shock method, which allow eliminating the identified individual "shortcomings" in the training process of weightlifters of 15–17 years. The special preparatory mesocycle consisted of retracting, shock and reducing microcycles.

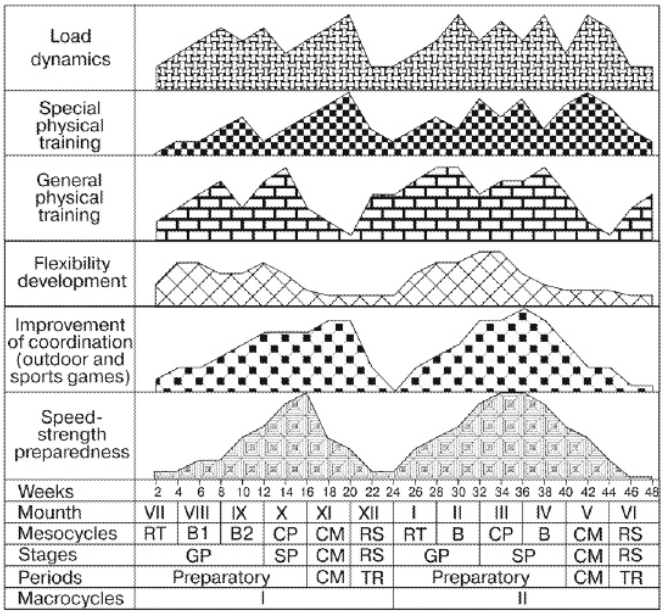

Fig. 1. Structure of the annual two-cycle macrocycle of weightlifters of 15–17 years, using means of speed-strength orientation: *Mesocycles: RT – retractor; B – basic; B1 – basic (general physical training), B2 – basic (special physical training); CP – control and preparation; CM – competitive; RS – restorative. Stages: GP – general-preparatory; SP – specially-preparatory; CM – competitive; RS – restorative. Periods: CM – competitive; TR – transitional.*

Structure of the competition period (lasting 4 weeks, December 2015) of the annual cycle has a mesocycle (competitive), which includes retracting, intermediate and competitive microcycles.

Transition period involves the restoration of the body after training and competitive activities, as well as a link between the past and the subsequent annual training macrocycle. The duration of the transition period was 4 weeks (Figure 1).

Second macrocycle (with a duration of 24 weeks, January 2016 – June 2016) is an organic continuation of the first macrocycle, the preparatory period of which was 16 weeks (January 2016 – April 2016).

General preparatory stage (duration of 8 weeks, January-February) included two mesocycles – retractor and base. The basic mesocycle was of an experimental nature, where the means and methods for the development of speed-strength training were included in the training process, and also the tasks of the mesocycle were to create prerequisites for further hard work, connected directly with the improvement of the technique of competitive exercises. The structure of the preparatory stage (duration 8 weeks) was of a formative character and included a special preparatory and basic mesocycle.

The special preparatory stage is characterized by the predominant use of highly specialized exercises and the use of special methodical techniques (static-dynamic, isometric, plyometric and shock), which allow to eliminate the identified individual "shortcomings" in the training process of weightlifters of 15–17 years. Specially-preparatory and basic mesocycles consisted of a reconstructive microcycle, retractor, shock and recovery.

Structure of the competition period (duration 4 weeks) has a formative character. The volume of the load is reduced, special attention is paid to the development of the technique of competitive exercises and the volume is increased by means of speed-strength character. The task of this period is the achievement of the peak form of the athletes at the main competitions. The structure of the competition period of the annual cycle has mesocycles (competitive), which includes retracting, intermediate and competitive microcycles.

Transition period involves the restoration of the body after training and competitive activities, as well as a link between the past and the subsequent annual training macrocycle. The duration of the transition period was 4 Sundays.

In the author's experimental methodology, we showed that in the preparatory period, athletes also have an increase in competitive exercises due to speed-strength means.

As an example, in Figure 2 shows the dynamics of the load of competitive exercises and speed-strength means in the preparatory period of the general preparatory stage, which includes three mesocycles: a retractor and two basic ones, including retracting, shock and recovery microcycles.

On the graph (Figure 2) it is evident that with practically the same maximum load variations (30–90%), the author's technique is characterized by a fundamental reduction in the load in competitive and special-auxiliary exercises. This dynamic load also allows the athlete to stabilize training. In general, the

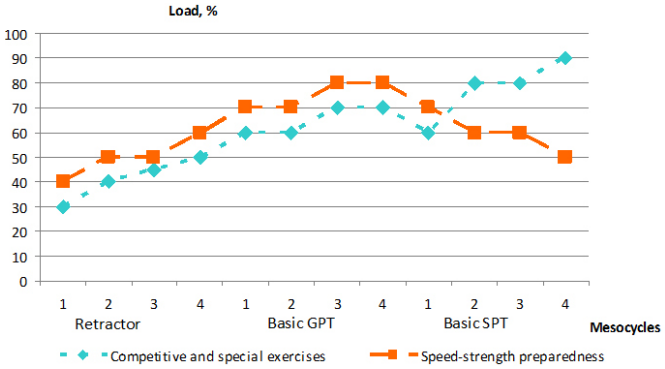

Fig. 2. Dynamics of the load of competitive exercises and speed-strength means (in percent of the maximum) in the preparatory period of the general preparatory stage of weightlifters of 15–17 years

experimental method proposed by us is characterized by a gradual increase in the load both in competitive exercises and in exercises for the development of speed-strength training of athletes. An important point of preparation is the fact that the gradual increase in exercises for the development of speed-strength training and static loads allows to ensure the prevention of overstrain and overtraining, which ultimately helps to keep the necessary form for weightlifters.

Table 1 shows a more detailed example of the construction of the training process in the shock microcycle of the basic mesocycle preparatory period of the general preparatory stage for weightlifters of 15–17 years using different operating modes and using speed-strength training.

The proposed experimental program of shock microcycle training included three sessions using speed-strength training, aerobic exercise, which is carried out by running a small intensity, which activates metabolic recovery and muscle relaxation after weight training.

Experimental results were expressed in the following.

Thus, at the beginning of a year-long macrocycle (Table 2), the difference is not likely in the classical snatch (control – 57,5 kg, experimental – 58,5 kg; $P>0,05$); classic clean and jerk (respectively – 67,1 kg, 69,5 kg; $P>0,05$); sum of biathlon (respectively – 124,6 kg, 128,0 kg; $P>0,05$); overhead squat (respectively – 90,1 kg, 88,7 kg; $P>0,05$); bench press (respectively – 56,1 kg, 60,1 kg; $P>0,05$) and deadlift (respectively – 96,5 kg, 99,9 kg; $P<0,05$).

Coefficients of variation of all the main indicators of special exercises separately for the control and experimental groups did not practically exceed the total output level. For example, for the classical snatch control group, it compiled V=13,7%, for experimental – V=14,0%. Accordingly, for the control and experimental groups, the coefficients of variation were the following values: classical clean and jerk – V=9,4%, V=7,7%; sum of biathlon – V=11,0%, V=9,8%; overhead squat – V=90,1%, V=88,7%; bench press – V=12,6%, V=9,8% and deadlift – V=8,6%, V=7,6%.

At the end of the study (Table 3), the difference between the indices: classical snatch (control – 72,5 kg, experimental – 80,5 kg; ($t=2,5$; $P<0,05$); classical clean and jerk (respectively – 87,5 kg, 97,8 kg; ($t=2,5$; $P<0,05$); sum of biathlon (respec-

Table 1

An example of a training program for weightlifters 15–17 years of the experimental group in the shock microcycle of the base mesocycle during the preparatory phase of the general preparatory phase

Day	Time of the classesstart	Classes duration, min	Means of training	Load direction	Load value	Basic method of performing exercise
1	11:00	60	Exercises for the jerk of the classic and traction thrust	Anaerobic	Lg.	Interval
	19:00	30	Exercises with the use of speed-strength training	Mixed	Sm.	Interval
2	11:00	60	Exercises for push the classic and thrust jerk	Anaerobic	Lg.	Interval
3	11:00	60	Exercises for the jerk of the classic and traction thrust	Anaerobic	Lg.	Interval
	19:00	30	Exercises with the use of speed-strength training	Anaerobic	Lg.	Interval
4	Day off		Rehabilitation equipment (massage)	Restoration of the athlete's body		
5	11:00	60	Exercises for push the classic and thrust jerky	Anaerobic	Av.	Interval
	19:00	30	Exercises with the use of speed-strength training	Mixed	Av.	Interval
6	11:00	60	Exercises for the jerk of the classic and traction thrust	Anaerobic	Lg.	Interval
	19:00	30	Running, fast 8 km·h^{-1}	Aerobic	Sm.	Continuous
7	Day off		Rehabilitation equipment (sauna, massage)	Restoration of the athlete's body		

Remark. *Load value: Sm. – Small, Av. – average, Lr. – large.*

Table 2

Average indicators of the results of competitive and specially-preparatory exercises for weightlifters 15–17 of the control and experimental groups at the beginning of the annual macrocycle (n_1=n_2=15)

Indicators	CG		EG		*t*	*P*
	$\bar{X}_1 \pm m_1$	V, %	$\bar{X}_2 \pm m_2$	V, %		
Classical snatch, kg	57,5±1,7	13,7	58,5±1,8	14,0	0,4	>0,05
Classical clean and jerk, kg	67,1±1,6	9,4	69,5±1,3	7,7	0,2	>0,05
Sum of biathlon, kg	124,6±3,3	11,0	128,0±2,9	9,8	0,3	>0,05
Overhead squat, kg	90,1±1,8	7,5	88,7±1,2	5,4	0,7	>0,05
Bench press, kg	56,1±1,8	12,6	60,1±1,5	9,8	1,7	>0,05
Deadlift, kg	96,5±2,1	8,6	99,9±1,9	7,6	1,2	>0,05

Table 3

Average results of the increase in the results of competitive and specially-preparatory exercises for weightlifters of the control and experimental groups at the end of the annual macrocycle (n_1=n_2=15)

Indicators	CG	EG	*t*	*P*
	$\bar{X}_1 \pm m_1$	$\bar{X}_2 \pm m_2$		
Classical snatch, kg	72,5±2,4	80,5±1,6	2,2	<0,05
Classical clean and jerk, kg	87,5±3,0	97,8±2,7	2,5	<0,05
Sum of biathlon, kg	160,0±5,5	178,3±4,9	2,5	<0,05
Overhead squat, kg	119,8±1,6	125,3±1,5	2,5	<0,05
Bench press, kg	71,0±1,8	77,1±1,4	2,5	<0,05
Deadlift, kg	116,3±2,8	128,2±2,6	3,1	<0,01

tively – 160,0 kg, 178,3 kg; (t=2,5; P<0,05); overhead squat (respectively – 119,8 kg, 125,3 kg; (t=2,5; P<0,05); bench press (respectively – 71,0 kg, 77,1 kg; (t=2,5; P<0,05) and deadlift (respectively – 116,3 kg, 128,2 kg; (t=3,1; P<0,01).

So, at the end of the observation, which took place during the annual training at the stage of preliminary basic training, the athletes of the experimental group showed higher results than the control group, which was trained according to the usual method of the Youth Sports School (Table 3), without using the means of speed-power directivity. At the same time 10 athletes EG have established personal records in the sum of a biathlon and in separate specially-training exercises.

Conclusions

Proceeding from the results of the pedagogical experiment of constructing the training and training process of weightlifters using non-traditional methods for the development of speed-strength qualities of weightlifters, namely, the shock method, it can be said that using this method contributes to the more effective development of speed-strength qualities, and, consequently, leads to growth sports results in weightlifting.

To develop speed-strength qualities, an effective complement to existing traditional means is isokinetic exercises. They contribute to a more effective increase in effort in the final part of the boom lift, not always available in the natural conditions of lifting the bar. The development of speed-strength qualities is most effective in adolescence. That is why right after mastering the technique of performing weightlifting (competitive) exercises, it is necessary to develop speed and strength abilities with the use of special tools and methods, this is highly effective at the stage of preliminary basic training, as evidenced by the results of the study.

At the end of the study, the difference between the indicators was also probable: classical snatch (control – 72,5 kg, experimental – 80,5 kg; (t=2,5; P<0,05); classical clean and jerk (respectively – 87,5 kg, 97,8 kg; (t=2,5; P<0,05); sum of biathlon (respectively – 160,0 kg, 178,3 kg; (t=2,5; P<0,05); overhead squat (respectively – 119,8 kg, 125,3 kg; (t=2,5; P<0,05); bench press (respectively – 71,0 kg, 77,1 kg; (t=2,5; P<0,05) and deadlift (respectively – 116,3 kg, 128,2 kg (t=3,1; P<0,01).

Further research: should include the development and justification of the training process of weightlifters 15–17 in the special preparatory stage of the preparatory preparation period.

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Information about the Authors

Oleksandr Piven: *Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0002-2490-5205
E-mail: piven_oleksandr@ukr.net

Tetiana Dorofieieva: *PhD (Physical Education and Sport), Assosiate Professor; Kharkiv State Academy of Physical Culture: st. Klochkivska, 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0001-9025-5645
E-mail: dti_81@mail.ru

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Changes in the preparedness of athletes engaged in track and field sprint in the conditions of a specialized sports club

Vjacheslav Shutieiev

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *to find out the influence on the preparedness of athletes-sprinters of the conditions for organizing training sessions in specialized sports clubs.*

Material & Methods: *in the study, students (young men) of the first year (age 17), who wanted to practice athletic sprint in a specialized sports club, participated in only 18 people, of which two groups (control and experimental) were formed. To assess the level of preparedness of athletes used common types of testing.*

Results: *conducted studies have shown that over the period of the experiment, the improvement in the results in the experimental group compared with the control group on average for all types of tests is 4,3%.*

Conclusion: *results of the experiment show that the athletes of experiment group, in comparison with the control, increased the level of general physical preparedness (improvement is 2,4%), the special strength preparedness (an improvement of 6,3%) and the special cross-country preparedness (an improvement of 4,2%).*

Keywords: *sports club, coach, athlete, training process, preparedness, sprint, athletics.*

Introduction

The problem of assessing the fitness of athletes under the influence of training and competitive loads is widely analyzed by leading scientists [1; 4; 6; 9 and etc.]. The results of these studies create objective prerequisites for the introduction of pedagogical technology for the formation of the personality of athletes by means of track and field sprint in a specialized sports club. As analysis of information posted on the Internet shows, sports activities in foreign universities are organized precisely in the form of club work. For example, at Cambridge University there are more than fifty sports clubs in which badminton, football, gymnastics, basketball, volleyball, triathlon, golf, etc. are cultivated (Data for 2016). At the University of Birmingham, for example, there are 53 sports clubs (from American football in windsurfing) that create opportunities for sports both for beginners and qualified athletes, and in the sports center of the University of Athens, students can choose any of the following sports: tennis, basketball, volleyball, football, traditional dances, classical sports, table tennis, gymnastics, physical training, aerobics, chess and other.

Among the sports that are cultivated in the student environment (athletics, sports aerobics, fitness aerobics, step aerobics, kickboxing, basketball, football and mini-football, table tennis, martial arts, volleyball, athletic gymnastics, gorodki sport and others), a special place is occupied by one of the most popular types of athletics – running for short distances. At present, the study of the features of the construction of the training process and the regularity of the process of long-term preparation of athletes-sprinters [1; 2; 5; 6; etc.], basic directions for improving the physical and technical preparedness of runners for short distances [3; 8], methods for the development of their speed-strength preparedness are being improved [2; 4, 7], various means of restoring runners to short distances are being studied [5; 8]. At the same time, without attention of scientists remains the problem of influence on the preparedness of athletes-sprinters in the conditions of organizing training sessions in specialized sports clubs.

The purpose of the research: to find out the influence on the preparedness of athletes-sprinters of the conditions for organizing training sessions in specialized sports clubs.

Material and Methods of the research

To solve the research problems, 18 students were selected from the first year students (young men) of the first year (age 17) wishing to practice athletic sprint in a specialized sports club, of which two groups (control and experimental). In the training process of the experimental group the following provisions were introduced: first, with the athletes of the experimental group, a special work was carried out to explain the essence of the construction of the training process; secondly, during the entire training process, the awareness of the athletes of the research group was due to information about the changes that occur in their preparedness; thirdly, a number of joint trainings were conducted for the athletes of the experienced group with more qualified athletes. To assess the level of preparedness of athletes used common types of testing.

Results of the research and their discussion

After conducting a complex natural experiment to introduce the pedagogical technology of the formation of the personality of athletes engaged in track and field sprint in the conditions of a specialized sports club in the training process, a comparison was made between the physical preparedness of the athletes of the experimental and control groups. Obtained results during the parallel pedagogical experiment are presented in Table 1, testifying to the following. For the period of the experiment, the development of speed-strength qualities for the athletes of the research group, which was estimated by the results of the tests in the "standing long jump" test (270,4 cm), significantly improved in comparison with the results of the control group athletes (264,8 cm) 5,6 cm, which

is 2,1%. Results of the study indicate that the athletes of the experimental group compared with the control group significantly improved the result of rapid development, which was evaluated based on the results of the test "running at 60 m". So, the athletes of the research group 60 meters ran on average for 7,4 seconds, while the athletes of the control group for 7,6 seconds. The difference in the results is statistically significant (t_p=4,1 greater than t_{gr}=2,12) and is 2,7%. Strength training is one of the strategic lines for building the training process of sprinters. The overall level of its development was assessed by the results of the athletes in the test "pull-ups". The obtained indices testify that during the experiment period the level of development of the general strength preparedness in the athletes of the experimental and control groups is not statistically different. The number of pull-ups is 13.9 and 14.2 times, respectively. Difference in the displayed results is statistically unreliable($t_p<t_{gr}$). he overall level of dexterity development was estimated by the results of athletes' performance in the "shuttle run 4x9 m" test.

The obtained data indicate that the athletes of the experimental group showed significantly better ($t_p>t_{gr}$) results in this type of testing (8,5 s) compared to the athletes of the control group (8,8 s). Such an improvement is about 2,3%. To assess flexibility, the "angled position from sitting position" test is used. The results of the study showed that, after the end of the experiment, the level of development of flexibility in athletes of the experimental and control groups practically coincides. Thus, in athlete of the experimental group it was 14,1 cm, and in athletes of the control group – 13,6 cm. The existing difference between the average group indicators is statistically unreliable ($t_p<t_{gr}$).

The results of the assessment of the special strength preparedness of student-athlete experienced and control groups after the introduction of pedagogical technology are presented in Table 2. They show that during the experimental period in the experimental group, compared with the control group, there is a significant improvement in the results shown by the athletes in the "run on 30 steps" test, respectively 4,0 and 4,2 seconds. This improvement is approximately 5,0%. In the experimental group, in comparison with the control group for the period of the experiment, there was also a significant improvement in the results of the "triple jump test", respectively, 8,5 and 8,3 m. The difference in the mean group indices in these groups is 2,35%. The results of the study show that the athletes of the experimental group compared to the control showed better results in the test "5-fold jump" according to 14,2 and 13,8 m. This improvement is 9,7%.

The results of the experiment on the introduction of pedagogical technology also indicate that the athletes of the experimental group at the end of the experiment also showed high results in special tests "jumping on one leg", according to 40,0 and 39,0 times, as well as "squatting in 30 s" respectively 27,0 and 25,0 times. Increase in the average results is 6,8% and 7,4%, respectively.

The generalized results of the pedagogical experiment are presented in Table 3. They testify that the sportsmen of the experimental group showed the best results in the test "running 30 m from the turn" (3,2 s) in comparison with the results of the control group (3,3 s). This difference is statistically significant, since t_p is greater than t_{gr}. The results of the comparison show that the athletes of the experimental group showed results in this test 3,1% better than the athletes of the control group. The results of the comparison of the level of the special running readiness achieved during the period of the experiment based on the results of the test "running 30 m from the start" show the advantage of the athletes of the experimental group (4,2 s) over the control (4,3 s). The difference in the indications of the results is statistically significant ($t_p>t_{gr}$) and is

Table 1

Level of general physical preparedness of athletes engaged in sprinting at the final stage of the experiment (q=0,05)

No. i/o	Preparedness indicators	Experimental group (n=9) $\bar{X}\pm\sigma$	Control group (n=9)	t_p	t_{gr}	L/P
1.	**Speed-strength:** standing long jump (cm)	270,4±4,3	264,8±7,4	3,7	2,12	suf.
2.	**Velocity:** running at 60 m (s)	7,4±0,12	7,8±0,21	2,2	2,12	suf.
3.	**Strength:** pull-ups (number of times)	13,9±3,9	14,2±4,2	1,9	2,12	n/s
4.	**Agility:** shuttle run 4x9 m (s)	8,6±0,02	8,8±0,03	4,6	2,12	suf.
5.	**Flexibility:** angled position from sitting position (cm)	14,1±1,2	13,6±2,4	0,9	2,12	n/s

Table 2

Level of special strength preparedness of students in the experimental and control groups at the end of the experiment (q=0,05)

No. i/o	Preparedness indicators	Experimental group (n=9) $\bar{X}\pm\sigma$	Control group (n=9)	t_p	t_{gr}	L/P
1.	Run on steps (n=30), s	4,0±0,06	4,2±0,12	3,8	2,12	suf.
2.	triple jump, m	8,5±3,2	8,3±4,7	4,6	2,12	suf.
3.	5-fold jump, m	14,2±0,46	13,8±0,84	3,2	2,12	suf.
4.	Jumping on one leg 20 m (s)	42,1±4,3	39,2±6,5	2,8	2,12	suf.
5.	Squatting in 30 s	27±4,6	25±5,2	2,6	2,12	suf.

Table 3

Level of the special running preparedness of the students of the experimental and control groups at the end of the experiment (q=0,05)

No. i/o	Preparedness indicators	Experimental group (n=9) $\bar{X}\pm\sigma$	Control group (n=9)	t_p	t_{gr}	L/P
1.	Running 30 m from the turn, s	3,2±0,14	3,3±0,20	4,2	2,12	suf.
2.	Running 30 m from the start, s	4,2±0,01	4,3±0,06	3,6	2,12	suf.
3.	Running 60 m from the start, s	7,4±0,47	7,6±0,60	2,8	2,12	suf.
4.	Running on the spot for 10 s (number of cross-country movements)	23,0±3,0	21,0±4,1	1,6	2,12	n/s
5.	Response time to auditory stimuli (s)	0,19±0,032	0,21±0,032	2,86	2,12	suf.
6.	Reaction time to visual stimuli (s)	0,243±0,034	0,25±0,047	1,75	2,12	n/s
7.	Running at 100 m, s	12,1±0,2	12,3±0,34	4,4	2,12	suf.

about 2,3%. An important indicator, which indicates the level of development in the sprinters of special running readiness, the result, which show athletes in the test "running 60 m from the start". According to the results of the experiment, according to this indicator, the athletes of the experimental group showed significantly better average group results (7,4 s) compared to the athletes of the control group (7,6 s). improvement is 2,7%. An important indicator that significantly affects the result of a sprint run is the maximum number of cross-country movements that the athlete performs during the run "running on the spot for 10 s". The results of the conducted testing show that during the experiment the sportsmen of the experimental and control groups showed practically the same results, according to – 23,0 and 21,0 cross-country movements for ten second. The difference between the mean group results is statistically unreliable ($t_p<t_{gr}$).

Experience shows that the result in sprinting significantly depends on the effectiveness of the start of athletes. Its effectiveness is significantly influenced by the level of development in athletes' ability to respond to auditory and visual stimuli. The conducted pedagogical experiment showed that the athletes of the experimental group compared with the athletes of the control group showed significantly better results in the test "response time to auditory stimuli", according to 0,19 s and 0,21 s, which is 10,5%.

At the same time, the athletes of both groups showed almost identical results in the test "reaction time to visual stimuli", according to 0,24 s and 0,25 s. The above-described results of testing the special running preparedness of the athletes of the experimental and control groups are the basis for an objective control of the training process. Result of such a process is the time spent by the competitors in the competitive distance. The results shown by the athletes of both groups in the 100m run at the "Runner's Day" competitions show that the athletes of the experimental group compared to the athletes of the control group showed significantly better results, according to – 12,1 s and 12,3 s. Group average difference absolute values in these groups is 2,5%.

Conclusions

1. During the period of introduction of pedagogical technology, the level of general physical preparedness among the athletes of the experimental group in comparison with the results shown by the athletes of the control group has significantly improved on 2,1%.

2. The results of the study of changes during the period of the pedagogical experiment of special strength training among the athletes of the experimental and control groups showed that the athletes of the experimental group are dominated by the control group athletes by the results of special strength tests – on average 6,3%.

3. Results of the study of changes during the period of the pedagogical experiment of special running preparedness in the athletes of the experimental and control groups showed that the athletes of the test group are predominant in the control group athletes according to the results of the tests in the "running at 30 m run" 3,1%), "running 30 m from the start" (improvement by 2,3%), "running 60 m from the start" (improvement of 2,7%), "response time to auditory stimuli" (improvement of 10,5%), "running 100 m" (improvement on 1,6%).

Prospects for further research. In the future, it is planned to study in more detail the peculiarities of the influence of specialized sports clubs on the preparedness of athletes.

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Information about the Authors

Vjacheslav Shutieiev: *Kharkov State Academy of Physical Culture: Klochkovskaya 99, Kharkov, 61058, Ukraine.*
ORCID.ORG/0000-0001-6459-8564
E-mail: shutey1971@ukr.net

UDK 796.922+796.927/796.015.572

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Impact of a large load of aerobic character with the use of movement on roller skis on the functional state of the body of racing skier 15–16 years

Larysa Taran

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: *determine the nature of the course and the timing of recovery as a result of the impact of a large load of aerobic orientation with the use of movement on the roller skis on the functional state of the organism of young racing skier aged 15–16.*

Material & Methods: *in the studies took part the young racing skier of 15–16 years (I, II sports category) of the age group "younger boys". Before the beginning of the training sessions, the subjects registered a set of indicators that allowed assessing the functional state of the organism (cardiovascular, respiratory and neuromuscular systems). Repeatedly recorded the studied indicators for the same complex after the end of training sessions after 1 hour, as well as after 24, 48 and 72 hours.*

Results: *the young racing skier based on the results of the conducted studies analyzed the dynamics of indicators of the functional state of the organism. The timing of restoration of the cardiovascular, respiratory and neuromuscular systems has been established, which must be taken into account when planning the training process in microcycles.*

Conclusion: *as a result of studies on the effect of heavy loads using the movement on skiing rollers, a decrease in the functional parameters of the cardiovascular, respiratory, neuromuscular systems of the body was established. The recovery period as a whole lasted for 72 hours. At the same time, it was revealed that the anaerobic metabolic capacity was restored after 48 hours.*

Keywords: *training load, movement on roller skis, functional condition, and recovery period.*

Introduction

Changes in the functional systems of the athletes body, arising during the recovery period, serve as a basis for improving training. Diagnosis of fatigue is very important for the rational planning of various structural formations of the training process[5].

According to McManus Armstrong (2008), Gamble (2014), a strenuous exercise aimed at increasing aerobic capacity, is more effective after the puberty period, but can also be planned in adolescence [9; 10].

In general, recovery processes after physical works are heterochronous, i.e., recovery and supercompensation of various body functions are not simultaneous. Orientation to the most recently restored indicators would mean the use of exercises with large training loads no more often than once in 4–7 days. The oppression of the athlete's capabilities as a result of intense training does not at all mean that the athlete is not able to show high performance in the near future in a fundamentally different direction, determined primarily by other bodies and functional mechanisms [5]. It is established that fatigue of athletes, which occurs as a result of intense muscular activity, is formed specifically for each type of work, depending on the degree of participation in its implementation of various functional systems and mechanisms [8].

The analysis of scientific and methodological literature made it possible to reveal that research in this direction was carried out by skiers with the use of a competitive training facility [4], while the influence of occupations using preparatory and special preparatory means was not studied.
The results of our studies on the effect of heavy loads using cross-country running and competitive loads using skiing were presented earlier [6; 7].

Getting around on roller skis refers to a specially-preparatory tools, and has a significant share in the preparation of young adolescent athletes [1; 3]. In the group of 15–16-year-old racing skier the share of special physical training makes up 20% of the total amount of all used means, along with general and auxiliary physical training [2].

The purpose of the research: determine the nature of the course and the timing of recovery as a result of the impact of a large load of aerobic orientation with the use of movement on the roller skis on the functional state of the organism of young racing skier aged 15–16.

Material and Methods of the research

In the studies, young racing skier of 15–16 years (I, II sports category) of the age group "younger boys" took part. The membership in the age group was based on the boundaries stipulated in the rules of the competition in cross-country skiing. Also, athletes of this age corresponded to the stage of preliminary basic training on the classification of the age limits of athletes at various stages of long-term preparation of V. N. Platonov.

Before the beginning of the training sessions, the subjects registered a set of indicators that allowed to assess the functional state of the organism (cardiovascular, respiratory and neuromuscular systems) – these data were taken as initial data. Repeatedly recorded study parameters for the same complex after the end of training sessions after 1 hour, and after 24, 48 and 72 hours.

During the studies used roller skis "ELPEX" with stiffness "three" rubbers when moving to that expended effort as close

Table 1

Dynamics of indicators of the functional state of the organism of young racing skier after performing a large load of aerobic orientation using the movement on the roller skis (n=15)

No.	Indicators		Initial	After the training session after 1 hour	After 24 hours	After 48 hours	After 72 hours
			$\bar{X}_1 \pm m_1$	$\bar{X}_2 \pm m_2$	$\bar{X}_3 \pm m_3$	$\bar{X}_4 \pm m_4$	$\bar{X}_5 \pm m_5$
1.	Metabolism of the heart muscle according to the ECG, conv. units	ANAMC*	65,13±1,72	56,67±1,38	62,20±1,51	65,73±1,31	65,20±1,51
		AMC	215,87±5,56	193,33±3,38	209,20±5,09	212,40±4,74	216,53±6,04
2.	HR, beat·min^{-1}		60,27±1,16	66,20±1,26	63,00±1,71	61,00±1,71	60,07±1,51
3.	Ruffier-Dickson test, conv. units		16,79±0,67	19,71±0,62	18,16±0,63	17,26±0,65	16,88±0,69
4.	Endurance factor, conv. units		10,29±0,51	13,10±0,49	11,17±0,59	10,72±0,51	10,37±0,52
5.	Skibinsky index, conv. units.		20,09±1,25	16,04±1,37	18,71±1,80	19,39±1,57	20,49±1,55
6.	Tremorography	Amplitude, cm	0,77±0,04	0,99±0,07	0,86±0,06	0,78±0,07	0,76±0,08
		Frequency, Hz	10,31±0,98	13,99±1,43	11,63±1,20	10,83±1,30	10,14±1,37
7.	Simple reaction time, ms	On a light stimulus	212,3±14,5	257,3±13,2	229,7±11,3	220,1±16,6	210,7±14,7
		On a sound stimulus	200,3±12,0	251,3±20,8	211,2±14,5	202,5±15,0	198,9±15,9

Remark. ** – indicators return to the baseline level after 48 hours.*

as possible in its effects to movement on skis.

Results of the research and their discussion

Moving on roller skis is one of the main special-preparatory means of racing skier. Results of the study on the effect on the racing skier body lessons with a large load of aerobic largest directional movement using roller skis on the classic style are presented in Table 1.

The amount of work performed in one training session prior to the onset of apparent fatigue, when using this special preparation in the experimental group was 27,0±2,0 km. Overcoming this distance had a significant impact on the functional systems of the body of young racing skier, the restoration of which lasted for three days.

In 24 hours after the training session, the data of ANAMC increased in comparison with the previous day by 5,53 conv. units (t=2,70, p<0,05), and AMC at 15,87 conv. units (t=2,60, p<0,05) (Table 2). On the second day, the increase in results was 9,06 conv. units (t=4,77, p<0,05) in terms of ANAMC and 19,07 conv. units (t=3,27, p<0,01) in terms of AMC. Completely the parameters of the heart metabolism returned to the initial and even slightly exceeded them in 48 hours in anaerobic and 72 hours in the aerobic component (p>0,05).

The same dynamics was observed in the heart rate and Ruffier-Dickson test (Table 3), which reached the baseline data only on the third day of the recovery period.

Endurance factor, combining the results of heart rate and pulse pressure, after training session increased by 2.81 conv. units (t=4,00, p<0,001). Data reduction occurred for 72 hours (Table 4).

The data of the Skibinsky index (Table 4), reflecting the functional state of the respiratory system, were also subject to a general trend: a significant decrease after training at 4,05 conv. units (t=2,19 p<0,05) and gradual recovery by the end of the third day (p<0,05).

An analysis of the dynamics of the results characterizing the state of the neuromuscular system made it possible to reveal

Table 2

Matrix of the t-test and the confidence levels (p) of the difference between the indicators of ANAMC and AMC in young racing skier during the recovery period after a heavy aerobic load using the movement on the roller skis (n=15)

Time of study	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_4$	$\bar{X}_5$
$\bar{X}_1$	3,83 (p<0,001) 3,46 (p<0,01)	1,28 (p>0,05) 0,88 (p>0,05)	0,28 (p>0,05) 0,47 (p>0,05)	0,03 (p>0,05) 0,08 (p>0,05)
$\bar{X}_2$		2,70 (p<0,05) 2,60 (p<0,05)	4,77 (p<0,05) 3,27 (p<0,01)	4,16 (p<0,001) 3,35 (p<0,01)
$\bar{X}_3$			1,77 (p>0,05) 0,46 (p>0,05)	1,40 (p>0,05) 0,93 (p>0,05)
$\bar{X}_4$				0,27 (p>0,05) 0,54 (p>0,05)

Remark. *$\bar{X}_1$ – initial indicators, $\bar{X}_2$ – after the training session after 1 hour, $\bar{X}_3$ – after 24 hours, $\bar{X}_4$ – after 48 hours, $\bar{X}_5$ – after 72 hours; top line – AHAME, bottom line – AME.*

Table 3

Matrix of t-test and confidence levels (p) differences in HR and Ruffier-Dickson tests in young racing skier during the recovery period after a large aerobic load using movement on the roller skis (n=15)

Time of study	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_4$	$\bar{X}_5$
$\bar{X}_1$	3,47 (p<0,01) 3,21 (p<0,01)	1,32 (p>0,05) 1,49 (p>0,05)	0,35 (p>0,05) 0,50 (p>0,05)	0,11 (p>0,05) 0,10 (p>0,05)
$\bar{X}_2$		1,51 (p>0,05) 1,76 (p>0,05)	2,45 (p<0,05) 2,73 (p<0,05)	3,13 (p<0,01 3,05 (p<0,01
$\bar{X}_3$			0,82 (p>0,05) 0,99 (p>0,05)	1,29 (p>0,05) 1,36 (p>0,05)
$\bar{X}_4$				0,41 (p>0,05) 0,40 (p>0,05)

Remark. *$\bar{X}_1$ – initial indicators, $\bar{X}_2$ – after the training session after 1 hour, $\bar{X}_3$ – after 24 hours, $\bar{X}_4$ – after 48 hours, $\bar{X}_5$ – after 72 hours; top line – HR, bottom line – Ruffier-Dickson tests.*

Table 4

Matrix of the t-test and the confidence levels (p) of the difference in the endurance coefficient and the Skibinsky index for young racing skier during the recovery from a heavy aerobic load using movement on the roller skis (n=15)

Time of study	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_4$	$\bar{X}_5$
$\bar{X}_1$	4,00 (p<0,001) 2,19 (p<0,05)	1,13 (p>0,05) 0,63 (p>0,05)	0,60 (p>0,05) 0,35 (p>0,05)	0,11 (p>0,05) 0,20 (p>0,05)
$\bar{X}_2$		2,51 (p<0,05) 1,18 (p>0,05)	3,39 (p<0,01 1,61 (p>0,05)	3,85 (p<0,001 2,15 (p<0,05)
$\bar{X}_3$			0,58 (p>0,05) 0,29 (p>0,05)	1,02 (p>0,05) 0,75 (p>0,05)
$\bar{X}_4$				0,48 (p>0,05) 0,50 (p>0,05)

Remark. *$\bar{X}_1$ – initial indicators, $\bar{X}_2$ – after the training session after 1 hour, $\bar{X}_3$ – after 24 hours, $\bar{X}_4$ – after 48 hours, $\bar{X}_5$ – after 72 hours; top line – endurance coefficient, bottom line – Skibinsky index.*

Table 5

Matrix of the t-test and the confidence levels (p) of the differences in the tremorography indexes (amplitude and frequency) in young racing skier during the recovery period after a large aerobic load using movement on the roller skis (n=15)

Time of study	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_4$	$\bar{X}_5$
$\bar{X}_1$	2,55 (p<0,05) 2,13 (p<0,05)	1,17 (p>0,05) 0,85 (p>0,05)	0,16 (p>0,05) 0,32 (p>0,05)	0,09 (p>0,05) 0,10 (p>0,05)
$\bar{X}_2$		1,32 (p>0,05) 1,27 (p>0,05)	2,05 (p<0,05) 1,64 (p>0,05)	2,06 (p<0,05) 1,94 (p>0,05)
$\bar{X}_3$			0,83 (p>0,05) 0,45 (p>0,05)	0,95 (p>0,05) 0,82 (p>0,05)
$\bar{X}_4$				0,19 (p>0,05) 0,36 (p>0,05)

Remark. *$\bar{X}_1$ – initial indicators, $\bar{X}_2$ – after the training session after 1 hour, $\bar{X}_3$ – after 24 hours, $\bar{X}_4$ – after 48 hours, $\bar{X}_5$ – after 72 hours; top line – amplitude of tremorography, bottom line – frequency of tremorography.*

a regularity similar to the data described above. The amplitude and frequency components of tremorography increased by 0.22 cm (t=2,55; p<0,05) and 3,68 Hz (t=2,13; p<0,05) respectively, after the training session (Table 5). Return of indicators to the initial data occurred gradually over three days.
After a session with a heavy load, a more delayed response (p>0,05) was observed following a simple reaction to the light and sound stimulus, and only 72 hours after it returned to the initial data (Table 6).

Table 6

Matrix of the t-test and the confidence levels (p) of the differences in the time parameters of a simple reaction to light and sound stimuli in young racing skier during the recovery period after a large aerobic load using movement on the roller skis (n=15)

Time of study	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_4$	$\bar{X}_5$
$\bar{X}_1$	2,29 (p<0,05) 2,13 (p<0,05)	0,94 (p>0,05) 0,58 (p>0,05)	0,35 (p>0,05) 0,11 (p>0,05)	0,08 (p>0,05) 0,07 (p>0,05)
$\bar{X}_2$		1,59 (p>0,05) 1,58 (p>0,05)	1,75 (p>0,05) 1,90 (p>0,05)	2,36 (p<0,05) 2,01 (p>0,05)
$\bar{X}_3$			0,47 (p>0,05) 0,42 (p>0,05)	1,03 (p>0,05) 0,57 (p>0,05)
$\bar{X}_4$				0,43 (p>0,05) 0,16 (p>0,05)

Remark. *$\bar{X}_1$ – initial indicators, $\bar{X}_2$ – after the training session after 1 hour, $\bar{X}_3$ – after 24 hours, $\bar{X}_4$ – after 48 hours, $\bar{X}_5$ – after 72 hours; top line – reaction to light, bottom line – reaction to sound.*

Conclusions

As a result of carried out studies on the effect of a large load using a special preparatory means-movement on roller skis, a decrease in the functional parameters of the cardiovascular, respiratory neuromuscular systems of the body. Recovery period as a whole lasted for 72 hours. At the same time, the rates of anaerobic metabolic capacity, as in previous studies, are restored after 48 hours.

Prospects for further research are related to the determination of the impact of impact microcycles on the functional state of the organism of young racing skier, whose content includes the use as a training vehicle for roller skis.

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Information about the Authors

Larysa Taran: *PhD (Physical Education and Sport), Associate Professor; Kharkiv State Academy of Physical Culture: Klochkivska st. 99, Kharkiv, 61058, Ukraine.*
ORCID.ORG/0000-0001-8141-443X
E-mail: taranlarisa11@gmail.com

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Dynamics of the level of choreographic preparedness of athletes at the stage of preliminary basic training (on the basis of sports aerobics)

Valentina Todorova

Lviv State University of Physical Culture, Lviv, Ukraine

Purpose: *to reveal the change in the level of choreographic preparedness of young athletes at the stage of preliminary basic training.*

Material & Methods: *an expert evaluation of 61 athletes, gymnasts, sports aerobics. Following research methods were used: theoretical analysis of literary sources, method of expert evaluation, methods of mathematical statistics.*

Results: *a methodology for assessing the choreographic preparedness of athletes at the stage of preliminary basic training was introduced. Based on the data obtained, it was found that in the group of gymnasts there was a significant increase in the choreographic skill, which was recorded according to the group indices of the formation of the choreographic preparedness, as well as all the criteria for choreographic readiness.*

Conclusion: *experimentally proved the effectiveness of the introduction of the author's program of choreographic training in the training process of gymnasts at all stages of training athletes in order to improve their choreographic skills.*

Keywords: *choreography, choreographic preparation, technical and aesthetic sports, stages of sports training, level of choreographic readiness.*

Introduction

Choreographic training in sports is a system that performs technical, special-physical, aesthetic, educational functions, and also has great significance in the composite decision of sports exercises [3, 4, 6; 7 etc.]. The multifaceted nature of sports training, where choreography is only one of the components of a common system next to technical, physical, psychological, moral-volitional, tactical, aesthetic, theoretical, functional and other forms of training, causes a lack of time for choreographic work in technical and aesthetic sports. Therefore, the development of loyal programs of choreographic training is considered appropriate and relevant at each stage of sports training.

The stage of preliminary basic training is characterized by a diversified development of the athlete's capabilities. At this stage, the tasks of strengthening the health of young athletes, the elimination of deficiencies in their level of physical development and physical fitness, the creation of motor potential, involves the development of a variety of motor skills. Choreographic preparation at this stage with a small amount of choreographic exercises is more favorable for further sports improvement than a narrowly specialized training [5].

Relationship of research with scientific programs, plans, themes. The work was carried out in accordance with the theme of research work: "Theoretical and methodological fundamentals of managing the training process and competitive activities in the Olympic, professional and adaptive sport" in accordance with the LSUPC plan for 2016–2020. (Number of state registration: 0116U003167).

The purpose of the research: to reveal the change in the level of choreographic preparedness of young athletes at the stage of preliminary basic training.

Objectives of the study:

1. Introduce the method of objective assessment of choreographic preparedness in technical and aesthetic sports at the stage of preliminary basic training.

2. To study the level of the formation of criteria for the choreographic preparedness of athletes in sports aerobics at the beginning and at the end of the experiment.

Material and Methods of the research

Research methods: theoretical analysis of literary sources, pedagogical experiment, method of expert evaluation, statistical methods of research.

The study involved 61 athletes – female gymnasts aged 11–14 years (1st category, KMS) who expressed a desire to become participants in the approbation. Based on preliminary expert evaluation, the subjects were distributed in the experimental (n=30) and control (n=31) groups.

Results of the research and their discussion

The analysis of the latest publications has shown that specialists in techno-aesthetic sports define choreographic training as a system of exercises and methods of their influence aimed at forming a "school of movements", educating the motor culture, expanding expressive means [2; 3; 7 etc.]. Many scientists understand choreographic training in the narrow sense of the word, and define it in teaching the established positions of the legs and hands, mastering the technique of performing the basic elements of choreography, using exercises for the trunk, head and limbs. Considerable attention in the research of various authors is given to the content, orientation, features of the choreographic training in technical and aesthetic

sports. Currently, there are methodological recommendations with examples of choreographic exercises for various stages of the multi-year training process [6].

In the experiment at the stage of preliminary basic training in the EG, choreographic exercises were introduced into the training session as a warm-up. The warm-up was arranged from the following choreography means: varieties of steps, various combinations of steps, jumps, turns, dance steps in waltz, polka, mazurka; jumps with changing positions, open and closed jumps; turns and cross turns. The duration of the choreographic workout is from 15 to 20 minutes. In the final part of the training session, the parterre choreography – to 15 minutes.

Separately, classes were held on choreography for 60 min 3 times a week. In the process of CP, three types of the main part of the lesson were used: on the basis of classical dance; on the basis of elements of folk and ballroom dances; mainly built on the movements of free plastics. In the final part of the exercise, the load was reduced with the help of specially selected exercises for relaxation, for stretching (moderate intensity). Gymnasts were offered exercises of parterre choreography in combination with respiratory. With fatigue for emotional adjustment to further work, dance movements and combinations with modern choreography.

The training process in the CG was held according to the standard program on sports aerobics.

For testing, a group of experts from five sports experts (choreographers and coaches for sports aerobics) were involved. The experts were offered such a set of criteria for choreographic preparedness with a detailed description of each of them: posture, turning and stretching of the legs, stability, accuracy of movements with hands and feet, completeness, ease and unity of movements, musicality, dance, illustrative and emotional expressiveness. All criteria were evaluated taking into account the requirements for the technique of performing "choreographic elements" on the part of choreography and in the aspect of the requirements of competition rules.

The logic of the evaluation was based on the fact that the criterion can be formed with a corresponding mark of two or one point. The judges were given the opportunity to provide an additional 0,5 (half-point) for grace, as a specific quality of the choreographic movement, or to reduce the score by "0,5 points" for the ungratefulness of the performance. Thus, a five-point scale was created, according to which the score of "0,5 points" was raised if the criterion was formed very poorly; "1 point" – if the criterion is not formed enough to successfully master the program of choreographic training; "1,5 point" – if the criterion is formed sufficiently to master the program of choreographic training; "2 points" – if the criterion is formed well; and "2,5 points" – if the criterion is formed flawlessly.

In order to study the effectiveness of the proposed experimental programs, we calculated the increase in the choreographic readiness indicators.

The group index of the athletes' choreographic preparedness was calculated by formula:

$$I_{gr} = \frac{3\sum_{n=1}^{k} P_O + 2\sum_{n=1}^{k} P_S + 1\sum_{n=1}^{k} P_l}{100\ k},$$

where I_{gr} – index of choreographic readiness; k – number of criteria; P_O – number of athletes (in %), which had an optimal level according to certain criteria, P_s – number of athletes (in %), which had an sufficient level according to certain criteria, P_l – number of athletes (in %), which had an low level according to certain criteria.

At the heart of the author's scheme for interpreting the results I_{gr}:

- low level (less than 1,2 points) – the predominance of gross errors in the performance of most choreographic elements;
- sufficient level (1,3–1,7) – the athlete assumes inaccuracy of execution of details of techniques, reduces efficiency of action as a whole;
- optimal level (more than 1,8) is the unmistakable performance by the athlete of most of the basic choreographic elements.

The generalization of the results of the analysis of individual data on the formation of the criteria for the choreographic preparedness of the female athletes of the EG at the stage of preliminary basic training at the end of the experiment makes it possible to determine, that according to individual indices of choreographic preparedness and for the majority of analyzed criteria, the majority of participants demonstrated the growth of choreographic skill from low or sufficient levels to a sufficient and even high levels (Table 1).

At the same time, according to certain criteria (Posture, Turnout, Leg stiffness, Stability, Emotional expressiveness) in a certain part of the athletes, the insufficient formation of the choreographic readiness. Consequently, the introduction of gymnasts into the training process during the preliminary basic preparation of the developed program of choreographic training in most cases can lead to a positive dynamics of improving the choreographic skill. However, a certain small proportion of athletes may remain insensitive to molding effects. Explaining this fact and proceeding from our own experience of coaching, we will make the assumption that the inhibitory effect, as a rule, produces a crisis during adolescence, which, according to specialists [1, 2 and etc.], is accompanied by specific effects in the manifestation of regulatory mechanisms sports activities.

Statistical check of certain changes in the choreographic readiness of athletes EG during the experiment using the reliability criterion with the use of the Student's t-test showed that during the period from the beginning to the end of the experiment in EG this index increased by 0,45 points. In this case, the calculated value of Student's t-test (t=10,04) significantly exceeds the critical value (t_{cr}=3,47), at which these changes can be considered statistically reliable at the level p<0,001.

In addition, significant growth, at the level of reliability p<0,001, was found when comparing the arithmetic mean values of previous and final results by the criteria "posture" on 0,39 point (t=4,36), "turnout" – on 0,38 point (t=4,49), "leg stiffness" – on 0,38 point (t=3,75), "accuracy of arm move-

Table 1

Changes in the formation of criteria for the choreographic preparedness of athletes EG (n=30) at the stage of preliminary basic training during the experiment

Indicators	Before experiment		After experiment		Student's t-test
	M	±SD	M	±SD	
Posture	1,23	0,37	1,62	0,31	4,36**
Turnout	1,25	0,34	1,63	0,32	4,49**
Leg stiffness	1,42	0,47	1,80	0,28	3,75**
Stability	1,42	0,47	1,77	0,31	3,34*
Accuracy of leg movements	1,55	0,50	1,88	0,25	3,22*
Accuracy of arm movements	1,27	0,45	1,83	0,24	5,85**
Completeness	1,37	0,47	1,83	0,24	4,68**
Legerity	1,27	0,31	1,73	0,25	6,29**
Continuity of movements	1,22	0,28	1,73	0,25	7,41**
Musicality	1,43	0,41	1,78	0,25	3,93**
Dance	1,17	0,24	1,73	0,25	8,88**
Illustrative expressiveness	1,03	0,13	1,67	0,24	11,39**
Emotional expressiveness	1,05	0,15	1,53	0,26	8,30**
Index of choreographic readiness	1,28	0,20	1,73	0,11	10,04**

Remark. *M – arithmetic mean; ±SD – mean square deviation; * – changes are statistically significant at the level of p<0,01; ** – changes are statistically significant at the level of p<0,001.*

Table 2

Changes in the formation of criteria for the choreographic preparedness of athletes CG (n=30) at the stage of preliminary basic training during the experiment

Indicators	Before experiment		After experiment		Student's t-test
	M	±SD	M	±SD	
Posture	1,23	0,31	1,34	0,35	1,24
Turnout	1,26	0,41	1,39	0,40	1,16
Leg stiffness	1,34	0,51	1,50	0,48	1,18
Stability	1,47	0,45	1,48	0,38	0,01
Accuracy of leg movements	1,44	0,46	1,56	0,36	1,08
Accuracy of arm movements	1,29	0,46	1,55	0,39	2,24*
Completeness	1,39	0,50	1,56	0,40	1,41
Legerity	1,31	0,38	1,47	0,36	1,58
Continuity of movements	1,27	0,36	1,40	0,37	1,27
Musicality	1,53	0,43	1,55	0,37	0,02
Dance	1,21	0,25	1,27	0,28	0,84
Illustrative expressiveness	1,06	0,17	1,24	0,25	2,15*
Emotional expressiveness	1,05	0,15	1,26	0,31	2,27*
Index of choreographic readiness	1,30	0,20	1,43	0,18	1,56

Remark. *M – arithmetic mean; ±SD – mean square deviation; * – changes are statistically significant at the level of p<0,05.*

ments" – on 0,56 point (t=5,85), "completeness" – on 0,46 point (t=4,68), "legerity" – on 0,46 point (t=6,29), "continuity of movements" – on 0,51 point (t=7,41), "Musicality" – on 0,35 point (t=3,93), "dance" – on 0,56 point (t=8,88), "illustrative expressiveness" – on 0,64 point (t=11,39) and "emotional expressiveness" – on 0,48 point (t=8,30), and also at the level p<0,01 by the criteria "stability" – on 0,35 point (t=3,34) and "accuracy of leg movements" – on 0,33 point (t=3,22). The above data allow us to conclude that in the group of gymnasts who were involved in the implementation of the developed program, there was a significant increase in the choreographic skill, which was recorded by the group indices of the formation of the choreographic readiness, as well as by all the criteria for determining this index.

The distribution of subjects according to the levels of the formation of the choreographic readiness indicates that a certain part of the CG female athletes at the final stage of the experiment remained at a low or sufficient level of choreographic skill (Table 2).

According to the statistical check of the changes in the formation of the choreographic preparedness of the CG athletes during the experiment by comparing the arithmetic mean values based on the results of the expert evaluation, it showed, that for the period from the beginning to the end of the experiment the value of the group index of formation (I_{gr}) of choreographic readiness increased by 0,13 points. In this case, the calculated value of Student's t-test (t=1,56) does not exceed the critical value (t_{cr}=2,01), at which these changes can be considered statistically reliable.

Conclusions

A methodology for assessing the athletes' choreographic preparedness at the preliminary basic training stage has been introduced. The objectivity of the technique consisted in calculating the index of choreographic readiness. Experimentally tested the effectiveness of the introduction of the author's program of choreographic training in the training process of athletes (on the basis of sports aerobics). Based on the ob-

tained data , it was found that in the group of gymnasts there was a significant increase in the choreographic skill, which was recorded according to the group indices of the formation of the choreographic readiness, and also by all the criteria for determining this index. That is, experimentally proved the effectiveness of the author's program of choreographic training in the training process of gymnasts at the stage of preliminary basic training to improve their choreographic skills.

Prospect of further research is to determine the dynamics of the level of choreographic preparedness at the next stages of sports training in technical and aesthetic sports.

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Information about the Authors

Valentina Todorova: *Lviv State University of Physical Culture, 11, Kostushko str., 79000, Lviv, Ukraine.*
ORCID.ORG/0000-0002-2679-5062
E-mail: Valentina_sport@ukr.net

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The reliability of the presented results correspond to authors

Publication of Kharkiv State Academy of Physical Culture
Kharkiv State Academy of Physical Culture
Klochkivska Str. 99, Kharkiv, 61058, Ukraine
+38 (0572) 705-21-02
sport-kharkov@mail.ru