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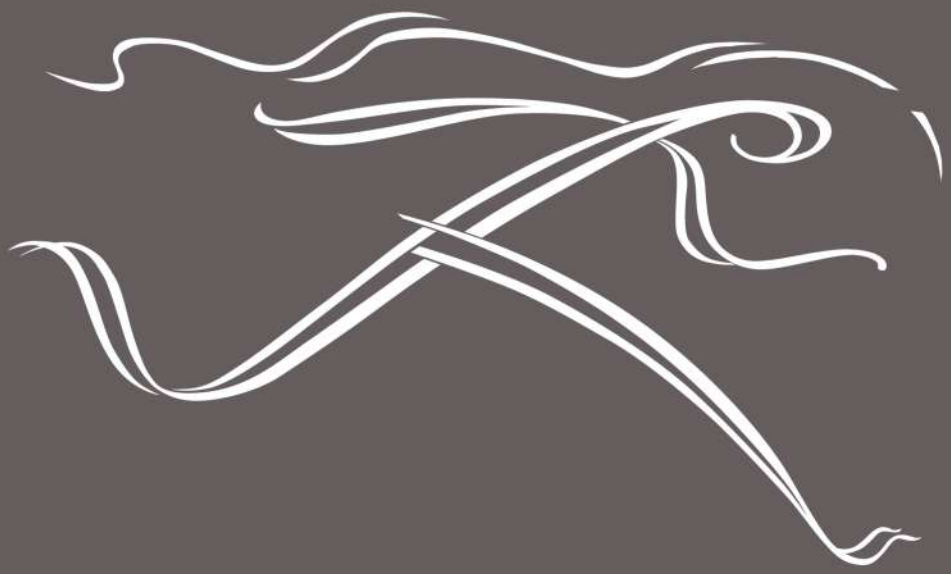

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The bulletin covers the results of the scientific investigations of the current problems connected with educational aspects of the physical training of different social classes, valeology, ergotherapy, preparing sportsmen and management in physical education.

The material is published in author's edition. This material is recommended to scientific, scientific-educational assistants, teachers of PE, health basics, sports coaches, physical theraphy specialists, doctoral candidates and Ph.D. students.

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CONTENTS

CONTENT OF THEORETICAL TRAINING OF STUDENTS IN NON-AUDITING STUDIES OF PHYSICAL EDUCATION CLASSES

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The paper the issues of non-auditing studies physical education classes in high school is considers. The relevance of the study is due to the objective need to increase the effectiveness of physical education of students during their studies in university. The complex use of all forms of physical education, a wide range of methods and techniques for acquiring theoretical knowledge to ensure effective physical education of university students actualize the question. *The purpose of the research*: to identify and substantiate the substantive content of theoretical training of students in non-auditing studies of physical education. *Material and methods*. The basis of the research is the use of a complex of general scientific theoretical methods: analysis, systematization, generalization, comparison of different views on the problem under study, generalization of scientific and methodological and specialized literature data. *Results.* Conceptual approaches in the process of substantive filling of theoretical preparation taking into account available theoretical and empirical data were formed. Based on the results of the scientific search, the starting points and perspective directions of the research approaches to solving the identified problems in the process of mastering theoretical knowledge of physical education of students during graduate school are determined. *Conclusions.* The content of theoretical training of students in non-auditing studies of physical education is aimed at forming the value orientations of student youth to acquire healthy lifestyle skills, to ensure a significant increase in the level of education of students on maintaining their health. A promising direction for solving problem the effectiveness of physical education classesis to master students of theoretical knowledge, as a motivational factor for learning in non-auditing forms of physical education was installed. The above is of theoretical and practical importance for improving the efficiency of physical education of university students.

Key words: student, physical education, non-auditing studies, theoretical training, efficiency.

Introduction

Ensuring the effectiveness of physical education classes for students of higher education institutions is now one of the central topics of scientific debate [1; 5; 9]. Reforming higher education, the positions of which are reflected in the legal documentation (National Report on the Status and Prospects of Education in Ukraine (2016), which is the basis of its development in Ukraine, requires radical changes in all parts of the higher education process and the need to harmonize it with world standards in the context of current trends in the industry [7].

An important source of strategic directions for ensuring the effectiveness of physical education of students in non-core higher education institutions is the qualitative formation of the theoretical knowledge base [12]. This involves the acquisition by students of basic competencies, practical skills and abilities to ensure the formation of value orientations of a healthy lifestyle [3].

There are opinions [10; 11] about the need to carry out additional educational process, which is possible only in extracurricular time. Integrated use of all forms of physical education, a wide range of methods and techniques for acquiring theoretical knowledge to ensure effective physical education of students of free economic education actualize the research problem.

The problem of students acquiring theoretical knowledge in the field of physical culture has been reflected in a number of studies [2; 7; 8; 12].

It is believed [10; 11] that the low level of such knowledge is negatively reflected in students' physical education, their attitude to physical culture and the formation of their healthy lifestyle.

Modern scientific research is devoted to the study and analysis of various aspects of students' mastery of theoretical knowledge of physical culture [5; 7], developed a fairly wide variability of the conceptual framework [12; 13], theoretical and methodological foundations of theoretical training [6; 11], patterns and factors functioning theoretical training [1; 4]. Problems of improving the quality of this process are covered in scientific papers [1; 7].

It is determined [7; 8] that the importance of theoretical classes is such that in some cases it is the only way to teach students the necessary knowledge related to the use of physical culture in the process of non-auditing studies of physical education.

However, research related to the acquisition of theoretical foundations for solving various problems of physical education of students is isolated quantitatively and fragmentarily in content.

At the same time, it is considered [4; 10] that the situation with the state of health of students (the negative dynamics of which is observed from year to year) is the result of their low level of knowledge about the rational formation, preservation and strengthening of their own health.

The above indicates the need for further research in this area: today in the domestic theory and practice of pedagogical science there is no thorough study of the essence of theoretical training of students in non-auditing studies of physical education.

Material and methods of research

The purpose of the research is to identify and substantiate the content of theoretical training of students in non-auditing studies of physical education.

This research is theoretical qualitative research. Research methods: theoretical analysis, systematization, comparison of different views on the problem under study, generalization of scientific and methodological and specialized literature data. In order to achieve the declared purpose, we have applied innovative ideas and a conceptual foundation for updating approaches to organising, postulating and realising the content of non-auditing studies of physical education.

Theoretical methods were used to determine the problem of scientific pedagogical research and evaluation of the collected facts. Theoretical methods included the study of scientific literature on the theory and practice of physical education in general and classes in non-auditing studies in particular; general and special works on the pedagogy of physical education; textbooks and manuals in the field of physical education and related sciences. The study of the literature made it possible to determine the aspects of certain issues regarding the formation of the base of theoretical knowledge in non-auditing studies of physical education of students from which scientific discussions are conducted and to identify parts of the issue that have not yet been resolved. Based on the theoretical analysis, the most significant results of the researched problem for today are clarified, as it is important for gathering ideas for the purpose of their comprehensive study.

Analyzing the collected facts of the issue of non-auditing studies physical education classes in higher education in general, generalizations were used. Generalization provided a logical transition from individual to general, from less general to more general judgments, knowledge, assessment of the content of theoretical training in this process. Based on the generalized judgment, which is characterized by a deep reflection of the collected material, the essence of theoretical training in non-auditing studies of physical education is clarified and significant dominant positions are identified, their relationship is established for their comprehensive study.

The synthesis involved the integration of previously selected parts, parties, features, properties, relations of theoretical training in non-auditing studies of physical education into a single whole.

Results

First of all, let's turn to the regulations governing the development of a holistic system of physical education as part of the educational process of high school students. In Ukraine, a comprehensive program "Physical Education – the health of the nation», which identifies priority areas of public policy in the industry [7]. According to her, physical education in the educational sphere as an integral part of the general education system should lay the foundations for ensuring and developing physical and moral health to active life and professional activity on the principles of priority of health orientation, extensive use of various means and forms of physical improvement continuity of this process. Therefore, in order to study the issue of acquiring theoretical knowledge in non-auditing studies of students' physical education, we consider it appropriate to specify this concept in the terminological aspect of our study from a general scientific and general practical standpoint. Mastering of theoretical knowledge by students to study biological, psychological, social, ideological, physical, aesthetic, behavioral aspects and reserve capabilities of the organism in the process of their motor activity is an active, creative process and result of mastering the system of physical culture, methodical and motor skills on physical development, functional improvement of the body, the formation of their values and health [8; 11].

In the future, we define the content of theoretical knowledge, which is a set of views aimed at considering and interpreting this process at the specific scientific level of research for non-auditing studies activities. Such knowledge is the factor of providing students with the need for physical improvement and systematic independent physical education [12]. It is not enough for students to receive a certain amount of classes. We believe that first of all it is necessary to ensure students' understanding of their development and relationships, gaining confidence in their knowledge.

Therefore, the educational material that forms the content of theoretical training of students in non-auditing studies of classes can be presented in the interaction of teacher and student and carried out in the form of a specialized course of lectures, lectures, debates, meetings, meetings on the basics of physical education. The volume and content of theoretical material is determined on the basis of general pedagogical principles and goals and objectives of classes. It is important to ensure interdisciplinary links: information about physical education should be combined with the knowledge that students acquire when studying other subjects [1].

The basis of the formation of the content of theoretical training – the laws of learning. The list of learning patterns that are factors in the selection and construction of

material: educational nature, the presence of purposeful interaction between teacher and student, active students in the educational process, the presence of a strong relationship between purpose, content and methods of implementation [13].

The purpose of mastering theoretical knowledge by students is the need to form the necessary knowledge, skills and health skills and use them in everyday life [5]. The main task should be the acquisition by students of ideas about the biology of their own body, physiological processes that occur in it, ways to prevent disease, maintain the proper level of motor activity to maintain their physical and mental condition in the norm. As a result of effective implementation of students' theoretical knowledge, by forming a positive attitude to the active maintenance of their own health throughout life, the effectiveness of extracurricular activities is ensured. In this case, it is determined that the development of the student in the process of mastering educational knowledge as a person and a subject of activity – is a prerequisite for the effectiveness of the acquisition of theoretical knowledge in the field of physical culture [7].

The choice and development of theoretical information requires that the student's activities be aimed not only at improving self-education and creative development of knowledge based on the individualization of their non-auditing studies in physical education, the choice of educational trajectory, but also to educate them to focus on healthy lifestyle In this case, the acquired knowledge is not only a means of developing skills and abilities, but also a means of acquiring new knowledge for self-acquisition of skills and abilities to engage in physical culture in non-auditing studies.

Theoretical generalization, systematization of available information in a certain direction of scientific research, revealed that the effectiveness of the method of formation of theoretical knowledge is due to the careful consideration of a number of prerequisites. The following is provided:

- analysis of the planned to study the action in order to determine its mechanical structure, the required physical qualities and the influence of environmental factors;
- establishing an exemplary amount and content of knowledge necessary to understand the patterns of physical improvement in non-auditing studies;
- determining the amount and content of information for each lesson;
- development of such ways of presenting information that would fit organically into the plan of non-auditing studies [1; 8; 11].

We believe that the presentation of theoretical material by volume should be planned in such parts that fit into the structure and content of a particular cycle of classes without affecting the amount of motor activity. The choice of forms of communication of theoretical information depends, in particular, on the content of educational material. Information about the social significance of physical education will require relatively more time, which can be allocated only in introductory classes. At the same time, information on safety rules, basic requirements for clothing, etc. are reported before studying the relevant practical material, information on techniques and rules of execution – in the course of its study.

The formation of the content of theoretical training of students in non-auditing studies of physical education depends on a number of factors. The first and foremost is the system of needs, which is inextricably linked with the system of goals, both social and personal. First of all, it is necessary to make physical education in non-auditing studies personally significant, necessary for each student, without weakening the focus on meeting the social needs of able-bodied professionals. To do this, the process of acquiring knowledge should be aimed at stimulating students to exercise, physical improvement, as a way to introduce physical culture in the life and leisure of students [4].

Objective factors in shaping the content of theoretical training are social and scientific achievements [7]. At the same time, it is necessary that the term of a new scientific discovery before the beginning of its systematic implementation in practice should be as short as possible, so that the implementation of new ideas is limited only by the terms of release of materials for free access.

The second factor is the factor of «opportunities», which plays the role of a kind of regulator that allows or does not allow in the content of education information that requires a certain level of material and technical equipment of the process of physical education in non-auditing studies. The development of the content of theoretical training of students on the basis of integration into this process of the latest progressive methods will undoubtedly help to increase its effectiveness.

Let's outline a number of scientific requirements for the formation of the content of theoretical training. The main ones are:

1. The leading role in determining the content of theoretical training belongs to the purpose and objectives of physical education of students in non-auditing studies. This means that the content of educational work is aimed at the full physical development of the individual, which is the basis for further employment.

2. The humanistic orientation of the content of theoretical training causes its compliance with modern needs and capabilities of students, the priority of the values of their health.

3. The scientific content of theoretical training involves the inclusion in the content of only those facts and theoretical provisions that are stable in science; material that corresponds to the current state of education, its latest achievements.

4. The unity of semantic and procedural aspects of physical education in non-auditing studies in the formation and structuring of its content. Physical education in this case is not only a means of developing skills and abilities, but also a means of acquiring new knowledge for the independent acquisition of skills and abilities.

5. Correspondence to the age capabilities and level of psychophysical condition of students – the dependence of the process of physical education on the level of inclinations and abilities belongs to the laws of the technological process, which is the process of learning theoretical knowledge.

6. Availability of programs and methods of presenting scientific knowledge [7; 12; 13].

The need to provide personality-oriented content of theoretical information [8]. By generalizing the information [7; 13] we supplement the didactic possibilities of realization of personality-oriented direction of theoretical training of students in non-auditing studies of physical education, which should be provided by realization of the following:

- creation of a methodology of extracurricular physical education classes in accordance with the needs of classes in free time, motives and values of each student;
- constructing the structure of students' readiness for regular physical education classes as a factor in maintaining their own health;
- development of personality-oriented health technologies for extracurricular activities;
- software and educational and methodological support for the effective implementation of these technologies in extracurricular forms;
- quality management of students' mastery of theoretical knowledge.

The implementation of this is carried out through the implementation of a set of systemic measures that ensure the competent acquisition by students of skills of self-control, personal hygiene, self-preservation, healthy lifestyle and experience of their implementation in non-auditing studies of physical education.

Students' mastery of theoretical knowledge for the successful implementation of physical education classes in non-auditing studies begins not so much with the formation of knowledge as with development. We believe that the development of the educational process is possible both through the resolution of contradictions and in an evolutionary way, through the improvement of the formed content. Thus, in this sense, the motivating factor should play a decisive role in shaping the content of theoretical training [5]. At the same time, such motives must be formed, developed, supplemented by various new, healthy elements and habits. And it is the leading role in the formation of such goals and motives is given to theoretical knowledge, which should encourage constant physical improvement, regular exercise, preservation and promotion of health.

Ensuring the quality of students' mastery of theoretical knowledge implies the presence of a structure. The structural elements in this case are: the goals of non-auditing studies, the need-motivating factor and the degree of achievement of their goal. The system-forming factor is the goals of physical education of students in non-auditing studies, and the basis and basic element is the need-motivating factor of learning the material.

The most difficult aspect in this direction is the problem of providing internal motivation and students' awareness of the need for daily physical education [5; 8].

Thus, the achievement of the goals of mastering theoretical knowledge by students is determined by the level of formation of the need and desire for systematic physical education. Thus, the formation of a set of necessary theoretical knowledge as an orderly set and sequence of methods and processes ensures the implementation of certain goals and the achievement of the results of physical education in non-auditing studies.

Discussion

We fully support the scientific approaches of specialists engaged in finding ways to increase the effectiveness of physical education university students, as the main factor in their healthcare. In this context, we are joining the idea [1; 8; 11] that the efficiency of this process can be greatly in non-auditing studies of student.

The results of the study confirm the available evidence [2; 7; 10] that the effectiveness of physical education largely depends on the quality of physical education in non-auditing studies, which to some extent is determined by students' mastery of theoretical knowledge. There is some evidence that knowledge of the benefits of physical activity is a determining factor that limits the state of motor activity of students in general. In contrast to previous studies, we conducted research in view of the impact on this process of the degree of mastery of theoretical knowledge in the field of physical culture.

We support scientific approaches [6; 7; 12] that high-quality acquisition of theoretical knowledge by students has theoretical and practical significance for improving the effectiveness of physical education of students while studying in higher education.

The results of the study supplement the information [3; 10; 13] about non-auditing studies of students in

physical education as a factor in ensuring the appropriate level of their motor activity.

Despite the undeniable importance of non-auditing studies of students in physical education, the methodological provisions related to the process of mastering basic theoretical knowledge have not been developed enough.

According to the results of scientific research [2; 4; 5], we join the idea that this is due to the focus on the average student, which does not bring tangible results in the formation of sustainable interests in maintaining health and maintaining a healthy lifestyle.

Conclusions

The results of scientific research show that the development of motor activity of students occupies one of the leading places among the tasks of physical education, which can be solved only by full use of physical education classes in non-auditing studies.

It is represented that the content of theoretical training of students in non-auditing studies of physical education is aimed at forming the value orientations of student youth to acquire healthy lifestyle skills, to ensure a significant increase in education of students on maintaining their health. In general, the acquisition of theoretical knowledge should be gradually transformed into a process of self-education and self-improvement.The view presented in the paper allows to develop integrated algorithms for the subjects of the pedagogical process to ensure the effective implementation of non-auditing studies of physical education, and thus increase its effectiveness in general.

Conflict of interest. The authors state that there is no conflict of interest.

References

1. Anikieiev DM. (2015). Criteria of effectiveness of students' physical education system in higher educational establishments. *Physical education of students*, 5, 3–8. doi:http://dx.doi.org/10.15561/20755279.2015.0501.
2. Ayers SF. (2004). High School Students' Physical Education Conceptual Knowledge. *Research Quarterly for Exercise and Sport*, 75(3): 272–287. doi:https://dx.doi.org/10.1080/02701367.2004.10609160.
3. Biddle S., Gorely T. & Stensel D.J. (2004). Healthenhancing physical activity and sedentary behaviour in children and adolescents. *Journal of Sports Sciences,* 22, 679-701.
4. Boychuk Yu., Iedynak G., Galamanzhuk L., Kljus O., Skavronskyi O. (2019). Research of the interest of university students in the development of their physical qualities*. Bulletin of the Kamianets-Podilskyi National Ivan Ohiienko University. Physical education, Sport and Human Health***,** Issue 13, 29-32. doi:https://dx.doi.org/10.32626/2227-6246.2019-13.29-33.
5. Iedynak GA., Mytckan BM., Zavatska L. (2012) The state and some theoretical aspects of enhancement of students' motivation to systematic motor activity of the well-being direction. *Bulletin of the Carpathian National University. Physical Education.* Issue 16, 44-50.
6. Koryahin V., Blavt O., Gurtova T., Serbo E. (2019). Technological Principles of Formation of Motor Competence in The Physical Education of Students With Chronic Health Conditions. *Theory and methods of physical education*, 19(4), 193-199. https://doi.org/10.17309/tmfv.2019.4.05
7. Корягін В., Блавт О., Стаднік В., Цовх Л. Організація та методика позааудиторної фізичної культури студентів вищої школи. Львів : Політехніка, 234 с.
   Koryahin, V., Blavt, O., Stadnik, V., Ts'ovkh, L. (2020), *Orhanizatsiya ta metody pozashkil'noyi fizkul'tury dlya studentiv vyshchoyi shkoly* [Organization and methods of extracurricular physical education for students of higher educationï. Polytechnic Publishing House, Lviv, 234 p. [in Ukraine].
8. Stadnik VV. (2014). Content of the extra-curriculum activities in the system of physical education of students of higher educational institutions. *Research Journal of International Studies*, 3(22), 47-51.
9. Ruscitti RJ., Thomas SG., Bentley DC. (2017). The experiences of students without disabilities in inclusive physical education classrooms: a review of literature. *Asia-Pacific Journal of Health, Sport and Physical Education, 8*(3), 245–257. https://doi.org/10.1080/18377122.2017.1345286
10. Voronetskiy VB. (2015). Motional activity as a part of the content of education in the institution of higher education. *Journal of Education, Health and Sport,* 5(7), 620-630. doi: http://dx.doi.org/10.5281/zenodo.439431
11. Pavlos RM., Bulatov AM., Hrebinka GY, Osinchuk VV. (2017). Extracurricular physical education classes of university students in the perspective of educational innovations. *Scientific journal of National Pedagogical University. MP Dragomanov. Series 15, Scientific and pedagogical problems of physical culture. Physical Education and Sport*, 5(87), 78-81.
12. Столяров В. И. Теория и методология современного физического воспитания: состояние развития и авторские концепции : монография. Київ : Олімп. л-ра, 2015. 704 с.
    Stolyarov, V. I. (2015), *Teoriya i metodologiya sovremennogo fizicheskogo vospitaniya: sostoyaniye razvitiya i avtorskiye kontseptsii* [Theory and methodology of modern physical education: state of development and author's concept]. Olympic literature, Kyiv, 704 p. [in Russian].
13. Stroot S. A. (2014). *Case Studies in Physical Education*: Real World Preparation for Teaching. Routledge.

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ACTIVE TOURISM AS A COMPONENT OF PHYSICAL EDUCATION SYSTEM OF STUDENT YOUTH

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The analysis of special sources showed that in Ukraine traditionally popular and developed is sports and health tourism as a type of leisure and competitive activity of different population groups. Powerful tourism and recreational resources of the Carpathian region make the research on sports and recreational tourism introduction into student youth physical education system extremely relevant. *The purpose* of our research was to study the effectiveness of active tourism means using in the physical education of young people of the Carpathian region. *Materials and methods.* Analysis of scientific data and Internet sources, as well as statistical reports of the 5-FC Department of Physical Culture and Sports, Ukrainian State Center for National Patriotic Education, Regional Studies and Tourism of Student Youth as at 2019; sociological methods (questionnaire); statistics. *Results.* It is found that there are 551 sports tourism clubs in the Carpathian region, with 8439 students involved. The most popular sports tourism kinds among student youth are backpacking (3791 students involved), orienteering (1110 students involved), junior local tourists (1054 students involved) and safety school (junior savior) (1001 students involved). *Conclusions.* On the base of research we conclude that in the Carpathian region (in the territory of Ivano-Frankivsk, Transcarpathian, Chernivtsi and Lviv regions) the proper conditions are created for involving student youth in systematic training of various active tourism kinds, in particular, with the support of student youth regional state centers of tourism.

Keywords: sports and health tourism, student youth, physical education system.

Introduction

Nowadays active tourism in our country develops as an integral part of the educational industry and aims at health promoting, development of physical, moral, volitional and intellectual person's abilities by involving him in various complications and competitions in sports tourism technique, their own leisure activities organization. At the same time, active tourism is an integral part of domestic tourism industry, which promotes the development and distribution of active recreation forms, and therefore has recreational, educational, economic and other functions. Developing within sports and active leisure in the natural environment, active tourism promotes the domestic tourism development through relatively cheap and at the same time effective activity promotion, which in low material income conditions of the country's population majority has social and priority importance for relevant state, public and commercial organizations [1; 2; 5].

Today in Ukraine there is a considerable decrease in the involvement level of different categories of people in the systematic involvement in different motor activity types, which is due to a great lack of healthy lifestyle promotion in the media, ineffective economic encouragement levers to physical activity engaging and recreation forms decrease in educational and recreational institutions [9; 10].

As a consequence, there is the problem of children morbidity level increasing, hypokinesia dissemination among student contingent and their overall physical health decrease [7]. The solution to this problem can be introduction of active tourism means in the practice of education system of students [2; 10].

Significant tourist and recreational resources in our state, and in particular the Carpathian region, make researches on active tourism implementation in student youth physical education significantly relevant [2; 9].

A number of domestic researchers [2; 5; 10] distinguished tourism as a separate motor activity type that promotes health, human capability restoration, recreation, communication, social networking organization etc.

For students themselves, active tourism is not only an opportunity to see new places, to show themselves and establish themselves in the team, to acquire new useful skills in their own leisure activities organizing, but also an interesting adventure, an unusual event that differs from everyday life [1].

The purpose of our study was to study the effectiveness of active tourism means use in student youth physical education.

Materials and methods of research

The analysis and synthesis of scientific and methodological literature and Internet sources data were carried out with the purpose to establish priority work directions, problematic issues identification in the implementation and use of active tourism means in the process of student youth physical education [4].

Sociological research methods (interview) were conducted to study the attitude of students to the introduction of different tourism kinds in the school curriculum. The questionnaire was conducted on the basis of Ivano-Frankivsk Regional State Center of Tourism and Local Studies of Student Youth. 128 students (82 boys and 46 girls) were interviewed. Summary statistic was used to processing report results.

Results

Based on 5-PC reports of the Department of Physical Culture and Sports, it is established that on January 1, 2020, in Ivano-Frankivsk region, adequate conditions are being created for engaging student youth in systematic classes of various active tourism types, in particular, facilitates the activity of the student youth regional state center of tourism and local history (SYRSCTLH), with its 242 functioning tourist-sports profile, attended by 3760 pupils. In total, there are 545 clubs in the Ivano-Frankivsk region, with 8689 pupils involved, 303 of them are in secondary schools with 4929 students engaged [7; 14] (Table 1).

Table 1 – Involvement of Student Youth In Sports And Health Tourism In The Carpathian Region (2019) [7; 13–16]

Title of clubs	Ivano-Frankivsk region		Lviv region		Transcarpathian region		Chernivtsi region	
	number of clubs	number of pupils	number of clubs	number of pupils	number of clubs	number of pupils	number of clubs	number of pupils
Junior local tourists	81	1156	-	-	37	596	16	293
Sport tourism:								
Backpacking (wilderness)	107	1813	68	960	33	365	34	615
Ski tourism	8	149	-	-	–	–	1	10
Nautical tourism	2	36	2	22	–	–	6	120
Hillwalking	1	12	1	12	–	–	–	–
Bicycle touring	6	100	20	269	1	20	8	147
Caving	–	–	1	10	3	45	–	–
Sports tourism	16	262	25	344	4	70	8	118
Orienteering	8	115	13	174	11	184	27	501
Hiking	–	–	13	171	–	–	1	23
Junior savior school	83	1126	5	54	26	327	–	–
Junior tourists	11	147	–	–	–	–	2	55
Totals	**323**	**4916**	**148**	**2016**	**115**	**1607**	**103**	**1882**

As for the Chernivtsi region, there are also appropriate conditions for involving schoolchildren in the systematic activities of various active tourism kinds. The municipal institution "Chernivtsi Regional Center of Tourism, Regional Studies and Excursions of Student Youth" (MI CRCT ESY) makes an extremely important contribution to physical education system development.

There are 87 tourist-sports clubs with 1589 pupils (see Table 1). Generally, in this region there are 181 clubs with 3190 pupils involved, 94 of them in secondary education institutions with 1601 pupils engaged [7; 16].

The analysis of student youth involvement state in systematic activities of various active tourism types in Lviv region allow to make the conclusion about the proper conditions for this type of activity. The municipal institution of Lviv Regional Council «Lviv Regional Center of Local Studies, Excursions and Tourism of Student Youth» (MI LRC LRCLSETSY) also makes a significant contribution to the development of active tourism in the region and area as a whole. There are 148 tourist-sports clubs with 2016 pupils engaged (see Table 1). In total, in Lviv region there are 590 clubs with 7870 pupils involved, 442 of which are in secondary schools with 5854 students engaged [7; 15].

In Transcarpathian region, active tourism is also given a significant role. In particular, mostly provided by Transcarpathian Center of Tourism, Local History, Excursions and Sports of Student Youth (TCTLSESSY), which includes 78 tourist-sports groups with 1010 pupils involved (see Table 1). In general, in Transcarpathia there are 185 circles of this direction, with 2833 pupils involved, 107 of them in secondary education institutions with 1823 pupils involved [7; 13].

More than 3,5 thousand pupils have fulfilled youth standards for various active tourism types, that indicates effective and coordinated work of teaching staff. Backpacking (3753 students involved), tourist and local study (2045 students involved) and safety school (junior savior) (1507 students involved) were the most popular kinds of sports tourism among student youth in the Carpathian region in 2019 [13–16] (Fig. 1).

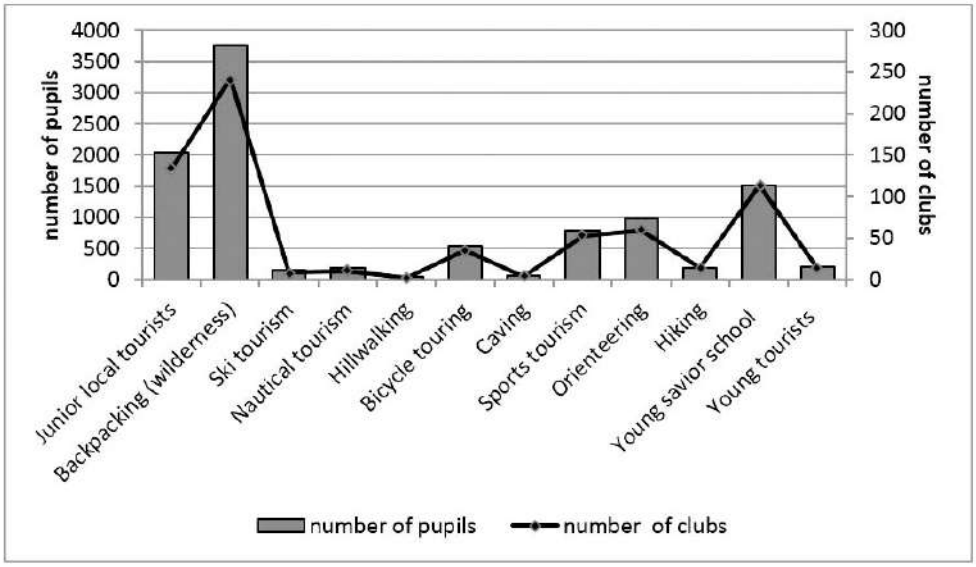

Fig. 1 Tourism group work state in educational institutions of the Carpathian region (as at 01.01.2019)

Next three positions were orienteering (974 students involved), sport tourism (794 students involved) and bicycling touring (536 students involved).

We were wondering if these data correlate with students' expectations.

Having conducted questionnaire we got the following results (Table 2). The obtained data show that 100% of respondents expressed a desire to participate in sports and recreational walkings.

Table 2 – Pupils' priorities for particular kinds of an active tourism (n = 128)

No	Kind of sport tourism	Number of pupils	%
1	Backpacking (wilderness)	49	38,3
2	Hillwalking	52	40,6
3	Bicycle touring	39	30,5
4	Motor tourism	59	46,1
5	Nautical tourism	36	28,1
6	Ski tourism	27	21,1
7	Caving	19	14,8
8	Motorcycle tourism	33	25,8
9	Junior savior school	23	18,0
10	Trail riding	50	39,1
11	Orienteering	31	24,2
12	Climbing	26	20,3
13	Hiking	14	10,9
14	Extreme tourism	69	53,9
15	Aerochute flight, hot air balloon flight	55	43,0

According to the poll, extreme tourism (diving, parachuting, freestyle, snowboarding) is a significant advantage for younger generation. In our opinion, this is due to media influence (a large number of videos, TV and movies, where the main characters are engaged in extreme, elite types of tourism.

Mountain tourism, motor tourism, balloon trips, hang gliding take second place in popularity. Mountain tourism occupies high position in the rank due to emotional perception of mountain landscapes, balloon travel, hang gliding under media influence, motor tourism as a result of mass modern society «motorization».

Third place belongs to hiking, cycling and trial riding tourism. The high ranking place is due to the fact that most people have more or less clear understanding of these tourism types [6]. Surprisingly, water tourism (kayaking, catamaran, raft and boat) took fourth place. This group also includes ski tourism, orienteering and rock climbing. The low ranking place is due to understanding the difficulties of these tourism types.

The last ranking place of mountaineering and caving is unexpected, which can be explained by the fact that in our region these tourism types are not developed.

It is also important to provide regional centers of tourism and local study for students of the Carpathian region with pedagogical staff. An important issue of regional SCTLSSY work is also the training of highly qualified personnel in sports tourism – Master's of Sports (MS) and candidates for Master's of Sports (CMS). In Ukraine the title of Master of Sports for distant sports tourism was awarded in 1996 for the first time. During 2019 in the Carpathian region one athlete was awarded the title of «Master of Sport of Ukraine» in orienteering (Table 3) [7].

Table 3 – Data About Sportsmen Qualification In Active Tourism In Carpathian Region (2019) [7]

No	Region	Sport qualification							
		MS	CMS	I	II	III	I junior	II junior	III junior
1	Ivano-Frankivsk region	1	6	–	42	290	615	990	1008
2	Lviv region	–	–	3	8	34	30	85	415
3	Transcarpathian region	–	4	3	1	10	27	34	111
4	Chernivtsi region	–	2	25	62	146	199	249	230
Total		**1**	**12**	**31**	113	480	871	1358	1764

As can be seen from the Table 3 pupils of tourist-sports groups of four regions of the Carpathian area lead active sports life and improve their skills during various tourist events. Specialists in this field of physical culture and sports prepared 12 candidates for Master's of Sport, 31 pupils completed the first category, 593 – the second and third.

RCTLSSY pedagogical staff providing in Ukraine as at 2010 is shown in Table 4.

Table 4 – Characteristics of Staff of Regional Center of Tourism, Regional Studies and Excursions of Student Youth (as at 01.01.2019) [7; 13–16]

Region	Staff	High Education	Post-secondary non-tertiary education	Master of Sports	Candidate to Master of Sports	I	II	III	Scientific title	Qualification category	Awarded
Transcarpathian	30	20	10	1	6	9	1	6	-	12	5
Ivano-Frankivsk	196	140	56	2	17	25	49	34	11	91	29
Lviv	18	18	-	-	6	19	16	5	1	40	9
Chernivtsi	31	25	6	6	19	10	23	19	3	50	5
Totals	**275**	**203**	**72**	**9**	**48**	**63**	**89**	**64**	**15**	**193**	**48**

As we can see from the Table 4, pedagogical staff providing of regional centers of tourism and local study of student youth of the Carpathian region is uneven at this time. Among 275 pedagogical employees in the field of active tourism, 203 (73,8 %) have higher education, 72 (26,2 %) have secondary specialized education. The number of Masters of Sports working in tourism centers is 9 (3,3 %), 48 (17,5 %) is CMS, 216 (78,5 %) have I–III grades, 15 (5,5 %) teachers have academic titles and degrees, 48 (17,5 %) educators have state departmental awards and honorary titles.

The main task of the Regional and Ukrainian Centers of Tourism is to organize various types of work with student youth (Fig. 2).

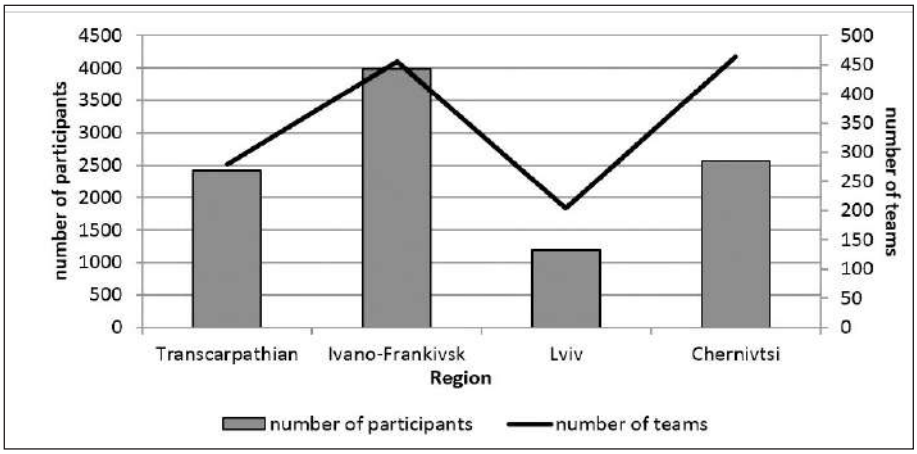

Fig. 2 Mass events on active tourism in the Carpathian region and level of engagement of pupils (as at 01.01.2019) [7; 13–16]

Thus, during 2019, in Ivano-Frankivsk region educators organized and conducted 13 great mass events of various complication in sports and recreational tourism, which involved 456 teams with a total number of 3991 participants, in Chernivtsi region educators organized and conducted 31 great mass events of various complication in sports and recreational tourism, which involved 463 teams with a total number of 2563 participants, in Lviv region educators organized and conducted 6 great mass events of various complication in sports and recreational tourism, which involved 204 teams with a total number of 1192 participants and in Transcarpathian region educators organized and conducted 26 great mass events of various complication in sports and recreational tourism, which involved 279 teams with a total number of 2425 participants [7; 13–16].

Discussion

With Strategy of National and Patriotic Education of Children and Youth adoption for 2016–2020 (Decree of the President of Ukraine from October 13, 2015 No. 580/2015) [17] child-youth tourism and local study have moved to an important stage in their development, as tourism industry is becoming of great importance for economy and social sphere development of Ukraine, and this gives the centers of tourism and local study of youth the opportunity for their activity qualified updating.

It should be noted that tourism and local studies activities were conducted not only in children and youth tourism centers, but also in other specialized and complex extra-curricular educational institutions, such as centers, aesthetic education palaces, ecological and naturalistic centers [11; 12].

It is reasonable because of, according to our data, we can note the negative dynamics in this activity sphere over the last 10 years, as in 2019 in the educational, extra-curricular educational institutions of tourist and local study profile, Palaces, Children's Creativity Houses of the Carpathian region there were functioning 689 sports clubs with 10421 students, compared to 894 clubs with 14843 students in 2010 [10]. It is confirmed with K.V. Mulik research too [10]. Our data are confirming with study results of a number of authors [3; 9; 10] that Backpacking and orienteering are the most common types of sports tourism in the Carpathian region.

Recently, most of tourist market participants have treated sports tourism as "non-market format" recreation form. But, in our opinion, this recreation form can take a proper place among travel agencies offers. Sport tourism is at the intersection of tourism industry and the national system of physical culture and sports [2; 10]. It performs sports, wellness, recreational, cognitive, educational, economic and other functions. That is why one of the most important tasks now is sports tourism integration into social mechanism of both child and adult recreation.

Conclusions

Active tourism is a type of activity, the essence of which is the complex and permanent restoration of person's physical, psychosomatic, emotional and spiritual forces by active physical activity means, where all physical culture functions are effectively realized.It is established that in the Carpathian region there are 551 groups providing educational services in the field of tourism with 6701 students involved. The most widespread active tourism types among student youth are backpacking (3791 students involved), orienteering (1110 students involved), junior local tourists (1054 students involved) and safety school (junior savior) (1001 students involved).

The conducted research made it possible to conclude that in the Carpathian area on the territory of Ivano-Frankivsk, Transcarpathian, Chernivtsi and Lviv regions the proper conditions for involving student youth in systematic classes of various active tourism types, in particular, with the help of regional state centers of tourism and local study, are created.

Conflict of interests. The authors declare no interest conflict.

References

1. Блистів Т. Мотиваційні пріоритети школярів до занять у центрах дитячо-юнацького туризму [Електронний ресурс]. Спортивна наука України. 2015. № 1(65). С. 70–75. URL: http://sportscience.ldufk.edu.ua/index.php/snu/article/ view/293.
   Blystiv, T. (2015), "Motyvatsiini priorytety shkoliariv do zaniat u tsentrakh dytiacho-yunatskoho turyzmu" [Motivational Priorities of Pupils to Classes In Centres of Children And Youth Tourism]. *Sports science of Ukraine,* 1(65), pp. 70–75. Retrieved from: http://sportscience.ldufk.edu.ua/index.php/snu/article/view/293. [in Ukraine].
2. Бондар А. С., Середа Н. В., Петренко І. В. Особливості організації спортивного туризму в рекреаційній діяльності дітей та підлітків. Основи спортивного туризму в рекреаційній діяльності, [S.l.], С. 28–36, вересень 2016. URL: http://journals.uran.ua/tourism_kzvsvst/article/view/79902.
   Bondar, A.S., Sereda, N.V., Petrenko, I.V. (2016), "Osoblyvosti orhanizatsii sportyvnoho turyzmu v rekreatsiinii diialnosti ditei ta pidlitkiv" [Features of Organization of Sports Tourism In Recreation Activities of Children And Adolescents]. *Fundamentals of sports tourism in recreational activities of different age groups of the population of Ukraine,* [S.l.], pp. 28–36. Retrieved from: http://journals.uran.ua/tourism_kzvsvst/article/view/79902. [in Ukraine].
3. Випасняк І. П., Іванишин І. М., Луцький В. Я. Стан розвитку спортивно-оздоровчого туризму як складової системи фізичного виховання учнівської молоді Карпатського регіону. Молодіжний науковий вісник Східноєвропейського національного університету імені Лесі Українки. 2019. №34. С. 13–19.
   Vypasniak I. P., Ivanyshyn I. M., Lutskyi V. Ya. (2019), "Stan rozvytku sportyvno-ozdorovchoho turyzmu yak skladovoi systemy fizychnoho vykhovannia uchnivskoi molodi Karpatskoho rehionu" [The state of sports and health tourism development as a component of physical education system of Carpathian Region student youth]. *Youth Scientific Journal Lesya Ukrainka Eastern European National University,* 34, pp. 13–19. [in Ukraine].
4. Галаманжук Л. Л., Єдинак Г. А. Основи наукових досліджень : навч.-метод. посіб. Кам'янець-Подільський : Рута, 2019. 150 с.
   Galamanzhuk, L., Iedynak, G. (2019), *Osnovy naukovykh doslidzhen*' [Fundamentals of scientific research]. Ruta, Kamianets-Podilskyi. 150 p. [in Ukraine].
5. Гриньова Т. І. Вплив оздоровчих занять різними видами спортивного туризму на формування фізичного стану дітей 10–13 років : автореф. дис. ... канд. наук з фіз. виховання і спорту : 24.00.02 Харків. держ. акад. фіз. культури. Харків, 2014. 20 с.
   Hrynova, T. I. (2014), *"Vplyv ozdorovchykh zaniat riznymy vydamy sportyvnoho turyzmu na formuvannia fizychnoho stanu ditei 10–13 rokiv"* [Impact of health related sessions of varios types of sports tourism on physical condition formation of children aged 10–13 years]: abstract of the dissertation for the sciences degree of cand. sciences in phys. education and sports: 24.00.02 Kharkiv State Academy of Physical Culture. Kharkiv. 20 p. [in Ukraine].
6. Горбенко М. І. Велотуризм як спеціалізований вид туризму в Україні. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. 2017. Вип. 10. С. 148–157. URL: http://nbuv.gov.ua/UJRN/Vkpnui_fv_2017_10_19.
   Horbenko M. I. (2017), "Veloturyzm yak spetsializovanyi vyd turyzmu v Ukraini" [Cycling as a specialized kind of tourism in Ukraine]. *Bulletin of Kamianets-Podilskyi national Ivan Ohiienko university. Physical education, sports and human health*. Issue 10, pp. 148–157. URL: http://nbuv.gov.ua/UJRN/Vkpnui_fv_2017_10_19. [in Ukraine].
7. Звіт про роботу Українського державного центру національно-патріотичного виховання, краєзнавства і туризму учнівської молоді в 2019 році. URL: http://ukrjuntur.org.ua/pro-nas/struktura-centru.html.
   Zvit pro robotu Ukrainskoho derzhavnoho tsentru natsionalno-patriotychnoho vykhovannia, kraieznavstva i turyzmu uchnivskoi molodi v 2019 rotsi [Report of the Ukrainian State Center For Tourism And Local Studies of Student Youth in 2019]. Retrieved from: http://ukrjuntur.org.ua/pro-nas/struktura-centru.html. [in Ukraine].
8. Індекс здоров'я. Україна–2018: Результати загальнонаціонального дослідження / Укл. Степурко Т. Г. та ін. Київ, 2018. 175 с.
   Indeks zdorov'ia. Ukraina–2018: Rezultaty zahalnonatsionalnoho doslidzhennia (2018) [Health Index. Ukraina-2018: Results of the National Testing] /ed. T. H. Stepurko, et. Kyiv. 175 p. [in Ukraine].
9. Луцький В. Я. Сучасний стан і перспективи активного туризму в Українських Карпатах. Фізичне виховання, спорт і культура здоров'я у сучасному суспільстві. 2010. № 4. С. 10–16. Режим доступу: http://nbuv.gov.ua/UJRN/Fvs_2010_4_5.
   Lutskyi V. Ya. (2010), "Suchasnyi stan i perspektyvy aktyvnoho turyzmu v Ukrainskykh Karpatakh" [Current State and Perspectives of Tourism in the Ukrainian Carpathians]. *Physical Education, Sport and Health Culture in Modern Society*, 4, pp. 10–16. Retrieved from: http://nbuv.gov.ua/UJRN/Fvs_2010_4_5. [in Ukraine].
10. Мулик К. В. Методична система використання спортивно-оздоровчого туризму в процесі фізичного виховання школярів і студентів : автореф. дис. … д-ра пед. наук: 13.00.02. ЧНПУ імені Т. Г. Шевченка. Чернігів, 2016. 40 с.
    Mulyk, K. V. (2016), *"Metodychna systema vykorystannia sportyvno-ozdorovchoho turyzmu v protsesi fizychnoho vykhovannia shkoliariv i studentiv"* [Methodical System of the Usage of Sport And Health-Improving Tourism In Physical Education of Pupils And Students]: abstract of the dissertation for the sciences degree of Doctor of pedagogical sciences : 13.00.02 Chernihiv National Pedagogical University named after Taras Shevchenko. Chernihiv. 40 p. [in Ukraine].
11. Про туризм: Закон України від 15 верес. 1995 р. № 325/95-ВР станом на 02.10.2018 / Верховна рада України, 2018, 46, С. 371. URL: http://zakon2.rada.gov.ua/laws/show/1282-15.
    Pro turyzm: Zakon Ukrainy vid 15 veres. 1995 r. No 325/95-VR stanom na 02.10.2018 [The Law of Ukraine «About Tourism» from Sept 15 1995, No 325/95-VR] / Documents by Publication, 2018, 46, S.371. Retrieved from: http://zakon2.rada.gov.ua/laws/show/1282-15. [in Ukraine].
12. Програма Федерації спортивного туризму України з розвитку спортивного туризму, як спорту високих досягнень, масового фізкультурно-спортивного, пізнавальне-патріотичного громадського руху та засобу активної рекреації населення на 2018–2021 роки. URL: https://www.mountain.net.ua/programa-federatsiyi-sportivnogo-turizmu-ukrayini-na-2018-2021-roki/.
    Prohrama Federatsii sportyvnoho turyzmu Ukrainy z rozvytku sportyvnoho turyzmu, yak sportu vysokykh dosiahnen, masovoho fizkulturno-sportyvnoho, piznavalne-patriotychnoho hromadskoho rukhu ta zasobu aktyvnoi rekreatsii naselennia na 2018–2021 roky [Program of the Sports Tourism Federation of Ukraine for the development of sports tourism, as a Professional sport, Mass-Sports, Patriotic Social Movement and Means of Active Recreation of the Population for 2018–2021]. Retrieved from: https://www.mountain.net.ua/programa-federatsiyi-sportivnogo-turizmu-ukrayini-na-2018-2021-roki/ . [in Ukraine].

13. Статистичні дані Головного управління статистики у Закарпатській області. [Електронний ресурс]. Режим доступу: http://www.uz.ukrstat.gov.ua/.
Statystychni dani Holovnoho upravlinnia statystyky u Zakarpatskii oblasti [Statistics of Main Statistical Office in Transcarpathian Region]. Retrieved from: http://www.uz.ukrstat.gov.ua/. [in Ukraine].
14. Статистичні дані Головного управління статистики у Івано-Франківській області. [Електронний ресурс]. Режим доступу: http://www.ifstat.gov.ua/.
Statystychni dani Holovnoho upravlinnia statystyky u Ivano-Frankivskii oblasti [Statistics of Main Statistical Office in Ivano-Frankivsk Region]. Retrieved from: http://www.ifstat.gov.ua/ . [in Ukraine].
15. Статистичні дані Головного управління статистики у Львівській області. [Електронний ресурс]. Режим доступу: http://www.lv.ukrstat.gov.ua/.
Statystychni dani Holovnoho upravlinnia statystyky u Lvivskii oblasti [Statistics of Main Statistical Office in Lviv Region]. Retrieved from: http://www.lv.ukrstat.gov.ua/. [in Ukraine].
16. Статистичні дані Головного управління статистики у Чернівецькій області. [Електронний ресурс]. Режим доступу: http://www.cv.ukrstat.gov.ua/.
Statystychni dani Holovnoho upravlinnia statystyky u Chernivetskii oblasti. [Statistics of Main Statistical Office in Chernivtsi Region]. Retrieved from: http://www.cv.ukrstat.gov.ua/ . [in Ukraine].
17. Стратегія національно-патріотичного виховання дітей та молоді на 2016–2020 роки : Указ Президента України від 13.10.2015 р. № 580/2015. Офіційний вісник Президента України. 2015, 23, С. 19, стаття 1319. URL: http://osvita.ua/legislation/pozashk_osv/48106/.
Stratehiia natsionalno-patriotychnoho vykhovannia ditei ta molodi na 2016–2020 roky: Ukaz Prezydenta Ukrainy vid 13.10.2015 r. No 580/2015 [Strategy of national and patriotic education of children and youth for 2016–2020: Decree of the President of Ukraine from October 13, 2015 No. 580/2015]. Documents by Publications. 2015, 23, p. 19, stattia 1319. Retrieved from: http://osvita.ua/legislation/pozashk_osv/48106/. [in Ukraine].

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DYNAMICS OF WOMEN PHYSICAL PREPAREDNESS INDICATORS WHILE STUDYING AT A HIGHER EDUCATIONAL INSTITUTION

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The article investigated the change in the values of women physical preparedness indicators while using the current content of physical education in the first year of studying at a higher educational institution. The purpose of the study was to establish the effectiveness of physical education at higher educational institution in the aspect of improving women physical preparedness. *Material and methods.* The study involved 100 women, whose age at the beginning of the study was in the range of 17–18 years. During the first year of studying at a higher educational institution, indicators of women basic conditional qualities and some manifestations of coordination were studied. For this purpose, the generally accepted in the practice of physical education and recommended by many researchers tests were used, which, in addition, also met all metrological requirements. *Results.* Using the available assessment standards, it was found that at the beginning of training the physical preparedness of women aged 17–18 corresponds to a low level. During the academic year, they improve only the speed and strength endurance of the abdominal muscles, and the development of other motor skills remains at the previously achieved low level. *Conclusion.* The obtained data indicate the need to modernize the standards for assessing women physical preparedness and the lack of effectiveness of physical education, which is implemented in a higher educational institution, in the aspect of solving the problem of improving women physical preparedness who belong to the main medical group and do not systematically engage in the chosen sports.

Key words: physical preparedness, women, higher educational institution, dynamics of indicators.

Introduction

At the present stage, one of the leading tasks of physical education in the institution of higher education (HEI) continues to be the development of physical (motor) qualities of students. This is evidenced by the content of physical education programs developed by the HEI in the period 2016-2019. The basis here are: Article 7 of the Law of Ukraine «On Physical Culture and Sports» [7; 8], letter of the Ministry of Education and Science of Ukraine «On the organization of physical education in higher educational institutions of Ukraine» No 1/9-454 of September 25, 2015 [10], Resolution of the Cabinet of Ministers of Ukraine «On Approval of the Procedure for Conducting Annual Assessment of Physical Preparedness of the Population of Ukraine» of December 9, 2015 No. 1045 [15].

Considering this, it is important to achieve the necessary result by physical education is the systematic monitoring of the development of the main motor qualities of girls and boys during their studies in the HEI. This is especially true for the first and second years of study, as during this period in most HEIs the physical education continues to be mandatory for all students: classes are provided in the curricula for bachelors in all specialties; are presented in the schedule; the implementation of such classes helps to strengthen students' motivation for physical activity in various forms [2; 5; 11; 14].

Material and research methods

The purpose of the study was to establish the effectiveness of physical education in a higher education institution in the aspect of improving the physical preparedness of girls. To achieve this goal, a set of adequate research methods was used. In particular, the following general scientific methods were used: analysis, synthesis, systematization, generalization; they were used in the processing of sources of information, namely documentary and literary. In addition, pedagogical research methods were used, namely pedagogical testing and experiment [3; 17]. The latter was an ascertaining, because the subject of the study did not interfere in the process of physical education of the controlled. As for pedagogical testing, here we note the use of tests that allowed assessing the state of development of motor qualities. These tests met metrological requirements [9; 12; 18] and allowed to study the components of high-speed qualities (tapping test for 10 sec, running 20m out of stride), explosive force (jump in length from a spot, throwing stuffed ball sitting), certain types of coordination, in particular in cyclical locomotions (shuttle running 4x9 m), absolute muscle strength (state dynamometry), strength endurance of different muscle groups (flexion-extension of the arms in the lying position, lifting into the seat from a supine position), flexibility (tilt forward sitting), aerobic endurance (Cooper's test) [16; 17; 20; 23-25]. One hundred girls aged 17-18 who began their studies at the HEI with the beginning of the study, were examined. Among the methods of mathematical statistics, basic one-dimensional statistics and the parametric criterion of the Student's t-test were used. The use of the latter was possible because the distribution of the values of the indicators studied in the sample of girls corresponded to the normal [17, p. 173].

The organization of the study took into account the provisions of the Helsinki Declaration of the World

Medical Association (WMA-2013) on the ethical principles of medical research with human participation; the Ethics Commission of the Taras Shevchenko National University «Chernihiv Collegium» approved the study protocol. Testing was assigned at the beginning of the school year (September-October) and at the end (May). Extracurricular testing took place in the form of competitions.

Results

At the beginning of the school year, the data obtained indicated a different from the required state of development of the studied motor skills. First of all, it concerned the explosive strength of the muscles of the lower extremities, because when comparing the obtained value with the defined standard of evaluation of the mandatory comprehensive test for 17-year-old girls [6, p. 40] in the long jump from a spot it was less than the minimum for the score «3», namely 174 cm (Table. 1).

At the same time, the last and average values in the sample of the girls studied (158.2±2.71cm) differed from each other by a reliably significant value, namely at the level of $p < 0.05$.

Table 1 – Identifying and changing the indicators of physical preparedness of girls when using the current content of physical education during the first year of study in a higher education institution

Indicator of physical preparedness	At the beginning		In the end		Change		t
	$\bar{X}_1$	m	$\bar{X}_2$	m	Abs.	%	
Running 20m out of stride, sec	3,59	0,06	3,58	0,05	–0,01	0,3	0,13
Long jump from place, m	158,2	2,71	158,0	2,68	–0,2	–0,1	0,05
Shuttle running 4x9 m, sec	11,87	0,13	11,7	0,1	–0,17	1,4	1,04
Tilt forward sitting, cm	12,5	1,28	13,8	1,23	1,3	10,4	0,73
Flexion-extension of the arms in the lying position, number of	12,3	0,53	12,5	0,55	0,2	1,6	0,26
Lifting into the seat from a supine position, number of	37,5	1,67	42,5	1,81	5,0	13,3	2,03*
Throwing stuffed ball sitting, m	4,8	0,16	5,2	0,13	0,4	8,3	1,84
Cooper's Test, m	1865,2	38,32	1838,2	35,84	–27,0	–1,4	0,51
State dynamometry, kg	62,4	2,01	65,6	2,06	3,2	5,1	1,11
Tapping test, number for 10 s	65,0	0,14	66,3	0,11	1,3	2,0	40,63***
at n=100 – $t_{кр}$ = 1,984							

In other words, at the beginning of their study in HEI, the girls reached a state of development of the explosive muscle strength of the lower extremities, which was less to a low level, determined by the standards of assessment of the mandatory comprehensive test of physical fitness of 17-year-old girls.

A similar result was obtained when comparing the values of the coordination index in cyclic locomotions and flexibility, except for this one. In the first case, the average result in the test demonstrated by the studied girls was 11.87 ± 0.13 s, and the standard for assessing this motor quality for a low level is 11 s or more. In the flexibility test, the average result was 12.5 ± 1.28 cm, and the standard for assessing this motor quality for the low level was 13 cm or less.

With regard to other studied motor qualities, we note the following: the tests used are not part of the mandatory comprehensive test to assess the physical fitness of girls; therefore, other available assessment standards were used. We obtained data showing that at the beginning of the school year the aerobic endurance of girls was below average, as the result was 1865.2 ± 38.32 m, and according to the assessment standards [28] values of 1700 m or less indicate a low level of development of this motor quality, and 2300 m and more - a high level.

Using the evaluation standards recommended by researchers [6. p. 349-356] we noted the following: the value of muscle strength and strength endurance at the beginning of the school year as a result of the position of the dynamometer and lifting into the seat from a supine position respectively were evaluated with a grade of «3», which corresponds to the initial (low) level; the explosive strength of the muscles of the upper extremities of the girls was rated «6», i.e. the development of this motor quality was at an average level..

Repeated testing at the end of the school year showed changes in the values of physical fitness indicators of girls during the first year of studying at the HEI. As can be seen

in Table 1, the positive trend of the change was noted in all the indicators studied, except aerobic endurance and coordination in cyclical locomotions. The discrepancy between the values of these motor qualities at the beginning and end of the school year showed a negative trend in their development.

However, this result was interpreted only as a tendency, since the discrepancies between the values of the studied motor skills at the beginning and end of the school year were statistically unreliable ($p > 0,05$). The exception here was an increase of 13.3 % in the value of the abdominal muscle strength, which was determined by the result of lifting into the seat from a supine position ($p < 0,05$), and by 2 % - the speed of individual movement as a result of the tapping test ($p < 0,001$).

In other words, during the first year of study, girls improved the state of development of speed and strength endurance of the abdominal muscles, and the state of development of other researched motor qualities remained at the level achieved by girls earlier.

Discussion

The current stage of development of the physical education system in Ukraine is marked by the return to the mandatory annual assessment of physical training of students in all types of educational institutions, that is, regardless of the form of ownership, personnel of the Armed Forces and other military formations [15]. The purpose is to increase the level of physical fitness of Ukraine's population, to create appropriate conditions for the physical development of different populations group, to improve their health, to ensure the ability to work highly productively, to protect the sovereignty and territorial integrity of Ukraine, and to promote patriotism and citizenship. Starting in 2017, the annual assessment should become the main indicator of the system of control over the state of physical development and health of the population of Ukraine; assessment is mandatory, so when developing and approving curricula in terms of physical education, this should be present there [10; 15].

This indicates an increase in the state's attention to pedagogical testing in physical education of students, and thus – the actualization of research aimed at solving problems of different content, but related to this scientific problem. In connection with the latter, we note the position of the theory of physical education and related fields of science on the need for systematic monitoring of the physical fitness of various populations to develop objective assessment standards and their correction, on average once every five years [1; 4; 6; 12; 12; 13; 19-26].

The data of the study indicate a low level of physical fitness, which is noted by the girls at the beginning of their studies in the HEI. It is also established that the detected level is maintained during the first year of their training. The results are consistent with the data of other researchers, although there are some differences, primarily related to the values of certain indicators of physical fitness [4; 5; 11; 13]. In general, the state of physical fitness of girls 17-18 years old, who started their studies in the HEI, is unsatisfactory. It should be noted that this conclusion is based on the use of assessment standards that were developed earlier. In connection with the latter, some researchers note the need to adjust the assessment standards, because due to the action of various external and internal factors, the previously relevant assessments today do not meet the necessary requirements, namely, are greater or lesser [12; 16; 19].

In addition, the data obtained to some extent show the insufficient effectiveness of physical education implemented in the HEI, in terms of solving the task of improving the physical fitness of girls who belong to the main medical group and do not engage in the chosen sport regularly. A significant number of researchers have emphasized the need to improve approaches and modernize the organization, content of physical education and methods of its implementation in the HEI. However, until now, such a problem has not been solved, which causes the need to continue research in this scientific direction.

Conclusions

1. At the present stage, the issue of physical fitness of students has become relevant again, both in terms of mandatory testing and standards for assessing the results of such testing, as well as the effectiveness of organizational and methodological support of physical education in the HEI in terms of solving the task related to the physical training of students.

2. At the beginning of studying in the HEI, the physical fitness of girls aged 17-18 using the available assessment standards corresponds to a low level, which confirms the insufficient effectiveness of physical education at school in terms of successful solution of such a problem.

3. The use during the first year of training in the HEI of traditional organizations and content of physical education provides to some extent an improvement of speed and strength endurance of some groups of muscles of girls only. The development of other motor qualities is maintained at the previously achieved level, that is, at a low level, which is an evidence of a different from the desired effect of physical education in the HEI.

Further research should be aimed at studying the indicators of physical fitness of girls in other years of study, as well as such indicators in boys.

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References

1. Банах В. Персоніфікований підхід до фізичного виховання студентської молоді. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка: Фізичне виховання, спорт і здоров'я людини. 2019. Випуск 15. С. 11–37.
   Banach, V. (2019), "Personifikovanyj pidchid do fizychnogo vychovanja stydentskoj molodi" [Personalized approach to physical education of student youth]. *Bulletin of Kamyanets-Podilskyi Ivan Ogiyenko National University. Physical Education, Sports and Human Health*, Issue 15, pp. 11–37. [in Ukraine].
2. Бойчук Ю., Єдинак Г., Галаманжук Л., Клюс О., Скавронський О. Дослідження інтересу студенток до розвитку фізичних якостей педагогічними засобами і методами. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка. Серія: Фізичне виховання, спорт і здоров'я людини. 2019. Випуск 13. С. 29–33. doi: 10.32626/2227-6246.2019-13.29–33
   Boychuk, Y. Iedynak, G., Galamandzuk, L., Klyus, O., Skavronskiy, O. (2019), "Doslidzennya interesu studentok do rozvytky fizychnyh yakostey pedagogichnymy zasobamy" [Research of students' interest in the development of physical qualities by pedagogical means]. *Bulletin of Kamyanets-Podilskyi Ivan Ogiyenko National University. Physical Education, Sports and Human Health,* Issue 13, pp. 29–34. [in Ukraine].
3. Галаманжук Л. Л., Єдинак Г. А. Основи наукових досліджень : навч.-метод. посібник. Кам'янець-Подільський : Рута, 2019. 150 с.
   Galamanzhuk, L. L., Iedynak, G. A. (2019), *Osnovy naukovykh doslidzhen*' [Fundamentals of scientific research]. Ruta Printing House LLC, Kamianets-Podilskyi, 150 p. [in Ukraine].
4. Дух Т., Лесько О., Рачук Н., Ріпак М. Фізична підготовленість як один із критеріїв ефективності фізичного виховання студентів вищих навчальних закладів. Спортивна наука України. 2015. Т. 2. С. 34–39. [Електронний ресурс]. – Режим доступу: http://repository.ldufk.edu.ua/handle/34606048/3050
   Dukh, T., Lesko, O., Rachuk, N., Ripak, M. (2015), Fizychna pidghotovlenistj jak odyn iz kryterijiv efektyvnosti fizychnogho vykhovannja studentiv vyshhykh navchaljnykh zakladiv. za red. Jevghena Prystupy" [Physical fitness as one of the criteria for the effectiveness of physical education of students of higher educational institutions]. *Sports science of Ukraine*, Vol. 2. pp. 34–39. – http://repository.ldufk.edu.ua/handle/34606048/3050 [in Ukraine].
5. Єдинак Г. А. Деякі теоретико-методичні аспекти посилення мотивації студентів до систематичної фізичної активності оздоровчої спрямованості. Вісник Чернігівського нац. пед. у-ту імені Т. Г. Шевченка. Серія: Педагогічні науки. 2014. Випуск 118. Т. 3. С. 109–114.
   Iedynak, G. A. (2014), "Deyaki teoretyko-metodychni aspekty posylennya motyvatsiyi studentiv do systematychnoyi fizychnoyi aktyvnosti ozdorovchoyi spryamovanosti" [Some theoretical and methodological aspects of strengthening students' motivation for systematic physical activity of health-improving orientation]. *Bulletin of the Chernihiv National University ped. in the name of Taras Shevchenko. Series: Pedagogical sciences*, Issue 118, Vol. 3. pp. 109-114. [in Ukraine].
6. Єдинак Г. А., Плахтій П. Д., Яценюк Ю. П. Фізична культура в школі (молодому спеціалісту). Кам'янець-Подільський : Абетка, 2000. 241 с.
   Iedynak, G. A., Plakhtiy, P. D., Yatsenyuk, Y. P. (2014), "Fizychna kul'tura v shkoli (molodomu spetsialistu)" [Physical culture at school (to the young specialist)]. Abetka, Kamyanets-Podilsky, 241 p. [in Ukraine].
7. Закон України «Про фізичну культуру і спорт» : постанова Верховної Ради України від 17 листопада 2009, № 2562 – [Електронний ресурс]. – Режим доступу: http://dsmsu.gov.ua/index/ua/material/4255
   Zakon Ukrayiny «Pro fizychnu kul'turu i sport» : *postanova Verkhovnoyi Rady Ukrayiny vid 17 lystopada 2009, № 2562* [Law of Ukraine "On Physical Culture and Sports": Resolution of the Verkhovna Rada of Ukraine of November 17, 2009, № 2562]. – http://dsmsu.gov.ua/index/ua/material/4255 [in Ukraine].
8. Зміни до Закону України «Про фізичну культуру і спорт»: зі змінами від 19 травня 2015. – [Електронний ресурс]. – Режим доступу: http://yurfact.com.ua/zminy_do_zakonodavstva/_zminy_vid_19/05/2015_do_zu_pro_fizychnu_kulturu_i_sport.html
   Zminy do Zakonu Ukrayiny «Pro fizychnu kul'turu i sport»: *zi zminamy vid 19 travnya 2015* [Amendments to the Law of Ukraine «On Physical Culture and Sports»: as amended on May 19, 2015]. – http://yurfact.com.ua/zminy_ do_zakonodavstva/_zminy_vid_19/05/2015_do_zu_pro_fizychnu_kulturu_i_sport.html [in Ukraine].
9. Костюкевич В. М. Спортивна метрологія : навч. посібник. Вінниця : «Вінниця», 2001. 183 с.
   Kostyukevich, V. M. (2001), *Sportyvna metrolohiya* [Sports metrology]. Vinnytsia, Vinnytsia, 183 p. [in Ukraine].
10. Лист Міністерства освіти і науки України **«**Щодо організації фізичного виховання у ВНЗ України» від 25.09.2015. № 1/9-454 від 25 вересня 2015 року.
    Lyst Ministerstva osvity i nauky Ukrayiny «Shchodo orhanizatsiyi fizychnoho vykhovannya u VNZ Ukrayiny» *vid 25.09.2015. № 1/9-454 vid 25 veresnya 2015 roku* [Letter of the Ministry of Education and Science of Ukraine "On the organization of physical education in universities of Ukraine" dated 25.09.2015. № 1 / 9-454 dated September 25, 2015]. – https://osvita.ua/legislation/ Vishya_osvita/47947/ [in Ukraine].
11. Лукавенко А. В., Єдинак Г. А. Диференційований підхід до покращення психофізичного стану першокурсників вищих навчальних закладів як проблема галузі фізичного виховання. Педагогіка, психологія та медико-біол. пробл. фіз. вих. і спорту. 2012. № 4. С. 27–33.
    Lukavenko, A. V., Iedynak, G. A., (2012), "Dyferentsiyovanyy pidkhid do pokrashchennya psykhofizychnoho stanu pershokursnykiv vyshchykh navchal'nykh zakladiv yak problema haluzi fizychnoho vykhovannya" [Differentiated approach to improving the psychophysical condition of freshmen in higher education as a problem in the field of physical education]. *Pedagogy, psychology and medical biology. probl. phys. out and sports.* № 4. pp. 27–33. [in Ukraine].
12. Носко М. О., Гаркуша С. В., Бріжата І. А. Метрологічний контроль у фізичному вихованні і спорті : навч. посібник. Київ : «МП Леся», 2012. 264 с.
    Nosko, M. O., Garkusha, S. V., Brizhata, I. A. (2012), *Metrolohichnyy kontrol*' u *fizychnomu vykhovanni i sporti* [Metrological control in physical education and sports]. MP Lesya, Kyiv, 264 p. [in Ukraine].
13. Одайник В., Авінов В. Етапи розвитку фізичних якостей студентів закладів вищої освіти засобами баскетболу. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка: Фізичне виховання, спорт і здоров'я людини. 2019. Вип. 15. С. 81–84.
    Odajnik, V., Avinov, V. (2019), "Etapy rozvidky fizychnych jakostej studentiv zakladiv vyshchoi osvitu zasobamy basketbol" [Stages of development of physical qualities of students of higher education institutions by means of basketbal]. *Bulletin of Kamyanets-Podilskyi Ivan Ogiyenko National University. Physical Education, Sports and Human Health.* Vol. 15. pp. 81–84. [in Ukraine].
14. Панчук Н., Слюсарчук В. Вплив статі на формування ціннісного компоненту професійної підготовки у закладі вищої освіти. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка. Серія: Фізичне виховання, спорт і здоров'я людини. 2019. Випуск 15. С. 85–91. doi: 10.32626/2309-8082.2019-15.85-91
    Panchuk, N., Slyusarchuk, V. (2019), "Vplyv stati na formuvannya

tsinnisnoho komponentu profesiynoyi pidhotovky u zakladi vyshchoyi osvity" [The influence of gender on the formation of the value component of vocational training in higher education]. *Bulletin of Ivan Ogienko National University of Kamyanets-Podilsky. Series: Physical education, sports and human health*. Issue 15. pp. 85–91. doi: 10.32626 / 2309-8082.2019-15.85–91

15. Постанова Кабінету Міністрів України від 9 грудня 2015 року№ 1045 «Про затвердження Порядку проведення щорічного оцінювання фізичної підготовленості населення України» : зі змінами внесеними згідно з Постановою КМ (№ 461 від 06.06.2018). – [Електронний ресурс]. – Режим доступу: https://zakon.rada.gov.ua/laws/show/1045-2015-%D0%BF (звернення: 30.5.2020)
Postanova Kabinetu Ministriv Ukrayiny vid 9 hrudnya 2015 roku № 1045 «Pro zatverdzhennya Poryadku provedennya shchorichnoho otsinyuvannya fizychnoyi pidhotovlenosti naselennya Ukrayiny» : *zi zminamy vnesenymy z·hidno z Postanovoyu KM (№ 461 vid 06.06.2018)* [Resolution of the Cabinet of Ministers of Ukraine of December 9, 2015 № 1045 "On approval of the Procedure for conducting the annual assessment of physical fitness of the population of Ukraine": as amended in accordance with the Resolution of the Cabinet of Ministers (№ 461 of 06.06.2018)]. – https://zakon.rada.gov.ua/laws/show/1045-2015-%D0%BF
16. Сергієнко Л. П. Тестування рухових здібностей школярів. Київ: Олімп. л-ра, 2001. 439 с.
Sergienko, L. P. (2001), *"Testuvannya rukhovykh zdibnostey shkolyariv"* [Testing of motor abilities of schoolchildren]. Olympus. l-ra, Kyiv, 439 p.
17. Шиян Б. М., Єдинак Г. А., Петришин Ю. В. Наукові дослідження у фізичному вихованні та спорті: навч. посіб. Кам'янець-Подільський : ПП Видавництво «Оіюм»», 2012. 280 с.
Shiyan, B. M., Iedynak, G. A., Petryshyn, Yu. V. (2012), *Naukovi doslidzhennya u fizychnomu vykhovanni ta sporti* [Scientific research in physical education and sports]. PE Oyum Publishing House, Kamianets-Podilsky, 280 p. [in Ukraine].
18. Creswell, J. W. (2013). *Research design: qualitative, quantitative, and mixed methods approaches*. London: Sage publications.
19. Di Tore, P. A., Schiavo, R., D'isanto, T. (2016). Physical education, motor control and motor learning: theoretical paradigms and teaching practices from kindergarten to high school. *Journal of Physical Education and Sport, 16(4*), 1293-1297. doi: 10.7752/ jpes.2016.04205
20. *Fitness testing*, http://www.teachpe.com/fitness/testing.php
21. Katzmarzyk, P. T., Silva, M. J. C. (2013). *Growth and maturation in human biology and sports.* Coimbra: University press.
22. Sands, R. R. (2012). *The anthropology of sports and human movement: a biocultural perspective*. Ed. by R. R. Sands, L. R. Sands. London: Lexington Books.
23. Schmidt, R. A., & Lee, T. (2013). *Motor learning and performance: from principles to application.* Champaing, IL: Human Kinetics.
24. Sternad, D. (2009). *Progress in motor control: a multidisciplinary perspective*. Pennsylvania: Pennsylvania State University.
25. Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2011). *Research methods in physical activity.* 6th ed. Champaign, IL: Human Kinetics.
26. Turvey, M. T., Fonseca, S. (2009). Nature of motor control: perspectives and issues. *Advances in Experimental Med. and Biology,* 629, 93–123.
27. World Medicine Association declaration of Helsinki: *Ethical principles for medical research involving human subjects*. – https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects (звернення: 30.05.2020)
28. Беговой тест Купера – нормативы, содержание, советы. – Режим доступу: https://keeprun.ru/programs/begovoj-test-kupera-normativy-soderzhanie-sovety.html

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PEDAGOGICAL CONDITIONS OF THE WOULD-BE PE TEACHERS' TRAINING FOR THE FORMATION OF A HEALTHY LIFESTYLE OF JUNIOR SCHOOLCHILDREN

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The article deals with the peculiarities of preparation of would-be teachers of physical education for the formation of a healthy lifestyle of junior schoolchildren. The analysis of the scientific literature is made by the authors, it indicates different approaches to improving the preparation of the specialists of physical education. The goal of the research is to substantiate theoretically and to test experimentally the pedagogical conditions of preparation of would-be teachers of physical education for the formation of a culture of health of junior schoolchildren. *Material and methods.* The experimental base of the research was made up of 62 students and masters of Faculty of Physical Training Kamianets-Podilskyi National Ivan Ohiienko University. Methods of the comparative analysis, generalization of literary sources and pedagogical experiment were used to solve the set tasks. *Objectives of the study:* to reveal the features of professional and pedagogical training of would-be PE teachers to educate a healthy lifestyle of junior schoolchildren; to analyze the philosophical, social, psychological and pedagogical prerequisites for the education of a healthy lifestyle of junior schoolchildren; to substantiate theoretically and to test experimentally the pedagogical conditions of preparation of would-be PE teachers for the education of a healthy lifestyle of junior schoolchildren. *Results.* The essential positive changes in the levels of formation of motivational, cognitive, activity components of training of would-be PE teachers who were included in the experimental groups compared to the indicators of would-be PE teachers who were in the control groups was revealed in the final analysis of experimental data. The preparation of students to perform the main teacher's functions in relation to the formation of a pupils' healthy lifestyle can be more effective if their activities, such as teaching, self-study and pedagogical practice, which is focused on training of the future professionals to implemente the school teachers' relevant functions at the stage of university education is also noted.

Key words: professional training, healthy lifestyle, interdisciplinary connections, self-study, pedagogical practice, pedagogical conditions, students.

Introduction

It is known that good mastery of the subject, the teacher's readiness to teach it helps to improving the quality of the education system. Today, a PE teacher faces a difficult task, the solution of which requires appropriate training, special knowledge, skills and abilities necessary for high-quality teaching subjects aimed at forming a high level of health culture in schoolchildren.

The content of professional training of future teachers of physical education at the present stage should be focused on the equipping students with knowledge, skills and abilities in the formation, maintaining and strengthening of health in all aspects of it (spiritual, mental and physical), the formation of a healthy lifestyle of schoolchildren [5; 7].

The analysis of the scientific literature shows different approaches to improving the training of PE specialists: the formation of a step-by-step system of training of physical culture specialists was paid attention to by L. Volkov,

Yu. Shkrebtiy, etc.; L. Sushchenko, B. Shiyan, and others reviewed the theoretical-and-methodological bases of professional training of PE teachers. However, the problem of professional training of future physical education teachers to the formation of a healthy lifestyle of young people so far has not been given due attention. [3; 5-7].

Material and research methods

The purpose of the study was to theoretically substantiate and experimentally check the pedagogical conditions of preparedness would-be PE teachers to form a culture of health of younger students. To do this, a set of methods was used. The use of psychological-and-pedagogical and sociological methods helped to identify the attitudes, motives, interests and needs of students in the integral manifestation of the health of pupils in the specifics of future professional activity [1; 6]. From pedagogical methods, observation was used, which provided a systematic analysis and assessment of psychological and pedagogical actions of students. The main components of the student's professional qualities from the standpoint of educating a healthy lifestyle of junior schoolchildren were included in the objects of observation. The pedagogical experiment determined the degree of effectiveness of the developed model, which ensures the implementation of organizational-and-pedagogical and psychological-and-pedagogical conditions for training specialists in the field of physical culture in the context of educating healthy lifestyle of younger students. The experiment was conducted at Ivan Ogienko Kamyanets-Podilsky National University. It involved 30 students as part of an experimental group and 32 students of control group. The pedagogical experiment lasted in 2017-2019 academic years.

In order to determine the level of formability of preparedness for the education of healthy lifestyles of younger representatives of control and experimental groups at the beginning and end of the forming experiment, written surveys and testing of students were conducted. To determine the motivational component of preparedness, the questionnaire T. Ehlers «Motivation for success» was used; the questionnaire Synyavsky-Fedorishin was used to determine the active component of preparedness; to determine the cognitive component the assessment for the specified activities of the researched, which were obtained with the help of experts, was used.

The obtained empirical data were processed by adequate methods of mathematical statistics. Thus, we determined the arithmetic mean, the reliability of the discrepancy between the two averages, set in percent, using the nonparametric Wilcoxon test, the value of the level is significant – 0.05.

Results

Formation of readiness of students of the Faculty of Physical Culture to form a healthy lifestyle of primary school students requires, first of all, reliance on the existing in pedagogical theory and practice ideas about what requirements should meet the appropriate readiness. First, it is necessary that its level in students before the graduation ensure their ability to perform adequately the basic functions of teachers.

The preparation of students of universities of physical culture and sports for the implementation of these functions of the schoolteacher is quite significant in terms of formation of future physical culture and sports specialists' readiness to promote a healthy lifestyle in younger students. At the same time, the functions of the teacher as a professional can be correlated with the main activities performed by students within the framework of their vocational education in the university on the chosen specialty [1; 4; 9].

Thus, the preparation of students to perform the main functions of the teacher on the formation of a healthy lifestyle of schoolchildren can be more effective if such activities as educational (classroom) work, independent work and internship, are focused on training future specialists to perform the relevant functions of the schoolteacher at the stage of university education.

In this regard, it makes sense to consider in more detail the peculiarities of the aforementioned activities of students. This will reveal significant features that are proposed as a basis for the methodical model of forming the readiness of would-be PE teachers to develop a healthy lifestyle of primary school students.

The main result of mastering the content of higher pedagogical education is the knowledge system formed in the student. The knowledge acquired by the student is the main condition for the implementation of specific types of their future professional pedagogical activity.

Characterizing the activities performed by students of the Faculty of Physical Culture within the framework of educational (classroom) work, it can be stated that it implicates a variety of forms of classes, methods and means of study. At the same time, the analysis of practice of physical culture and pedagogical education shows that the increase in the volume of mastered facts or concepts, rules or theoretical conclusions does not necessarily change significantly the level of competence of the future specialist of physical culture [2].

In these conditions, the educational work of students of the Faculty of Physical Culture is characterized by a prevailing cognitive orientation. Its activity aspect is represented by skills mainly of reproductive nature with insufficient, in our opinion, motivational component involved. One of the topical directions of increasing the effectiveness of the formation of relevant components of the readiness of would-be PE teacher to implement the formation of a healthy lifestyle in students is the reliance on interdisciplinary links in the training of relevant specialists.

Currently, many experts in the field of pedagogical science recognized that interdisciplinary links are an important didactic condition and a means of intensifying educational activities, deeper and more comprehensive mastery of the basics of sciences, systematization of knowledge, and formation of independent and cognitive interest [1; 5; 6].

The selection of the interdisciplinary content determines the choice of forms of organization of the educational process, which contributes to the generalization, systematization of knowledge, comprehensive disclosure of educational problems, methods and techniques of study, which ensure the transfer of knowledge and skills of students in different subjects and their generalization.

In terms of the use of interdisciplinary links oriented on the formation of students', while getting a higher vocational education, readiness to form a healthy lifestyle of schoolchildren; the priority is the focus of these links on the assimilation of elements of educational material that form in would-be PE teacher the ability to ensure parity between measures of health orientation and measures that increase intellectual activity of schoolchildren.

Interdisciplinary links of search character are connected with the formation of a motivational component of the readiness of students of the Faculty of Physical Culture

to realization of a health-saving function in younger students. There is a direct dependence between search and motivation. On the one hand, having a motive is a stimulus to the student's search activity. On the other hand, when searching, the student finds one or another way to solve the problem, which provides the motivation for activities aimed at implementing these ways in practice. In this regard, it can be argued that the use of search interdisciplinary links while working with students contributes to the formation of a motivational element of professional pedagogical readiness in this aspect.

Interdisciplinary links belonging to the category of creative, respectively, are interdependent with the creative component of the readiness of would-be PE teacher to form a healthy lifestyle of primary school students. Such interdisciplinary links make it possible to obtain relevant knowledge related to different disciplines, qualitative results for the student, independent design of individual techniques for the formation of a healthy lifestyle, etc. The relevant activity is innovative for its subject and can be attributed to creativity. Performing it over and over again, a student of the Faculty of Physical Culture develops his abilities to create authorial developments in this area. At the same time, he is developing a creative component of readiness in the aspect of students' health [4; 7].

Thus, in order to form the readiness of future physical culture teachers to develop a healthy lifestyle in younger students, in addition to the orientation of students to the existing features in the implementation of the relevant function, it is necessary to implement interdisciplinary links of reproductive, search and creative nature, which are aimed, respectively, at the formation of cognitive, motivational and active components of professional pedagogical readiness in this aspect.

Returning to the beginning of the article, which refers to classroom and independent work, as well as vocational and pedagogical practice of students as the main manifestations of their activities, within which there is a readiness to form a healthy lifestyle of students, we should characterize these types of training of students of the Faculty of Physical Culture.

Independent work of students acts as a cognitive activity, during which they actively perceive, comprehend knowledge, acquire professional and pedagogical skills, master the culture of mental work, processing the information received at lectures and seminars [1; 2]. This type of activity is specific and pursues as the goal of forming the independence of the student, the formation of knowledge, skills and abilities, which is carried out indirectly through the content and methods of all types of educational activities. At the same time, independent work acts as a didactic form of study, which is a system of organization of pedagogical conditions that ensure the management of educational activities of students and takes place in the absence of a teacher and without his direct participation and assistance [2; 5; 8].

In the independent work of students, initiative in obtaining scientific knowledge necessary to solve the problems of practice is of particular importance. The degree of development of cognitive interest plays an important role. Active forms and methods of study, individual tasks, and work with literature determine the essence of independent work. The constant expansion of the amount of scientific knowledge cannot be immediately reflected in educational programs, so pedagogy pays special attention to the development of students' abilities to self-master knowledge. The independent work is the most important means of gaining flexible experience of self-education [2; 6].

Thus, the independent work of students contributes to the formation of the aforementioned aspects of motivational and active readiness of students to form a healthy lifestyle of schoolchildren. It also forms a creative component of the appropriate readiness. Learning to design independently effective health-saving technologies, to carry out innovative activities is possible only in creative, not «template» work. This, in turn, only happens when the student is given sufficient independence. In other words, doing the independent work, he implements his initiative and on this basis develops ability to pedagogical creativity.

Based on the above, we can conclude that in the classroom work, which is carried out in order to form the readiness of students to nurture a healthy lifestyle of schoolchildren, it makes sense to focus primarily on the interdisciplinary links of reproductive and search nature. Organizing the independent work of the corresponding orientation, teachers of high schools should give preference to establishing interdisciplinary links of search and creative nature.

As mentioned at the beginning of the article, in addition to the classroom and independent work of students, the third important component of the activity, which implements the formation of readiness of the Faculty of Physical Culture students to form a healthy lifestyle of schoolchildren, is the vocational and pedagogical practice. Drawing parallels between the aspects of students' activities in education and the functions of teachers in the educational institution, we can state that the pedagogical practice of students corresponds to the actual professional function of teachers [3; 5; 6].

Pedagogical practice, carried out on the basis of comprehensive institutions with a break from classroom learning for quite a long period, acts as a method of understanding by students the essence of the professional

activity of the teacher. During the practice, it is possible to:

- to get acquainted with different types of comprehensive institutions and the specifics of their work;

- apply psychological, pedagogical and special theoretical knowledge in a particular educational activity;

- to realize the needs of proficiency in the ability to integrate knowledge in order to solve specific pedagogical problems, to understand the importance of obtaining theoretical knowledge;

- master the knowledge and gain the experience in organizing and conducting educational work.

In the process of pedagogical practice, students' cognitive activity is improved on the basis of meaningful factual material, knowledge and effective development of which is possible in the presence of ideas about the school life, the essence of student and teaching staff, its functions, capabilities, etc. However, the real actual material requires ordering, generalization and reflection on the ideas of science, laws and patterns of educational process, methods of teaching a particular special discipline. The process of cognition during the period of pedagogical practice is characterized, on the one hand, by the fact that the theoretical knowledge obtained deepens and acquires the nature of practical necessity, and on the other hand, the school experience is constantly qualitative changes both in the educational process and in issues outside of school. The experience of observation and participation in the educational process creates new needs, adjusts the way of thinking, behavior, attitudes of students to teaching.

Thus, the importance of pedagogical practice is also in the student's mastering of methods of scientific and pedagogical research, methods of pedagogical observation, experiment, mastering elements of scientific search, since the teacher always has an element of scientific and pedagogical research.

In the process of pedagogical practice at school, the student tries to realize all the functions of the teacher to the extent that he was prepared for the entire previous period of study at the university. Based on this, pedagogical practice performs a number of functions that contribute to the formation of the future teacher's personality, the basics of the individual style of future professional activity.

First of all, pedagogical practice complements and enriches theoretical training of students, giving them the opportunity to consolidate and deepen the knowledge already gained, to use theoretical knowledge to solve practical problems of teaching and educating schoolchildren. Thus, during the period of pedagogical practice there is a process of actualization of theoretical knowledge of students, which involves reproduction, synthesis and generalization of knowledge during the practical activity.

Thus, the final analysis of experimental data revealed significant positive changes in the levels of readiness of PE teachers would-be who were part of the experimental group compared to the control: cognitive, active and motivational. At the end of the pedagogical experiment, it was confirmed that there was a significant difference between the change in the average values of the cognitive component of future physical culture teachers who were in the experimental group (0.4±0.02 points), and the change in the average values of the cognitive component of future PE teachers from the control group (0.275±0.04 points); change in the average values indicator of forming of the active component (0.5±0.025 points) of PE teachers would-be, who were part of the experimental group, and changing in the average values of the indicator of forming the active component (0.065±0.008 points) of PE teachers would-be from the control group; changing the average values of the indicator of forming a motivational component (0,533±0,025 points) of future teachers of physical culture, who were part of the experimental group, and changing the average values of the indicator of forming a motivational component (0,274±0,02 points) of future teachers of physical culture from the control group.

The results of the study show that all indicators of effectiveness of training future teachers of physical culture for the education of healthy lifestyles of younger students at the end of the pedagogical experiment were higher in the experimental group, compared to the control (Table 1).

Table 1 –Dynamics of forming of preparedness components of PE teachers would-be for the education of a healthy lifestyle in younger students, %

Components of preparedness	Experimental group, n = 30						Control group, n = 32					
	Level											
	High		Average		Low		High		Average		Low	
	To	After	To	After	To	After	To	After	To	After	To	After
Motivational	18,33	50	60	50	21,67	0	17,74	30,65	61,29	62,90	20,97	6,45
Cognitive	20	45	65	55	15	0	19,35	35,48	66,13	61,29	14,52	3,23
Active	16,67	61,67	43,33	36,67	40	1,33	16,13	17,74	43,55	46,78	40,32	35,48

Discussion

At the present stage, there is not enough data characterizing the component analysis of the preparedness of future physical education teachers to educate junior students of health culture. There are also not enough techniques aimed at preparing PE teachers would-be to nurture a healthy lifestyle of primary school children.

The developed model of the specified preparation was realized during the forming stage of the experiment. Some of the main provisions of this model stipulated that the preparedness of future PE teachers was ensured through a special organization of the educational process, step-by-step training of students on the basis of the principles of integration of psychological-and-pedagogical, professional (psychophysiological, physical) practical training, creation of necessary pedagogical conditions, addition of the content of disciplines of psychological, pedagogical and professional cycle (pedagogy, psychology, human physiology, hygiene, theory and methods of physical education, etc.) scientific material taking into account the development of science on the education of healthy lifestyles of younger schoolchildren.

The obtained data are consistent with the results of other researchers, especially in the conclusion about the different level of preparedness of PE teachers would-be to the formation of healthy lifestyle in younger students [3; 4]. In addition, there is an opportunity to increase this level in case of using the innovative technologies and techniques containing pedagogical conditions related to the organization, formation and implementation of the content of this direction [2; 6; 9]. In particular, the gender approach used takes into account the individual characteristics of students, as well as the motivation, knowledge, skills, personal qualities of PE teachers to implement health education.

At the same time, the effectiveness of the use of criteria and indicators to assess the effectiveness of the future teacher of physical culture, namely cognitive, active and motivational, has been confirmed. The need to use such criteria in determining readiness for a particular activity has been proven by many researchers [5; 6; 8; 9].

Conclusions

1. An important condition for improving the readiness of students of the Faculty of Physical Culture to provide schoolchildren with the ability to lead a healthy lifestyle, in addition to focusing students on existing features in the implementation of the relevant function, it is necessary to provide interdisciplinary links of reproductive, search and creative nature, to evaluate cognitive, motivational and active components of this type of professional pedagogical training, as well as the implementation of independent work and pedagogical practice.

2. The defining in the process of pedagogical practice is the integration of theoretical knowledge and practical skills, its content is adjusted in accordance with future professional activities in the context of educating a healthy lifestyles of primary schoolchildren and involves the use of physical education technologies for the formation of spiritual, mental and physical aspects of health, valeological analysis, determination of the health status of schoolchildren, assistance in the development of an individual program of health orientation.

Conflict of interest. The authors declare no conflict of interest

References

1. Галаманжук Л. Л., Єдинак Г. А. Основи наукових досліджень : навч.-метод. посібник. Кам'янець-Подільський : Рута, 2019. 150 с.
   Galamanzhuk, L. L., Iedynak, G. A. (2019), *Osnovy naukovykh doslidzhen'* [Fundamentals of scientific research]. Ruta Printing House LLC, Kamianets-Podilskyi, 150 p. [in Ukraine].
2. Заікін А. В. Інноваційні підходи до підготовки спеціалістів з фізичної культури. Вісник Чернігівського державного педагогічного університету імені Т. Г. Шевченка. 2008. Випуск 55. Т. 1. С. 160–163.
   Zaikin, A. V. (2008), "Innovaciyni pidhody do pidgotovky specialistiv z fizychnoi kultury" [Innovative approaches to training specialists of physical culture]. *Bulletin of Taras Shevchenko Chernihiv State Pedagogical University,* Issue 55 (1), pp. 160-163. [in Ukraine].
3. Імас Є., Василенко М. Діагностика сформованості праксеологічного компонента професійної компетентності майбутніх фітнес-тренерів у закладах вищої освіти. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. 2019. Випуск 13. С. 34–39. doi: 10.32626/2227-6246.2019-13.34-39.
   Imas, E., Vasylenko, M. (2019), "Diahnostyka sformovanosti prakseolohichnoho komponenta profesiynoyi kompetentnosti maybutnikh fitnes-treneriv u zakladakh vyshchoyi osvity" [Diagnosis of the formation of the praxeological component of professional competence of future fitness trainers in higher education institutions]. *Bulletin of Kamianets-Podilskyi National Ivan Ohiienko University: Physical education, sports and human health.* Issue 13, pp. 34–39. doi: 10.32626/2227-6246.2019-13.34-39 [in Ukraine].
4. Комар А. О. Проблема готовності майбутніх учителів фізичної культури до позакласної роботи з молодшими школярами. Психолого-педагогічні проблеми сільської школи. 2015. Випуск 52. С. 31–36.
   Komar, A. O. (2015), "Problema hotovnosti maybutnikh uchyteliv fizychnoi kul'tury do pozakiasnoi roboty z molodshymy shkolyaramy" [The problem of readiness of future physical education teachers for extracurricular activities with primary school students]. *Psychological and pedagogical problems of rural school*, Issue 52, pp. 31-36. [in Ukraine].
5. Кремень В. Г. Підготовка вчителя в умовах переходу загальноосвітньої школи на новий зміст, структуру і 12-річний термін навчання. Вища школа, 2003. Випуск 1. С. 3–11.
   Kremen, V. H. (2003), "Pidhotovka vchytelya v umovah perehodu na novyi zmist, strukturu i 12-richnyi termin navchanya" [Teacher training in transition secondary school for a new content, structure and 12-year term of study]. *High school*, Issue 1, pp. 3–11. [in Ukraine].

6. Носко М. О. Здоров'язбережувальні технології у фізичному вихованні : монографія. Київ : СПД Чалчинська Н. В., 2014. 340 с.
Nosko, M. O. (2014), *Zdorov'yazbereguval'ni tehnologii u fizychnomu vyhovanni* [Health technologies in physical education]. SPD Chalchynska N. V., Kyiv, 340 p. [in Ukraine].
7. Мельник А. О. Сутнісний зміст позакласної роботи учителів фізичної культури у початковій школі. Наукові записки. Серія : Педагогічні науки. 2015. Випуск 141(II). С. 183–186.
Melnyk, A. O. (2015), "Sutnisnyi zmist pozaklasnoi roboty uchyteliv fizychnoi kul'tury u pochatkoviy shkoli" [The essential content of extracurricular work of physical education teachers in primary school]. *Proceedings. Series: Pedagogical sciences*, Issue 141(II), pp. 183–186. [in Ukraine].
8. Сущенко Л. П. Про професійне самовизначення майбутніх фахівців фізичного виховання та спорту. Педагогіка і психологія формування творчої особистості: проблеми і пошуки. 2004. Випуск 31. С. 383–389.
Sushchenko, L.P. (2004), "Pro profesiyne samovyznachenyf maybutnych fahivciv fizychnogo vyhovannya ta sportu" [About professional self-determination of the future specialists in physical education and sports]. *Pedagogy and psychology of creative personality formation: problems and searches*, Issue 31, pp. 383–389 [in Ukrainian].
9. Шиян Б. М. Теоретико-методичні основи підготовки вчителів фізичного виховання в педагогічних навчальних закладах : автореф. дис.... д-ра пед. наук : 13.00.04 Ін-т педагогіки і психології професійної освіти АПН України. Київ, 1997. 45 с.
Shyian, B. M. (1997), "*Teoretyko-metodychni osnovy pidhotovky vchyteliv fizychnogo vyhovannya v pedagogichnyh zakladah*" [Theoretical and methodological bases of physical training teacher in pedagogical educational institutions]: abstract of the dissertation of the doctor of pedagogical sciences: 13.00.04 Institute of Pedagogy and Psychology of Vocational Education of the Academy of Pedagogical Sciences of Ukraine. Kyiv. 45 p. [in Ukraine].
10. Шкребтій Ю. М. Про врегулювання системи фізичної культури і спорту в Україні. Реалізація здорового способу життя – сучасні підходи. 2005. С. 13–26.
Shkrebtii, Yu. M. (2005), "Pro vregulu'vanya systemy fizychnoi kul'tury I sportu v Ukraini" [About the regulation of the system of physical culture and sports in Ukraine]. *Realizatsiia zdorovoho sposobu zhyttia – suchasni pidkhody*, pp. 13–26. [in Ukraine].

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METHODS OF MOTOR SKILLS AND ABILITIES DEVELOPMENT OF JUNIOR SCHOOLCHILDREN IN EXTRACURRICULAR GAME ACTIVITIES

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Kozibrotskyi S., Hrytsiuk S. Methods of motor skills and abilities development of junior schoolchildren in extracurricular game activities

Abstract. The new Ukrainian school, which is focused on active learning, search and creativity of primary school age children, is aimed to teach productive leisure and fill it with activities for diverse development. The quests have a significant potential of extracurricular activities in the direction of educating the intentions for systematic improvement of motor skills and abilities. *Methods of the research.* The purpose of the study is to theoretically substantiate the methods of motor skills and abilities development of junior schoolchildren in extracurricular game activities using quests. For this goal, the following research methods were used: analysis of psychological and pedagogical literature, medical, biological and special literature methods, methods of comparison and systematization of information (to justify the starting points of the study, generalization of available data). *Results of the research*. The key structural elements and functions of the cognitive object were identified. They are reflected in the model of motor skills and abilities development of junior schoolchildren in extracurricular game activities. For achieving the effectiveness of research and experimental work on the development of motor skills and abilities of junior school children, led to a set of key interconnected elements of the structural-functional model, which are represented by the following blocks: target, content-process and results. *Conclusions.* Modeling the development of motor skills and abilities made it possible to determine the main components of this complex process: purpose, objectives, methodological foundations, principles and pedagogical conditions of implementation, age characteristics of junior schoolchildren, specifics of extracurricular game activities (in the form of quests), criteria, indicators, levels of motor skills and abilities development.

Key words: quests, extracurricular activities, motor skills and abilities.

Introduction

The younger school age is the most sensitive period of ontogenesis in the formation and improvement of knowledge, skills, in particular motor skills, and abilities necessary for everyday and future professional life. That is why the main tasks of general secondary education institutions include the task of updating the pedagogical conditions of physical culture and health-improving work with students of this age in order to make optimal use of opportunities to improve their physical activity.

The new Ukrainian school, which is focused on active learning, search, creativity of children of primary school age, taking into account the conditions of reducing the time allotted for homework, is aimed to teach productive leisure, fill it with activities for diverse development [1].

Scientific research and experimental work with younger students show significant potential of extracurricular play activities in the direction of educating the desire for systematic improvement of motor skills and abilities [2; 5].

During games, children practice motor activities without much tension, emotionally respond to motor tasks, have fun. The task of the teacher is to give the game extracurricular activities the nature of voluntary regularity. Actually, that younger students, themselves willing to attend these classes, become active participants in prolonged play activities, because only such a «repetition without repetition» is able to ensure the development of motor experience and the need for an active motor lifestyle [1; 5].

Material and research methods

The purpose of the study is to substantiate theoretically the methodology of development of motor skills and abilities of junior schoolchildren in extracurricular play activities using quests.

To achieve this goal, the following research methods were used: analysis of psychological and pedagogical literature, life sciences and special literature, comparison, systematization of information (to justify the initial provisions of the study, generalization of data), statistical research methods [7].

Results

An effective method of scientific knowledge that can provide its theoretical level is modeling. In the course of studying any phenomenon or process, in any field of science, there comes a point when there is a need to consider the object and subject of the study holistically and thoroughly, based on an analytic and synthetic approach.

All these characteristics of the models used in the pedagogical field, we took into account when creating of a model of development of motor skills and abilities of primary schoolchildren in extracurricular activities. In order to ensure the objectivity, productivity and

realism of the modeling process, significant preparatory work was carried out, which consisted in the analysis of methodological theories and concepts, research and methodological sources. The pedagogical experience of extracurricular work, conducting playing activities of physical training direction was also studied and generalized. The analysis of empirical stated studies of motor skills and abilities of junior schoolchildren, of their motor and cognitive interests was carried out.

Based on this work, the key structural elements and functions of the object of knowledge, which are reflected in the model, were identified (Fig. 1).

The direction to achieve the effectiveness of experimental work on the development of motor skills and abilities of primary school students, led to a set of key interconnected elements of the structural-and-functional model, which can be represented by the following blocks: target, meaningful procedural, effective.

As for the components of the defined blocks, here we note this. The central component of the model is the target unit. In fact, all components of the experimental system are consolidated around the purpose of the process studied, complementing each other and synergizing efforts to implement it. Although the method of creation, the purpose, as an idea of the result of an activity or process, is a subjective product, the sources of its origin are objective.

Along with contradictions, causes, social factors that determine the need for this process, methodological approaches to understanding the process, activities, and phenomena play a significant role.

We have identified and formulated the essence of the purpose of the study as the development of motor skills and abilities of younger students. Under the development of motor skills and abilities, we understand the progressive gradual expansion of the ability of conscious and automated management of motor actions, opportunities, as needed, to actualize inventively and rationally a holistic executive functional system for the productive implementation of necessary (complicated by life circumstances) motor tasks.

All this is objectively realized while tasks are being executed: expanding the motor experience of junior schoolchildren, improving the skills of vital motor actions, their use in everyday and play activities, and effective solution of motor tasks in life, non-standard and modified situations.

The content-and-procedural block includes elements that are designed to implement certain goals and objectives that can be widely interpreted as means and methods of activity. This is what gives these elements a functional nature. In our study, they all come together around a leading process – extracurricular play activities. We interpret this phenomenon as a prolonged pedagogically modeled entertaining action in a specially organized game environment, which takes place in extracurricular time and is built on the principles of interactivity, creativity, exercise. The specifics of extracurricular play activities within our study mainly affect the implementation of motor actions by younger students, the performance of motor tasks, the improvement of motor skills and abilities.

To test experimentally the possibilities of extra-curricular play activities in the development of motor skills and abilities of primary school students, we used the ideas of quest approaches to the organization of extracurricular activities.

Focusing on quests, rather than on moving games in their classic manifestation, is due to a number of characteristic that largely distinguish both types of game activity. Based on the analysis of quests and moving games, it was determined that both phenomena have many positive qualities for physical education of younger students. In particular, for our study, their ability on the basis of emotionality and interest to create a variety of long-term situations for the use of motor skills and abilities, manifestation of relevance has a special value. In the game activities of both types there is a large space for choosing a variety of ways to overcome difficulties and obstacles in motor actions arising on the way to fulfillment of the goals, conditional modeling of life situations.

However, the quests are endowed with greater opportunities for the implementation of didactic tasks for the development of motor skills [4; 6].

First, it concerns the presence of a much more complexity than in the motor game, a plot that has a certain consistency, tension in the way of intellectual tasks, culmination, and game shell in the form of a description of circumstances, time, space and roles with a certain entourage. Players are conventionally transformed into travelers, Cossacks, Indians, pirates, treasure seekers, cowboys, Aboriginal people, climbers, athletes, rescuers and other characters of interest of

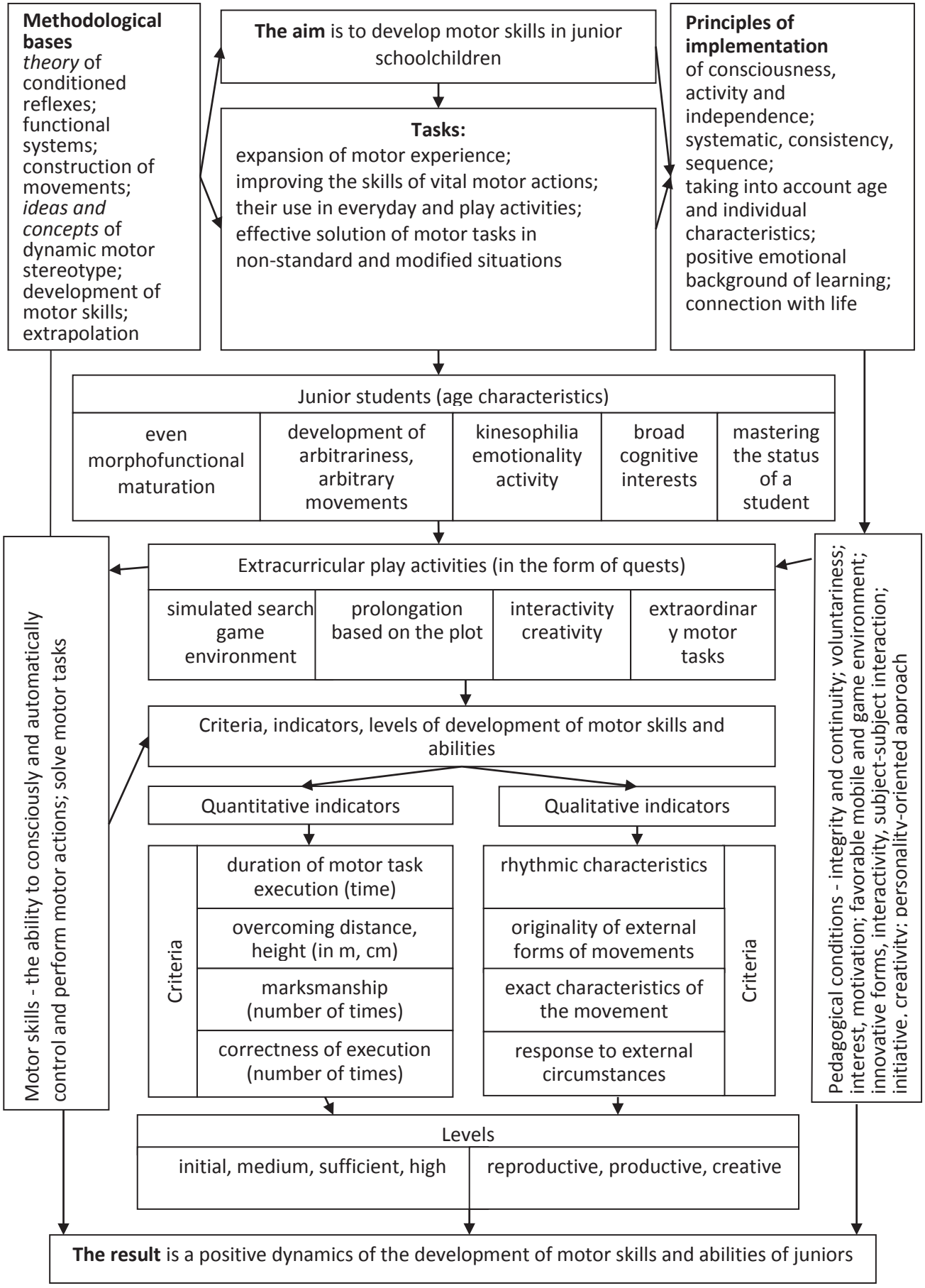

Fig. 1 Model of development of motor skills and abilities of junior schoolchildren in extracurricular playing activities

children of this age. Such a plot-designed game action causes a fuller sharpness of feelings and aspirations of younger students. It reminds children of computer games with «wanderers», trials, confrontation.

Secondly, the division into teams puts children in a situation of rivalry, the desire to fully discover their motor capabilities. On the other hand, team interaction is able to cultivate in younger students the traits of camaraderie, mutual assistance, cooperation.

Thirdly, quests create a much more space for creative use of motor skills. Schoolchildren also find themselves in such circumstances, when they have to invent their own motor tests for rivals. Rules are created in the course of game actions as a necessity of ensuring the safety of participants. Instead, in moving games, participants are regulated by strict rules, which causes their even repetitiveness.

Fourthly, the quest, according to its structure, involves long-term activities to achieve goals. It is perceived as a whole, as a step-by-step, systematized and logically determined movement to perform the game tasks. The quest can have a long, prolonged nature. The mega-quest is able to include a whole set of assonant with the topic of quest classes.

Fifthly, the simultaneous unanimous advancement of all players along the route determines a significant motor density of the quest session. They almost always perform the same tasks at the same time, as they have to move the whole team. In the course of moving games mainly in active movement are actualized participants who in the order perform the tasks, which are especially shown in relay games.

Sixth, the quests involve the movement of players in a large territories in nature (park, forest, meadow, etc.), city or villages streets, in a stadium bounded by a certain conditional border. Such a spatial range activates the game participants to fast motion. The questors, knowing that another team is moving alongside, can hastily overcome significant distances. Moving games are held in a limited small area in the gym or on the sports ground, which to some extent deprives the game actions of novelty and unexpectedness.

The development of content, forms, varieties, ways of implementing extra-curricular play activities in the form of quests, as well as in general the implementation of goals and tasks aimed at developing motor skills and abilities of primary schoolchildren, should be based on certain principles and experimentally proven pedagogical conditions.

In our opinion, pedagogical efforts in the development of motor skills and abilities of junior schoolchildren in the process of extracurricular play activities should focus on the principles that fully overcome those contradictions that inhibit the motor activities of children of primary school age. In particular, these are: the principle of consciousness, activity and independence; the principle of systematic, consistency, and sequence; the principle of taking into account age and individual characteristics; the principle of positive emotional background of learning; the principle of connection with life

These principles, which are a necessary basis for the implementation of the tasks of developing motor skills and abilities of primary schoolchildren, can be realized through the provision of certain relevant pedagogical conditions.

Based on the analysis and generalization of scientific achievements, during the modeling of the process of development of motor skills and skills in younger students, we have identified such basic pedagogical conditions as: integrity and continuity; voluntariness; interest, motivation; favorable mobile-gaming environment; innovation of forms, interactivity, subject-to-subject interaction; initiative, creativity; personally oriented approach [2].

An important component of the model of development of motor skills and abilities of junior schoolchildren in extracurricular play activities is the effective unit. Its development involved determining criteria, indicators, levels of development of motor skills and abilities. The state of development of vital motor skills and abilities of children of primary school age can be reflected in a variety of quantitative and qualitative indicators.

To test the effectiveness of the developed methodology of the evolution of motor skills and abilities of junior schoolchildren in extracurricular play activities using quests, a pedagogical experiment was conducted. It was attended by 207 second-grades, including 102 students of the control group, and 105 – the experimental group.

Analysis of the results of the pedagogical experiment showed that students of the experimental group reliably ($p<0,001$) improved indicators on all standards of physical preparedness (Table 1).

Thus, the pedagogical experiment showed the high efficiency of the proposed method for the development of motor skills and abilities of junior schoolchildren in extracurricular play activities using quests.

Table 1 – Physical fitness of students of experimental and control groups after pedagogical experiment ($\overline{X} \pm S\overline{x}$)

Indicator	Experimental group (n=105)	Control group (n=102)	Probability of difference, P
BOYS			
Alternating walking and running up to 1000 m (m)	1100±3,13	800±3,89	< 0,001
Running for 30 m (s)	7,1±0,21	7,6±0,25	< 0,001
Shuttle run 4 x 9 m (c)	13,5±0,12	14,3±0,14	< 0,001
Standing long jump (cm)	107±2,21	93±2,31	< 0,001
GIRLS			
Alternating walking and running up to 1000 m (m)	950±3,15	700±3,91	< 0,001
Running for 30 m (s)	7,6±0,23	8,3±0,27	< 0,001
Shuttle run 4 x 9 m (c)	13,9±0,14	14,6±0,16	< 0,001
Standing long jump (cm)	94±2,23	85±2,31	< 0,001

Discussion

The analysis of literary sources showed a significant scientific interest in play activities as a means and method of implementing the tasks of physical education of primary schoolchildren in extracurricular time and a significant assessment of its role in the development of students' motor skills and abilities. The motor activity of game character and the positive emotions caused by it strengthen the physiological processes in the body and improve the work of all its organs and systems. Also effectively affect the development of mental processes, mobilize the will, perseverance in performing various motor tasks. The value of games lies in the fact that the acquired qualities, skills, abilities are repeated and improved in new, rapidly changing conditions.

Our study suggests that the use of quest technologies in the development of motor skills has significant prospects. The positive of those quest technologies is that the interest in complex motoring tasks increases due to concernment and emotional satisfaction; decreases the anxiety of younger students for the results of the implementation of the necessary motor actions; modeled difficulties cause children excitement, desire to demonstrate all their opportunities to overcome obstacles.

The generalization of the results of the pedagogical experiment gives reason to assert the effectiveness of the proposed methodology for the development of motor skills and abilities of junior schoolchildren in extracurricular play activities using quests, as evidenced by the probable improvement of physical fitness indicators ($p<0,001$).

The data obtained are to some extent confirmed by the results of other researchers [2; 4; 6]. In particular, they noted that the teacher's work is multifaceted; it is not limited to lessons. The obtained data are to some extent confirmed by the results of other researchers [2; 4; 6]. In particular, they note that the work of a teacher is multifaceted, it is not limited to lessons. One of the components is extracurricular activities that involve the use of various forms of organization. Nevertheless, the children are most interested in the game: anyone can play it, the actions of each player are valuable, not so important physical qualities as the necessary wit, the ability to make decisions quickly and act in the team. The quest is such game. In the quest, the tasks make children think, find a way out of difficult situations, which contributes to the development of their logical thinking, intelligence, children learn to cooperate and communicate productively with their peers.

At the same time, we note that despite the ability to solve different tasks, the use of quests also contributes to the development of physical qualities of primary schoolchildren. This is evidenced by the result obtained. It strengthens the argument in favor of the necessity, expediency and effectiveness of the use of quests by younger students in solving different problems.

Conclusions

Modeling the development of motor skills made it possible to determine the main components of this complex process: purpose, objectives, methodological foundations, principles and pedagogical conditions of implementation, age characteristics of primary school students, specifics of extracurricular play activities

(in the form of quests), criteria, indicators, levels of motor development skills and abilities. All of them are interconnected and under the conditions of successful implementation are able to provide objectively the main result – the positive dynamics of the development of motor skills and abilities of junior schoolchildren. We see prospects for further research in the modeling of quests depending on their plot and location.

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

References

1. Аксьонова О. Нова фізична культура або школа розумного руху. Теорія та методика фізичного виховання. 2010. № 12 (74). С. 29–34.
   Aksonova, O. (2010), "Nova fizychna kul'tura abo shkola rozumnoho rukhu" [New physical culture or school of mental movement]. *Theory and methods of physical education,* No 12 (74), pp. 29–34. [in Ukraine].
2. Грицюк С., Козіброцький С. Педагогічні умови реалізації дидактичного потенціалу квестів щодо розвитку рухових умінь навичок молодших школярів. Kelm : knowledge, education, law, management. Lublin : Fundacja Instytut Spraw Administracji Publicznej, 2018. pp. 25–34.
   Hrytsyuk, S., Kozibrotskyy, S. (2018), "Pedahohichni umovy realizatsiyi dydaktychnoho potentsialu kvestiv shchodo rozvytku rukhovykh umin' navychok molodshykh shkolyariv" [Pedagogical conditions for the realization of the didactic potential of quests for the development of motor skills of junior high school students]. *Kelm : knowledge, education, law, management*, pp. 25-34. [in Ukraine].
3. Носко М., Єдинак Г. Передумови персоналізації в розвитку координації учнів початкової школи. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. Випуск 14, 2019.С. 36–40. doi: 10.32626/2227-6246.2019-14.36-40.
   Nosko, M., Iedynak, G. (2019), "Peredumovy personalizatsiyi v rozvytku koordynatsiyi uchniv pochatkovoyi shkoly" [Prerequisites for personalization in the development of coordination of primary school students]. *Bulletin of Kamyanets-Podilskyi Ivan Ogiyenko National University. Physical Education, Sports and Human Health,* Issue 14, pp. 36–40. [in Ukraine].
4. Мальцева О. Шкільний квест: маршрутами здоров'я. Здоров'я та фізична культура. 2013. № 20. С. 18-20.
   Maltseva O. (2013), "Shkil'nyy kvest: marshrutamy zdorov'ya" [School quest: health routes]. *Health and physical culture*, No 20, pp. 18–20. [in Ukraine].
5. Приступа Є. Н. Українські народні ігри : монографія. Львів : ЛДУФК, 2012. 431 с.
   Prystupa, Ye. N. (2012), *Ukrayins'ki narodni ihry* [Ukrainian folk games]. LDUFK, Lviv, 431 p. [in Ukraine].
6. Сокол І. М. Класифікація квестів. Педагогіка формування творчої особистості у вищій і загальноосвітній школах. 2014. Вип. 36 (89). С. 369–374.
   Sokol, I. M. (2014), "Klasyfikatsiya kvestiv" [Classification of quests]. *Pedagogy of formation of creative personality in higher and general education schools*, Issue 36 (89), pp. 369–374. [in Ukraine].
7. Шиян Б. М., Єдинак Г. А., Петришин Ю. В. Наукові дослідження у фізичному вихованні та спорті : навч. посіб. Кам'янець-Подільський : ПП Видавництво «Оіюм»», 2012. 280 с.
   Shiyan, B. M., Iedynak, G. A., Petryshyn, Yu. V. (2012), *Naukovi doslidzhennya u fizychnomu vykhovanni ta sporti* [Scientific research in physical education and sports]. PE Oyum Publishing House, Kamianets-Podilsky, 280 p. [in Ukraine].

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THE DEVELOPMENT LEVEL OF POWER ABILITIES AT 12–13 YEAR OLD PUPILS

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One of the components of physical preparation is the level of muscle strength development, which is the basic quality for effective performance of different types of motor activities. In the process of physical education it is important to ensure the necessary level of pupils' force preparation, because power abilities are the key to harmonious, comprehensive development of pupils, contribute to more effective and correct formation of motor skills, are the basis for development of other physical qualities. Therefore, determining the level of development of strength qualities at secondary school pupils is a topical issue and needs to be studied. *Purpose:* to determine the development level of power abilities at the 7th–8th grades pupils. *Material and methods:* 56 pupils of the 7th–8th grades of the middle school took part in the research. Such methods as theoretical analysis and generalization of scientific methodological literature, pedagogical testing and methods of mathematical statistics were used during the research**.** *Results:* the level of development of strength qualities at middle school pupils was determined by the indicators of hand muscles strength, abdominal press, high-power and speed qualities. Standards of physical culture curriculum and tests, proposed by L. P. Serhiienko, were used. The data comparison of power abilities development in sexual, age aspects and with corresponding norms was presented. *Conclusions:* it was established that indicators of the development level of power qualities at 12–13 year old boys are higher than girls have in the sexual aspect; the results of secondary school pupils are increasing with age; comparison with the relevant norms found that the results correspond to the "average" level, which indicates the need for purposeful pedagogical influence in the direction of comprehensive force training of secondary school pupils.

Keywords: power abilities, pupils, physical education, indicators, research.

Introduction

Current living conditions contribute to an increase in the deficit of physical activity in schoolchildren, which adversely affects their development and health [2, 6, 15, 16, 20].

It is possible to affect the somatic health of children by increasing motor activity and improving the level of physical preparedness [5, 13, 19].

I. P. Maslyak, O. V. Vyshnia, D. S. Hryda [7], A. Aghyppo, S. Tkachov, O. Orlenko [14] notes that the organization of the process of physical education in schoolchildren requires special attention, because this age is characterized by the formation of basic systems of the body, the formation of a stable habit of systematic exercise, is sensitive to the development of physical qualities and to the formation of motor skills and abilities.

One of the components of physical fitness is the level of development of muscle strength, which is the basic quality for the effective performance of various types of motor activity [1, 4, 9, 17].

According to L. P. Sergienko [11], N. Sorokolit [12], in the process of physical education, it is important to ensure the necessary level of strength training of students, since strength is the key to harmonious, comprehensive development of schoolchildren, contribute to the more effective and correct formation of motor skills and abilities, is the basis for the development of other physical qualities.

The analysis of domestic and foreign scientific literature showed the presence of a significant number of works devoted to the study of the level of development of strength abilities of middle-school students [1, 3, 4, 10, 12, 17, 18].

However, determining the level of development of strength qualities of primary schoolchildren remains an urgent issue and requires further study.

Material and research methods

The purpose of the study: to determine the level of development of strength qualities in schoolchildren of 7-8 grades.

The study involved 56 students of 7–8 grades (23 boys and 33 girls) of the general secondary education institution in Kharkiv. Such methods of research as theoretical analysis and generalization of scientific and methodological literature, pedagogical testing and methods of mathematical statistics were used.

The analysis of literary sources was carried out in order to study the state of the problem studied and determine the degree of relevance of the issue.

The level of development of strength qualities of middle-school students was determined by the indicators of arm muscle strength, abdominal press and speed-strength qualities. The standards of the curriculum "Physical education at school. Grades 5-9'' [8] and tests offered by L. P. Sergienko, were used [11].

The materials obtained as a result of the study were processed using the methods of mathematical statistics. The calculation was performed using Microsoft Office Excel spreadsheets for computer data analysis.

Results

Studying the results of sit-ups for 30 s of students of 7–8 grades in sexual aspect (Table 1), it should be noted that the boys show better results than girls do. At the same time, schoolchildren of the 7th grade have a significant differences (p<0,001).

Analyzing the indicators of flexion and extension of the arms in a lying position (push-ups) in the studied contingent in the gender aspect (Table 1), it should be noted that the boys have reliably higher results than girls do (p<0,001).

Comparing the data of high-speed and strength qualities based on the results of standing long jump and the distance ball throw of the students aged 12–13 gender relatively (Table 1), it should be noted that the boys perform the exercises better than the girls do. In this case, the differences are significant (p <0,001).

Tabl 1 – Comparison of indicators of strength qualities of pupils of 7–8 grades in sexual aspect

Sex	n	Sit-ups for 30 sec, number of times	Flexion and exten-sion of the arms in the lying position (push-ups), number of times	Standing long jump, cm	The distance ball throw, m
		$\bar{X}$ ± m			
Grade 7					
B	11	19,27±0,78	19,91±1,24	161,00±4,40	27,55±1,03
G	17	15,00±0,59	10,24±0,70	133,76±2,33	15,65±0,53
t		4,38	6,78	5,47	10,24
p		<0,001	<0,001	<0,001	<0,001
Grade 8					
B	12	20,00±1,05	21,75±1,67	167,00±3,38	30,33±1,28
G	16	17,94±0,68	11,06±0,88	136,00±4,53	17,56±1,08
t		1,64	5,66	5,48	7,63
p		>0,05	<0,001	<0,001	<0,001

Tabl 2 – Comparison of indicators of strength qualities of schoolchildren aged 12–13 in age aspect

Age	n	Sit-ups for 30 sec, number of times	Flexion and exten-sion of the arms in the lying position (push-ups), number of times	Standing long jump, cm	The distance ball throw, m
		$\bar{X}$ ± m			
Girls					
12	11	19,27±0,78	19,91±1,24	161,00±4,40	27,55±1,03
13	12	20,00±1,05	21,75±1,67	167,00±3,38	30,33±1,28
t		0,56	0,88	1,08	1,69
p		>0,05	>0,05	>0,05	>0,05
Дівчата					
12	17	15,00±0,59	10,24±0,70	133,76±2,33	15,65±0,53
13	16	17,94±0,68	11,06±0,88	136,00±4,53	17,56±1,08
t		3,25	0,74	0,44	1,60
p		<0,01	>0,05	>0,05	>0,05

An analysis of the flexion and extension of the arms (push-ups) in the lying position, standing long jump and the distance ball throw in the age aspect (Table 2), found that the data of 13-year-old students are slightly higher than the results of twelve-year-old schoolchildren. However, there are no significant differences (p>0,05).

Comparing the indicators of sit-ups for 30 sec for the students aged 12–13 with the assessment scale presented in the state program of physical culture [8], it should be noted that the results correspond to a "sufficient" level. The exception is the data of 7th grade girls, in which they correspond to the "average" level.

The comparison of the results of arms' flexion and extension in the lying position (push-ups) in the studied contingent with the norms offered by L. P. Sergienko [11] showed that they are equal to the assessment of "unsatisfactory" in boys and the assessment of "satisfactorily" in girls.

Comparing the standing long jump data of schoolchildren of grades 7-8 with the norms of the curriculum on physical culture [8], revealed that the results correspond to the "average" level. Except for the indicators of the 7th grade boys, in which they are equal to the "sufficient" level of competence.

The results of the distance ball throw in students aged 12–13 compared to the assessment scale presented in the curriculum on physical culture [8], showed a "sufficient" level of competence in the development of this quality. Thus, the level of development of strength qualities of middle-school students corresponds to the "average" level.

Discussion

The issue of the development of strength qualities is one of the most relevant in the process of physical education of schoolchildren. A number of authors also point out that insufficient development of strength is the cause of various impaired corset function, development of respiratory and cardiovascular diseases, obesity, etc. Difficulties in adapting to learning conditions, overloading students with insufficient strength training occur much more often [4, 9, 12, 22]. According to V. A. Romanenko [10], strong abdominal muscles ensure the effective work of internal organs, help to prevent hernias; well-developed back muscles prevent spinal injuries.

Strength training is important for students of the main school, because this period is quite favorable for learning movements and education of physical qualities, strength abilities in particular. This is so because, on the one hand, at this age, the indicators of the body's systems are close to those of adults, and on the other hand, there is enough flexibility and propensity to perceive pedagogical influences [3, 9, 11, 17, 21]. This opinion coincides with the research of M. A. Mameshina [6], who notes that in schoolchildren aged 14–15 years the indicators of strength development improved more significantly compared to other age groups (by 31. 8% in boys and 30.5 % in girls).

Considering the studied indicators of the level of development of strength qualities in the gender aspect, it should be noted that the results of the boys are generally significantly better than the results of the girls. The data of the study coincide with the results of domestic and foreign authors D. O. Gubareva, I. P. Maslyak [2], N. V. Krivoruchko, R. V. Lisina [4], M. Joksimović, Z. Németh, I. Skrypchenko, M. Trivun, M. Pantović [18], who note that the indicators of muscle strength between boys and girls differ; the girls' results are lower. In particular, according to V. A. Romanenko [10], before the puberty period ends, sexual differences in the level of development of maximum strength reach 40 %. Based on the above, strength exercises in the process of physical education of school students should be clearly regulated based on sexual differences.

Analyzing the results of the strength of schoolchildren aged 12–13 in terms of age, it should be noted that with age, the studied indicators increase. Similar results are observed in the studies of V. Yu. Veremeenko [1], M. A. Mameshina [6], I. P. Maslyak, O. V. Vyshny, D. S. Gryda [7], who note a general tendency to improve the indicators of strength abilities with age.

T. Y. Krutsevych [5] notes that the age-related change in strength is uneven and individual for individual muscle groups. The general development of muscle strength is characterized by the highest growth rates in the period from 9–10 to 16–17 years.

Specialists in physical education and sports note the insufficient level of development of strength qualities of modern schoolchildren. Thus, as a result of research N. V. Kryvoruchko and R. V. Lisin [4], it was established that the level of development of strength in middle-class boys is equal to "average", in girls – "below average" level. I. P. Maslyak, O. V. Vyshnia, D. S. Hryda [7], point out that the overall level of development of the strength

of students of 5-6 grades of regional schools is equal to the assessment of 4 points, which corresponds to the "sufficient level". The research data of V. Yu. Nagornyuk and I. P. Maslyak [9], show that the development of strength in boys aged 12–13 is "below average". L. E. Shesterova, I.O. Kuzmenko, A. L. Medvedev [13], comparing the results of the exercise of flexion and extension of the arms in lying position (push-ups) with the appropriate standards, determined that 7th grade boys performed a control exercise for 1 point, and the girls – for 2 points.

Herewith, according to the results of the study, it was found that the contingent of students studied also has an insufficient level of development of strength qualities, which corresponds to the "average" level. At the same time, the lowest rates are observed in the development of arm muscle strength.

Conclusions

Considering the indicators of the level of development of strength qualities in gender aspect, it should be noted that the results of the boys are significantly better than those of girls. The exception is the data of sit-ups for 30 sec of 8th grade students, where there are no significant differences (p>0,05).

Analyzing the results of strength abilities of schoolchildren aged 12–13 in terms of age, it should be noted that with age the studied indicators increase, but the significance of differences is observed only in the data of sit-ups for 30 sec in girls (p<0,01).

Comparison of the indicators studied with the presented norms showed that the level of development of strength abilities corresponds to the "average" level. The study indicates the need for purposeful pedagogical influence in the direction of comprehensive strength training of school students.

Prospects for further research in this direction may be to increase the level of development of strength qualities of middle school students through the use of modern techniques and innovative exercises in the educational process.

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References

1. Веремеєнко В. Ю. Рухові здібності: методика розвитку сили та силової витривалості у хлопців середнього шкільного віку. *Теорія та методика фізичного виховання*. 2019. № 19(1). С. 3–13. https://doi.org/10.17309/tmfv. 2019.1.01.
   Veremeienko, V. Yu. (2019), "Rukhovi zdibnosti: metodyka rozvytku syly ta sylovoi vytryvalosti u khloptsiv serednoho shkilnoho viku" [Motor abilities: method of strength development and power endurance at boys of the secondary school age]. *Theory and methods of physical education,* 19(1), pp. 3–13. https://doi.org/ 10.17309/ tmfv. 2019.1.01. [in Ukraine].
2. Губарева Д. О., Масляк І. П. Стан рухової підготовленості школярів середніх класів. *Актуальні проблеми фізичного виховання різних верств населення. Збірник наукових праць*. Харків. ХДАФК, 2018. С. 71–83.
   Hubareva, D. O. & Masliak, I. P. (2018), "Stan rukhovoi pidhotovlenosti shkoliariv serednikh klasiv" [State of motor preparedness of secondary school pupils]. *The topical problems of physical education of different segments of the population. Collection of scientific works,* Kharkiv, HDAFK, pp. 71–83. [in Ukraine].
3. Драчук С., Брезденюк О., Дідик Т., Чуйко Ю. Педагогічні технології розвитку швидкісно-силових якостей в учнів 12–13 років. *Фізична культура, спорт та здоров'я нації.* Вип. 8(27), Вид-во ЖДУ ім. І. Франка, 2019. С. 42–49.
   Drachuk, S., Brezdeniuk, O., Didyk, T. & Chuiko, Yu. (2019), "Pedahohichni tekhnolohii rozvytku shvydkisno-sylovykh yakostei v uchniv 12–13 rokiv" [Pedagogical technologies of power and speed qualities development at 12–13 year old pupils]. *Physical culture, sports and health of the nation,* iss. 8(27), ZhSU Publishing House named after I. Franko, pp. 42–49. [in Ukraine].
4. Криворучко Н. В., Лісін Р. В. Рівень розвитку силових та швидкісних здібностей учнів середніх класів. *Актуальні проблеми фізичного виховання різних верств населення*. Харків. ХДАФК, 2019. С. 124–133.
   Kryvoruchko, N. V., Lisin, R. V. (2019), "Riven rozvytku sylovykh ta shvydkisnykh zdibnostei uchniv serednikh klasiv" [The development level of power and speed abilities at secondary school pupils]. *The topical problems of physical education of different segments of the population. Collection of scientific works.* Kharkiv, HDAFK, pp. 124–133. [in Ukraine].
5. Круцевич Т. Ю. Теорія і методика фізичного виховання. Т. 1, Київ: Олімпійська література, 2012. 392 с.
   Krutsevych, T. Yu. (2012), *Teoriia i metodyka fizychnoho vykhovannia* [Theory and methods of physical education]. vol. 1. Olympic literature, Kyev. 392 p. [in Ukraine].
6. Мамешина М. Диференціація змісту навчальних занять з фізичного виховання з урахуванням показників фізичного здоров'я та фізичної підготовленості школярів 7–9-х класів. *Слобожанський науково-спортивний вісник*. 2019. № 6(74). С. 25–31. doi: 10.15391/snsv.2019-6.004.
   Mameshyna, M. (2019), "Dyferentsiatsiia zmistu navchalnykh zaniat z fizychnoho vykhovannia z urakhuvanniam pokaznykiv fizychnoho zdorovia ta fizychnoi pidhotovlenosti shkoliariv 7–9-kh klasiv" [The differentiation of the content of physical education classes taking into account indicators of physical health and physical fitness of the 7th-9th grades pupils]. *Slobozhansky scientific and sports bulletin*, 6(74), pp. 25–31. doi: 10.15391/snsv.2019-6.004. [in Ukraine].
7. Масляк І. П., Вишня О. В., Грида Д. С. Фізична підготовленість учнів середніх класів обласних загальноосвітніх шкіл. *Актуальні проблеми фізичного виховання різних верств населення: матеріали II Всеукраїнської науково-практичної конференції (Харків, 20 травня 2016 р.).* Харків. ХДАФК, 2016. С. 118–127.
   Masliak, I. P., Vyshnia, O. V., Hryda, D. S. (2016), "Fizychna pidhotovlenist uchniv serednikh klasiv oblasnykh zahalnoosvitnikh shkil" [Physical fitness of secondary school pupils of regional comprehensive schools]. *The topical problems of physical education of different segments of the population: materials of the II All-Ukrainian scientific and practical conference*, Kharkiv, HDAFK, May 20, 2016, pp. 118–127. [in Ukraine].

8. Навчальні програми для загальноосвітніх навчальних закладів: Фізична культура. 5–9 класи. Київ. Видавничий дім “Освіта”. 2013. 240 с.
Navchalni prohramy dlia zahalnoosvitnikh navchalnykh zakladiv: Fizychna kultura. 5–9 klasy [Curricula for general education institutions: Physical culture. The 5th-9th grades]. (2013), Education Publishing House, Kyev. 240 p. [in Ukraine].
9. Нагорнюк В. Ю., Масляк І. П. Вплив воркауту на прояв силових здібностей школярів середніх класів. *Актуальні проблеми фізичного виховання різних верств населення. Збірник наукових праць.* Харків. ХДАФК, 2018. С. 194–204.
Nahorniuk, V. Yu., Masliak, I. P. (2018) “Vplyv vorkautu na proiav sylovykh zdibnostei shkoliariv serednikh klasiv” [Influence of workout on the manifestation of power abilities of middle school pupils]. *The topical problems of physical education of different segments of the population. Collection of scientific works,* Kharkiv, HDAFK, pp. 194–204. [in Ukraine].
10. Романенко В. А. Диагностика двигательных способностей. Донецк: Издательство Дон НУ, 2005. 290 с.
Romanenko, V. A. (2005), *Diagnostika dvigatel’nyh sposobnostej* [Diagnostics of motive abilities]. Don NU Publishing House, Donetsk. 290 p. [in Russia].
11. Сергієнко Л. П. Тестування рухових здібностей школярів. Київ: Олімпійська література, 2001. 439 с.
Serhiienko, L. P. (2001), *Testuvannia rukhovykh zdibnostei shkoliariv* [Testing of pupils’ motor abilities]. Olympic literature, Kyev. 439 p. [in Ukraine].
12. Сороколіт Н. Розвиток силових здібностей учнів 5–9 класів в умовах нової навчальної програми. *Молода спортивна наука України*. Т. 2. 2015. С. 282–286.
Sorokolit, N. (2015), “Rozvytok sylovykh zdibnostei uchniv 5–9 klasiv v umovakh novoi navchalnoi prohramy “ [The development of power abilities at pupils of the 5th-9th grades in the conditions of a new curriculum]. *Young sports science of Ukraine*, vol. 2. pp. 282–286. [in Ukraine].
13. Шестерова Л. Є., Кузьменко І. О., Медведєва А. Л. Рівень рухової підготовленості школярів 7–8-х класів. *Актуальні проблеми фізичного виховання різних верств населення: матеріали II Всеукраїнської науково-практичної конференції (Харків, 20 травня 2016 р.).* Харків. ХДАФК, 2016. С. 221–228.
Shesterova, L. Ye., Kuzmenko, I. O., Medvedieva, A. L. (2016), “Riven rukhovoi pidhotovlenosti shkoliariv 7–8-kh klasiv” [The level of motor fitness at the 7th-8th grades pupils]. *The topical problems of physical education of different segments of the population: materials of the II All-Ukrainian scientific and practical conference*. Kharkiv, HDAFK, May 20, 2016, pp. 221–228. [in Ukraine].
14. Aghyppo A., Tkachov S. & Orlenko O. Role of physical education on the formation of a healthy lifestyle outside of school hours. *Journal of Physical Education and Sport*. 2016. 16(2). pp. 335–339.
15. Biddle S. J. & Asare M. Physical activity and mental health in children and adolescents. A review of reviews. *British Journal of Sports Medicine*. 2011. 45(11), pp. 886–895.
16. Ho F. K. W., Louie L. H. T., Wong W. H. S., Chan K. L., Tiwari A., Chow C. B., & Cheung Y. F. A sports-based youth development program, teen mental health, and physical fitness: An RCT. *Pediatrics*. 2017. pp. 15–43.
17. Ivashchenko O., Khudolii O., Yermakova T., & Veremeenko V. Power a bilities: the structure of development in girls of 12-14 years old. *Pedagogics, Psychology, Medical-Biological Problems of Physical Training and Sports*. 2018. 22(4). pp. 195–202. https://doi. org/10.15561/18189172.2018.0405/
18. Joksimović M., Németh Z., Skrypchenko I., Trivun M., & Pantović M. Gender differences in development of explosive power and rapidity in schoolchildren aged 14-15 years old. *The Journal of International Anatolia Sport Science.* 2018. 3(2). pp. 294–304.
19. Krivoruchko N., Masliak I., Bala T., Shesterova L., Mameshina M., Kuzmenko I. & Kotliar S. Physical health assessment of 10–16 year old schoolgirls of the Kharkiv Region of Ukraine. *Research journal of pharmaceutical, biological and chemical sciences (RJPBCS).* 2018. 9(4). pp. 1498–1506.
20. Lonsdale C., Rosenkranz R. R., Peralta L. R., Bennie A., Fahey P. & Lubans D. R. A systematic review and meta-analysis of interventions designed to increase moderate-to-vigorous physical activity in school physical education lessons. *Preventive Medicine*. 2013. 56(2). pp. 152–161.
21. Ortega F. B., Ruiz J. R. & Castillo M. J. Physical fitness in childhood and adolescence: a powerful marker of health. *International Journal of Obesity.* 2008. 32. pp. 1–11.
22. Rasberry C. N., Lee S. M., Robin L., Laris B. A., Russell L. A., Coyle K. K. & Nihiser A. J. The association between school-based physical activity, including physical education, and academic performance: a systematic review of the literature. *Preventive medicine*. 2011. 52. pp. 10–20.

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THE INFLUENCE OF THE EXPERIMENTAL PROGRAM ON THE RESULT OF THE COMPETITIVE ACTIVITY OF ATHLETES IN MILITARY PENTATHLON

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Military pentathlon is one of the most popular sports among servicemen of the Armed Forces of different countries all over the world. However, there is no information about the content and features of the training of such athletes in the available sources and literature. In this regard, a study was conducted and its *aim* was to determine the results of the impact of classes on the author's program on physical, movement training and the results of competitions in military pentathlon. *Material and methods*. The analysis, systematization, generalization, pedagogical testing, experiment and methods of mathematical statistics were used to achieve this goal. The main features of the content used in the experimental and control groups were as follows: the latest used the traditional (typical for the preparation of most teams) structure and content, which is used in various types of multisport race; the author's program took into account specific factors that determine the characteristics of activities and training in this sport. *Results*. After the experiment, the result was obtained and it testified to the effectiveness of the author's program, namely higher than that of athletes in the control group: achievements in competitions of various ranks; development of physical qualities; skills formation in special (military-applied) movement exercises. *Conclusion*. The developed structure and content of training of athletes in military pentathlon should be used in practice but taking into account the rank of competitions, individual characteristics of athletes and the stage of training.

Key words: military pentathlon, training of athletes, experimental program, efficiency of use.

Introduction

Military pentathlon is a relatively young sport for the Armed Forces of Ukraine (AFU). Competitions in this sport are held in five adversarial exercises, namely: slow and high-speed shooting with AK-74, overcoming the obstacle course of the CISM model, swimming 50 m with obstacles, throwing grenades for accuracy and maximum distance, cross-8000 m. Competitions take place within three days.

The analysis of the military pentathlon-training program showed that it is very similar to training programs for other types of all-around athletes. However, the training does not take into account the different condition of the material base and features related to the content of competitive exercises, the specifics of the life of servicemen, their daily routine, other factors that determine the peculiarities of sports training of servicemen in the specified kind of all-around and its difference from other varieties.

The expediency and necessity of improving the educational process of military pentathlon, in particular the development of an appropriate program, is due primarily to the sporting potential of rival teams, the possibility of participation in international competitions, including the World Military Games (under the auspices of the International Military Sports Council). Military pentathlon is an effective means of developing physical qualities, military-applied skills, which in its structure are very similar to the professional activities of servicemen [2; 12; 14; 15].

In addition, the World Competitions among military organizations in pentathlon (military pentathlon), organized by the International Sports Organization «International Military Sports Council» (CISM) and which in recent years is attended by the team of the Armed Forces of Ukraine, is a regular event [13].

At the same time, they found that at the present stage there is virtually no scientific and methodological information on the organization, structure, formation and implementation of the content of military pentathlon training sessions [15].

Insignificant in scope is the material on these aspects of training athletes, but in other types of all-around [3; 7; 9; 16; 17]. However, here we note that the training of athletes in such types of multi-fight differs from the optimal one for athletes in the military pentathlon.

Considering all of the above, we note the actualization of researches aimed at offering the structure and content of training military pentathlets.

Material and research methods

The purpose of the study is to examine the impact of the author's program on the physical fitness and results of adversarial activities of athletes in military pentathlon. The following methods were used during the research: analysis and generalization of scientific, methodical literature, competition protocols; pedagogical, namely observation, testing, experiment; mathematical statistics [1; 18]. Testing involved the use of tests that meet metrological requirements and are widely used in the practice of physical education in higher military educational institutions of Ukraine. The pedagogical experiment involves the formation of two research groups, namely experimental and control.

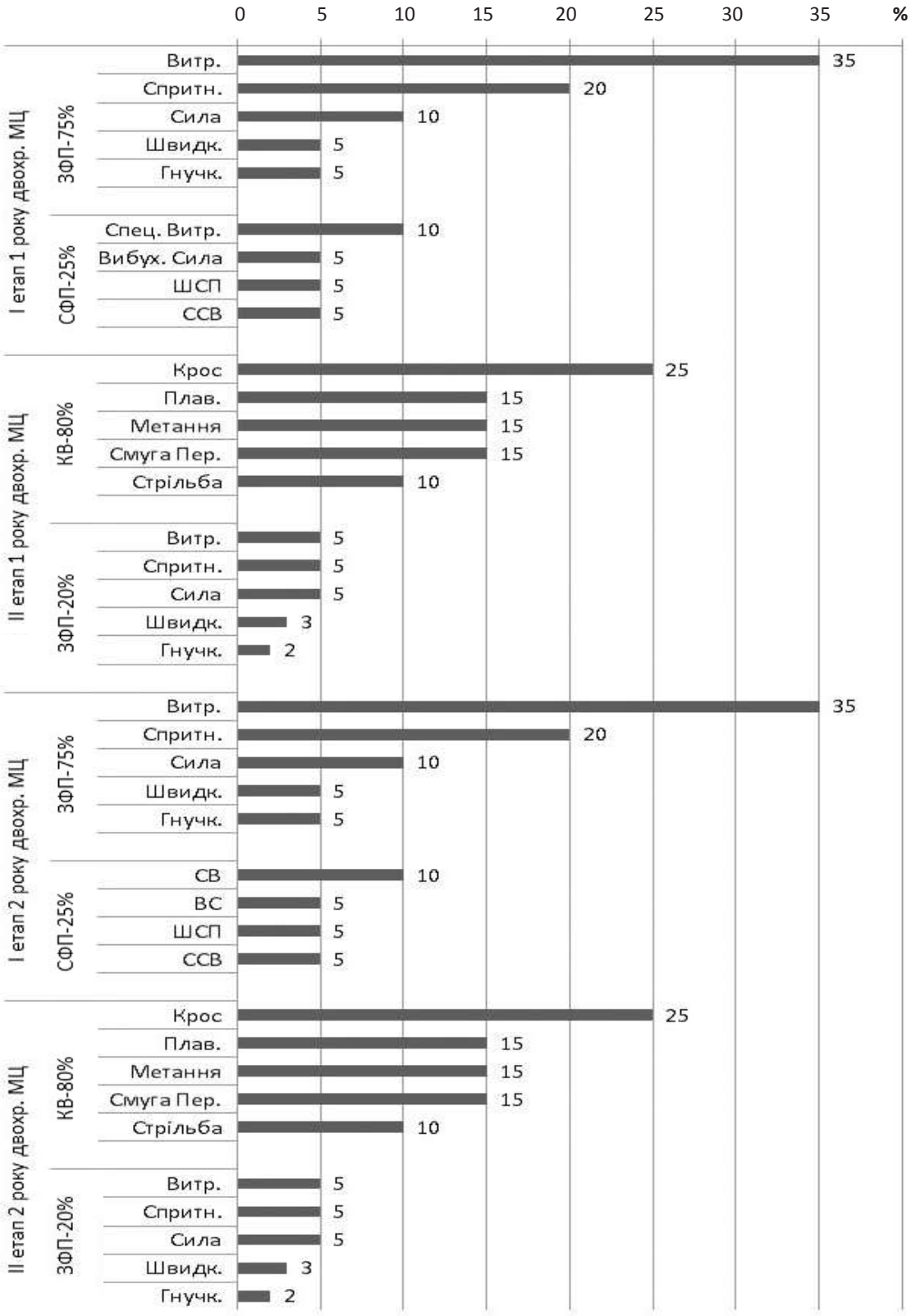

Fig. 1 **Approximate two-year macrocycle for training athletes in military pentathlon, which provides general, special physical training and improvement of technique for performing competitive exercises at the level of motor skills**

The experimental program of training athletes in military pentathlon was developed to solve different tasks, one of the leading ones is to increase the results of the performance of athletes of our higher military educational institution at the competitions. The main organizational conditions for testing the effectiveness of such a program were related to the formative pedagogical experiment.

One of the defining features of the program is the sports training of the military pentathlets in the conditions of insufficient provision of the training process with the necessary material base. Another feature was related to the structure of training, in particular, it provided for two one-year macrocycles, each of which was implemented in two stages (Fig. 1).

In particular, the first stage lasted 5 months from November to March, the main task of which was the development of general and special physical qualities and preparation for the intermediate start – the Championship of the Armed Forces of Ukraine among higher military educational institutions.

The second stage lasted 7 months from April to October, it solved the task of improving the results of control exercises of all-around and preparing for the main start – the World Military Games.

The first stage of the 1st year of the two-year macrocycle included exercises for the general training (75 % of the total time of the period) and 25 % for the special physical training. The second stage of the 1st year of the two-year macrocycle included exercises to improve the results of the control exercises of all-around, which accounted for 80 % of the total training time at this stage, and the remaining 20 % were used for general physical training.

The first stage of the 2nd year of the two-year macrocycle included exercises on the development of qualities provided by general physical training in the amount of 75 % of the total time and 25 % for the development of qualities provided by special physical training.

The second stage of the 2nd year of the two-year macrocycle included exercises to improve the results of adversarial military pentathlon exercise, and their volume was 80 % of the total time of the stage. The remaining 20 % aimed at the development of qualities that were provided for by the content of general physical fitness.

The basis of each macrocycle were microcycles, which were part of mesocycles aimed at solving problems defined by the experimental program. Each microcycle took place during a calendar week, consisted of 6 training sessions for 3 hours each and one day off. At the same time, hydrothermal procedures were carried out twice a month for 2 hours, usually after training on the last training day of the weekly cycle. During the direct preparation for the main start, a three-week training session with two training sessions a day for 3 hours each (before and after lunch) and with hydrothermal procedures at the end of the training in the first two weeks on the last training day of the weekly cycle, were held.

To test the experimental program, an experimental (n=20) and a control (n=20) groups were formed, in which all cadets of the military pentathlon had the same level of sports preparedness. The arrangement was based on the results of preliminary testing using the method of random sampling.

For the maximum objectivity, the control group included athletes from the national teams of higher military educational institutions of the Armed Forces of Ukraine. The initial motivation was provided by stimulating the need to achieve high athletic results in future competitions (the championship of the National Ground Forces Academy, the Ground Forces Championship, the Championship of the Armed Forces of Ukraine, the European and World Championships), and by the completion of sports qualifications. The control group used the traditional content of military pentathlon training (Table 1).

During the experiment, the same number of training sessions were conducted in the research groups, the content of which consisted of exercises from the military pentathlon program.

The discrepancy between the programs used was that the experimental group used the following.

1) During the training, specific exercises were used, that allow to develop and improve physical and special qualities, to form the motor skills necessary for successful performance of technically difficult exercises of military pentathlon, in the absence of possibility of using stationary sports facilities (when sports facilities are placed far outside the educational institution (military training ground)). Thus, when training military pentathlets to overcome obstacles, the following exercise is used. On a flat area (in the gym) equipped track 10-20 m long and 1-2 m wide, in the middle of which a portable obstacle is placed. The exercise is performed as a shuttle run.

Moreover, the length of the segment, the number of repetitions, as well as the height, quality, method of overcoming and the number of obstacles can vary according to the level of physical preparedness of the pentathlets and the tasks of this training period. Gymnastic apparatus (such as pommel horse, gymnastic goat, crossbar), gymnastic benches placed one on top of the other, Swedish wall were used as obstacles. Training with the use of this special exercise was carried out in the preparatory period 1-2 times a week, in the pre-competitive period – 2-4 times a week.

Table 1 – Content of training sessions on the traditional program of training of athletes in military pentathlon (control group)

Discipline of pentath-lon	Used tools
Slow and high-speed shooting from Kal-ashnikov rifle	Study of the tactical and technical characteristics of the weapon, interaction of its parts and mechanisms, rules of handling of the weapon, safety measures and conditions of performance of exercise AK-1. Studying and working out the position for firing lying still, aiming, holding your breath and pulling the trigger. Dry shooting (without a chuck). Improvement of shooting technique without time limit. Study and training of high-speed shoot-ing. Training in shooting under the conditions of AK-1 exercise. Control shooting
Overcoming the ob-stacle course	Study and improvement of running technique with overcoming obstacles, starting positions, move and run-up, technique of running at a distance of 200 m to the obstacle course and 200 m after the obstacle course, studying the technique of turning and over-coming individual obstacles. Improving the technique of overcoming the segment of obstacles for a certain time, several segments of the obstacle course for a certain time. Overcoming the entire band of obstacles at speed. Overcoming the entire obstacle course after running 200m in a certain time. Overcoming the en-tire obstacle course in combination with running for 400m under the conditions of the exercise. In order to develop the physical and special qualities neces-sary for this exercise, used general physical and jumping exercises, running for 200 and 400 m;
Swimming with ob-stacles	Steady swimming, swimming with variable intensity and interval training method, study and improve-ment of technique of arm stroke, start, and overcom-ing obstacles
Throwing grenades for accuracy and dis-tance	Studying the conditions of exercise and safety measures during throwing. Learning how to hold (grab) a grenade while throwing for accuracy and dis-tance. Studying and improving the technique of throwing grenades for accuracy and dis-tance. Training in throwing a grenade for accuracy on a sloping shield. Improving the throwing tech-nique on concentric circles with a gradual increase of distance (20, 25, 30, 35 m). Control throwing of gre-nades for accuracy under the conditions of the exer-cise. Studying and improving the technique of throw-ing grenades for distance. Throwing stones, tennis or stuffed balls. Control throwing;
Cross 8000 m	Continuous running on the distance of up to 15 km, repeated and alternating running for a distance of 400 to 3000 m, downhill running.

During the training of military pentathlets in throwing grenades for accuracy and distance, special throwing exercises were used: small balls (weight 400-600 g) were thrown at the wall of the gym; large stuffed balls (weight 2-5 kg) were thrown from the bottom to the back and from behind the head from one to another. The balls were thrown into ellipses marked on the wall, which were located on one vertical line at different heights. Performing this exercise, first of all, work out throwing in the direction, the purpose of which is to form a skill in throwing grenades without deviation from a given direction (corridor). During training, the width of the corridor was gradually reduced. Then they worked out throwing for accuracy with elliptical circles; the goal is the development of muscle sensitivity necessary for the correct setting of the angle of throw, trajectory and initial velocity of throwing the device and the formation of experience in throwing for accuracy.

During distance grenade throwing training, the weight of the ball was reduced to 300-400 grams. Initially, throwing was worked out to develop the skills in throwing grenades from the run (3-4 steps) without deviation from the specified direction (corridor), with maximum effort. Then practiced throwing along the corridor, defined by two vertical and two horizontal lines – to form the skills of throwing a grenade with maximum effort under the condition of the optimal angle of departure of the device, namely 40 °-50°.

Training in the experimental group on shooting with a Kalashnikov rifle was conducted at an increased distance (up to 120 m) on standard (adversarial) targets, reduced by 20 % targets from the standard distance (100 m), firing on the command of the head of shooting at a certain interval.

During the training of cross-country on 8000 m, such special exercises were used as: running through snow, running on sand, running on tall grass, running uphill and downhill, running up and down stairs, cross-country skiing

Swimming with obstacles according to the expe-rimental program was carried out using the following special exercises: on land – jumping up with the weight; pulling a rubber harness in a tilted position, torso parallel to the ground; pulling a rubber harness lying on the bench with an alternating change of hands; in water – overcoming the raft with resistance (using a rope), swimming with overcoming the tension of the rubber harness, swimming with the brake belt.

2) Different amounts of exercises were used to develop physical qualities, special abilities and the formation of motor skills in a separate training session. This concerned, first of all, the preparatory and pre-competition periods. Most of the time spent on training was dedicated to

running training and general physical training. The latter involved the impact on aerobic, anaerobic capabilities, improvement of muscle strength, strength endurance, different types of coordination. Thus, after running (development of aerobic capabilities) special exercises were used in overcoming obstacles (development of special endurance, formation of motor skills in overcoming obstacles). Before a running exercise (for the development of anaerobic capabilities) used exercises in throwing for accuracy and distance (development of explosive power, formation of motor skills).

3) In the experimental and control groups there were different ratios of volume and intensity of training loads. Thus, in the latter, compared to the first, the amount of training load in running was lower by 17.6 % and, at the same time due to the use of special exercises, the amount of training load to overcome obstacles was increased– by 23.4 % and for throwing – by 19.6 %. The intensity of physical activity in the experimental group, compared to the control group, was greater: during overcoming obstacles – by 129.5 %, throwing grenades – by 76%, running training – by 42,4 %. Increasing the volume and intensity of technically difficult military pentathlon exercises took into account the thesis of the theory of transfer of the training effect, motor skills in particular, namely: the greater the similarity between the structure of motor action studied, and in which the motor skills were previously formed, the easier and faster the training and improvement of the technique of execution of the first will take place after.

4) In the experimental group much earlier began to use control classes, which allowed to evaluate the technique of performing motor actions and exercises of military pentathlon, but primarily which were technically difficult.

The formative pedagogical experiment was conducted on the basis of the National Ground Forces Academy named after Hetman Petro Sahaidachny, its duration was two calendar years.

Results

During the pedagogical experiment, the athletes of the experimental and control groups were examined at the beginning and end. It was found that during the experiment there were changes in the research groups. In all groups, trainers of the Department of Physical Training, who have the same methodical training, conducted training sessions. Therefore, the results of the experiment were interpreted as a consequence of the impact of the factor associated with the programs used on athletes.

The analysis of the indicators after the experiment showed significant changes that occurred in the experimental and control groups, which, at the same time, were marked by different nature and magnitude of changes in the value of the indicator. In particular, in the experimental group significantly ($p<0,05$) increased values in the following indicators: throwing grenades for accuracy, distance throwing grenades, overcoming the obstacle course, running at 400 m, running at 8000 m, standing long jump. In the control group, changes were found in the following: absolute muscle strength as a result of wrist and standing dynamometry, sit-ups, running 100 m, running 8000 m. As for the largest increase in physical fitness in the experimental group, there were noted the results of the 100 m running tests and overcoming the obstacle course – 10.7 % and 19.3 % respectively ($p<0.05$), as well as the result of the standing long jump (increase of 15.5 %; $p<0,05$), and grenades throwing for accuracy (increase 25.9 %; $p<0,01$).

In the control group in the studied indicators, the largest increase in absolute muscle strength as a result of wrist dynamometry was 5.8 % ($p<0,05$), as a result of standing dynamometry – 8.6 % ($p<0,05$), as well as an increase of strength endurance of the abdominal muscles, as a result of sit-ups was 27 % ($p<0.05$), and total endurance as a result of running 8000 m, where the increase was 3.6 % ($p<0.05$).

Consequently, during the research period in the experimental group, there were significant changes in the level of development of the physical qualities determining the effectiveness of competitive activities of the military pentathlets (such as speed and special endurance, explosive strength of the throwing hand), as well as in the level of forming motor skills in overcoming obstacles, and throwing grenades for accuracy. Indicators of maximum muscle strength remained virtually unchanged, except for the increase in relative.In the control group, changes in the indicators of maximum muscle strength and explosive strength of the legs were significant; also showed a positive change in the special qualities of athletes, but it was statistically insignificant, which testified to their remain at previously achieved level.

During the period of training of athletes in the military pentathlon according to the generally accepted methodology, in 2017 our team was on the 4th place in the Spartakiad of the Armed Forces of Ukraine. The results of its competitive activity were statistically better ($p <0.05$) than the results of the teams of the following military universities: Military Institute of Tank Troops of the National Technical University «Kharkiv Polytechnic Institute», the Military Institute of Telecommunications and Informatization, the Military Institute of Kyiv National University and the Institute of Naval Forces of the National University «Odessa Maritime Academy»; did not differ statistically ($p>0.05$) from the results of the Military Academy (Odessa) and the Zhytomyr Military Institute of Radio Electronics; were statistically lower ($p <0.05$) than the results of the team of the Kharkiv National Air Force University.

After the implementation of the experimental program of training athletes in military pentathlon in the period from 2018 to 2019, the competitive activity of our team increased in the ranking of the Spartakiad of the Armed Forces of Ukraine after the experiment, our team moved from 4th to 2nd place.

At the same time, the results of the competitive activity of our national team, in comparison with other teams of the Armed Forces of Ukraine, have changed and looked as follows: the results of the Military Institute of Tank Troops of the National Technical University «Kharkiv Polytechnic Institute», the Military Institute of Telecommunications and Informatization, the Military Institute of Kyiv National University and the Institute of Naval Forces of the National University «Odessa Maritime Academy» remained significantly lower ($p < 0.05$) than obtained by the experimental group; the results of the Military Academy (Odessa) and the Zhytomyr Military Institute of Radio Electronics also became statistically lower ($p < 0.05$) than in the experimental group, and Kharkiv National Air Force University, although remaining higher than in the experimental group, but the discrepancy was considered as statistically unlikely (Table 2).

Table 2 – Results of the performance of national teams of higher military educational institutions at the Championships of the Armed Forces of Ukraine in military pentathlon in 2017-2019, points

Team	The result of years of research						Compare results 2017 and 2018	Compare results 2018 and 2019	Increase for 2019 compared to 2017, %
	2017		2018		2019				
	$\bar{X}$	m	$\bar{X}$	m	$\bar{X}$	m			
Kharkiv National Air Force University	18208,4	44,56	18217,1	57,18	18254,8	38,62	p>0,05	p>0,05	0,3 p>0,05
Military Acade-my(Odessa)	16102,9	94,54	16219	148,06	16122,2	86,93	p>0,05	p>0,05	0,1 p>0,05
Zhytomyr Military Institute	16410,5	71,92	16707,8	114,3	16646,6	38,96	p>0,05	p>0,05	1,4 p>0,05
National Ground Forces Academy	16006,2	74,52	16989,5	42,42	18084	53,27	p<0,05	p<0,05	12,9 p<0,05
Military Institute of Tank Troops of the National Technical University "Kharkiv Polytechnic Institute"	14206	55,91	13538,7	60,3	14368,2	80,5	p>0,05	p>0,05	1,1 p>0,05
Military Institute of Telecommunications and Informatization	14454	47,2	14225,7	38,84	14865	79,46	p>0,05	p>0,05	1,8 p<0,05
Military Institute of Kyiv National University	13572,4	72,31	13686,7	114,69	14091,4	70,72	p>0,05	p>0,05	1,91 p>0,05
Institute of Naval Forces of the National University "Odessa Maritime Academy"	11719,7	47,8	12120,6	56,69	12184,7	65,16	p>0,05	p>0,05	1,93 p>0,05

Discussion

Military pentathlon is gaining more and more popularity among servicemen of the Armed Forces and other paramilitary units of Ukraine. Instead, in the armies of the North Atlantic Alliance, the military pentathlon is quite popular [10; 11; 13]. One of the leading reasons for this is the ability to influence a large number of physical qualities, psychophysiological properties, functional capabilities of the serviceman for their improvement and development. Herewith, such changes contribute to the achievement of a high level of professional training [12; 15].

At the same time, it is impossible to achieve high results in the military pentathlon without constant improvement of the organization, content, ways of implementing this pedagogical process at the stages of preparation of military-athletes for competitions [4; 6-9]. In this regard, based on the available results of our athletes, a program was developed to prepare servicemen-athletes for military pentathlon competitions and experimentally tested its effectiveness in solving the tasks.

During the study, the results were obtained due to a set of reasons. First of all, this concerns the advantage

of the experimental program over the traditional one in increasing the physical fitness of athletes. This was evidenced by changes in the values of indicators of fitness in the research groups, namely, they differed in nature and size. In particular, this concerned the physical qualities that are decisive in throwing grenades for accuracy, distance grenades throwing, overcoming obstacles, running at 400 m, running at 8000 m, standing long jump. Such data are partly confirmed by the results of other researchers [4; 5; 12; 19], namely those indicating the possibility of significantly increasing the level of development, primarily of different types of coordination, explosive power and aerobic endurance of cadets. We also note that one of the leading reasons for this feature is associated with the transfer of the positive training effect [7; 8], and the sensitive period that is characteristic of these physical qualities at the age stage in which the subjects were [5; 17].

Other reasons were associated with the used planning of load parameters, tools and methods of preparation; on the importance and effectiveness of optimal parameters of training loads in a certain period of preparation of athletes for competitions [2; 8].

Conclusions

1. The traditional system of training military pentathlets is based on the approaches that form the basis of training athletes in other types of all-around. This does not help to take into account the differences from the required state of logistics of the training process, the peculiarities of the content of the exercises, the specifics of the life of servicemen, including the routine of the day, other factors that determine the military pentathlon, compared to other existing types of all-around.

2. The experimental program takes into account the certain factors, involves two annual macrocycles with two stages each, where the first stage lasts 5 months (from November to March), is provided for general and special physical training; the second stage lasts 7 months (from April to October) and aims at improving the results of performing the adversarial exercises of military all-around.

3. The experimental program is effective in preparing athletes for the championship of the National Ground Forces Academy and the Armed Forces of Ukraine: the experimental group in 2017 achieved the result of 16006.2 points, while in 2019 – 18084 points, i.e an increase of 12.9% ($p < 0.05$), which was more than the teams of other higher military educational institutions; the level of development of physical and special qualities, functional capabilities, the state of formation of motor skills in competitive exercises has significantly increased.

Further research should be focused at establishing the reasons for the results obtained for the consideration of the structure and content from these positions.

Conflict of interest. The author declares no conflict of interest.

References

1. Галаманжук Л. Л., Єдинак Г. А. Основи наукових досліджень : навч.-метод. посібник. Кам'янець-Подільський : Рута, 2019. 150 с.
   Galamanzhuk, L. L., Iedynak, G. A. (2019), *Osnovy naukovykh doslidzhen*' [Fundamentals of scientific research]. Ruta Printing House LLC, Kamianets-Podilskyi, 150 p. [in Ukraine].
2. Закорко І. П., Журавель О. В., Логвиненко Ю. В., Сверділ Є. В., Каліфський А. М. Спеціальна фізична підготовка : навч.-метод. комплекс. Київ : Знання України, 2010. 51 с.
   Zakorko, I. P., Zhuravel, O. V., Logvinenko, Yu. V., Sverdil, E. V., Kalifsky, A. M. (2010), *Spetsial'na fizychna pidhotovka* [Special physical training]. Knowledge of Ukraine, Kyiv, 51 p.
3. Кирпенко В. М., Корчагін М. В., Одінаєв О. К. та ін. Аеронавтичне багатоборство : навч.-метод. посіб. Харків : ХНУПС, 2016. 168 с.
   Kirpenko, V. M., Korchagin, M. V., Odinaev, O. K. (2016), *Aeronavtychne bahatoborstvo* [Aeronautical all-around]. KhNUPS, Kharkiv, 168 p.
4. Ленарт Д., Романчук С., Андрес А., Лесько О., Романів І. Оптимізація навчально-тренувального процесу військових п'ятиборців в умовах недостатнього навчально-матеріального забезпечення. Вісник Кам'янець-Подільського нац. у-ту імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. 2019. Випуск 13. С. 40-45. doi: 10.32626/2227-6246.2019-13.40-45
   Lenart, D., Romanchuk, S., Andres, A., Lesko, O., Romanov, I. (2019), "Optymizatsiya navchal'no-trenuval'noho protsesu viys'kovykh p'yatybortsiv v umovakh nedostatn'oho navchal'no-material'noho zabezpechennya" [Optimization of the training and training process of military pentathlon fighters in conditions of insufficient educational and material support]. *Bulletin of Kamianets-Podilskyi national Ivan Ohiienko university. Physical education, sports and human health*, Issue 13, pp. 40-45. doi: 10.32626/2227-6246.2019-13.40-45 [in Ukraine].
5. Овчарук І. С., Єдинак Г. А. Моделювання параметрів занять з фізичної підготовки курсантів, майбутніх фахівців з ліквідації наслідків надзвичайних ситуацій : метод. реком. Кам'янець-Подільський : ПП Зарицький А. В., 2007. 118 с.
   Ovcharuk, I. S., Iedynak, G. A. (2007), *Modelyuvannya parametriv zanyat*' z *fizychnoyi pidhotovky kursantiv, maybutnikh fakhivtsiv z likvidatsiyi naslidkiv nadzvychaynykh sytuatsiy : metod. rekomendatsiyi* [Modeling of parameters of occupations on physical training of cadets, future specialists on elimination of consequences of emergency situations]. PP Zaritsky AV, Kamianets-Podilsky, 118 p. [in Ukraine].
6. Окіпняк Д., Окіпняк А., Зубаль М., Єдинак Г., Галаманжук Л. Удосконалення підготовки майбутніх фахівців із розмінування у процесі фізичного виховання. Вісник Прикарпатського університету. Серія: Фізична культура. 2017. Випуск 25-26. С. 190–195.
   Okipnyak, D., Okipnyak, A., Zubal, M., Iedynak, G., Galamanzhuk, L. (2017), "Udoskonalennya pidhotovky maybutnikh fakhivtsiv iz rozminuvannya u protsesi fizychnoho vykhovannya" [Improving the training of future demining specialists in the process of physical education]. *Bulletin of the Precarpathian University. Series: Physical culture,* Issue 25-26, pp. 190–195. [in Ukraine].

7. Платонов В. Н. Система подготовки спортсменов в олимпийском спорте. Общая теория и ее практические приложения : учебник. Київ : Олімп. л-а, 2004. 808 с.
Platonov, V. N. (2004), *Systema podhotovky sportsmenov v olympyiskom sporte. Obshchaia teoryia y ee praktycheskye prylozhenyia* [The system of training athletes in Olympic sports. General theory and its practical applications]. Olympyiskaia lyteratura, Kyev, 808 p. [in Russia].
8. Платонов В. Н. Периодизация спортивной тренировки. Общая теория и её практическое применение. Київ : Олімп. л-ра, 2013. 624 с.
Platonov, V. N. (2013), *Periodizatsiya sportivnoy trenirovki. Obshchaya teoriya i yeyo prakticheskoye primeneniye* [Periodization of sports training. General theory and its practical application]. Olympyiskaia lyteratura, Kyev, 624 p. [in Russia].
9. Понимасов О. Е., Николаев С. В. Спортивная тренировка по офицерскому троеборью с акцентированным использованием средств плавания. Київ, 2016. 245 с.
Ponimasov, O. E., Nikolaev, S. V. (2016), *Sportivnaya trenirovka po ofitserskomu troyebor'yu s aktsentirovannym ispol'zovaniyem sredstv plavaniya* [Sports training in officer triathlon with accented use of swimming equipment]. Kyiv, 2016. 245 p. [in Russia].
10. Приступа Є. Н., Романчук С. В. Військові багатоборства та військово-прикладні види спорту в системі підготовки фахівців Збройних Сил України. Вісник Кам'янець-Подільського нац. ун-ту імені Івана Огієнка. Серія : Фізичне виховання, спорт та здоров'я людини. 2012. Випуск. 5. С. 223–230.
Prystupa, Ye. N., Romanchuk, S. V. (2012), "Viiskovi bahatoborstva ta viiskovo-prykladni vydy sportu v systemi pidhotovky fakhivtsiv Zbroinykh Syl Ukrainy" [Military all-rounds and military-applied sports in the system of training of specialists of the Armed Forces of Ukraine]. *Bulletin of Kamianets-Podilskyi national Ivan Ohiienko university. Physical education, sports and human health*, Issue 5, pp. 223–230. [in Ukraine].
11. Пронтенко К., Андрейчук В., Безпалий С. Вплив занять гирьовим спортом на фізичний розвиток курсантів військових закладів вищої освіти. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. 2019. Вип. 13. С. 46–55. doi: 10.32626/2227-6246.2019-13.46-55.
Prontenko, K., Andreychuk V., Bezpalyi S. (2019), "Vplyv zaniat hyrovym sportom na fizychnyi rozvytok kursantiv viiskovykh zakladiv vyshchoi osvity" [Having the urge to engage in weight-lifting sports for physical development of cadets in high school mortgages]. *Bulletin of Kamianets-Podilskyi National Ivan Ohiienko University: Physical education, sports and human health*, Issue 13, pp. 46–55. doi: 10.32626/2227-6246.2019-13.46-55 [in Ukraine].
12. Ролюк О. В., Лойко О. М. Військове п'ятиборство як засіб формування військово-прикладних якостей військовослужбовців : мат. Міжн. наук.-тех. конф. «Перспективи розвитку озброєння і військової техніки Сухопутних військ» (Львів, 14–16 травня 2014 р.). Львів : АСВ, 2014. С. 263-267.
Rolyuk, O. V., Loyko, O. M. (2014), "Viys'kove p'yatyborstvo yak zasib formuvannya viys'kovo-prykladnykh yakostey viys'kovosluzhbovtsiv" [Military pentathlon as a means of forming military-applied qualities of servicemen]: mat. Intern. scientific and technical conf. «Prospects for the development of armaments and military equipment of the Land Forces» (Lviv, May 14-16, 2014)]. DIA, Lviv, pp. 263–267. [in Ukraine].
13. Ролюк О. В., Лойко О. М., Красота В. М. Становлення та розвиток військового пентатлону. Науковий часопис НПУ ім. М. П. Драгоманова. Науково-педагогічні проблеми фізичної культури (фізична культура). 2014. Серія 15. Вип. 3 К (44). С. 327–332.
Rolyuk, O. V., Loiko, O. M., Krasota, V. M. (2014), "Stanovlennya ta rozvytok viys'kovoho pentatlonu" [Formation and development of military pentathlon]. *Scientific journal of NPU named after M. P. Dragomanova*. *Scientific and pedagogical problems of physical culture (physical culture). Series 15,* Issue 3 K(44), pp. 327-332. [in Ukraine].
14. Романчук С. В., Десятка О. А. Організація та проведення змагань на першість військової частини з військово-прикладних видів спорту : навч.-метод. посіб. Львів : АСВ, 2010. 144 с.
Romanchuk, S. V., Desyatka, O. A. (2010), *Orhanizatsiya ta provedennya zmahan' na pershist' viys'kovoyi chastyny z viys'kovo-prykladnykh vydiv sportu* [Organization and holding of competitions for the championship of the military unit in military-applied sports]. DIA, Lviv, 144 p. [in Ukraine].
15. Старчук О. О., Пронтенко К. В., Пронтенко В. В. та ін. Військове п'ятиборство. Організація та методика проведення навчально-тренувальних занять і змагань : навч.-метод. посіб. Житомир : ЖВІ, 2017. 172 с.
Starchuk, O. O., Prontenko, K. V., Prontenko, V. V. (2017), *Viys'kove p'yatyborstvo. Orhanizatsiya ta metodyka provedennya navchal'no-trenuval'nykh zanyat'* і *zmahan'* [Military pentathlon. Organization and methods of conducting training sessions and competitions]. ZhVI, Zhytomyr, 172 p. [in Ukraine].
16. Цимбалюк Ж. О., Піддубний О. Г. Особливості організації відбору в команду з аеронавтичного багатоборства в ВВНЗ. Стратегічне управління розвитком фізичної культури і спорту : матеріали V регіональної наук.-пр. інтернет-конф. з міжнар. участю (м. Харків, 26–28 квітня 2017 р.). Харків : ХДАФК, 2017. С. 89–93.
Tsymbalyuk, Zh. O., Piddubny, O. G. (2017), "Osoblyvosti orhanizatsiyi vidboru v komandu z aeronavtychnoho bahatoborstva v VVNZ [Peculiarities of the organization of selection in a team on aeronautical all-around in VVNZ] : *materials of the V regional nauk.-pr. internet conference with international participation "Strategic management of the development of physical culture and sports" (Kharkiv, April 26-28. 2017)*. KhDAFK, Kharkiv, pp. 89-93. [in Ukraine].
17. Шинкарук О. А. Отбор спортсменов и ориентация их подготовки в процессе многолетнего совершенствования (на материале олимпийских видов спорта) : монография. Київ : Олімп. л-ра, 2011. 360 с.
Shinkaruk, O. A. (2011), *Otbor sportsmenov i oriyentatsiya ikh podgotovki v protsesse mnogoletnego sovershenstvovaniya (na materiale olimpiyskikh vidov sporta)* [The selection of athletes and the orientation of their training in the process of many years of improvement (based on the material of Olympic sports)]. Olimp. l-ra, Kiev, 360 p.
18. Шиян Б. М., Єдинак Г. А., Петришин Ю. В. Наукові дослідження у фізичному вихованні та спорті: навч. посіб. Кам'янець-Подільський : ПП Видавництво «Оіюм»», 2012. 280 с.
Shiyan, B. M., Iedynak, G. A., Petryshyn, Yu. V. (2012), *Naukovi doslidzhennya u fizychnomu vykhovanni ta sporti* [Scientific research in physical education and sports]. PE Oyum Publishing House, Kamianets-Podilsky, 280 p. [in Ukraine].
19. Melnykov, A., Iedynak, G., Galamandjuk, L., Blavt, O., Duditska, S., Balatska, L., Mazur, V. (2018). Factors that influence changes in cadets' physical preparation during the first half of study at a military academy. *Journal of Physical Education and Sport,* 18(2), pp. 781–786.

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FEATURES OF COMPETITIVE ACTIVITY OF HANDBALL TEAMS C IN THE CONDITIONS OF NUMERICAL INEQUALITY

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Features of competitive activity of handball teams of high qualification in conditions of numerical inequality are considered in the article. The analysis of recent studies and publications shows that the issues of competitive activity of teams of high qualification in numerical inequality due to the removal of one of the players of the team has not been sufficiently studied. *The purpose of the study:* to determine the features of the offensive actions of competitive activities of highly qualified handball teams in terms of numerical inequality due to the temporary removal of the player. *Research methods:* analysis of literature sources, pedagogical observation, methods of mathematical statistics. The following factors were taken into account: the number of two-minute player removals per game, the number of attacks taken during player removal, the number of goals scored during the removal of players in teams, the effectiveness of attacks in the numeric majority or minority, the duration of attacks by teams that attack in the numeric majority or minority due to player removal. *Research results and key conclusions.* In total, 65 games of the 2020 Final European Men's Handball Championship were analyzed. 24 national teams participated in the championship. As a result of pedagogical observation, it was found that 23.82 % of the goals during the Final European Men's Handball Championship were scored during the penalty of players being temporarily removed. 15.52 % of the goals are the ones of the teams that were in the numerical majority due to the removal of the player of the opposing team, and 8.30 % goals are of the teams that attacked in the conditional numerical minority. The average duration of attacking actions by teams of high qualification in the numerical majority due to the removal of opposing team player was 21.51 seconds, and duration of attacking actions by teams in the minority was 41.19 seconds. The total time of all team attacks in the numerical majority due to the removal of the opposing team player is 19127 seconds, and the total attack time of teams with a removed player is 26999 seconds. However, the number of performed attacks is opposite, accounting for 880 attacks in most and 646 attacks by teams with a removed player. The efficiency of attacking handball teams of high qualification during numerical advantage due to the removal of the opposing team player was 62.44 % and that of their opponents was 46.04 %.

Keywords: player removal, handball teams, high qualification, efficiency, number of attacks, numerical advantage, 2020 European Handball Championship.

Introduction

Formulation of the problem. The current stage of handball development is characterized by significant changes in the rules of the game, which in turn require a more detailed analysis of all components of adversarial activities. [13]

Mastering tactical actions is associated with the expansion of the number of means and methods, the development of skills to use one technique to solve various tactical problems. Moreover, using different techniques to solve one task. [10]

Determining the most characteristic indicators of adversarial activity in a particular sport will create an adversarial model, which in turn will give an opportunity to create conditions for achieving a high result. [6]

The formation of the direction of training influences at the stage of direct preparation for competitions and in competitive microcycles should take into account the tactical activities of the leading athletes at the largest international competitions (European, world championships, Olympic Games). [3]

Analysis of recent research and publications. The analysis of scientific works showed that in handball the issues of control of training and competitive activities of highly qualified teams are studied in detail. [12] The program of differentiation of physical training is substantiated. [1] The issues of improving the technical and tactical actions of highly qualified handball players [2] and the training process of qualified handball players [4, 5] was studied. A comparison of tactical actions at different stages of long-term training [8] was made.

In recent years, international organizations that manage the development of a particular sport are increasingly changing the rules of the game in order to increase entertainment. [7, 8, 9].

However, in the available information sources, we did not find information about a detailed analysis of the activities of highly qualified handball teams in terms of numerical inequality. There are only data on adversarial activity of water polo players aged 15-17 in terms of numerical advantage. [11].

This situation requires a detailed analysis of the adversarial activities of highly qualified handball teams, in particular in conditions where one of the teams is in the numerical minority as a result of the temporary removal of the player.

Material and research methods

The purpose of the study is to determine the peculiarities of offensive actions of adversarial activities of highly qualified handball teams in terms of numerical inequality due to the temporary removal of the player. Research methods: analysis of literature sources in order to determine the research issues and determine the purpose; pedagogical observation of the adversarial activities of highly qualified handball teams during the European Men's Handball Championship 2020 in order to determine the peculiarities of offensive actions during the removal of a player, mathematical statistics methods were used to process the results of the study. A total of 65 games of the 2020 European Championship among men's teams were processed, with the participation of 24 national teams.

Results

According to the rules of the game, in certain sports, sometimes there may be situations when the player of the team receives a penalty for violating the rules of the game in the form of temporary or complete exclusion from the game while his team continues to participate in the competition for the specified time in the numerical minority.

In handball, for a gross violation of the rules of the game, an athlete can receive a two-minute exclusion from the game penalty. Since offencive actions in handball are regulated by relatively objective time parameters, the team will be forced to carry out both offencive and defensive actions in the numerical minority.

The first stage of our study was to conduct pedagogical observation of the competitive activities of highly qualified handball players during the 2020 European Handball Championship among the men's teams. All 65 games of the final part of the sports forum mentioned, in which 24 national teams took part, were analyzed. The attacking actions of adversarial activities of teams during the removal of players are analyzed.

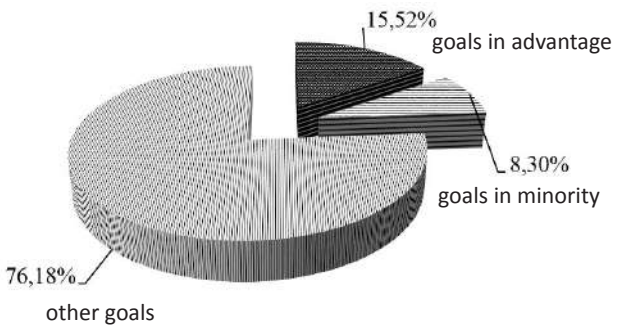

Fig. 1 The ratio of goals scored at the European Handball Championship among the men's teams in 2020.

With the help of pedagogical observation, the indicators of attacking actions of handball teams against an opponent in the numerical minority and attacking actions of the team, which has a player removed, were determined.

Thus, the first component of the adversarial activity of highly qualified handball players analyzed was the number of goals scored (Fig. 1).

Thus, for the entire 2020 European Handball Championship among the men's teams, 3235 goals were scored by the teams. Of these, 548 goals that is 15.52 % of the total goals scored, the teams scored when attacking teams in which the player was serving a penalty being temporary ejected from the game. In turn, the teams in which the player was temporarily removed, during the attacking actions scored 293 goals, which is 8.30% of the total goals scored.

Thus, for all the 2020 European Handball Championship among men's teams games, 23.82 % of goals were scored by teams while they were in numerically uneven line-ups, which in turn makes up almost a quarter of all goals scored, during the final part of the sports forum mentioned. What we believe has a significant impact on the result of adversarial activity in handball.

The time characteristics of the attacking actions of high-skill handball teams with unequal team compositions due to the temporary ejection of the player became the next group of indicators that could be analyzed.

Thus, for the entire final tournament of the 2020 European Handball Championship among the men's teams, the total duration of the offensive actions of the teams conducting attacking actions against the opponent, who was in the numerical minority as a result of receiving punishment by the temporary removal of the player, was 19,127 sec., which is 41.47 %. Teams serving penalties with a two-minute ejection spent 26,999 sec in the attack that is 58.53% of the teams' total playing time in such numerical inequality.

Analyzing the average duration of attacks of highly qualified handball teams in the final tournament of the 2020 European Handball Championship among the men's teams, we determined that the average duration of attacks by teams conducting offensive actions, having a player serving a penalty being temporary ejected from the game, is 41.19 sec. The duration of attacks by teams attacking a team with a temporarily ejected player is 21.51 sec. (Fig.2).

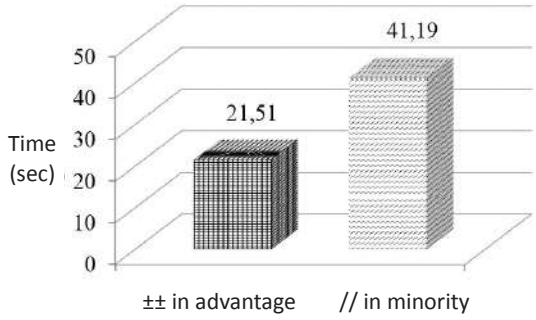

Fig. 2 The average duration of attacks of full teams and in the numerical minority.

Another feature that was studied was the number of attacks carried out by teams during the removal of one of the players and their effectiveness.

Thus, for the entire final tournament of the 2020 European Handball Championship among the men's teams, there were 880 attacks by teams that gained a numerical advantage by removing the player of the opponent's team. The teams that carried out the offensive actions, having a temporarily removed player, made 646 attacks for the entire tournament. This difference is due to the fact that after the removal of a player, the right to attacking actions was given to the team against which the rules of the game were violated, which led to the temporary removal of the player of the opponent's team.

Analyzing the effectiveness of attacking actions of highly qualified handball teams, during the temporary removal of the player, we obtained the following results. The teams that carried out attacks in the numerical majority on average effectively implemented 62.44 % of attacks, and teams in the minority effectively completed 46.04% of attacks (Fig. 3)

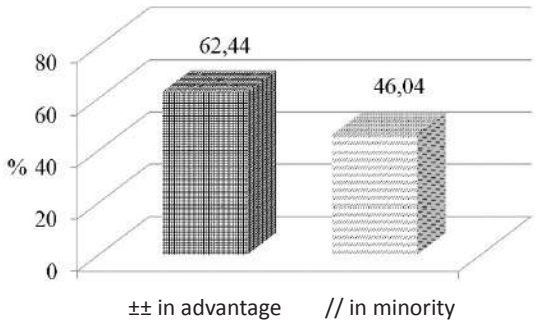

Fig. 3 Effectiveness of team attacks in attack in full line-up and in the numerical minority

Such differences in the effectiveness of offensive actions are explained by the fact that the teams that are in the numerical majority provide a higher implementation rate due to the fact that they create conditions for the completion of close-range attacks, the percentage of which is the highest in handball.

The lower indicator of offensive actions of teams that have a temporarily removed player is due to the fact that despite the replacement of the goalkeeper with the field player and conducting the attacks in relatively numerical equality, attacks still end all the same against the opponent, which has a numerical advantage in defense. As it is necessary to make a quick and in time replacement for the return of a player who has the right to defend the goal.

Discussion

The results obtained allow us to state that the analysis of the structure and content of the offensive actions of the adversarial activities of highly qualified handball teams during the temporary removal of players will allow determining the main directions of tactical actions.

According to the analysis of the minutes of the 2020 European Handball Championship games among the men's teams, it was found that the teams received 510 two-minute removals for the whole tournament. On average, this amounts to 3.92 withdrawals per game for each team. That is, on average, in one game, each team spends about eight minutes in the numerical minority as a result of the removal of players, which is 13.33 % of the total time of the entire game. It also confirms the relevance of our research.

In our opinion, the differences in the duration of offensive actions of highly qualified teams are due to the fact that the attacking teams in the numerical minority tried to possess the ball longer, in order to reduce the number of attacks of the team of rivals. Much less time are attacks of teams that have a numerical advantage, due to the removal of a player of the opponent's team, because the numerical advantage makes it possible to bring quickly the player to the position to complete effectively the attack. Therefore, teams are trying to carry out the largest number of such attacks.

Conclusions

1. According to the results of pedagogical observation, it was found that 23.82 % of the goals during the final tournament of the 2020 European Handball Championship among the men's teams were scored during the temporary removal from the game. At the same time, 15.52 % of the goals were made by the teams with the numerical advantage, and 8.30 % – by the teams that were in the numerical minority.

2. The total time of all attacks of teams with the numerical majority, as a result of the removal of the player of the opponents' team, is 19127 sec., and the total time of attacking actions of teams with a removed player is 26999 sec. However, the number of attacks are reversed and is 880 attacks in advantage and 646 attacks of the team with the player removed.

3. The average duration of offensive actions of highly qualified teams in the numerical majority due to the removal of a player of the opponent's team is 21.51 sec., this index in the team that was in the numerical minority is 41.19 sec.

4. The effectiveness of offensive actions of highly qualified handball teams during the numerical advantage due to the removal of an opponent's team player was 62.44 %, and their opponents – 46.04 %.

Prospects for further research are related to further detailed study of the offensive actions of highly qualified handball teams. In particular, the duration of offensive actions, the features of actions that ensure the outcome of competitive activities, and so on.

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

References

1. Базильчук О. В. Індивідуалізація системи фізичної підготовки кваліфікованих гандболісток : автореф. дис. ... канд. наук з фіз. виховання і спорту : [спец.] 24.00.01 Львів. держ. ін-т фіз. культури. Львів, 2004. 23 с.
   Bazylchuk, O. V. (2004), *"Indyvidualizatsiia systemy fizychnoi pidhotovky kvalifikovanykh handbolistok"* [Individualization of the system of physical training of qualified handball players]: abstract of the dissertation of the candidate of physical education and sports: 24.00.01 Lviv State University of Physical Culture. Lviv, 23 p. [in Ukraine].
2. Дорошенко Е. Ю., Сердюк Д. Г., Мітова О. О. Удосконалення техніко-тактичних дій висококваліфікованих гандболістів: проблеми, пошуки, шляхи вирішення : монографія. Запоріжжя : ЛІПС ЛТД, 2016. 436 с.
   Doroshenko, E. Yu., Serdiuk, D. H., Mitova, O. O. (2016), *Udoskonalennia tekhniko-taktychnykh dii vysokokvalifikovanykh handbolistiv: problemy, poshuky, shliakhy vyrishennia* [Improving technical and tactical actions of highly qualified handball players: problems, searches, solutions]. LIPS LTD, Zaporizhzhia, 436 p. [in Ukraine].
3. Дорошенко Э. Ю. Управление технико-тактической деятельностью в командных спортивных играх : монография. Запорожье : ЛИПС ЛТД, 2013. 436 с.
   Doroshenko, E. Yu., (2013), *Upravleniye tekhniko-takticheskoy deyatel'nost'yu v komandnykh sportivnykh igrakh* [Management of technical and tactical activities in team sports games].]. LIPS LTD, Zaporizhzhia, 436 p. [in Russia].
4. Дядечко І. Є. Удосконалення тренувального процесу кваліфікованих гандболісток з урахуванням специфічних особливостей організму : автореф дис. ... канд. наук з фіз. виховання і спорту : 24.00.01 Придніпр. держ. акад. фіз. культури і спорту. Дніпро, 2018. 20 с.
   Diadechko, I. Ye. (2018), "*Udoskonalennia trenuvalnoho protsesu kvalifikovanykh handbolistok z urakhuvanniam spetsyfichnykh osoblyvostei orhanizmu"* [Improving the training process of qualified handball players taking into account the specific features of the body]: abstract of the dissertation of the candidate of physical education and sports: 24.00.01 Dnieper state acad. phys. culture and sports. Dnipro, 20 p. [in Ukraine].
5. Игнатьева В. Я. Построение подготовки гандболисток высокой квалификации на основе контроля соревновательной деятельности : автореф. дис. … д-ра пед. наук. 13.00.04 ГЦОЛИФК. М., 1995. 31 с.
   Yhnateva, V. Ya. (1995), *"Postroyeniye podgotovki gandbolistok vysokoy kvalifikatsii na osnove kontrolya sorevnovatel'noy deyatel'nosti*" [The construction of training highly qualified handball players on the basis of control of competitive ctivity]: abstract of the dissertation of the doctor of pedagogical sciences. 13.00.04 State Central Order of Lenin Institute of Physical Culture. Moscow, 1995, 31 p. [in Russia].
6. Костюкевич В. М. Теорія і методика спортивної підготовки (на прикладі командних ігрових видів спорту) : навч. посіб. Вінниця : Планер, 2014. 616 с.
   Kostiukevych, V. M. (2004), *Teoriia i metodyka sportyvnoi pidhotovky (na prykladi komandnykh ihrovykh vydiv sportu)* [Theory and methods of sports training (on the example of team games)]. Planer, Vinnytsia, 616 p. [in Ukraine].
7. Линець М., Гнатчук Я. Удосконалення фізичної підготовленості кваліфікованих волейболістів. Фізична активність, здоров'я і спорт. 2017. № 4(30). С. 40–49.
   Lynets, M., Hnatchuk, Ya. (2017), "Udoskonalennia fizychnoi pidhotovlenosti kvalifikovanykh voleibolistiv" [Improving the physical fitness of qualified volleyball players.]. *Physical activity, health and sports,* 4(30), 40–49. [in Ukraine].
8. Мельник В., Пітин М. Порівняльна характеристика показників тактичних дій у нападі гандболістів на різних етапах системи багаторічної підготовки. Молодіжний науковий вісник Східноєвроп. нац. ун-ту імені Лесі Українки. 2015. Вип. 17. С. 146–150.
   Melnyk, V., Pityn M. (2015), "Porivnialna kharakterystyka pokaznykiv taktychnykh dii u napadi handbolistiv na riznykh etapakh systemy bahatorichnoi pidhotovky" [Comparative characteristics of tactical actions in the attack of handball players at different stages of the system of long-term training.]. *Lesya Ukrainka East European National University Youth Scientific Bulletin*, Issue 17, pp. 146–150. [in Ukraine].
9. Мітова О. Проблеми контролю в сучасних командних спортивних іграх. Спортивний вісник Придніпров'я. 2015. № 3. С. 89–95.
   Mitova, O. (2015), "Problemy kontroliu v suchasnykh komandnykh sportyvnykh ihrakh" [Control problems in modern team sports games.]. *Sports Bulletin of the Dnieper,* No 3, pp. 89–95. [in Ukraine].
10. Платонов В. Н. Система подготовки спортсменов в олимпийском спорте. Общая теория и ее практические приложения : учеб. Киев : Олимпийская литература, 2004. 584 с.
    Platonov, V. N. (2004), *Systema podhotovky sportsmenov v olympyiskom sporte. Obshchaia teoryia y ee praktycheskye prylozhenyia* [The system of training athletes in Olympic sports. General theory and its practical applications]. Olympic Literature, Kiev, 584 p. [in Russia].
11. Погребняк І. М., Куделко В. Е. , Островський М. В. Аналіз змагальної діяльності ватерполістів 15–17 років щодо використання та реалізації чисельної переваги. Педагогіка, психологія та медико-біологічні проблеми фізичного виховання і спорту. 2012. № 5. С. 102–105.
    Pohrebniak, I. M., Kudelko, V. E., Ostrovskyi, M. V. (2012), "Analiz zmahalnoi diialnosti vaterpolistiv 15-17 rokiv shchodo vykorystannia ta realizatsii chyselnoi perevahy" [Analysis of zmagalnogo dyalnosti water polystyv 15–17 rokod shvodo vikoristannya and realizatsii numerically overrun]. *Pedagogy, psychology and medical and biological problems of physical and sports,* No 5, pp. 102–105. [in Ukraine].
12. Тищенко В. Контроль тренувальної та змагальної діяльності команд високої кваліфікації з гандболу : монографія. Запоріжжя : Статус, 2017. 404 с.
    Tyshchenko, V. (2017), *Kontrol trenuvalnoi ta zmahalnoi diialnosti komand vysokoi kvalifikatsii z handbolu* [Control of training and competitive activities of highly qualified handball teams]. Status, Zaporizhzhia, 404 p. [in Ukraine].
13. Шестаков М. П., Шестаков И. Г. Гандбол : тактическая подготовка. М. : Спортакадемпресс, 2001. 132 с.
    Shestakov, M. P., Shestakov Y. H. (2001), *Handbol: taktycheskaia pidhotovka* [Handball: tactical training]. Sportakadempress, Moskva, 132 p. [in Russia].

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DYNAMICS OF TECHNICAL AND TACTICAL PREPAREDNESS INDICATORS OF ATHLETES AT THE STAGE OF SPECIALIZED BASIC TRAINING IN PANKRATION

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The dynamic development of pankration as a sport in Ukraine indicates on need for regular treatment to important issues of improving the athletes' training at different stages of long-term training. *Purpose:* to determine the technical and tactical training dynamics of athletes in pankration at the stage of specialized basic training in the annual cycle under the influence of experimental and traditional programs. *Methods:* theoretical analysis and generalization of literary sources; analysis of documentary materials; pedagogical testing; pedagogical experiment; methods of mathematical statistics. During November 2018 – October 2019, a formative pedagogical experiment was organized and conducted. It provided the introduction of the author's annual training program for athletes at the stage of specialized basic training in pankration. The control (21 athletes) and experimental (22 athletes) groups were formed. *Results.* For all indicators of technical and tactical preparedness (quantitative and qualitative), without exception, there is a significant improvement ($p \leq 0.01$). The highest increments were observed in the drill №2 ("dead zones") – 20.12 %; estimates of performance "low kick" – 21.59 %, throws "hook" – 19.08 % and variants of painful knee techniques – 20.57 % compared to initial level. Another indicators also underwent significant changes, although with slightly lower values from 8.62 % to 17.24 compared to initial level (the beginning of the pedagogical experiment). For athletes of the control group, significant gains were recorded in all quantitative indicators of technical and tactical preparedness based on the results of the pedagogical experiment duration. The percentage changes values were in the range of 4.12–11.76 % ($p \leq 0.01$–0.04) and only for three of the eight qualitative technical and tactical preparedness indicators. *Conclusions.* The results of the study show that the author's program was more pronounced in terms of quality performance of technical and tactical actions in conditions of modeling competitive activities in the training process. According to all quantitative indicators of technical and tactical preparedness the use of the experimental program had a better effect on athletes at the stage of specialized basic training in pankration.

Key words: quantitative and qualitative indicators, improvements, annual training, dynamics.

Introduction

The theory of training of athletes in sport martial arts includes the need for optimal content of the educational and training process [10; 15; 19]. Dynamic development of pankration as a sport in Ukraine indicates the need for regular appeal to important issues of improving the training system of athletes at different stages of many years of training [1; 2; 3; 17].

Among the available scientific papers, the problems of pankration has been studied quite indirectly [5; 8; 11; 18]. However, some scientists emphasize the importance of properly building the training process [1; 4; 9; 16]. In their opinion, high-quality construction of the training process should include improvement of special physical qualities, improvement of the principles of technology (professional and applied aspects), development of skills for mastering the technique of punches, kicks and wrestling, improved moral and volitional qualities, etc. [16; 18]. It is also worth highlighting the works of I.M. Skrypka. V. Cherednichenko, who devoted some of their researches to studying of motivation of students to practice pankration, and the work of I. Y. Nakonechny about psychological aspects and conditions of athletes in pankration classes [7; 8; 11].

Significant influence on our chosen scientific direction was exerted by the received own data at the previous stages of research [12; 13], the results of the study of regulations [6; 9]; the results of the analysis of indicators of competitive activity [2; 7; 14]; generalization of practice experience based on a survey of trainers [5; 19], working with athletes at the stage of specialized basic training in pankration.

Material and research methods

The purpose of the study: to establish the dynamics of indicators of technical and tactical training of athletes in pankration at the stage of specialized basic training in the annual cycle under the influence of experimental and traditional programs of annual training.

During November 2018 – October 2019, a formative pedagogical experiment was organized and conducted, which provided for the establishment of initial data, the introduction of the author's program of annual training of athletes at the stage of specialized basic training in the pankration; obtained and grouped arrays of empirical data, analyzed and summarized experimental data. A control (21 athletes) and experimental (22 athletes) groups from the contingent of athletes at the stage of specialized basic training in pankration were formed. All participants gave

an informed consent to participate in this pedagogical experiment.

The following methods were used: theoretical analysis and generalization of literary sources (search for information and clarification of the validity of scientific research issues); analysis of documentary materials (studied the structure and content of the training program of qualified athletes at the stage of specialized basic training in pankration); pedagogical testing (the indicators of psychophysiological characteristics of athletes at the stage of specialized basic training in pankration established); pedagogical experiment (the effectiveness of the author's approach to the construction of the structure and content of the training program of athletes at the stage of specialized basic training, taking into account modern requirements of adversarial activity, tested); methods of mathematical statistics (used to process empirical data at different stages of the study). The reliability of the discrepancies between the indicators of the athletes of the control and experimental groups, as well as the reliability of the increase of results within these groups were determined by the Student's t-criterion at the level of significance $p<0,05$ and $p<0,01$ (for homogeneous and heterogeneous groups). The calculations were done on a computer using Excel 6.0 tables.

Within the pedagogical experiment, significant differences were made to the existing structure and content of the program of annual training of athletes at the stage of specialized basic training in the pankration. Among the corrections we offered were the following: selection of exercises taking into account the specifics of athletes' competitive activities at the stage of specialized basic training; taking into account the projected level of preparedness contained in approaching the indicators of adult athletes; differentiation of training tools taking into account the variability of manners of conducting adversarial activities and building technical and tactical actions; change in the ratio of the volume of exercises for general and special physical training; increasing the overall intensity of exercises.

In annual training, we proposed to reduce the training volumes in such sections as theoretical training, technical training (selective influence), tactical training (selective influence), control standards execution, general and special physical training (selective influence), free and controlling duels. It was proposed to increase the volume of joint training with athletes of other sports teams, the number of duels, or engaging in other types of sports; to supplement the structure with a section using the means of combined action of technical and tactical training and for physical training – by means of combined action with technical and tactical training; using sports related to the structure and content of adversarial activities with pankration (boxing, wrestling, kickboxing, etc.) and specifying the ratio of hours between participation in qualifying competitions and refereeing and coaching practice. Pedagogical testing of indicators of technical-and-tactical preparedness was carried out three times – at the beginning, in the middle and at the end of the pedagogical experiment. The following tests and control exercises are offered for control:

- «Drill No1» – complex performance of technical-and-tactical actions in a flow method with a limit of 10 times. The complex includes the need for athletes to perform such pain techniques at a rapid pace: «armbar» (from bottom guard), «triangle» (from bottom guard), «kimura» (from bottom half-guard), pass the guard, leg painful technique (top-side Achilles foot lock standing). Time was registered for a series of the same techniques and the total time of continuous execution;
- «Drill No2 («dead zones») – complex execution of technical-and-tactical actions by streaming way with a time limit of 180 s (number of times). In the second version, it was suggested that athletes perform to a partner in any sequence of pain or choke techniques with a conditional resistance. Herewith the stroke was not completed, and the athlete after performing one switched to another possible pain or choke stroke taking into account the initial and intermediate positions for its execution and without losing control. If there is a loss of control or a long way from one pain or choke stroke to another, then the test was not counted and started from the beginning, and the result was taken accordingly to the full and correct execution of the test. The number of strokes with the completed technique was registered.
- «Work on a heavy bag» is a set of exercises to determine the quantitative indicators of technical-and-tactical techniques of hands, feet and their complex use. Athletes carried out mass work on a series of striking for 30 s with the need to demonstrate their maximum speed. The following variants were performed: 1 – work with hands («jab», rear straight, side punches, etc.); 2 – kicks («low-kick», «high kick», «middle kick», straight strike, etc.); 3 – combined work with hands and feet – the requirement for the test was to use the strikes specified in paragraphs 1 and 2, but the athletes had to alternate strikes using their hands and feet at least three consecutive strikes, and all these strikes had to be different (if strikes were done with their hands or legs only). The results were recorded in the number of times, subject to the rules of the test. In case of an error, there was a re-execution;

• «Sparring on the task (free fight)» (5 min.) – during the testing, the athlete was asked to perform consecutive sparring with several rivals («half strength») lasting 3-5 minutes. Herewith the coaches evaluated the execution of technical and tactical techniques in conditions close to adversarial, but in the absence of timekeepers and with no clear scoring. The assessment was conducted by three experts (coaches, adult qualified athletes) on external grounds (kinematic and dynamic characteristics of movements and their correctness).

The task for the athletes was to show the maximum amount of their technique in sparring. Grades were divided into «unsatisfactory» (gross errors, or technique is not performed at the proper level), «satisfactorily» (the execution of the stroke mostly corresponds to the basic technique), «good» (the technique of performing the stroke has minor errors, but may give an advantage to the athlete in a competitive fight).

Results

Considering the complexity and importance of solving the tasks of training athletes at the stage of specialized basic training in the pankration, the direction of further stages of long-term improvement, we could not ignore the change in the main indicators of technical-and-tactical preparedness. In addition, according to most martial arts experts, the achieved level of physical fitness of athletes is only prerequisites for the implementation of the technical-and-tactical arsenal of athletes in the conditions of adversarial activity.

When founding out the dynamics of the technical-and-tactical preparedness of athletes, we tried to follow the recommendations of leading experts of Ukraine in pankration and other sport martial arts [1; 4; 7; 8; 11]. The set of tests included those aimed at assessing the quantitative and qualitative components of technical-and- tactical preparedness (Tables 1, 2). A total of thirteen tests and control exercises were offered.

Table 1 – Quantitative indicators of technical preparedness of athletes at the stage of specialized basic training in pankration during the pedagogical experiment

№	Test (control exercise)		Stage of control						p		
			start (1)		the middle (2)		complete (3)				
			EG	KG	EG	KG	EG	KG	EG1-KG1	EG2-KG2	EG3-KG3
1	Drill No1	X	230,5	225,6	219,3	221,0	210,6	216,3	0,01	0,33	≤0,01
		SD	4,7	4,8	4,1	4,3	5,8	3,7			
2	Drill No2 ("dead zones")	X	14,9	15,4	16,7	15,6	17,9	16,3	0,14	0,01	≤0,01
		SD	0,8	1,0	1,3	1,0	1,3	1,2			
3	Punches	X	19,0	19,9	20,7	21,0	22,2	21,0	0,14	0,53	≤0,01
		SD	1,2	1,8	1,1	1,3	1,2	1,2			
4	Kicks	X	13,3	13,7	14,8	14,7	15,3	15,0	0,34	0,86	0,33
		SD	1,1	1,2	0,9	0,8	0,9	0,9			
5	Combination of strikes	X	21,0	20,2	22,2	21,9	23,2	22,6	0,09	0,40	0,16
			1,2	1,0	1,2	1,2	0,9	1,1			

According to the quantitative indicators of technical-and-tactical preparedness, five tests were proposed, which include the available types (groups) of technical-and-tactical actions. Execution of striking technique with hands and feet and wrestling technique (different stances or ground positions).

When performing drill No1, which involved a comprehensive performance of technical-and-tactical actions in a streaming way with a limit of 10 times. The following pain techniques were performed: «armbar» (from bottom guard), «triangle» (from bottom guard), «kimura» (from bottom guard), pass the guard, and leg painful technique (top-side Achilles foot lock standing).

Considering the intra-group changes in indicators, we noted that the representatives of the experimental group during the first stage of the pedagogical experiment (macrocycle training) significantly improved the results of all proposed control exercises to determine the quantitative indicators of technical-and-tactical preparedness. The largest relative values of increases were recorded in the results of the drill No2 («dead zones»), which was 12.2 % of the initial level ($p \leq 0,01$). The same level of reliability ($p \leq 0.01$) were changes in results for other control exercises, although their values were slightly lower from 4.83 % to 10.92 %. Interesting was the fact that in the control of striking technique, the highest increase was noted for performing serial kicks.

At the second stage of the pedagogical experiment, a further positive increase of the results of these control exercises to determine the quantitative indicators of technical-and-tactical techniques was recorded. Growth rates are slightly lower, but still significant (p≤0.01-0.05). Thus, for all control exercises, increases were between 3.69 % and 7.47 %. Nevertheless, the largest values were found in the results of drill No2 and serial of punches (7.07 % and 7.49 % respectively). This indicates that athletes were adapting to the varied training means used with the appropriate level.

The establishment of appropriate indicators for athletes at the stage of specialized basic training of the control group made it possible to state that there were significant positive changes in most control exercises. The most pronounced they were observed for serial work with a combination of punches and kicks (7.71 %, p≤0,01) and drill No1 (2,00 %, p≤0,01). Also significant were changes in the performance of serial work separately with hands (6.02 %, p≤0,05) and with feet (7.51 %, p≤0,01). It is obvious that the traditional program focuses on improving the technical-and-tactical training of athletes aimed at striking technique in the pankration.

However, at the second stage of the pedagogical experiment, the values of increases and reliability indicators were already lower. This shows that athletes' body addicts to the means used in the training process at the stage of specialized basic preparation. Thus, significant increases are available for the drill No 1 only, which amounted to 2.11 % (p≤0,01) and serial work with a combination of punches and kicks – 3.49 % (p=0.02). For other control exercises during the second stage of the pedagogical experiment for athletes of the control group, the changes were insignificant (p=0.07–0.87) and the percentage values were between 0.23 and 4.27 %.

The obtained results also show that at the initial level, the athletes of the experimental group outperformed their colleagues in the time of performing the control exercise drill No1. The differences were 2.14 % (p=0.01). That is, in terms of speed, they were inferior to the athletes at the stage of specialized basic training of the control group. In the middle of the pedagogical experiment (at the end of the first stage / macrocycle), the indicators of representatives of the two groups no longer had significant differences and were close. The difference was only 0.76 % (p=0.33). The information on the final stage of testing, which indicated that the athletes of the experimental group acquired a significantly higher level of preparedness in quantitative indicators in the drill No1test, is valuable. The advantage of athletes at the stage of specialized basic training of the experimental group was 2.65 % (p≤0,01), which undoubtedly indicates the advantages in acquiring the technical-and-tactical preparedness based on the results of the experimental program.

According to the results of the control exercise drill No2 at the initial level between the athletes of the experimental and control groups there were no significant differences, their values were 3.37 % (p=0.14). However, at the end of the first and, then, the second stage of the pedagogical experiment, the advantage of athletes at the stage of specialized basic training became more noticeable. After the first macrocycle, it was 7.10 % (p=0.01) and after the second – 9.97 % (≤0.01). This indicates compliance with the recommended by experts (according to the survey) focus on improving the wrestling technique of athletes.

In another of the control exercises to determine quantitative indicators, the advantage of the athletes of experimental group over the control was established. It is about performing serial punches. Despite the fact that in the first two stages of testing (the beginning and middle of the pedagogical experiment) there were no significant differences between these groups (4.32 %, p=0.14 and 1.52 %, p=0.53), at the end of the pedagogical experiment, a significant advantage of the athletes of the experimental group was recorded. It was 6.08 % (≤0.01). In our opinion, this allows us to talk about certain features of competitive activities. That is, after several series of punches, athletes can move on to more active actions to perform the capture and transfer to wrestling actions in fighting stances or ground position. At the same time, in case of detection of defense shortcomings, the option to continue serial work with hands with increasing power and «pressure» on the rival is quite possible.

For the other two control exercises (serial work with kicks and a combination of kicks and punches) at all stages of testing in the pedagogical experiment, it was no significant advantage of any of the groups. For serial operation with kicks, differences were within 0.40-2.89 % (p=0.32–0.86), and for the combination of work hands and feet – 1.69–3.76 % (p=0.09–0.40) in favor of a particular group of athletes at the stage of specialized basic training.

Along with the quantitative indicators of technical-and-tactical preparedness, qualitative indicators of technical-and-tactical actions are a strong proof of the effectiveness of the programs used in the training of athletes at the stage of specialized basic training.

In the conditions of the training fight on the task, the assessment of the quality of execution of strokes was

carried out by three coaches who put up certain scores (good – 4 points, satisfactorily – 3 points, unsatisfactory – 2 points). For evaluation, variants of technical-and-tactical actions that have large pieces of execution or carry a high degree of effectiveness in the conditions of adversarial activity of athletes in pankration (Table 2) are selected.

Table 2 – Qualitative indicators of technical preparedness of athletes at the stage of specialized basic training in pankration during the pedagogical experiment

№	Technical-and-tactical technique (group of techniques)		Stage of control, evaluation (points)						p		
			start (1)		the middle (2)		complete (3)				
			EG	KG	EG	KG	EG	KG	EG1-KG1	EG2-KG2	EG3-KG3
1	"Low Kick"	X	2,7	2,7	3,1	3,0	3,2	2,9	0,84	0,43	0,02
		SD	0,4	0,4	0,4	0,4	0,4	0,5			
2	Roundhouse Kick	X	2,7	2,7	2,8	3,0	3,0	3,0	0,94	0,34	0,78
		SD	0,6	0,5	0,5	0,5	0,5	0,4			
3	Hip toss	X	2,7	2,7	2,8	3,0	3,2	3,0	0,68	0,31	0,20
		SD	0,5	0,5	0,5	0,4	0,4	0,5			
4	Leg trip throw	X	2,6	2,7	2,8	2,8	3,1	2,9	0,55	0,83	0,08
		SD	0,5	0,5	0,4	0,5	0,4	0,5			
5	Variants of chokes from the back	X	2,5	2,7	2,7	3,0	3,0	3,0	0,35	0,09	0,73
		SD	0,5	0,5	0,4	0,5	0,5	0,5			
6	Variants of head and arm chokes	X	2,7	2,5	2,9	2,8	3,1	2,7	0,25	0,71	0,02
		SD	0,6	0,5	0,5	0,5	0,5	0,5			
7	Variants of leg painful technique	X	2,6	2,8	2,8	3,0	3,1	2,7	0,30	0,50	0,02
		SD	0,6	0,5	0,5	0,4	0,4	0,3			
8	Variants of knee painful technique	X	2,7	2,8	2,9	3,0	3,2	2,8	0,45	0,60	0,02
			0,5	0,6	0,4	0,4	0,5	0,4			

According to the results of some stages of the pedagogical experiment, it can be observed that the athletes of the experimental group at the first stage have significant changes in six out of the eight indicators studied. Exceptions were «roundhouse kick» and «hip toss» where the values did not become reliable (3.33 % for both, p=0.18 and 0.11 respectively).

Note that athletes at the stage of specialized basic training of the experimental group managed to improve most significantly the performance of «low kick», where the experts' assessments were higher than the initial indicators by 15.34 % (p≤0.01).

For other technical-and-tactical techniques, the percentages of performance improvement were somewhat similar and were between 4.17 % and 8.67 % at p≤01-0.03.

At the second stage of the pedagogical experiment, expert assessments that showed reliable changes in the performing certain techniques (or groups), were recorded in four cases out of eight. These are, in particular, significant improvements in the technique of execution in «hip toss», "leg trip throw», variants of chokes from the back, and variants of knee and leg painful techniques. Note that the values of increases in these technical-and-tactical techniques were slightly higher than during the first stage of the pedagogical experiment. That is, we can make assumptions about the growing effect of the impact of training loads on the experimental program in terms of the technical-and-tactical training of athletes at the stage of specialized basic training in the pankration. All significant positive changes ranged from 8.51 % to 13.44 % with p≤0.02.

In those control indicators where were no positive changes, the relative values of the increase of expert assessments ranged from 5.42 % to 7.33 % (p=0.06-0.07). In our opinion, the lack of sufficient increase in the indicators of «low kick» is associated with the achievement of the optimal level at the first stage of the pedagogical experiment.

The following results were obtained among the representatives of the control group. At the first stage, positive changes were received for the majority, namely seven out of eight indicators (their groups) regarding the quality of technical-and-tactical techniques.

The exception was the execution of leg trip throw where the changes in estimates were within 3.03 % (p=0.09) from baseline. At the same time, for all other indicators, the improvement of the quality of technique was from 4.82 % to 11.06 % (p≤0.01-0.03) compared to the initial data.

However, at the second stage of the pedagogical experiment (the second macrocycle of training), there were no significant positive changes in any of the qualitative indicators of technical-and-tactical actions of the athletes of the control group. All expert assessments were within the absence of statistical confirmation (p=0.09-0.90) and ranged from 0.57 to 11.70 % of the level in the middle of the pedagogical experiment.

When comparing the results between representatives of experimental and control groups at different stages of observation, it is necessary to divide all indicators into two groups.

The first group includes indicators in which at all stages of observation there were no significant differences in quality indicators of technical-and-tactical training between athletes of experimental and control groups. These are such as roundhouse kick, hip toss, leg trip throw, variants of chokes from the back. They did not establish the advantages of any of the groups of athletes at the stage of specialized basic training in the pankration, the differences were from 0.48 to 10.19 % (p=0.08-0.94).

The other group includes «low kick», variants of head and arm chokes, leg and knee painful techniques. There is a significant difference in favor of representatives of the experimental group. Although it was acquired, only as a result of the second stage of the pedagogical experiment (the final stage of observation). The advantage of representatives of the experimental group was from 13.21 % to 13.79 % over the athletes of the control group (p=0.02 for all cases).

For all indicators of technical-and-tactical preparedness (quantitative and qualitative), without exception, there is a significant improvement (≤0.01). The highest increases in the relative values of the results during the entire period of the pedagogical experiment were observed in drill No2 («dead zones») – 20.12 %; estimates of execution of «low kick» – 21.59 %, leg trip throw – 19.08 %, and variants of knee painful technique– 20.57 % compared to baseline.

According to other indicators, there were also significant changes, although with slightly lower values from 8.62 % to 17.24 from the initial level (the beginning of the pedagogical experiment).

However, for athletes of the control group, the number and expression of positive changes has some differences. Athletes of the control group at the stage of specialized basic training in the pankration recorded significant increases in all quantitative indicators of technical-and-tactical preparedness based on the duration of the entire pedagogical experiment. The relative values of changes reached values in the range of 4.12-11.76 % (p≤0.01–0.04) and by only three out of eight qualitative indicators of technical-and-tactical preparedness. Among them are roundhouse kick (12.27 %, p=0.03), hip toss (13.17 %, p=0.03), and variants of chokes from the back (11.70 %, p≤0.01) compared to the initial level at the beginning of the pedagogical experiment (annual training cycle). According to other qualitative indicators of technical-and-tactical preparedness, there are tendencies to increase at the level of 0.57-8.18 % compared to the initial data, but they have no statistical confirmation (p=0.11-0.91).

Discussion

Among the available scientific works, the issue of pankration has been studied quite indirectly [15; 18]. However, some scientists emphasize the importance of properly building the training process [1; 2; 4; 7; 19]. According to them, high-quality construction of the training process should include improvements, technical-and-tactical training, in particular.

We believe that some differences in the results of the athletes of the control and experimental groups in the first and second stages are associated with the growing requirements for technical-and-tactical training of the athletes. That is, in the case of the athletes of the experimental group, it was possible to maintain the positive dynamics of increases in the second stage, although their values were slightly lower in the first stage of the pedagogical experiment. At the same time, the athletes of the control group, having higher positions during the first stage, failed, to some extent, to maintain the growth rate in the second part of the pedagogical experiment, which was reflected in the corresponding assessments of execution of technical-and-tactical actions.

According to experts, the factors of this are the need for optimal construction and selection of the content of the training process at different stages of long-term training [5; 8]. In particular, we note that during the study of regulations and scientific data, certain inconsistencies in the training of athletes in the pankration on the example of the stage of specialized basic training are discovered [5; 10; 9; 13].

According to the recommendations of specialists in general theory and representatives of sport martial arts, who dealt with the training of athletes at the stage of specialized basic training, at this stage there should be an increase in indicators of different related preparedness [1; 4; 10].

Most specialists working with athletes at the stage of specialized basic training generally use the recommendations given in the curriculum for CYSS on pankration and consider it optimal [7; 8; 9; 11].

However, we can state that at the end of the second stage of the pedagogical experiment of the athletes at the stage of specialized basic training performed about half of the technical-and-tactical actions with a higher level of stability, efficiency, and effectiveness in situations that required it. This significantly increases the possibilities for high-quality fighting in direct adversarial activity.

Based on the generalization of the data of the pedagogical experiment about the results of the technical-and-tactical preparedness of athletes at the stage of specialized basic training in the pankration, we received a significant confirmation of the effectiveness of the author's approach to the structure and content of annual training.

Conclusions

The results of the study convincingly show that the author's program had a more pronounced effectiveness in terms of qualitative performance of technical-and-tactical actions in the conditions of modeling of adversarial activity in the training process. It can also be argued that according to all quantitative indicators of technical-and-tactical preparedness, the use of the experimental program has had a better effect on athletes at the stage of specialized basic training in pankration.

It was found that most of the individual technical-and-tactical techniques and their groups, the representatives of both groups had positive changes during the pedagogical experiment. The assessments that took place mostly coincided. However, it should be noted that with each stage of testing, accordingly to the increase of the general level of preparedness, the requirements of the experts who conducted the assessment also increased slightly (subjectively). The assessment was carried out against the background of comparing the visual perception of the performance of technical-and-tactical actions of all athletes (both experimental and control groups). Prospects for further research involve finding out the dynamics of other groups of athletes at the stage of specialized basic training in pankration.

Conflict of interest. The authors have no conflict of interest.

References

1. Вовк В. В. Азбука панкратиона (Синтез борьбы и кулачного боя) : метод. пособие. Львів, 2008. 105 с.
   Vovk, V. V. (2008), *Azbuka pankrationa (Sintez borby i kulachnoho boya)* [The alphabet of pankration (The synthesis of wrestling and fisticuffs)]. Lviv, 105 p. [in Russia].
2. Дзорданидис В., Кузьмин, В. В. Анализ соревновательной деятельности панкратионистов. Ученые записки. 2008. № 8(42). С. 28–31.
   Dzordanidis, V., Kuzmin, V. V. (2008), "Analiz sorevnovatelnoy deyatelnosti pankrationistov" [Analysis of the competitive activity of pankrationionists]. *Scientific notes*, No 8(42), pp. 28–31. [in Russia].
3. Долженко М. Ю. Психологическая подготовка спортсменов-студентов соревновательной деятельности в панкратионе. Ukrainian Journal of Ecology. 2015. № 1a (14). С. 42–45.
   Dolzhenko, M. Yu. (2015), "Psikholohicheskaya podhotovka sportsmenov-studentov sorevnovatelnoy deyatelnosti v pankratione" [Psychological training of student athletes in competitive activities in pankration]. *Ukrainian Journal of Ecology*, No 1a(14), pp. 42–45. [in Russia].
4. Коньков Д. А. Дифференцированная технология тренировки «панкратионików» с различным уровнем физической и технической подготовленности : автореф. дисс... канд. пед. наук : 13.00.04 ХабГПУ. Хабаровск, 2008. 22 с.
   Konkov, D. A. (2008), *"Differentsirovannaya tekhnolohiya trenirovki «pankrationikov» s razlichnym urovnem fizicheskoy i tekhnicheskoy podhotovlennosti"* [Differentiated training technology of "pankrationics" with different levels of physical and technical readiness]: abstract of the dissertation of the candidate of pedagogical sciences: 13.00.04 Khabarovsk State Pedagogical University. Khabarovsk, 22 p. [in Russia].
5. Коньков Д. А. Методические особенности построения тренировочного процесса в панкратионе. Известия Российского государственного педагогического университета им. А. И. Герцена. 2008. № 58. С. 399–405.
   Konkov, D. A. (2008), "Metodicheskie osobennosti postroeniya trenirovochnoho protsessa v pankratione" [Methodological features of the construction of the training process in pankration]. *Bulletin of the Russian State Pedagogical University name A. I. Herzen,* № 58, pp. 399–405. [in Russia].
6. Мандрік О. П., Яковенко Р. В., Томенко О. А., Чередніченко С. В., Наконечний І. Ю., Ветров О. М. Панкратіон : правила змагань. Київ, 2015. 55 с.
   Mandrik, O. P., Yakovenko, R. V., Tomenko, O. A., Cherednichenko S. V., Nakonechniy I. Yu., Vetrov O. M. (2015), *Pankration : pravila zmahan* [Pankration: rules shaken]. Kyiv, 55 p. [in Ukraine].
7. Наконечний І. Взаємозв'язок спеціальної фізичної та техніко-тактичної підготовки висококваліфікованих спортсменів з панкратіону. Вісник Прикарпатського університету. Серія: Фізична культура. 2020. С. 62-67. doi: 10.15330/fcult.33.62-67.
   Nakonechniy, I. (2020), "Vzayemozvyazok spetsialnoi fizichnoi ta tekhniko-taktichnoi pidhotovki visokokvalifikovanikh sportsmeniv z pankrationu" [Relationship between special physical and technical-tactical training of highly qualified pankration athletes]. *Bulletin of the Precarpathian University. Series: Physical culture*, pp. 62–67. doi: 10.15330/fcult.33.62-67 [in Ukraine].

8. Наконечний І. Ю. Взаємозв'язок спеціальної фізичної підготовки та психологічного супроводу в багаторічній підготовці висококваліфікованих спортсменів з панкратіону. Молодий вчений. 2017. № 3.1(43.1). С. 221-226.
Nakonechniy, I.Yu. (2017), "Vzayemozvyazok spetsialnoi fizichnoi pidhotovki ta psikholohichnoho suprovodu v bahatorichniy pidhotovtsi visokokvalifikovanikh sportsmeniv z pankrationu" [Relationship between special physical training and psychological support in long-term training of highly qualified pankration athletes]. *Young scientist*, No 3.1(43.1), pp. 221–226. [in Ukraine].
9. Панкратіон : навчальна програма для дитячо-юнацьких спортивних шкіл. Київ, 2010. 54 с.
Pankration : navchalna prohrama dlya dityacho-yunatskikh sportivnikh shkil [Pankration: a curriculum for children's and youth sports schools]. Kyiv, 2010, 54 p. [in Ukraine].
10. Платонов, В. Н. Общая теория подготовки спортсменов в олимпийском спорте. Киев : Олимпийский спорт, 1997. 416 с.
Platonov, V. N. (1997), *Obshchaya teoriya podhotovki sportsmenov v olimpiyskom sporte* [The general theory of training athletes in Olympic sports]. Olimp. Literature, Kyiv, 416 p. [in Russia].
11. Скрипка І. М., Чередніченко С. В. Застосування елементів панкратіону в процесі фізичного виховання молодших школярів. Молодий вчений. 2017. № 3.1(43.1). С. 250–253.
Skripka, I. M., Cherednichenko, S. V. (2017), "Zastosuvannya elementiv pankrationu v protsesi fizichnoho vikhovannya molodshikh shkolyariv" [Application of elements of pankration in the process of physical education of junior schoolchildren]. *Young scientist*, No 3.1(43.1), pp. 250–253. [in Ukraine].
12. Согор О., Пітин М. Показники змагальної діяльності кваліфікованих дорослих спортсменів із панкратіону. Фізична активність, здоров'я і спорт. 2018. № 2(32). С. 36-43.
Sogor, O., Pityn, M. (2018), "Pokazniki zmahalnoi diyalnosti kvalifikovanikh doroslikh sportsmeniv iz pankrationu" [Indicators of competitive activity of qualified adult athletes in pankration]. *Physical activity, health and sports,* No 2(32), pp. 36-43. [in Ukraine].
13. Согор О., Пітин М. Показники змагальної діяльності юних спортсменів із панкратіону. Науковий часопис нац. пед. ун-ту ім. М. П. Драгоманова. 2019. № 9 (117). С. 83–89.
Sogor, O., Pityn, M. (2019), "Pokazniki zmahalnoi diyalnosti yunikh sportsmeniv iz pankrationu" [Indicators of competitive activity of young athletes in pankration]. *Scientific journal of the National Pedagogical University named after MP Drahomanov,* No 9(117), pp. 83–89. [in Ukraine].
14. Юхно Ю. А., Зарудний В. Ю., Олексенко І. Н., Журавель А. В. Состав и структура соревновательной деятельности в панкратионе на современном этапе его развития. Физическое воспитания студентов. 2011. Вип. 4. С. 92–95.
Yukhno, Yu. A., Zarudniy, V. Yu., Oleksenko, I. N., Zhuravel, A. V. (2011), "Sostav i struktura sorevnovatelnoy deyatelnosti v pankratione na sovremennom etape eho razvitiya" [Composition and structure of competitive activity in pankration at the modern stage of its development. *Physical education students*, Issue 4, pp. 92–95. [in Russia].
15. Andreasson, J., Johansson, T. (2018). Negotiating violence: mixed martial arts as a spectacle and sport. *Sport in Society: Cultures, Media, Politics, Commerce*, 1-15 https://doi.org/10.1080/17430437.2018.1505868
16. Pityn, M., Okopnyy, A., Tyravska, O., Hutsul, N., Ilnytsky, I. (2017). Dynamic of indexes of technical and tactical actions of qualified kick-boxer individual fighting style. *Journal of Physical Education and Sport*. 17 (Suppl. issue 3). pp. 1024–1030. doi:10.7752.jpes.2017.s3157
17. Radchenko, Y. A.. (2015). Specific features of competition functioning of martial arts elite sportsmen. *Pedagogics, Psychology, Medical-Biological Problems of Physical Training and Sports*, 19(12). 91-95. https://doi.org/10.15561/ 18189172.2015.12014
18. Stenius, M. (2014). The Legacy of Pankration: Mixed Martial Arts and the Posthuman Revival of a Fighting Culture. *Journal of Combat Martial Arts and Science*, 14, pp. 4–27.
19. Zbigniew, B., Mircea,V., M., Dariusz, G. (2014). The hierarchy of professional activities of martial arts and mixed martial arts coaches. *Ido Movement for Culture. Journal of Martial Arts Anthropology*, 14(2), pp. 29–35. doi: 10.14589/ido.14.2.4

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EVALUATION OF PREPAREDNESS OF HIGHLY QUALIFIED GEARBOARDS IN A LONG CYCLE WEIGHT POST

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The dependence of sport result in the athlets of weight push over a long cycle on the classic exercise upon performance rate is approved in the article. The rate characterizes speed-power athlete's potential. The rate activity is based on technical and functional ability of sportsman. *Aim of the survey* was to identify the level of preparedness of professional athletes of weight push over a long cycle after the ranking classification table. *Survey methods* are as follows: theoretical analysis and generalization of scientific and methodological literature, documentary method (the study of protocols and reports of competitions); methods of mathematical statistics. *Results.* The winners of National Cup in weight push over a long cycle (Zhytomyr, 2018) took part in the survey. We used video recording and study of protocols and reports of the competitions during the research of weight push over a long cycle technique. Personal result of each of the participants was taking into account. The classic exercise "weight push over a long cycle" being speed-power multiply repeating motion has to be done for 10 min. The comparative analysis of the tournament results of professional athletes of weight push over a long cycle (winners of the National Cup 2018) in different weight categories and the classification rankings for Master of Sports of Ukraine (MSU) and Master of Sports of Ukraine of International Level (MSUIL) is presented. Athlete under 63 kg did 52 lifts what is 2 lifts more than MSUIL rank. Athlete under 68 kg did 51 lift what is 7 lifts more than MSU rank, and 6 ones less than MSUIL rank. Athlete under 73 kg did 58 lifts what is 8 lifts more than MSU rank, and 6 ones less than MSUIL rank. Athlete under 78 kg did 73 lifts what is 3 lifts more than MSUIL rank. Athlete under 85 kg did 66 lifts what is 9 lifts more than MSU rank, and 10 ones less than MSUIL rank. Athlete under 95 kg did 64 lifts what is 4 lifts more than MSU rank, and 16 ones less than MSUIL rank. Athlete over 95 kg did 66 lifts what is 4 lifts more than MSU rank, and 16 ones less than MSUIL rank. *Conclusions.* Thus, the insufficient level of athletes preparedness for the performance of MSUIL rank, especially in the heavy weight categories, is observed. We consider improving or changing the techniques/training programs completely as well as analyze their preparedness and improve those of the physical qualities which are weaker.

Keywords*:* technique, physical qualities, athlete, weightlifting, weight push over a long cycle.

Introduction

The long cycle kettlebell lifting in Ukraine and abroad is gaining popularity and developing. Competition rules of it are constantly changing and bit standards are being raised. The growth of athletic results requires further improvement of the process of training of kettlebell lifters.

It is easier to lift kettlebells both to the chest and from the chest slightly squatting. The shallow squat allows you to perform each exercise more gently and economically. The depth of the squat depends on the strength of the muscles of the legs, back, technical training of the athlete, flexibility, as well as the level of fatigue when the movement is performed. Well-trained kettlebell lifters in the last lifts in the weight push over a long cycle, when pushing the kettlebells from the chest to the desired height is very difficult, they apply a deeper squat, which ensures a more reliable stability that allows you to straighten your arms at the top and keep the weights over your head [1; 4].

Technical preparedness is an integrated indicator of the properties of the athlete's individual motor program and his/her abilities to implement it. Platonov V. considers the level of technical preparedness as the volume of techniques and actions possessed by the athlete, as well as the degree of their mastery, the effectiveness of technology [11]. Sports-and-technical improvement leads to the development of specific qualities (sense of kettlebells, sense of time) and other things that determine the achievement of high sports results. Without this, any biomechanical technique of movements turns into formal movements and does not lead to high and stable results [5; 11]. However, in order to correct weight training, it is necessary to know the indicators of his technique, which are interrelated with sports results.

Existing publications on kettlebell lifting sports are more based on the coaching or sports experience of the authors [1; 13]. Technical preparedness cannot be considered separately, but should be presented as a component in which technical solutions are closely interconnected with physical and functional training [5; 11]. The process of improving the technical training of highly qualified athletes remained without sufficient attention of specialists. Among the most informative is

the method of video-computer analysis, which allows not only to identify the main shortcomings of the technique, and ways to solve them, but also helps to improve motor action and control the impact of technical training on athlete training, as well as for the establishment of objective technical indicators [13]. You can also determine the pace of adversarial exercise on each minute of the time allotted, in a 10 minute time frame. If necessary, determine your comfortable pace and evenly go through the entire distance.

Analysis of studies has shown that qualified athletes raise kettlebells at the same pace for 10 minutes, and if at the end of the last minute there is strength, they accelerate.

Studies of many scientists indicate that in addition to the necessary professional skills, athletes-kettlebell lifters achieve a high level of physical and psychological readiness. Improves the functional state of the body's main systems and efficiency [14; 18; 20].

Material and research methods

The purpose of the study is to identify the level of preparedness of highly qualified kettlebell lifters in the push of weights over a long cycle according to the classification table of bit standards.

To conduct a comparative analysis of the long cycle kettlebell push indicators of the leading weightlifters of Ukraine of different weight categories. Investigate the dynamics of the long cycle push of the Cup of Ukraine winners by weight categories. Identify the state of implementation of classification standards in the long cycle kettlebell lifting.

Methods: theoretical analysis and generalization of scientific and methodical literature, documentary method (study of protocols and reports of competitions); methods of mathematical statistics. Mathematical processing done using standard Microsoft Excel functions [2; 16].

Results

The winners of the Cup of Ukraine in long cycle kettlebell lifting (Zhytomyr, 2018) took part in the research.

During the research, the method of video recording and study of protocols and reports of competitions was used. The sports result of highly qualified kettlebell lifters, the winners in each weight category, was determined, and analyzed their functional and technical preparedness.

The characteristics of the technique of highly qualified athletes specializing in long cycle kettlebell push are determined. Moreover, the technique of pushing the weight over a long cycle is divided into 4 techniques: the first – lifting kettlebells on the chest, the second – press the kettlebells overhead from the chest (pushing), the third – pull down the weights back on the chest, the fourth – lowering the weight from the chest to the hanging position [1; 5].

The classic exercise "long cycle kettlebells lifting" is a velocity-and-power exercise, performed as many repetitions as possible in a 10-minute time frame [5; 10; 12].

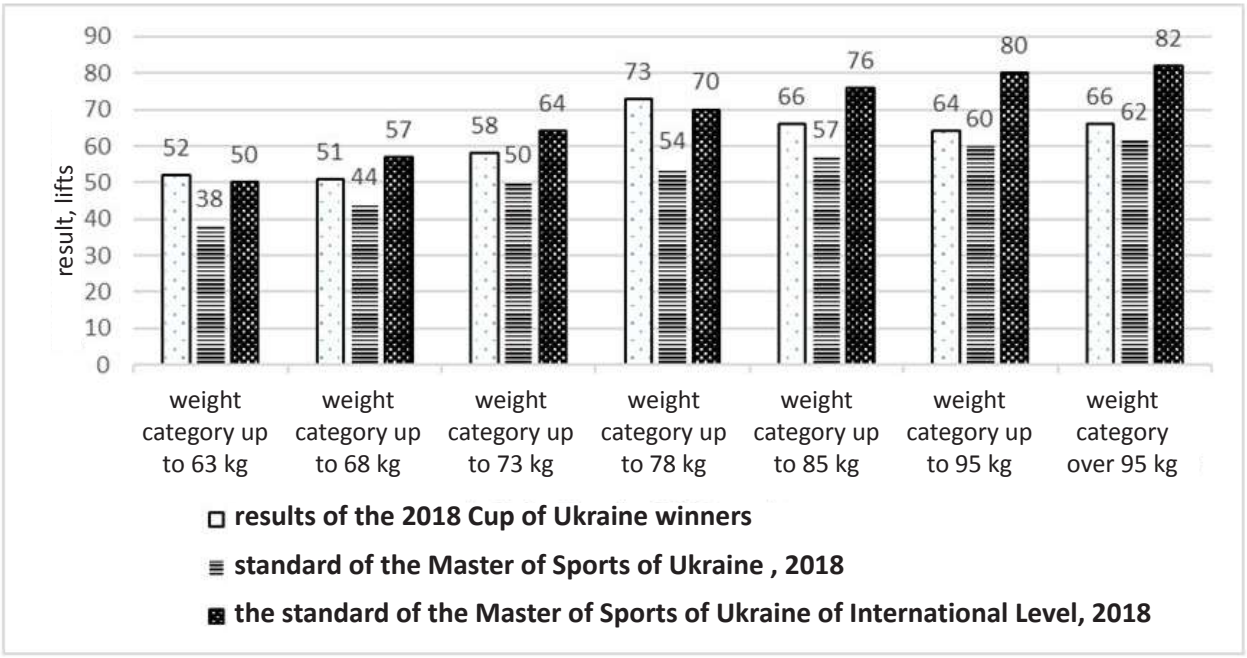

Fig. 1 Dynamics of changes in the results of the 2018 Cup of Ukraine winners in the long cycle kettlebell lifting compared to the classification requirements of the MSU and MSUIL (in the jerk)

Figure 1 presents a comparative analysis of the adversarial activity indicators of the dynamics of changes in highly qualified kettlebell lifters, who are the winners of the 2018 Cup of Ukraine in the long cycle kettlebell lifting of different weight categories (w/c) compared to the classification requirements of the MSU and MSUIL (in the lifts). In the weight category up to 63 kg the athlete showed the result – 52 lifts, which is higher than the standard of the Master of Sports of Ukraine of International Level (MSUIL) by 2 lifts; in the w/c up to 68 kg – 51 lifting that is higher than the standard of the Master of Sports of Ukraine (MSU) by 7 lifts and 6 lifts less than the MSUIL standard; in the weight category up to 73 kg – 58 lifts, this is higher than the standard of the MSU by 8 lifts and 6 lifts less than the MSUIL standard; in the w/c up to 78 kg – 73 lifts, this is higher than the MSUIL standard by 3 lifts; in the w/c up to 85 kg – 66 lifts, it is higher than the MSU standard by 9 lifts and less than the MSUIL standard by 10 lifts; in the w/c up to 95 kg – 64 lifts, this is higher than the MSU standard by 4 lifts and below the MSUIL standard by 16 lifts; in the w/c over 95 kg – 66 lifts, that is 4 lifts above the MSU standard and below the MSUIL standard by 16 lifts

The results of pedagogical observation of the process of adversarial activity showed that the lowest indicators of adversarial activity accordingly to the classification table of bit standards are for athletes of heavyweight categories up to 95 and over 95 kg. They have 16 lifts less than the MSUIL standard compared to the weight category up to 85 kg – 10 lifts and in the weight category up to 68 and 73 kg, where there is less than MSUIL standard by 6 lifts.

Considering their body weight, we have concluded that their training missing the means for development of general endurance because of which it is possible to form a special endurance to work with kettlebells. Application of a differentiated approach to improving the physical qualities of athletes depending on the weight categories, for light weight categories the ratio is 60% for strength and for endurance 40 %, in heavyweight category this ratio should be 50 % / 50 %.

Special endurance is the ability to perform work effectively and overcome fatigue in the conditions of loads, due to the requirements of effective adversarial activity in a particular sport [5; 11; 15].

Discussion

Taking into account the dynamics of changes in the results of the winners of the Cup of Ukraine in the long cycle kettlebells lifting, we see that in the weight categories up to 95 and over there are 16 lifts less to meet the MSUIL standard. Therefore, there is a need to review their methods of training for competitions, to analyze their physical fitness, to improve those physical qualities that lag behind. Sports training of kettlebell lifters includes the following components: physical training (general and special), technical, tactical, theoretical, and psychological (moral-and-volitional). All these components are closely interconnected. Insufficient level of training in any of these components will not allow the athlete to reveal their physical capabilities.

The tasks of physical training are aimed at following: increasing the level of development and expanding the functional capabilities of the body of weightlifters, developing physical qualities and improving the function of muscle relaxation, improving physical abilities that ensure the effectiveness of achieving maximum results in competitions [3; 5; 15].

These tasks are solved in the process of general and special physical training. General physical training is carried out in order to improve health, to increase efficiency, physical qualities development level, harmonious physical fitness. The main means of general physical training are various physical exercises. These are running, exercises on sports apparatus, exercises with weights, exercises with your own body weight, etc. General physical training expands the functional capabilities of the body, increases physical activity and provides conditions for the development of special physical fitness of the athlete and his achievement of high results in competitions [8-10; 17; 19]. Special physical training aims at developing of special physical qualities. The means of special training are adversarial exercises.

The most effective means of improving the special training of the kettlebells lifters are control “estimates” and participation in competitions. However, the abuse of these means can lead to exhaustion of the nervous system, fatigue of the body and reduced athletic performance. General and special physical training are interrelated and interdependent. Their ratio changes in the process of long-term training: with the increasing of professional qualification of weightlifters, the part of general training exercises decreases, and the part of special physical training increases [5-7].

To confirm the above hypothesis, scientist Platonov V. conducted researches and stated that one of the most important methodical conditions for improving rational technology is interconnection and interdependence of the movement structure and the level of development of physical qualities. Improving of physical fitness requires a transition to a new level of technical skill and vice versa – a more advanced technical skill of the athlete requires appropriate physical training [11].

In the long cycle kettlebell lifting, the result depends on the pace and tempo activity of the classical exercise especially in the second half of the segment. Tempo activity relies on the technical and physical preparedness of the athlete. The pace indicators decrease in the second half of the allotted time by 8-10 minutes. The pace characterizes the velocity-and-strength potential of the athlete. Therefore, the athlete must calculate his strength so that he could at one, the highest pace for himself to cover the entire distance for 10 minutes without slowing down.

Conclusions

We conducted a comparative analysis and identified the level of preparedness of highly qualified weightlifters, the dynamics of changes in the winners of the 2018 Cup of Ukraine in a long cycle kettlebell lifting of different weight categories compared to the classification requirements of the MSU and MSUIL (in the jerk). The results of pedagogical observation of the process of adversarial activity showed that all the winners of the Cup of Ukraine in a long cycle kettlebell lifting had the results above the standard of the Master of Sports of Ukraine, of which two athletes of weight categories up to 63 and 78 kg exceeded the standard of MSUIL. Athletes of categories up to 95 and over showed the lowest indicators of competition. They have 16 lifts less to the MSUIL standard, when in the weight category up to 85 and up to 68 and 73 kg it was 10 and 6 lifts less, respectively. Thus, we observe an insufficient level of preparedness of athletes to meet the qualification requirements of the MSUIL standard, especially in heavy weight categories. There is a need to consider improving or completely changing the methodology or training program. To analyze their physical fitness, to improve those physical qualities that lag behind.

Prospects for further research are laying in studying of the development of methodological recommendations for improving the training process through the appropriate combination of means of technical and physical training of highly qualified kettlebell lifters of different weight categories.

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

References

1. Андрейчук В. Я. Методичні основи гирьового спорту: навч. посібник. Львів: Тріада плюс, 2007. 500 с.
   Andreychuk, V. Ya. (2007), *Metodychni osnovy hyrovoho sportu* [Methodical bases of kettlebell sports]. Triada plius, Lviv, 500 p. [in Ukraine].
2. Галаманжук Л. Л., Єдинак Г. А. Основи наукових досліджень : навч.-метод. посібник. Кам'янець-Подільський : Рута, 2019. 150 с.
   Galamandjuk, L. L., Iedynak, G. A. (2019), *Osnovy naukovykh doslidzhen*' [Fundamentals of scientific research]. Ruta Printing House LLC, Kamianets-Podilskyi, 150 p. [in Ukraine].
3. Грибан Г.П. Гирьовий спорт у вищих навчальних закладах: навч.-метод. посібник. / Г. П. Грибан, К. В. Пронтенко, В. В. Пронтенко [та ін.]: Вид-во "Рута", 2014. 400 с.
   Hryban, H. P. (2014), *Hyrovyi sport u vyshchykh navchalnykh zakladakh* [Weightlifting in higher education]. Vyd-vo "Ruta", Zhytomyr, 400 p. [in Ukraine].
4. Гирьовий спорт: навч. прогр. для дит.-юнац. шк., спеціаліз. дит.-юнац. шк. олімп. резерву. М-во України у справах сім'ї, молоді та спорту, Федер. Гирьового спорту України / підгот. Ю. В. Щербина. Київ, 2010. 52 с.
   Hyrovyi sport (2010), *Navch. prohr. dlia dyt.-yunats. shk., spetsializ. dyt.- yunats. shk. olimp. rezervu, [*Weightlifting]. Kyiv, 52 p. [in Ukraine].
5. Пронтенко К. В., Андрейчук В. Я., Пронтенко В. В., Романів І. В. Підготовка спортсменів у поштовху гир за довгим циклом : навч.-метод. посібник. Львів: Ліга-Прес, 2016. 228 с.
   Prontenko, K. V., Andreychuk, V. Ya., Prontenko, V. V., Romaniv, I. V. (2016), *Pidhotovka sportsmeniv u poshtovkhu hyr za dovhym tsyklom* [Training athletes to push the weights over a long cycle]. Liha-Pres, Lviv, 228 p. [in Ukraine].
6. Пронтенко В. Ефективність спортивної підготовки гирьовиків на сучасному етапі розвитку гирьового спорту. Молода спортивна наука України. Львів 2010. Вип. 14, т. 1. С. 238-242.
   Prontenko, V. (2010), "Efektyvnist sportyvnoi pidhotovky hyrovykiv na suchasnomu etapi rozvytku hyrovoho sportu" [Efficiency of sports training of weight lifters at the present stage of development of weight training]. *Young sports science of Ukraine,* Issue 14, Vol. 1, pp. 238-242. [in Ukraine].
7. Пронтенко К., Андрейчук В., Пронтенко В., Бойко Д. Ефективність підготовки спортсменів у поштовху гир за довгим циклом. Молода спортивна наука України. 2014. Вип. 18, т. 1. С. 225–231.
   Prontenko, K., Andreychuk, V., Prontenko, V., Boiko, D. (2014), "Efektyvnist pidhotovky sportsmeniv u poshtovkhu hyr za dovhym tsyklom" [The effectiveness of training athletes in the push of weights over a long cycle]. *Young sports science of Ukraine,* Issue 18, Vol. 1, pp. 225–231. [in Ukraine].
8. Пронтенко К., Андрейчук В., Безпалий С. Вплив занять гирьовим спортом на фізичний розвиток курсантів військових закладів вищої освіти. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. Кам'янець-Подільський: КПНУ ім. І. Огієнка. 2019. Вип. 13 (2019), С. 46-55. doi: 10.32626/2227-6246.2019-13.46-55.
   Prontenko, K., Andreychuk V., Bezpalyi S. (2019), "Vplyv zaniat hyrovym sportom na fizychnyi rozvytok kursantiv viiskovykh zakladiv vyshchoi osvity". [Having the urge to engage in weight-lifting sports for physical development of cadets in high school mortgages]. *Bulletin of Kamyanets-Podilsky National in the name of Ivan Ogienko. Physical education, sports and human health,* Issue 13, pp. 46-55. doi: 10.32626/2227-6246.2019-13.46-55. [in Ukraine].
9. Пронтенко К. В., Романчук С. В., Андрейчук В. Я., Романів І. В., Лесько О. М., Панькевич Я. А. Особливості тренувального процесу спортсменів-гирьовиків різної кваліфікації у поштовху гир за довгим циклом. Науковий часопис Національного педагогічного університету імені М. П. Драгоманова. Серія № 15 : Науково-педагогічні проблеми фізичної культури (фізична культура і спорт). 2018. Вип. 11 (105) 18. С. 121–125.
   Prontenko K. V., Romanchuk S. V., Andreychuk V. Ya., Romaniv I. V., Lesko O. M., Pankevych Ya. A. (2018), "Osoblyvosti trenuvalnoho protsesu sportsmeniv-hyrovykiv riznoi kvalifikatsii u poshtovkhu hyr za dovhym tsyklom" [Features of the training process of weightlifters of different qualifications in weightlifting over a long cycle]. *Scientific and pedagogical problems of physical culture (physical culture and sports),* Issue 11(105) 18, pp. 121–125. [in Ukraine].

10. Пронтенко К., Романчук С., Андрейчук В., Лесько О., Романів І., Лещінський О., Барашевський С., Музика Н. Структура фізичної підготовленості спортсменів-гирьовиків на етапах багаторічної підготовки. Вісник Кам'янець-Подільського національного університету імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. Кам'янець-Подільський: КПНУ ім. І. Огієнка. 2020. Вип. 16. С. 74–78. doi: 10.32626/2309-8082.2020-16.74-78.
Prontenko K., Romanchuk S., Andreychuk V., Lesko O., Romaniv I., Leshchinskyi O., Barashevskyi S., Muzyka N. (2020), "Struktura fizychnoi pidhotovlenosti sportsmeniv-hyrovykiv na etapakh bahatorichnoi pidhotovky" [The structure of physical fitness of weightlifters at the stages of long training]. *Bulletin of Kamyanets-Podilsky National in the name of Ivan Ogienko. Physical education, sports and human health*, Issue 16, pp. 74-78. doi: 10.32626/2309-8082.2020-16.74-78 [in Ukraine].
11. Платонов В. Н. Система подготовки спортсменов в олимпийском спорте. Общая теория и ее практические приложения : учебник. Киев: Олимпийская литература, 2004. 808 с.
Platonov, V. N. (2004), *Systema podhotovky sportsmenov v olympyiskom sporte. Obshchaia teoryia y ee praktycheskye prylozhenyia* [The system of training athletes in Olympic sports. General theory and its practical applications]. Olympyiskaia lyteratura, Kyiv, 808 p. [in Ukraine].
12. Рассказов В. С. Пути и перспективы развития гиревого спорта. М., МФГС, 2004. 32 с
Rasskazov, V. S. (2004), *Puty y perspektyvy razvytyia hyrevoho sporta* [Ways and prospects of kettlebell sport development]. MFGS, Moskva, 32 p. [in Russia].
13. Романчук В. М., Пронтенко К. В., Пронтенко В. В., Бойко Д. В. Розвиток фізичних якостей у студентів засобами гирьового спорту : навч.-метод. посібник. Житомир : ЖВІ НАУ, 2012. 224 с.
Romanchuk, V. M., Prontenko, K. V., Prontenko, V. V., Boiko, D. V. (2012), *Rozvytok fizychnykh yakostei u studentiv zasobamy hyrovoho sportu* [Development of physical qualities in students by means of weight training]. ZhVI NAU, Zhytomyr 224 p. [in Ukraine].
14. Романчук С. В. та ін. Фізичне виховання у військових підрозділах : навч. посібник. Львів, 2014. 540 с.
Romanchuk S. V. ta in. (2014), *Fizychne vykhovannia u viiskovykh pidrozdilakh.* [Physical education in military units]. Lviv, 540 p. [in Ukraine].
15. Матвеев Л. П. Общая теория спорта и ее прикладные аспекты. М. : Известия, 2001. 334 с.
Matveev, L. P. (2001), Obshchaia teoryia sporta y ee prykladnye aspekty [General sport theory and its applied aspects]. Yzvestyia, Moskva, 334 p. [in Russia].
16. Шиян Б. М., Єдинак Г. А., Петришин Ю. В. Наукові дослідження у фізичному вихованні та спорті : навч. посібник. Кам'янець-Подільський : ПП Видавництво "Оіюм", 2012. 280 с.
Shiyan, B. M., Iedynak, G. A., Petryshyn, Yu. V. (2012), *Naukovi doslidzhennya u fizychnomu vykhovanni ta sporti* [Scientific research in physical education and sports]. PE Oyum Publishing House, Kamianets-Podilsky, 280 p. [in Ukraine].
17. Prontenko K., Griban G., Aloshyna A., Bloshchynskyi I., Kozina Zh., Bychuk O., Novitska I., Korchagin M. (2019). Analysis of Cadets' Endurance Development at Higher Military Educational Institutions during the Kettlebell Lifting Training. *Sport Mont*, 17 (2), pp. 3–8. doi 10.26773/smj.190601
18. Kamaiev O. I., Hunchenko V. A., Mulyk K. V., Hradusov V. A., Homanyuk S. V., Mishyn M. V., Martynenko O. M., Shuryaev V. P. (2018). Optimization of special physical training of cadets in the specialty "Arms and Military Equipment" on performing professional military-technical standards. *Journal of Physical Education and Sport*, 18 (Sup. issue 4), pp. 1808–1810. doi:10.7752/jpes.2018.s4264
19. Prontenko K., Griban G., Bloshchynskyi I., Boyko D., Loiko O., Andreychuk V., Novitska I., Tkachenko P. (2019). Development of power qualities of cadets of Ukrainian higher military educational institutions during kettlebell lifting training. *Baltic Journal of Health and Physical Activity*, 11 (3), 27–38. doi: 10.29359/BJHPA.11.3.04
20. Prontenko K., Griban G., Prontenko V., Andreychuk V., Tkachenko P., Kostyuk Yu., Zhukovskyi Ye. (2017). Kettlebell lifting as a means of physical training cadets in Higher Military Educational Institution. *Journal of Physical Education and Sport*, 17 (4). pp. 2685–2689. doi:10.7752/jpes.2017.04310

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PURPOSEFUL CHANGE OF MORPHOLOGICAL PARAMETERS OF THE BODY OF ADULTS IN THE PROCESS OF MENTAL FITNESS

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One of the important indicators of physique is the circumferential parameters of the human body, which are often used as a criterion for the impact of a technique of health training aimed at correcting the figure. *The purpose of the study: t*o determine the impact of mental fitness on the morphological parameters of the body of mature women. *Objective:* to investigate the effect of Pilates on the correction of figure of middle-aged women to improve their health and well-being. *Research methods* – analysis and generalization of literature sources, anthropometry (measurement of circumferential body size), methods of mathematical statistics. *The results of the study*: as a result of the experimental program, changes in the circumferential body size of middle-aged women by the end of the study in the experimental group were noted in the range of 0,1 % – 3,5 %. The most significant were the changes in the circumferential dimensions of the tense shoulder – 3,5 % (t = 6,63), waist – 3,4 % (t = 5,63), abdomen – 3,1 % (t = 4,32), thigh – 3,0 % (t = 4,52). The change in the circumferential dimensions in the control group was insignificant – 0 %–1,9 %, and there were almost no changes in the circumference of the chest – 0 % (t = l,84), waist (t = 3,58) and abdomen (t = 4) – 0,3 %, as well as the buttocks – 0,4 % (t = 3,07). The largest and most significant were the changes in the circumference of the forearm (t = 2,9) and thigh (t = 4,19) –1,9 %. It should be noted that there were almost no changes in the circumferential dimensions of the neck and chest in the intermediate state in both groups ($t < t_{kp}$). *Conclusion*: according to experimental studies, the use of the Pilates technique in the training programs of middle-aged women provides an increase in physical performance in the absence of muscle growth, which is an important motive for exercise for most women and is an undeniable advantage of the Pilates program.

Key words: middle-aged women, figure correction, Pilates system.

Introduction

In recent years, special attention among adults has been paid to various correctional-and-health improving technologies aimed at developing a balance between body and mind, mental and social balance, which can be achieved by a combination of physical and mental training, i.e. conscious execution of each movement, full control over the body in the process of exercise [1; 2; 9; 10]. The purpose of many training programs has become common sense and attitude to yourself through consistent study of own body, reaching agreement with yourself through an optimal combination of physical and mental activity [3; 5; 6]. These programs were called «Mind Body» (Smart Body). The term “Mind Body” came from the physical therapy [6; 9; 10], the rapid development of which was observed in the 40-50 s of last century.

The peculiarity of mental directions in fitness is the use of figurative thinking, which offers its own images of visualization [3; 4]. Visual image is a relatively new concept in the world of fitness, but the most effective. Using visual images to engage consciousness is the fastest way to access a complex anatomical system [8]. Using visualization in training helps to «discover the abilities of the mind and body» and «join their efforts» to achieve the task, to help the central nervous system choose the right combination of muscles to perform a particular movement [9].

Mental fitness includes the Pilates exercise system, created about a hundred years ago by German physician, coach and athlete Joseph Pilates. The Pilates method includes features inherent in both Western (European and American) movement culture and Eastern. The Pilates system affects the development of physical qualities such as strength and flexibility, as well as affects positively the psycho-emotional state of adults [4]. When performing exercises on the Pilates system, much attention is paid to the visualization method, which ensures the correct execution of movements and accelerates the learning process [5; 9; 10]. At the end of the last century, the Pilates method was revived and modernized.

Nowadays, the «Mind Body» programs are the most popular and in demand. However, despite the great popularity of mental fitness programs among mature people, their study and detection of their impact on the body of women is devoted to much less work than traditional methods.

Material and research methods

The purpose of the work was to study the effect of the Pilates system on the correction of the figure of middle-aged women to improve their well-being and active life. Objective: to investigate the impact of Pilates classes on the correction of the figure of middle-aged women to improve their health and life. The following methods of research

were used: analysis, systematization, generalization of literary sources; anthropometry; mathematical statistics. To assess the physical development of middle-aged women, the following anthropometric measurements were performed [8; 11; 12]. Measurement of body was carried out in the standard position, in a horizontal plane, using a centimeter tape with an accuracy up to 2 mm. Measured: chest circumference, circumference of shoulder in a relaxed state and in a tense condition, forearm circumference, buttock circumference, hip circumference, shin, abdomen, waist and neck circumferences.

The organization of the study involved a two-stage pedagogical experiment, namely the ascertaining and the main (forming). 100 women from 25 to 45 years old took part in the ascertaining experiment. The task of this stage of the study was to form experimental and control groups with the same level of preparedness (to obtain the most informative results of the main study). The main experiment involved 40 women with identical characteristics of physical fitness, who were divided into two levels of groups engaged in different programs: the first group is experimental, which used the D. Pilates exercise system; the second group is control that engaged only in basic aerobics of power orientation. At the same time, for 12 months (September 2018 – August 2019), women of the first group were engaged in a specially designed complex of exercises of the Pilates system, while the other 20 people practice the standard basic and strength aerobics lessons used in fitness clubs of Rivne [5; 6; 10; 11; 12].

Results

One of the important indicators of physique are circumferential parameters of the human body, which are often used as a criterion for the impact of a particular method of health training aimed at correcting the figure [5; 7; 9]. In the process of studying the degree of influence of the training program we developed, ten circumferential characteristics were measured: a strained shoulder and shoulder in a calm state, shin, forearm, hip, neck, chest, waist, abdomen and buttock.

The results of measurements of circumferential dimensions before and after the experiment for experimental and control groups, and data obtained during statistical processing are given in Table 1.

Table 1 – Significance of Differences in Circumferential Indicators of Women of Experimental and Control Groups

Circumferences (mm)	Experimental group			Control Group		
	Before the experiment	After the experiment	Significance of differences	Before the experiment	After the experiment	Significance of differences
Strained shoulder	29,94 ± 2,28	28,9 ±2,12	t = 6,63; P < 0,01	30,46 ± 3,49	30,15 ±3,46	t = 4,78; p < 0,01
Shin	36,95 ± 2,01	36,27 ± 1,74	t = 3,53; P < 0,01	38,4 ±3,02	37,98 ±3,15	t = 3,59 ; p < 0,01
Relaxed shoulder	28,66 ± 2,01	28,01 ± 1,76	t = 3,85; P < 0,01	30,7 ±3,19	30,315 ± 3,26	t = 5,42; p < 0,01
Forearm	24,6 ± 1,8	24,34 ± 1,73	t = 4,21; P < 0,01	25,34 ±3,02	24,87 ± 2,99	t = 2,9; p < 0,01
Hip	57,55 ± 4,02	55,83 ± 3,18	t = 4,52; P < 0,01	59,75 ± 3,07	58,62 ±2,91	t = 4,19; p < 0,01
Neck	34,09 ± 2,49	34,05 ± 2,5	t = 1,9; P > 0,01	34 ± 2,45	33,911 ± 2,51	t=1,93; p > 0,01
Breast	88,93 ± 4,88	88,81 ± 4,86	t= 1,48; P > 0,01	89,12 ±5,23	89,08 ± 5,22	t=1,84; p > 0,01
Waist	76,32 ± 5,82	73,7 ±5,17	t = 5,63; P < 0,01	77,99 ± 5,47	77,7 ± 5,46	t = 3,58; p < 0,01
Abdomen	102,29 ± 8,06	99,12 ±6,5	t = 4,32; P < 0,01	103,78 ± 4,22	103,522 ± 4,24	t = 4; p < 0,01
Buttock	103,12 ±5,83	101,38 ± 5,36	t = 5,13; P < 0,05	103,96 ±4,53	103,58 ± 4,46	t = 3,07; p < 0,01
$t_{кр}$= 2,861						

The results of the study show that the circumference of the strained shoulder, shin, relaxed shoulder, forearm, hip, waist, abdomen and buttock changed significantly in both the control and experimental groups. The value of the Student's criterion was higher for the experimental group, meaning that the circumferential dimensions decreased in the experimental group more than in the control group. It should be noted that there were practically no changes of the circumferences of the neck and chest in both groups ($t < t_{кр}$). The results of changes of the circumferences for both groups are presented graphically in Figures 1 and 2.

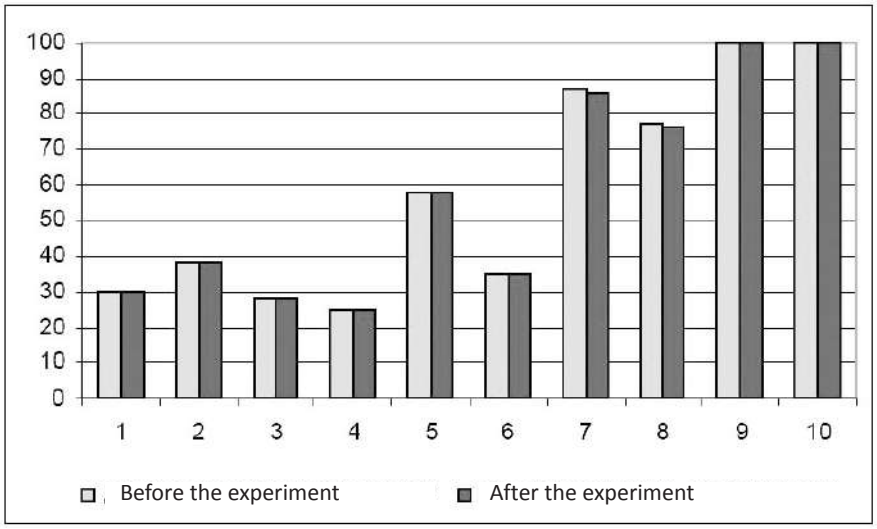

Fig. 1. Dynamics of changes of the circumferences of the experimental group (n = 20)

N o t e s. Legend of circumferences:

1 – strained shoulder;	3 – relaxed shoulder;	5 – hip;	7 – chest in intermediate position;	9 – abdomen;
2 – shin;	4 – forearm;	6 – neck;	8 – waist;	10 – buttock

Figure 1 shows that changes in the circumferential women's body sizes by the end of the study in the experimental group were in the range of 0.1–3.5 %. The largest and most significant were changes in the circumferences of the strained shoulder – 3.5 % ($t = 6.63 > t_{kp}$), waist – 3.4 % ($t = 5.63 > t_{kp}$), abdomen – 3.1 % ($t = 4.32 > t_{kp}$), and hips – 3.0 % ($t = 4.52 > t_{kp}$).

The changes in circumferential dimensions in the control group that are given in Figure 2, were insignificant – 0 –1.9 %, and practically were no changes in the chest circumference – 0 % ($t = l,84 < t_{kp}$), waist ($t = 3.58 > t_{kp}$), abdomen ($t = 4 > t_{kp}$) – 0.3 %, and buttock – 0.4 % ($t = 3.07 > t_{kp}$). The largest and most significant were changes in forearm ($t = 2.9 > t_{kp}$) and hip circumferences $0 = 4.19 > t_{kp}$) – 1.9 %.

Figure 2 indicates that as a result of conditioning training used for the control group, the value of the circumferential sizes decreased significantly less than in the experimental group, which used training according to the Pilates method.

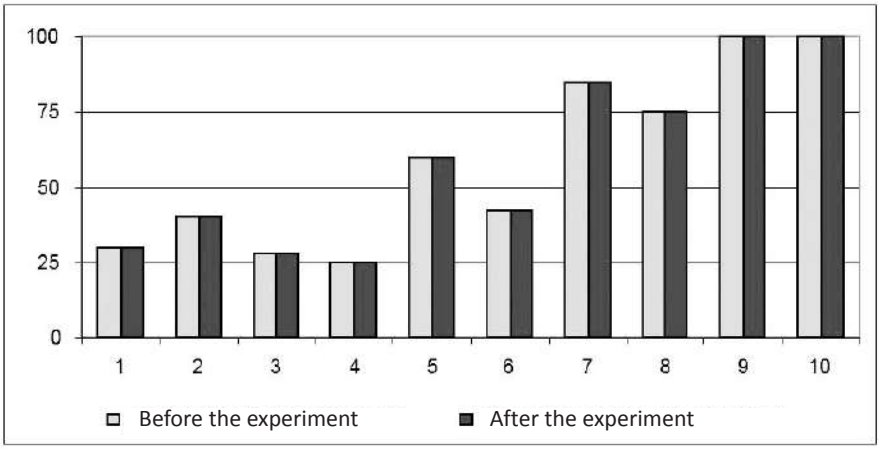

Fig. 2 Dynamics of changes of the circumferences of the control group (n = 20)

For example, the hip circumference in the control group decreased significantly by 1.9 % and in experimental group – by 3 %; the circumferences of abdomen and waist in the control group decreased by 0.3%, and in experimental – by 3.1 % and 3.4 % respectively; the buttock circumference in the control group decreased by 0.4 %, and in experimental group – by 1.7 %. A similar pattern is observed in the dynamics of other anthropometric indicators.

Table 2 presents the differences in the size of the circumferential dimensions between the control and experimental groups after the experiment.

Table 2 – Significance of Differences in Circumferential Sizes of Women After the Experiment

Circumferences, mm	Experimental group	Control Group	Significance of differences
Strained shoulder	28,898 ± 2,12	30,15 ± 3,46	t= 1,07 (p > 0,05)
Shin	36,27 ± 1,74	37,98 ± 3,15	t = 2,41 (p < 0,05)
Relaxed shoulder	28 ± 1,76	30,315 ± 3,26	t = 3,45 (p < 0,05)
Forearm	24,34 ± 1,73	24,87 ± 2,99	t= 1,38 (p > 0,05)
Hip	55,83 ± 3,18	58,62 ±2,91	t = 2,46 (p < 0,05)
Neck	34,05 ± 2,49	33,91 ±2,52	t=l,58 (p > 0,05)
Chest	88,81 ±4,86	89,08 ± 5,23	t= 1,04 (p > 0,05)
Waist	73,7 ± 5,2	77,7 ± 5,46	t = 2,23 (p < 0,05)
Abdomen	99,115 ± 6,5	103,52 ±4,24	t = 2,l (p < 0,05)
Buttock	101,38 ± 5,36	103,58 ±4,46	t = 2,12 (p < 0,05)
$t_{кр}$= 2,021			

As can be seen from the table, the differences were insignificant (p > 0.05) in the circumferences of the strained shoulder (t = l,07 < t_{kp}), forearm (t = l, 38 < t_{kp}), neck (t = l,58 < t_{kp}) and chest (t = l,04 < tp). This can be explained by the conservatism of these indicators and by the peculiarity of training. At the same time significantly (p < 0.05) changed circumferences of the shin (t = 2,41 < t_{kp}), relaxed shoulder (t = 3.45 < t_{kp}), hips (t = 2.46 < t_{kp}), waist (t = 2.23 < t_{kp}), abdomen (t = 2.1 < t_{kp}) and buttock (t = 2.12 < t_{kp})).

Thus, the group engaged in the Pilates system had a greater decrease of the circumferential sizes of those parts of the body that are closer to the «center», which once again confirms the maximum involvement in the work of the muscles of the abdominal press, thighs and buttocks in this system of training.

Discussion

The results of the pedagogical experiment give reason to state that with equal progress of physical qualities, the use of the Pilates program was more effective at reducing the circumferences than the traditional training program with aerobic and strength components. According to experimental studies conducted with women aged 25-45 years, for the correction of physique and improvement of physical preparedness of women it is advisable to use both classes, the Pilates technique and traditional conditioning training.

According to our research, the use of middle-aged women in training programs by the D. Pilates methodology provides an increase in physical performance in the absence of growth of muscle volume, which is an important motive for exercise for most women. This fact is an undeniable advantage of the D. Pilates's program [2].

Conclusions

Changes of the circumferential body sizes of women by the end of the study in the experimental group were observed in the range of 0.1 % – 3.5 %. The most significant were changes in the circumstantial dimensions of the strained shoulder – 3.5 % (t = 6.63), waist – 3.4 % (t = 5.63), abdomen – 3.1 % (t = 4.32), hips – 3.0 % (t = 4.52). The changes in the circumferential sizes in the control group were insignificant – 0 – 1.9 %, and had almost no changes in the circumferences of the chest in the intermediate state – 0 % (t = l, 84), waist (t = 3.58) and abdomen (t = 4) – 0.3%, as well as buttocks – 0.4 % (t = 3.07). The largest and most significant were changes in the circumferences of the forearm (t = 2.9) and hips (t = 4.19) – 1.9 %. It should be noted that there were almost no changes in the circumferential dimensions of the neck and chest in the intermediate state in both groups (t < t_{kp}). According to experimental research, the use of the D. Pilates's methodology in the training programs of middle-aged women ensures an increase of physical indicators in the absence of muscle growth, which is a strong motive for exercise for most women and is an undeniable advantage of D. Pilates's program.

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References

1. Kashuba, V., Tomilina, Y., Byshevets, N., Khrypko, I., Stepanenko, O., Grygus, I., Smoleńska, O., & Savliuk, S. (2020). Impact of Pilates on the Intensity of Pain in the Spine of Women of the First Mature age. *Teorìâ ta Metodika Fìzičnogo Vihovannâ*, *20* (1), 12–17. https://doi.org/10.17309/tmfv.2020.1.02
2. Pilates, J., W. J. Miller, S. Gallagher. (2000) *The complete writings of Joseph H. Pilates.* Philadelphia: BainBridge Books, 115 p.
3. Bass, M. (2004). *The complete classic pilates method: center yourself with this step-by-step approach to Joseph Pilates' original matwork program.* London: Rodale, 205 p.
4. Latey, P. (2001), *The pilates method: history and philosophy.* Journal of Bodywork and Movement Therapies. Vol. 5. pp. 275–282.
5. Вейдер, С. Йога+Пилатес=Йогалатес. Модный фитнес для души и тела. Ростов на Дону: Феникс, 2006. 224 с.
   Vader, S. (2006), *Yoga+Pilates=Yogalates. Modnyy fitnes dlya dushi i tela.* [Yoga + Pilates = Yogalates. Fashionable fitness for body and soul]. Rostov-on-Don: Phoenix, 224 p. [in Russia].
6. Давыдов, В. Ю., А. И. Шамардин, Г. О. Краснова. Новые фитнес-программы. Волгоград: Волгоград, гос. акад. физ. культуры, 2011. 137 с.
   Davydov, V. Y., Shamardin, A. I., Krasnova, G. O. (2011), *Novyye fitnes-programmy* [New fitness programs]. Volgograd State Academy of Physical Culture, Volgograd. 137 p. [in Russia].
7. Ивлиев, Б. К. Организационно-педагогические основы развития и технологии шейпинга в России: автореф. дис... канд. пед. наук. Росс. гос. ун-т физ. культуры, спорта и туризма. М., 2006. 24 с.
   Ivliev, B. K. (2006), *"Organizatsionno-pedagogicheskiye osnovy razvitiya i tekhnologii sheypinga v Rossii*" [Organizational and pedagogical foundations of development and technology of shaping in Russia]: abstract of the dissertation of the candidate of pedagogical sciences. Russian State University of Physical Culture, Sports and Tourism. M., 24 p. [in Russia].
8. Практикум по психофизиологической диагностике: учеб. пособие для студ. вузов. Э. М. Казин [и др.]. М.: Гуманит. изд. центр ВЛАДОС, 2000. 128 с.
   Kazin E. M. (2000). *Praktikum po psikhofiziologicheskoy diagnostike: uchebnoye posobiye dlya studencheskikh vuzov* [Workshop on psychophysiological diagnostics: a textbook for student universities]. E. M. Kazin [et al.]. M.: Humanitarian Publishing Center VLADOS. 128 p. [in Russia].
9. Робинсон, Л., Фиер, Х., Жаклин, Н. Пилатес – управление телом. Минск : ООО «Попурри», 2005. 272 с.
   Robinson, L., Fier, K., Jacqueline, N. (2005), *Pilates – upravleniye telom* [Pilates – body control]. Popuri LLC, Minsk. 272 p. [in Russia].
10. Хоули, Э. Т., Френке, Б. Д. Оздоровительный фитнес. Киев : Олимпийская литература, 2000. 377 с.
    Hawley, E. T., Frenke, B. D. (2000), *Ozdorovitel'nyy fitnes* [Wellness fitness]. Olympic Literature, Kiev. 377 p. [in Russia].
11. Галаманжук Л. Л., Єдинак Г. А. Основи наукових досліджень : навч.-метод. посібник. Кам'янець-Подільський : Рута, 2019. 150 с.
    Galamanzhuk, L. L., Iedynak, G. A. (2019), *Osnovy naukovykh doslidzhen*' [Fundamentals of scientific research]. Ruta Printing House LLC, Kamianets-Podilskyi, 150 p. [in Ukraine].
12. Шиян Б. М., Єдинак Г. А., Петришин Ю. В. Наукові дослідження у фізичному вихованні та спорті : навч. посібник. Кам'янець-Подільський : ПП Видавництво «Оіюм», 2012. 280 с.
    Shiyan, B. M., Iedynak, G. A., Petryshyn, Yu. V. (2012), *Naukovi doslidzhennya u fizychnomu vykhovanni ta sporti* [Scientific research in physical education and sports]. PE Oyum Publishing House, Kamianets-Podilsky, 280 p. [in Ukraine].

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SCREENING OF THE SPATIAL ORGANIZATION OF THE BODY OF 6–10 YEARS OLD CHILDREN WITH HEARING DEPRIVATION IN THE PROCESS OF ADAPTIVE PHYSICAL EDUCATION

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At the present stage, the spatial organization of the body is interpreted as the unity of morphological and functional organization of man, reflected in its external form – "habit", individual features of the biogeometric profile of posture, functional state of the musculoskeletal system (MSS) and morphological status. The formation of the spatial organization of the body occurs under the influence of both biological and social development programs, and its violations create in the human body the preconditions for the emergence of a number of diseases, especially the spine. The relevance of scientific research on the prevention and correction of disorders of spatial organization of the body of 6–10 years old children with sensory systems deprivation, proved on the basis of analysis of professional literature and practical experience in adaptive physical education, due primarily to the high prevalence of such nosology. The purpose of the study is to systematize the results of empirical research on the peculiarities of the level of the state of the biogeometric profile of the posture of children of primary school age with hearing impairment in the process of adaptive physical education. Research methods: theoretical analysis, synthesis and generalization of data from scientific and methodological sources and information from Internet resources, medical and biological methods, methods of mathematical statistics. Based on a comparative analysis of the level of the biogeometric profile of the posture of 6–10 years old children with hearing deprivation with their almost healthy peers, it was determined that primary school children with sensory systems deprivation are statistically significantly inferior ($p < 0,05$) on such indicators to their almost healthy peers. It was found that postural disorders are a determinant of the indicators of biogeometric profile of posture of 6–10 years old children with hearing deprivation and different types of posture, which is confirmed by nonparametric dispersion analysis of Kraskel-Wallis at a significance level of $p < 0,05$: 63,3 % of children with hearing deprivation with normal posture, and 40,0 % of children with hearing deprivation with various types of posture disorders fall into the risk zone of functional disorders of MSS, which indicates the so-called premorbid state of MSS – the condition before the disease, which provides for the feasibility of further continuous monitoring of the biogeometric profile of posture, as well as the use of methods for the prevention of its violations.

Prospects for further research will be related to the scientific development and testing of the concept of forming the vertical stability of the body of primary school children with hearing deprivation.

Key words: adaptive physical education, spatial organization of the body, children of primary school age, deprivation, hearing, sensory system.

Introduction

At the present stage, the spatial organization of the body is interpreted as a unity of morphological and functional organization of a person, reflected in its external form – «body habitus», individual features of biogeometric posture profile, functional state of the musculoskeletal system (MSK) and morphological status [6; 7; 10]. The formation of the spatial organization of the body occurs under the influence of both biological and social development programs [1; 5; 10], and its violations create preconditions in the human body for a number of diseases, especially the spine [3, 4; 6, 7].

The relevance of scientific developments on the problem of prevention and correction of disorders of the spatial organization of the body of children 6-10 years with the deprivation of sensory systems [1; 3; 4; 9], is proved on the basis of analysis of professional literature [2; 9; 10] and practical experience in the field of adaptive physical education, due primarily to the high prevalence of such nosology [3; 4; 6; 8].

Material and research methods

The purpose of the study is to systematize the results of empirical research on the peculiarities of the level of the biogeometric profile of posture of children of primary school age with hearing impairment in the process of adaptive physical education.

Objectives of the study:

1. To study and summarize data on the screening of spatial organization of the body of children of primary school age with hearing impairments according to the scientific and methodological literature.

2. To determine the level of the biogeometric profile of posture of junior schoolchildren with hearing impairment.

Adequate research methods were used to solve the tasks: theoretical analysis, synthesis and generalization of data of scientific and methodical sources and information from Internet resources were used to clarify the problem field of the system of prevention and correction of disorders of spatial organization of the body of primary

school children with the hearing deprivation and the state of its scientific- methodological processing; complex method – consideration of a scientific problem in the context of various scientific directions: symbiosis of pedagogy, medicine, physical education, biomechanics, correctional pedagogy, etc.; medical-and-biological methods were used for visual screening using an improved map of express control of the state of biogeometric posture profile (R. Bibyk, V. Kashouba, N. Nosova, 2012) – the level of the biogeometric posture profile of children 6-10 years old with the deprivation of sensory systems; photography – the type of posture of such children, methods of mathematical statistics (descriptive statistics; selective method; Shapiro-Wilk test criterion; Student's parametric criterion; non-parametric dispersion analysis of Kraskel-Wallis) was used to analyze the sets of empirical data at different stages of the study [11; 12]; material systematization and primary mathematical processing were executed using MS Excel software packages (Microsoft, USA), Statistica 8.0 (StatSoft, USA).

Results

Express control of spatial organization of the body of children aged 6-10 years with hearing impairment was carried out using visual screening of the biogeometric profile of children's posture presented in Table 1.

Table 1 – Assessment of the state of the biogeometric profile of the posture of schoolchildren with hearing deprivation with different types of posture, scores [7]

Posture type	6 years (n=22)		7 years (n=30)		8 years (n=26)		9 years (n=29)		10 years (n=32)	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
	(n=12)	(n=10)	(n=17)	(n=13)	(n=13)	(n=13)	(n=15)	(n=14)	(n=16)	(n=16)
Normal posture	32,3	31,9	31,8	31,9	31,4	31,7	31,1	30,8	29,7	27,5
Scoliotic posture	16,7	16,8	16,7	15,5	16,2	15,2	13,9	13,9	12,7	12,7
Slouch back	16,8	16,8	15,8	15,8	15,3	14,8	14,7	13,1	12,6	12,5
Round back	16,9	15,8	16,8	15,8	15,2	14,2	14,1	13,1	12,0	12,6
Flat back	–	–	16,3	–	15,2	15,3	13,6	13,6	12,6	12,1

To assess the state of the biogeometric profile of posture, the following indicators were used: relative to the sagittal plane – the position of the head and trunk on the vertical axis, the state of thoracic kyphosis and lumbar lordosis, the shape of the abdomen, the angle in the hip and shin biopairs; on the front plane – the location of the shoulders, the lower corners of the shoulder blades and pelvic bones, waist triangles, the position of the feet. The evaluation of each indicator was carried out according to the tribal system by comparing the individual posture on the videogram and graphical representations of the options on the sample, table. 2.

Table 2 – Distribution of children 6–10 years old with hearing deprivation with different types of posture by the levels of biogeometric posture profile, %

Posture type	The level of biogeometric posture profile, points		
	Low	Average	High
Normal posture	0	0	34,5
Scoliotic posture	20,8	0	0
Slouch Back	17,2	0	0
Round and round curved back	17,2	0	0
Flat and flat-curved back	10,1	0	0
Total violations:	65,4	–	34,5

Distribution of schoolchildren by the levels of the biogeometric posture profile was carried out taking into account 11 indicators in the frontal (5) and sagittal (6) planes. Out of 139 junior schoolchildren with hearing deprivation (HD), 91 schoolchildren had functional posture disorders, and only 48 schoolchildren with HD had normal posture.

Distribution of schoolchildren by the assessment of the state of biogeometric profile with posture disorders, and with normal posture corresponded to the law of normal distribution (which was checked using the Shapiro-Wilk criterion of consent). To determine the risk zones of MSK (musculoskeletal system) functional disorders, the vertebral neurologist evaluated the posture of students with hearing deprivation in the frontal and sagittal planes for each indicator of the rapid control map of the biogeometric profile of posture (norm – 2 points, pathological changes - 1 point).

According to the results of the assessment of the biogeometric profile of schoolchildren's posture in the frontal plane and in the sagittal plane, as well as the generalized total assessment (Table 3), the levels of the biogeometric profile of schoolchildren's posture were calculated (the value of the assessment in the interval / ± S is adopted as a medium level, below / – S – low level and above / +S – high level.

Table 3 – Assessment of the biogeometric profile of schoolchildren's posture (n=139), points

Assessment	Statistical indicator	
		S
Frontal plane	9,8	1,7
Sagittal plane	10,7	1,8
Integral	20,5	3,2

To identify the risk zone (RZ) for the occurrence of functional disorders of the MSK of the past, graphs of normal distribution of schoolchildren with normal posture and with posture disorders on the indicators of biogeometric posture profile assessment in the frontal plane, assessment of biogeometric posture profile in the sagittal plane and generalized total assessment of biogeometric posture profile (Fig. 1) were constructed.

Areas of intersection (overlay) of graphs, where a high values of assessment the biogeometric posture profile in the frontal plane of a group of schoolchildren with disabilities are at the same time a low values of this assessment in the group of children with normal posture, can be classified as a risk zone

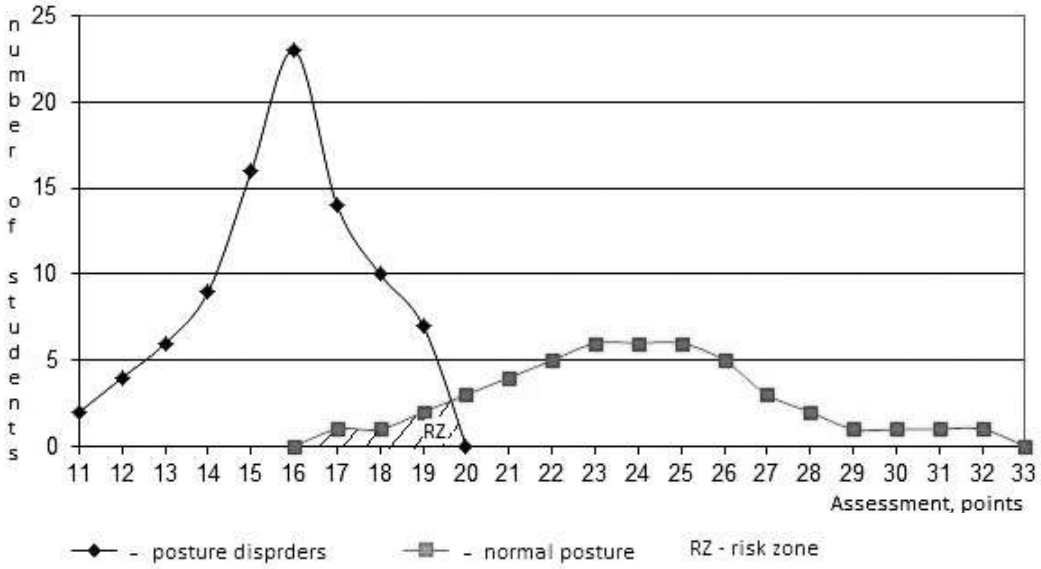

Fig. 1 – Distribution of junior schoolchildren with hearing deprivation according to the general assessment of the biogeometric posture profile

Discussion

Analyzing the data obtained on the results of the assessment of the biogeometric posture profile, we can conclude that 63.33% of children with normal posture have an average level of biogeometric posture profile, and 40.0% of them fall into the so-called «Risk Zone» of the occurrence of further functional disorders of the MSK. This means that they need further constant monitoring of the biogeometric profile of the posture, as well as methods of prevention of its violations. It should be noted that children with hearing deprivation with different types of posture disorders, who have a low level of biogeometric posture profile fall into the so-called premorbid state of MSK. Premorbid state (from Lat. prae before and morbus disease) – the initial state of a person before the disease.

This condition is characterized by a decrease in adaptation capabilities of the body and has 2 stages of development: with the predominance of nonspecific changes in the preservation of homeostatic characteristics and with the predominance of specific changes in organs and systems, when the pathology is not yet expressed and changes are compensatory. In our opinion, the determinants, which determine the emergence and development of this state, are of particular importance in this regard.

Analysis of special literature shows [1; 3; 8; 10] that the theory and practice of adaptive physical education of children with hearing deprivation requires solving a number of problems, including the prevention and correction of functional disorders of the musculoskeletal system, which, according to our research, were found in 88.4% of children 6-10 years old with hearing deprivation, of these posture disorders – 65.4%, which confirms the results of researches of other authors [4; 5; 7, etc.]. According to literary evidence [6; 7], the presence of different forms and degrees of posture disorders on the background of poor physical development can be considered as a condition before the disease of the vertebral column, as adaptive reactions of the musculoskeletal system are reduced. The seriousness of the problem of posture disorders in children of junior

school age is due to the fact that without timely correction of functional posture disorders become a favorable factor for the development of structural changes in the spine and diseases of internal organs, leading to decreased performance or disability in adulthood.

Nervous system disorders caused by postural deterioration, as some researchers note [3; 4; 5; 6; 7, etc.], affect all other systems and functions of the body.

Despite the great interest of researchers and the results obtained so far, the problem of prevention and correction of functional disorders of the musculoskeletal system in the process of adaptive physical education of children of junior school age with hearing deprivation is not solved.

This is evidenced by the fact that in the special literature we found not many works of this direction. Our research is consistent with the opinion [2; 4; 5; 7, etc.] and show that when preventing fixed disorders of the musculoskeletal system, the main attention should be focused on exercises to strengthen the muscles of the back, abdomen, chest, shin and feet, as well as selection of starting positions that will help to unload of the vertebral column and muscles of the lower extremities. There are differences of opinion about the use of exercise with different muscle modes in the physical education of primary school children.

Conclusions

Based on a comparative analysis of the level of the biogeometric profile of the posture of children 6-10 years old with hearing deprivation with their almost healthy peers, it was determined that primary school children with deprivation of sensory systems are statistically significantly inferior ($p < 0.05$) to their almost healthy peers. It was found that posture disorders are a determinant of the biogeometric profile of posture of children aged 6-10 with hearing deprivation and with different types of posture, which is confirmed by the results of non-parametric dispersion analysis of Kraskel-Wallis at a significance level of $p < 0.05$: 63.3 % of children with hearing deprivation with normal posture, and 40.0 % of children with hearing deprivation with different types of posture disorders enter the risk zone of functional disorders of the MSK, which indicates the so-called premorbid state of MSK – a condition before the disease, which provides for the feasibility of further constant monitoring of the biogeometric posture profile and methods of prevention of its violations.

The prospects for further research will be related to the scientific development and approbation of the concept of formation of vertical stability of the body of children of primary school age with reduced hearing in the process of adaptive physical education.

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References

1. Savliuk, S., Kashuba, V., Romanova, V., Afanasiev, S., Goncharova, N., Grygus, I., Gotowski, R., Vypasniak, I., Panchuk, A. (2020). Implementation of the Algorithm for Corrective and Preventive Measures in the Process of Adaptive Physical Education of Pupils with Special Needs. *Teorìâ Ta Metodika Fìzičnogo Vihovannâ*, *20*(1), 4-11. https://doi.org/10.17309/tmfv.2020.1.01
2. Savliuk, S., Kashuba, V., Vypasniak I., Yavorskyy A., Kindrat P., Grygus I., Vakoliuk A., Panchuk I., Hagner-Derengowska M. (2020). Differentiated approach for improving the physical condition of children with visual impairment during physical education. *Journal of Physical Education and Sport*, Vol 20 (Supplement issue 2), pp. 958 – 965.
3. Kashuba V., Savliuk S., Chalii L., Zakharina I., Yavorskyy A., Panchuк A., Grygus I., Ostrowska M. (2020). Technology for correcting postural disorders in primary school-age children with hearing impairment during physical education. *Journal of Physical Education and Sport,* Vol 20 (Supplement issue 2), pp. 939 – 945.
4. Афанасьєв С., Бурдаєв К. Формування вертикальної стійкості тіла молодших школярів з вадами слуху в процесі фізичного виховання: Journal of Education, Health and Sport. 2017. 7(6). С. 1169-1178.
   Afanasyev, S., Burdaev, K. (2017), "Formuvannya vertykal'noyi stiykosti tila molodshykh shkolyariv z vadamy slukhu v protsesi fizychnoho vykhovannya" [Formation of the vertical stability of the body of junior schoolchildren with hearing impairments in the process of physical education]. *Journal of Education, Health and Sport*, 7(6), pp. 1169-1178. [in Ukraine].
5. Бондар О. М. Джевага В. В. Ефективність експериментальної технології розвитку координаційних здібностей дітей молодшого шкільного віку з вадами слуху. Науковий часопис Національного педагогічного університету імені М. П. Драгоманова. Сер. 15: Науково-педагогічні проблеми фізичної культури (фізична культура і спорт). 2016. Вип. 5 (75). С. 19–21.
   Bondar, O. M., Dzhevaha, V. V. (2016), "Efektyvnist' eksperymental'noyi tekhnolohiyi rozvytku koordynatsiynykh zdibnostey ditey molodshoho shkil'noho viku z vadamy slukhu" [The efficiency of experimental technology for the development of coordination abilities of children of elementary school age with hearing impairments]. *Science Chronicle of the National Pedagogical University imeni M. P. Drahomanova. Ser. 15: Science-pedagogical problems of physical culture (physical culture and sport),* Issue 5 (75), pp. 19–21. [in Ukraine].
6. Кашуба В. А. Биомеханика осанки. Київ : Олімп. л-ра, 2003. 280 с.
   Kashuba, V. A. (2003), *Biomekhanika osanki* [Biomechanics of the posture]. Olimp. Lit., Kyiv, 280 p. [in Ukraine].
7. Кашуба В. А., Бондарь Е. М., Гончарова Н. Н., Носова Л. Н. Формирование моторики человека в процессе онтогенеза : монография. Луцьк : Вежа-Друк, 2016. 232 с.
   Kashuba V. A., Bondar E. M., Goncharova N. N., Nosova L. N. (2016), *Formirovaniye motoriki cheloveka v protsesse ontogeneza.* [Formation of human motor activity in the process of ontogenesis]. Vezha-Druk, Lutsk, 232 p. [in Ukraine]

8. Kashuba, V., Savluyk, S. (2017), "Biolohichni peredumovy rozrobky kontseptsiyi formuvannya prostorovoyi orhanizatsiyi tila ditey 6–10 rokiv iz depryvatsiyeyu zoru" [Biological preconditions for the development of the formation concept of spatial organization of body of the children with vision deprivation Journal of Education]. *Journal of Education, Health and Sport formerly Journal of Health Sciences. Kazimierz Wielki University in Bydgoszcz. Bydgoszcz, Poland*. Issue 7, No 7. pp. 1095-1112. – http://dx.doi.org/10.5281/zenodo.1039950
9. Kashuba, V., Savluyk, S. (2017), "Struktura ta zmist tekhnolohiyi profilaktyky y korektsiyi porushen' prostorovoyi orhanizatsiyi tila ditey 6–10 rokiv iz depryvatsiyeyu sensornykh system" [Structure and content of the technology of prevention and correction of disturbances of spatial organization of the body of children 6–10 years old with sensory systems deprivation]. *Journal of Education, Health and Sport formerly Journal of Health Sciences. Kazimierz Wielki University in Bydgoszcz. Bydgoszcz, Poland*, Issue 7, No 8, pp. 1387–1407. – http://dx.doi.org/10.5281/ zenodo.1050987
10. Савлюк С. Концептуальні основи розробки концепції просторової організації тіла дітей 6–10 років із депривацією сенсорних систем у процесі фізичного виховання. Фізичне виховання, спорт і культура здоров'я у сучасному суспільстві. 2017. Вип. 3 (39). С. 180–185.
Savluyk, S. (2017), "Kontseptual'ni osnovy rozrobky kontseptsiyi prostorovoyi orhanizatsiyi tila ditey 6–10 rokiv iz depryvatsiyeyu sensornykh system u protsesi fizychnoho vykhovannya" [Conceptual basis of the concept of spatial organization of body of children 6–10 years with sensor systems deprivation in the process of physical education]. *Physical education, sports and health culture in modern society*, Issue 3(39), pp. 180-185. [in Ukraine].
11. Галаманжук Л. Л., Єдинак Г. А. Основи наукових досліджень : навч.-метод. посібник. Кам'янець-Подільський : Рута, 2019. 150 с.
Galamanzhuk, L. L., Iedynak, G. A. (2019), *Osnovy naukovykh doslidzhen*' [Fundamentals of scientific research]. Ruta Printing House LLC, Kamianets-Podilskyi, 150 p. [in Ukraine].
12. Шиян Б. М., Єдинак Г. А., Петришин Ю. В. Наукові дослідження у фізичному вихованні та спорті : навч. посібник. Кам'янець-Подільський : ПП Видавництво «Оіюм», 2012. 280 с.
Shiyan, B. M., Iedynak, G. A., Petryshyn, Yu. V. (2012), *Naukovi doslidzhennya u fizychnomu vykhovanni ta sporti* [Scientific research in physical education and sports]. PE Oyum Publishing House, Kamianets-Podilsky, 280 p. [in Ukraine].

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DYNAMICS OF SPECIAL PHYSICAL FORM OF GIRLS – FUTURE OFFICERS DURING TRAINING IN A MILITARY EDUCATIONAL INSTITUTION

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Studied the changes in the manifestation of special physical form of future officials who studies at a higher educational institution during first year. *The aim of study* is to determine dynamic of changes of physical form of future officers-girls during their studying. *Material and methods*. The study involved 108 girls, and their age was 17–18years at the beginning. We studied the peculiarities of changes in the indicators of special physical form during each year of study. Physical exercises defined by special documents were used for the purpose. The basis of the exercises were: exercise # 7 – complex strength exercise, exercise # 10 – running 100 meters, exercise # 10a – shuttle running 10x10 meters, exercise # 14 – running 1000 meters. They allowed to assess the state of development of various types of endurance, namely speed, strength, coordination and aerobic**.** *Results.* Information from scientific sources testified the isolated nature of data concerning the dynamics of indicators of special physical form of girls - future officers during their studies at a higher military educational institution. The test results showed the existence of peculiarities in the dynamics of each indicator of special physical form of girls – future officers during certain year of study. The dynamics of certain indicators of special physical form of girls – future officers is marked by the following features: 1 and 2 years of training – improves strength and speed endurance, but deteriorates coordination and aerobic endurance; 3rd year of study – only strength endurance improves, others remain at the previously achieved level; 4th year of training - speed and aerobic endurance improves, others remain at the achieved level. During the evaluation of the results it was noted that they corresponded to a lower than required level. *Conclusions.* The obtained data should be taken into account during the implementation of physical education at a higher military educational institution, as it will increase its efficiency in solving the tasks.

Key words: physical form, dynamics, girls, higher military educational institution.

Introduction

For future officers of any paramilitary formation of Ukraine, physical training continues to be a leading component of their professional development [1; 11; 12; 18; 19]. This fully applies to girls – future officers, and the purpose of their physical training – the formation and development of qualities that provide a high level of individual military-professional skills of a modern soldier – instant assessment of the situation, speed, accuracy and maneuverability of actions, physical and mental endurance [9, p. 3]. Herewith, it is expected to achieve a high level in the development of both components of physical fitness, namely general and special [7-9; 15; 16; 20].

At the same time, the results of the available research show insufficient effectiveness of physical education in higher military educational institutions in the aspect of proper training of future officers for professional activity [10; 13; 14].

However, until now, data on the dynamics of indicators of physical fitness of girls – future officers of the Armed Forces of Ukraine during their training at the military academy are isolated and, sometimes, ambiguous [2; 4]. There are few data on such preparedness of girls – future border officers and officers of the Armed Forces of Ukraine [15; 16]. Nevertheless, these data to some extent answer the question of no significant discrepancy in the indicators of special physical fitness of girls – future officers while studying at various higher military educational institutions.

This indicates the need for research on the physical fitness of girls – future officers while studying in various higher military educational institutions to further improve the organization, the content of their physical education and ways of implementation this content in the educational process.

Material and research methods

The purpose of the study was to determine the dynamics of indicators of special physical fitness of girls – future officers during their studies at a higher military educational institution. This goal was achieved by using a set of adequate research methods. In particular, the following general scientific methods were used: analysis, synthesis, systematization, generalization; with their help, documentary and literary sources of information were processed. Pedagogical research methods were also used, namely pedagogical testing and experiment [3; 17]. Wherein, the ascertaining stage of the experiment organized by the longitudinal method was implemented. As for pedagogical testing, here we note the use of tests determined by documentary sources for the evaluation of special physical preparedness (SPP) of girls – future officers [7-9]. In particular, it is exercise #7 (complex strength exercise), exercise #10 (running 100 m), exercise #10a (shuttle running 10x10 m), exercise

#14 (running 1000 m); they allowed to assess the state of development of different types of endurance, namely strength, speed, coordination and general, respectively. The empirical data obtained were processed by adequate methods of mathematical statistics, in particular to establish the main one-dimensional statistics, as well as to verify the nature of the data distribution of each indicator in the study sample (λ-criterion Kolmogorov-Smirnov test [17, p. 178]) and differences between the two medium (Student's t-criterion with a critical limit at the level from α=0.05) [17; 21; 22].

As for the organization of the study, it notes the following: 108 girls aged 17-18 were involved; of them, 54 began training at the Bohdan Khmelnytsky National Academy of the State Border Guard Service of Ukraine, and the other 54 – at the Hetman Petro Sahaidachny National Academy of Ground Forces. Testing was conducted annually from the beginning to the completion of the girls' education in a higher military educational institution. It took place in free time in the form of competition. The organization of the study took into account the provisions of the Helsinki Declaration of the World Medical Association Workers (WMA-2013) on the ethical principles of medical research with human participation; the Ethics Commission of the Taras Shevchenko National University "Chernihiv Collegium" approved the study protocol.

Results

During the first year of training of girls – future officers noted significant changes in the values of the studied indicators of SPP (Table 1). At the same time, we noted the change in the value of assessment received by girls for performing exercises, except exercise #7. In the latter case, its deterioration was unreliable, and thus it allowed talking about maintaining the result at the previously achieved level.

Table 1 – Changes in the indicators of girls' SPP – future officers (n=108) during the first year of study at a higher military educational institution

Indicator of Physical Preparedness	At the beginning		At the end		Change of value ($\bar{X}_1 - \bar{X}_2$)		t
	$\bar{X}_1$	m	$\bar{X}_2$	m	in abs. value	in %	
Exercise #7 Complex strength exercise, number	26,8	0,47	29,6	0,44	2,8	10,4	4,38***
Exercise #10 Running 100 m, s	17,61	0,09	16,37	0,1	–1,24	8,0	9,19***
Exercise #10a Shuttle running 10x10 m, s	34,18	0,2	34,77	0,21	0,59	– 1,7	2,03*
Exercise #14 Running 1000 m, s	283,1	3,02	242,8	2,71	9,7	– 4,2	2,39*
Exercise #7 assessment	3,14	0,12	3,02	0,1	– 0,12	– 3,8	0,75
Exercise #10 assessment	2,99	0,08	4,16	0,09	1,17	39,1	9,75***
Exercise #10a assessment	3,17	0,1	2,78	0,09	– 0,39	– 12,3	2,89**
Exercise #14 assessment	3,62	0,08	4,67	0,08	1,05	29,0	9,55***
Average assessment in all exercises	12,92	0,24	14,63	0,18	1,71	13,2	5,7***

Таблиця 2 – Зміни у показниках СФП дівчат – майбутніх офіцерів (n=108) між першим і другим роками навчання у вищому військовому навчальному закладі

Indicator of physical preparedness	At the beginning		At the end		Change of value ($\bar{X}_1 - \bar{X}_2$)		t
	$\bar{X}_1$	m	$\bar{X}_2$	m	in abs. value	in %	
Exercise #7 Complex strength exercise, number	29,6	0,44	31,4	0,46	1,8	6,1	2,81*
Exercise #10 Running 100 m, s	16,37	0,1	16,06	0,08	–0,31	1,9	2,42*
Exercise #10a Shuttle running 10x10 m, s	34,77	0,21	35,51	0,21	0,74	– 2,1	2,49*
Exercise #14 Running 1000 m, s	242,8	2,71	252,4	2,6	9,6	– 4,0	2,56*
Exercise #7 assessment	3,02	0,1	2,76	0,09	– 0,26	– 8,6	1,93
Exercise #10 assessment	4,16	0,09	4,42	0,09	0,26	6,3	2,05*
Exercise #10a assessment	2,78	0,09	2,21	0,07	– 0,57	– 20,5	5,18***
Exercise #14 assessment	4,67	0,08	4,13	0,09	– 0,54	– 11,6	4,5***
Average assessment in all exercises	14,63	0,18	13,5	0,19	– 1,13	– 7,7	4,35***

As for the actual SPP indicators, the change was ambiguous: strength endurance as a result of exercise #7 and high-speed endurance as a result of exercise #10 improved by 10.4 % and 8 % respectively (p <0,001); instead, coordination endurance in cyclic locomotion and aerobic endurance as a result of exercise #10a and exercise #14, on the contrary, deteriorated by 1.7 % (p <0.05) and 4.2 % (p <0.001) respectively.

Thus, the strength of girls improved by 6.1%, speed – by 1.9 % (p <0,05).

Whilst the deterioration of coordination endurance in cyclic locomotion was 2.1 %, and aerobic endurance – 4 % (p <0,05). As for the results of exercises assessments, they all deteriorated, except for the assessment for exercise #10, which increased by 6.3 % and reached the level of 4.42 points.

During the third year of study, certain features marked changes of SPP indicators of the same girls. First of all, they noted the maintenance at the previously achieved level of development of motor skills, which were a part of SPP, except for strength endurance (Table 3).

The value of the latter indicator improved by 7.3 % (p <0.05). In other cases, the changes were as follows: positive in indicator of speed endurance and negative in indicator of coordination and aerobic endurance.

As for the results of assessment of girls' achievements according to the current standards [9], they certified their achievements at the same level as one year earlier, that is, during the second year of study in a higher military educational institution.

Таблиця 3 – Зміни у показниках СФП дівчат – майбутніх офіцерів (n=108) між другим і третім роками навчання у вищому військовому навчальному закладі

Indicator of physical preparedness	At the beginning		At the end		Change of value ($\bar{X}_1 - \bar{X}_2$)		t
	$\bar{X}_1$	m	$\bar{X}_2$	m	in abs. value	in %	
Exercise #7 Complex strength exercise, number	31,4	0,46	33,68	0,43	1,28	7,3	2,03*
Exercise #10 Running 100 m, s	16,06	0,08	16,04	0,08	–0,02	0,1	0,18
Exercise #10a Shuttle running 10x10 m, s	35,51	0,21	35,67	0,22	0,16	– 0,5	0,53
Exercise #14 Running 1000 m, s	252,4	2,6	254,5	2,56	2,1	– 0,8	0,58
Exercise #7 assessment	2,76	0,09	2,41	0,07	– 0,35	– 12,7	3,07**
Exercise #10 assessment	4,42	0,09	4,07	0,09	– 0,35	– 7,9	2,76*
Exercise #10a assessment	2,21	0,07	2,25	0,07	0,04	1,8	0,4
Exercise #14 assessment	4,13	0,09	3,86	0,09	– 0,27	– 6,5	2,16*
Average assessment in all exercises	13,5	0,19	12,6	0,18	– 0,9	– 6,7	3,46**

Таблиця 4 – Зміни у показниках СФП дівчат – майбутніх офіцерів (n=108) між третім і четвертим роками навчання у вищому військовому навчальному закладі

Indicator of physical preparedness	At the beginning		At the end		Change of value ($\bar{X}_1 - \bar{X}_2$)		t
	$\bar{X}_1$	m	$\bar{X}_2$	m	in abs. value	in %	
Exercise #7 Complex power exercise, number	33,68	0,43	36,11	0,41	– 0,57	– 7,2	0,97
Exercise #10 Running 100 m, s	16,04	0,08	15,75	0,08	– 0,29	1,8	2,57*
Exercise #10a Shuttle running 10x10 m, s	35,67	0,22	35,45	0,25	– 0,22	0,6	0,67
Exercise #14 Running 1000 m, s	254,5	2,56	244,5	2,42	– 10,0	3,9	2,84*
Exercise #7 assessment	2,41	0,07	2,32	0,07	– 0,09	– 3,7	0,9
Exercise #10 assessment	4,07	0,09	4,18	0,09	0,11	2,7	0,87
Exercise #10a assessment	2,25	0,07	2,22	0,06	– 0,03	– 1,3	0,03
Exercise #14 assessment	3,86	0,09	4,06	0,08	0,2	5,2	1,67
Average assessment in all exercises	12,6	0,18	12,78	0,16	0,18	1,4	0,75

During the last year of study, changes in SPP indicators were found, which was that speed endurance (increase of 1.8 %) and aerobic endurance (3.9 %)

increased i ($p < 0,05$) (Table 4). It was also noted that at the previously reached level there remained a level of development of strength and coordination endurance, as the deterioration of the first was 7.2%, the improvement of the second – 0.6 % ($p > 0.05$). That is, these changes were insignificant, so they were considered as a manifestation of the previously achieved level.

Discussion

Physical fitness continues to be one of the defining components of a young officer's readiness for high-quality professional activity [1; 11; 12; 18; 19]. In case of formation of readiness of girls – future officers, this is the same [8; 9]. Without dwelling on the leading approaches to the formation and implementation of the content of physical training, we note only that according to the data obtained, these approaches are not effective enough to achieve this goal. This is confirmed by the results of other researchers [2; 4; 5]. In particular, they state that the insufficient effectiveness of the current system of physical training of women is due to incomplete scientific justification of the special orientation of such training, insufficient consideration of the specifics of professional activities of women-military, lack of strength endurance exercises for different muscle groups, low efficiency of motor development. It is also noted that the physical fitness of female military is low, because 50.1 % have an unsatisfactory level. Their physical development and functional state are also different from the normative ones.

The data of the study confirm the conclusion about the different from the necessary development of motor qualities, which according to documentary sources [7-9] are decisive in future professional activity.

In addition, the data obtained indicate insufficient SPP of girls – future officers during the entire period of their study in a higher military educational institution and inability to achieve high results. This does not contribute to the quality of their professional activities after the completion of the educational institution.

The current norms of SPP assessment of girls – future officers play a certain negative role in achieving such a result. They do not fully perform their functions and reflect the achievements: this is evidenced by the data obtained in the study, in particular, an increase in the average score in the sample for a particular test with deteriorating results and vice versa. In particular, during the first year of study, this was found in the exercise # 14, during the third year of study – in the exercises # 7, # 10 and # 10a, during the last year of study – in the exercise # 10a.

Some researchers emphasize the need to revise the standards for assessing the physical fitness of servicemen [5; 13]. It is noted that taking into account the information of foreign experience at the present stage is the most effective scoring system for assessing the physical fitness of servicemen. When developing evaluation standards, it is also advisable to use a percentile scale, not to equate the concept of «norm» and «average value of the indicator in the sample» when determining the quantitative characteristics of the indicator, since this approach smooths individual (typological) differences, and the same person, assessed according to different standards, can get an unequal assessment [6, p. 185].

Consequently, during the training of girls – future officers it is necessary to take into account their low physical fitness, as well as the peculiarities of the dynamics of special physical preparedness during each year of study to achieve the maximum possible effectiveness of physical education classes and other forms of physical activity.

Conclusions

1. At the present stage, there is insufficient data on the peculiarities of the dynamics of indicators of general and special physical fitness of girls – future officers during study in higher military educational institutions.

2. The dynamics of certain indicators of special physical fitness of girls – future officers are marked by the following features: 1st and 2nd years of training – strength and speed endurance improves, but coordination and aerobic endurance deteriorates; 3rd year of study – strength endurance improves only, others remain at the previously achieved level; 4th year of study – speed and aerobic endurance improves, others remain at the achieved level.

3. The development of motor qualities, which are part of special physical training during the entire period of study of girls – future border and the Armed Forces of Ukraine officers is at a lower level than necessary.

Further research should be aimed at studying the annual change in indicators of general physical fitness of girls – future officers.

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

References

1. Анохін Є. Д. Фізична підготовка в арміях провідних країн НАТО: навч.-метод. посібник. Львів: ЛВІ, 2005. 115 с.
   Anokhin, Ye. D. (2005), *Fizychna pidhotovka v armiyakh providnykh krayin NATO* [Physical training in the armies of leading NATO countries]. LVI, Lviv, 115 p. [in Ukraine].
2. Боярчук О. М. Фізична підготовка жіночого контингенту Збройних сил України в системі професійної діяльності : автореф. дис… канд. наук з фіз. вих. і спорту : 24.00.02 Львівський держ. ун-т фіз. культури. Львів, 2010. 20 с.
   Boyarchuk, O. M. (2010), *"Fizychna pidhotovka zhinochoho kontynhentu Zbroynykh syl Ukrayiny v systemi profesiynoyi diyal'nosti"* [Physical training of the female contingent of the Armed Forces of Ukraine in the system of professional activity]: abstract of the dissertation of the candidate of physical education and sports: 24.00.02 Lviv State University of Physical Culture. Lviv, 2010. 20 p. [in Ukraine].
3. Галаманжук Л. Л., Єдинак Г. А. Основи наукових досліджень : навч.-метод. посіб. Кам'янець-Подільський : ТОВ «Друкарня «Рута», 2019. 154 с.
   Galamanzhuk, L. L., Iedynak, G. A. (2019), *Osnovy naukovykh doslidzhen*' [Fundamentals of scientific research]. Ruta Printing House LLC, Kamianets-Podilskyi, 150 p. [in Ukraine].
4. Добровольський В. Б. Удосконалення фізичної підготовки курсантів-жінок вищих військових навчальних закладів : дис… канд. наук з фіз. вих. і спорту : 24.00.02 Військовий інститут Київського нац. ун-ту імені Тараса Шевченка. Київ, 2018. 230 с.
   Dobrovolsky V. B. (2018), *"Udoskonalennya fizychnoyi pidhotovky kursantiv-zhinok vyshchykh viys'kovykh navchal'nykh zakladiv*" [Improving the physical training of female cadets of higher military educational institutions]: diss. for the sciences degree of candidate in physical education and sports: 24.00.02 Military Institute of Kyiv National Taras Shevchenko University. Kyiv, 2018, 230 p. [in Ukraine].
5. Єдинак Г. А., Приступа Є. Н. До питання про вдосконалення системи оцінювання фізичної підготовленості військовослужбовців Збройних Сил України. Фізичне виховання, спорт і культура здоров'я у сучасному суспільстві. 2012. № 4 (20). С. 276–280.
   Iedynak, G. A., Prystupa, E. N. (2012), "Do pytannya pro vdoskonalennya systemy otsinyuvannya fizychnoyi pidhotovlenosti viys'kovosluzhbovtsiv Zbroynykh Syl Ukrayiny" [On the issue of improving the system of assessment of physical fitness of servicemen of the Armed Forces of Ukraine]. *Physical education, sports and health culture in modern society*, № 4 (20). pp. 276–280. [in Ukraine].
6. Зубаль М. В. Оцінка фізичної підготовленості школярів у системі педагогічного контролю. Вісник Кам'янець-Подільського нац. у-ту імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. 2008. Випуск 1. Том 2. С. 183–189. doi: https://doi.org/10.32626/2309-8082.2008-0.%p
   Zubal, M. V. (2008), "Otsinka fizychnoyi pidhotovlenosti shkolyariv u systemi pedahohichnoho kontrolyu" [Assessment of physical fitness of schoolchildren in the system of pedagogical control]. *Bulletin of Kamyanets-Podilsky National in the name of Ivan Ogienko. Physical education, sports and human health*. Issue 1. Vol. 2. pp. 183–189. doi: https://doi.org/10.32626/2309-8082.2008-0.%p [in Ukraine].
7. Наказ Генерального штабу Збройних Сил України від 11.02.2014 № 35, «Тимчасова настанова з фізичної підготовки у Збройних Силах України». – Режим доступу: http://library.vitv.kh.ua/items/show/103 (дата звернення: 31.05.2020).
   Nakaz Heneral'noho shtabu Zbroynykh Syl Ukrayiny vid 11.02.2014 № 35, «Tymchasova nastanova z fizychnoyi pidhotovky u Zbroynykh Sylakh Ukrayiny» [Order of the General Staff of the Armed Forces of Ukraine dated 11.02.2014 № 35, "Temporary guidelines for physical training in the Armed Forces of Ukraine"], http://library.vitv.kh.ua/items/show/103 [in Ukraine].
8. Настанова з фізичної підготовки в Прикордонних військах України. Київ, 1999. 214 с.
   Nastanova z fizychnoyi pidhotovky v Prykordonnykh viys'kakh Ukrayiny [Guidelines for physical training in the Border Troops of Ukraine] (1999). Kyiv.
9. Настанова з фізичної підготовки у Збройних Силах України (НФП-2009). Київ : Міністерство оборони України, 2009. 234 с.
   Nastanova z fizychnoyi pidhotovky u Zbroynykh Sylakh Ukrayiny (NFP-2009) [Guidelines for physical training in the Armed Forces of Ukraine (NFP-2009)] (2009). Ministry of Defense of Ukraine, Kyiv, 234 p. [in Ukraine].
10. Одеров А. М., Логінов Д. О. Методики перевірки та оцінювання фізичної підготовленості військовослужбовців як складова їх професійної підготовки. Вісник Чернігів. нац. пед. ун-ту. Серія: Педагогічні науки. Фізичне виховання та спорт. 2013. Випуск 112(2). С. 203–207.
    Oderov, A. M., Loginov, D. O. (2013), **"**Metodyky perevirky ta otsinyuvannya fizychnoyi pidhotovlenosti viys'kovosluzhbovtsiv yak skladova yikh profesiynoyi pidhotovky**"** [Methods of checking and assessing the physical fitness of servicemen as a component of their professional training]. *Bulletin of Chernihiv. nat. ped. un-tu. Series: Pedagogical sciences. Physical education and sports***,** Issue 112 (2), pp. 203–207. [in Ukraine].
11. Отравенко О. В. Рухова культура як компонент якісної професійної підготовки здобувача вищої освіти. Вісник Кам'янець-Подільського нац. у-ту імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. 2019. Випуск 12. С. 50–54.
    Otravenko, O. V. (2019), "Rukhova kul'tura yak komponent yakisnoyi profesiynoyi pidhotovky zdobuvacha vyshchoyi osvity" [Motor culture as a component of high-quality professional training of higher education seekers]. *Bulletin of Kamianets-Podilskyi National University in the name of Ivan Ogienko. Physical education, sports and human health*. Issue 12. pp. 50–54. [in Ukraine].
12. Романчук С. В. Фізична підготовка курсантів військових навчальних закладів Сухопутних військ Збройних сил України : монографія. Львів : АСВ, 2012. 367 с.
    Romanchuk, S. V. (2012), *Fizychna pidhotovka kursantiv viys'kovykh navchal'nykh zakladiv Sukhoputnykh viys'k Zbroynykh syl Ukrayiny* [Physical training of cadets of military educational establishments of the Land Forces of the Armed Forces of Ukraine]. ACS, Lviv, 367 p. [in Ukraine].
13. Романчук С. В., Боярчук О. М. Фізична підготовка жіночого контингенту Збройних Сил України : навч.-метод. посіб. Житомир : ЖВІ НАУ, 2008. 160 с.
    Romanchuk, S. V., Boyarchuk, O. M. (2008), *Fizychna pidhotovka zhinochoho kontynhentu Zbroynykh Syl Ukrayiny* [Physical training of the female contingent of the Armed Forces of Ukraine. ZhVI NAU, Zhytomyr, 160 p. [in Ukraine].
14. Селіванова О. В. Експериментальне обґрунтування організаційно-педагогічних умов формування професійної готовності курсантів-дівчат. Педагогіка, психологія та медико-біологічні проблеми фізичного виховання і спорту. 2006. № 6. С. 94–98.

Selivanova, O. V. (2006), "Eksperymental'ne obgruntuvannya orhanizatsiyno-pedahohichnykh umov formuvannya profesiynoyi hotovnosti kursantiv-divchat" [Experimental substantiation of organizational and pedagogical conditions of formation of professional readiness of cadets-girls]. *Pedagogy, psychology and medical and biological problems of physical education and sports*, № 6. pp. 94–98. [in Ukraine].

15. Слюсарчук В., Панчук С. Загальна фізична підготовленість дівчат – майбутніх офіцерів-прикордонників на початку навчання в спеціалізованому закладі вищої освіти. Вісник Кам'янець-Подільського нац. у-ту імені Івана Огієнка. Серія: Фізичне виховання, спорт і здоров'я людини. 2019. Випуск 14. С. 21–24. doi: 10.32626/2227-6246.2019-14.46-50
Slyusarchuk, V., Panchuk, S. (2019), "Zahal'na fizychna pidhotovlenist' divchat – maybutnikh ofitseriv-prykordonnykiv na pochatku navchannya v spetsializovanomu zakladi vyshchoyi osvity" [General physical fitness girls - future border guards at the beginning of training in a specialized institution of higher education]. *Bulletin of Kamyanets-Podilsky National in the name of Ivan Ogienko. Series: Physical education, sports and human health*. Issue 14. pp. 21–24. doi: 10.32626 / 2227-6246.2019-14.46-50 [in Ukraine].
16. Слюсарчук В. В. Спеціальна фізична підготовленість дівчат – майбутніх офіцерів під час навчання у різних вищих військових навчальних закладах. Педагогіка здоров'я: зб. наук. пр. X Всеукраїнської наук.-пр. конф. «Педагогіка здоров'я». Харків, 23–24 квітня 2020 р. Харків, 2020. С. 165–169.
Slyusarchuk, V. V. (2020), "Spetsial'na fizychna pidhotovlenist' divchat – maybutnikh ofitseriv pid chas navchannya u riznykh vyshchykh viys'kovykh navchal'nykh zakladakh" [Special physical fitness of girls - future officers during training in various higher military educational institutions]. Health pedagogy: texts of X Avenue of the All-Ukrainian Scientific conf. Health Education, Kharkiv, April 23–24, 2020. Kharkiv, pp. 165-169. [in Ukraine].
17. Шиян Б. М., Єдинак Г. А., Петришин Ю. В. Наукові дослідження у фізичному вихованні та спорті : навч. посібник. Кам'янець-Подільський : ТОВ «Друкарня «Рута», 2012. 280 с.
Shiyan, B. M., Iedynak, G. A., Petryshyn, Yu. V. (2012), *Naukovi doslidzhennya u fizychnomu vykhovanni ta sporti* [Scientific research in physical education and sports]. PE Oyum Publishing House, Kamianets-Podilsky, 280 p. [in Ukraine].
18. Duncan, A. G. (2016). *The military education of junior officers in the Edwardian Army*. Birmingham: History Department College of Arts and Law University.
19. Melnykov, A., Iedynak, G., Galamandjuk, L., Blavt, O., Duditska, O., Koryagin, V., Balatska, L., Mazur, V. (2018). Factors that influence change in cadets' physical preparation during the first half of study at the military academy. *Journal of Physical Education and Sport, 18*(2), 781–786. doi:10.7752/ jpes.2018.02115
20. Sliusarchuk, V., Iedynak, G. (2015). Physical education of future woman-officers of the state border service for formation of readiness to physical self-development at academy education as a pedagogical problem. *J of Education, Health and Sport, 5*(7), 690-698. doi: http://dx.doi.org/10.5281/zenodo.2539671
21. Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2011). *Research methods in physical activity.* 6th ed. Champaign, IL: Human Kinetics.
22. Vincent, W. J. (2005). *Statistic in kinesiology,* 3rd ed. Champaign IL: Human Kinetics, Inc.

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PECULIARITIES OF RECREATIONAL AND WELLNESS ACTIVITIES IN THE LEISURE STRUCTURE OF THE ELDERLY

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Recreational and wellness activities are a kind of marker of the duration and quality of life in old age. Precisely because of motor activity you can slow down the aging process. The best way is to fill the lives of retirees with motor activity in their spare time. Goal of research: study of the components of recreational and wellness activities in the leisure structure of the elderly. We used the following research methods: theoretical analysis of special literature, system analysis method, sociological poll method, mathematical statistics methods. The study involved 173 people at the ages from 60 to 75 years. The research paper highlights the peculiarities of recreational and wellness activities for the elderly, its impact on the body of people of venerable age. The main structural organizational components of recreational and wellness activities for this age group are identified. The purpose of recreational and wellness activities, the basic forms and means of wellness and recreational motor activity are defined. The structure of intrinsic motives which are guided by elderly people at filling of their leisure is defined. Thus, insufficient motor activity leads to premature aging, accelerated wear and tear of the body and leads to life dissatisfaction, which in the old age is one of the immediate problems. We have identified important intrinsic motives that help older people to achieve a certain satisfaction in life, it is the ability to communicate, which helps older people to learn more about the organization and use of wellness and recreational motor activities. Preserving the needs of the cognitive plan, which encourages the elderly to engage in physical culture or certain types of motor activities. The desire and need for change, which gives you the opportunity to change your life for the better.

Key words: leisure, recreational and wellness activities, elderly age, intrinsic motives, structure.

Introduction

The complex process of systemic transformations currently taking place in Ukraine have affected almost all segments of the population, destroying the existing and established system of social stratification. Modern scientific research conducted in the social sphere, states crises in many areas of life of the elderly, which in one way or another affect their consciousness and behavior [5; 8; 14; 19]. A serious social danger is that the negative consequences of such changes affect the elderly as the most vulnerable category of the population. This leads to a violation of their physical and mental health, gives impetus to the development of various diseases [1; 6; 10; 14].

The issue of improving the health efficiency of physical activity at leisure time in old age today occupies an important place in the field of physical culture and medicine. First, it depends on a number of factors, on environmental and natural conditions, lifestyle, food, the pace of development. Often older people have a tendency to reduce physical activity, which causes various diseases, as well as general deterioration of health, adversely affects human health [19; 20].The continuation of the active period of life is influenced by many factors: material, social, psychological, biological, genetic, etc. However, the leading factor, of course, are the motives for active creative longevity, which largely depend on the physical and psychological health of a person.

Material and research methods

The purpose of our study was to study the components of recreational-and-health improving activities in the leisure structure of the elderly. To achieve this goal, we used the following research methods: theoretical analysis of special literature (reconstruction method, apperception method, aspect analysis, hermeneutic analysis, critical analysis, conceptual analysis, problem analysis), method of system analysis, method of sociological survey (questionnaire), methods of mathematical statistics. The study involved 173 people aged 60-75.

Results

The fight against aging and restraint of involution processes is also one of the tasks of recreational-and-health activities. Motor activity activates the body and contributes not only to the preservation of its biological functions, but also their improvement, which leads to a noticeable decrease in the rate of involution. In old age there are irreversible changes in the systems and organs of the human body, so-called aging. Indicators of speed and accuracy of motor actions fall, coordination of movements becomes less perfect, their amplitude decreases gradually.

A person gradually begins to move less, his\her motor activity decreases, he\she becomes less capable of physical activity, it becomes difficult to perceive and execute them. Involutional changes, their pace and intensity are largely determined both by the nature of the

motor activity of an elderly person and by the way of his\her life at a juvenile, young and mature age [2; 12].

Obviously, recreational-and-health-improving activities in old age have a pronounced recreational character, the main goal of which is to optimize the physical condition of the human body, actualize its internal reserve capabilities. Therefore, exercises for the elderly primarily have a health and preventive orientation [8; 11].

Some types of recreational-and-health activities accompany getting great pleasure from motor activities. First of all, it is connected with various games (with a ball, with a puck, with a shuttlecock, or balls, etc.). Their high level of emotionality is peculiar to them, is a great incentive for exercise. They are conducted both spontaneously, independently, on the initiative of the players themselves, and in groups, sections, or teams [4].

The main forms of exercises of elderly recreational-and-health activities are: hygienic gymnastics, shaping, aerobics, skiing, cycling, walking, tourism, training sessions in the health groups or sports sections, industrial gymnastics, swimming, ice skating, various games. One of the main tasks of recreational-and-health activities in old age is slowing down the aging processes, the processes of involution of the body, creating a basis for normal, age-active human activity [14].

Recreational-and-health activities of the elderly are carried out in various organizational forms of recreational activities: collective (health groups, running clubs, health centers at parks and sports facilities) and independent (individual).

According to most researchers, the best form of organization of recreational classes are health groups, where classes are conducted by qualified instructors-methodologists who have special education in specially developed programs [21].

Engaged in motor activity in a health group, the elderly do not feel weak and helpless, and vice versa, they have higher self-esteem, improved well-being and mood, but most importantly, engaging in a group gives them motives to succeed. Exercising in a group among like-minded people and showing interest in activities, a person has an incentive, there is a goal, it is not just engaging in strengthening health and slowing down the aging process, person begins to exercise in order to become better.

It is very important for the elderly to maintain and show kindness, positive emotions, without exposing pessimism and mood swings that occur due to ailments, partial loss of communication, dissatisfaction with life. In solving many of these problems is of great importance recreational-and-health-improving activities, it is associated with positive emotions, with the pleasure of movements, with communication, with the joy of life, despite all the difficulties and problems. This does not mean that it fully solves them, but it helps to greatly reduce their negative impact on the elderly [13].

Important for the elderly is the level of their physical education, that is, improving their physical abilities, motor skills as a household (walking, running, swimming), and more complex (cycling, rowing, etc.), knowledge of elementary and simplest basics of the theory and methods of physical recreation, hygiene, labor mode, nutrition, recreation [5; 11; 15].

Motor activity, hard domestic work (snow removal, firewood harvesting, work in the garden) are most important for preservation and strengthening of health and struggle against aging. Exercise and motor activity in general have a positive effect on the psyche, all autonomic functions – respiratory system, digestion, cardiovascular and excretory systems, endocrine glands. They create a basis for a healthy lifestyle, help combat bad habits and increase the body's ability to resist fatigue and disease [10; 18].

The dramatism of old age is that desires persist and opportunities fade, so you cannot admire, overestimate your capabilities, because it leads sometimes to tragic consequences (strokes, heart attacks, muscle ruptures and ligaments, fractures). Exercise, and any kind of physical activities is recommended to combine with water and hardening (shower, bathing), massage, thermal procedures (sauna, bath). Active exercise of the elderly requires constant medical control and self-control, for competent, conscious attitude to their health [7].

In this regard, there is a need for theoretical and practical solution to the problem of high-quality leisure time for recreational-and-health activities of the elderly.

For the proper organization of recreational-and-health activities of the elderly, it is important to determine what internal motives guide respondents when filling their leisure time (Fig. 1).

One is the ability to communicate and the need for it. Interestingly, only 33.0 % of single men, but 53.0 % of single women recognized the existence of a psychological problem of loneliness for them. At the same time, this problem faces 27.0 % of women with close relatives, but it was not named by any "family" man.

As expected, the majority of pensioners (57.0 %) communicate mainly with people close to them – relatives and neighbors, 17 % called friends, 8.5 % mentioned former colleagues and as many – acquaintances.

Fig. 1 Structure of internal motives that guide the elderly in filling their leisure time

Also about 2.5–5 % as communication partners named acquaintances and friends who are engaged in physical activity and attend various recreational activities. That is, the circle of communication is usually narrowed, as we have noted before, the expansion of this circle has a positive effect on the self-feeling, mood and behavior of the elderly.

However, only 22.0 % of respondents want to expand it by attending health-recreational activities, which include the types of motor activity offered to them by acquaintances and friends.

At the same time, 51.4 % of respondents agree to become regular visitors to health clubs for the elderly, 17.0 % of them agree on condition "if health allows. 11.4 % refused due to poor health. That is, one way or another, about 63.0% of the elderly would like to communicate more and more often and attend health-and-recreational activities. Accordingly, in this environment, the problem of organization of communication, which helps the elderly people to learn more about the organization and use of means of health-improving and recreational motor activity, is very actual.

Another important motive is preserving the needs of the cognitive plan. Apparently, these needs are preserved (or have been formed during life) in about 30-40 % of people, as 37.0 % attend various cultural-aesthetic and recreational-and-health activities, 22.8 % attend health-and-recreational activities that they like (fitness clubs, swimming pools, independent classes on the grounds and stadiums), 5.8 % pay attention to housework and family communication, 8.7% - concerts, museums, or libraries, 11.0 % like to travel, 5.8 % offered to introduce computer courses for their self-improvement.

Moreover, 28.5% in addition to household work would like to include in their lives helping other people, reading, walking, hiking, collecting stamps. 28.5 % want to work. Despite the fact that the majority of respondents indicate the lack of material resources, as the main reason, 40.8 % of respondents nothing would have changed in their lives with the solution to the financial problem. Only 30.4 % would take up in this case the satisfaction of cognitive needs related to their health, and the need for physical activity, which is associated with health-improving recreation.

Interestingly, among this category there was not a single elderly person who was not engaged in physical activity. That is, in cognitive interests, the elderly during certain periods of their lives were engaged in physical culture or certain types of motor activity.

The next resource we have considered is the desire and the need for change. 45.0% want and do not want to change their lives. Apparently, the lack of material resources is not the main inhibiting factor, as with solving this problem, 57.2 % would find health- and-recreational activities that they want and can do. Thus, most likely, the availability of this resource can also be stated in approximately 40.0 % of respondents.

Discussion

Society and its social institutions play a big role in the degree of fullness of personal development of the elderly and his\her social functioning. Global aging of the population poses difficult challenges for social protection systems around the world, the solution of which in Ukraine is even more difficult due to the economic crisis. Studies of biological mechanisms of aging, prevention of premature aging are presented in the works of Bulich E. (2002) [6], Koval O.G., Cherednichenko T. M. (2011) [14], Agranovich N. V. (2014) [1], Hakman A. V., Balatska L. V., Lyasota T. I. (2016) [10]. Biomedical aspects of aging were studied by Agranovich N. V., Anopchenko A. S., Agranovich V. O. (2014) [1], Litovchenko G. O., Tkachenko S.V ., Bulanov O. M. (2007) [17]; mental health of elderly people studied Andreeva O. (2014) [2], Bulich E., Muravov I. (2002) [6], Hakman A. V., Baydyuk M. Yu. (2016) [8] and others. At the beginning of the 21st century, the issues of preservation of health and physical activity at a later age [4; 12; 14; 15; 18, etc.], as well as the social situation of pensioners [13; 17; 22] were actively studied.

Recreational and health-improving activities in old age contribute to the preservation and strengthening of health, increasing the adaptation capabilities of their body, reducing the incidence of exacerbations of chronic diseases and improving the psycho-emotional sphere of the person. Therefore, the problem of finding effective ways to fill the free time of the elderly with physical activity is relevant.

Conclusions

Thus, insufficient motor activity leads to premature aging, accelerated wear and tear of the body and leads to dissatisfaction with life, which in old age is one of the pressing problems. We have identified important internal motives that help the elderly people to achieve some satisfaction in life, it is the ability to communicate, which helps the elderly to learn more about the organization and use of health-and-recreational physical activity.

Preserving the needs of a cognitive plan that encourages the elderly to engage in physical culture or certain types of motor activity. The desire and need for change makes it possible to change your life for the better. The possibility of rest, expanding the range of social contacts during recreational-and-health-improving activities are some of the qualitative parameters that reflect the quality of life of people. Recreational-and-health activities are one of the main factors of a healthy lifestyle. Conducting general recreational and health-improving activities is of great importance for the preservation of health, prevention of injury, prevention of transition of morphological deviations in the body and for the prevention of development of diseases.

The prospects of the study are to develop approaches and programs to involve the elderly in health and recreational activities during leisure.

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

References

1. Агранович Н. В. Анопченко А. С., Агранович В. О. Медико-социальные аспекты занятий умеренной физической активностью в пожилом возрасте. Фундаментальные исследования. 2014. № 10 (часть 1). С. 13-17.
   Agranovich, N. V., Anopchenko, A.S., Agranovich, V.O. (2014), "Mediko-sotsial'nyye aspekty zanyatiy umerennoy fizicheskoy aktivnost'yu v pozhilom vozraste" [Medico-social aspects of moderate physical activity in old age]. *Basic research,* No 10 (part 1), pp. 13-17. [in Russia].
2. Андрєєва О. Розробка та впровадження технології проектування активної рекреаційної діяльності різних груп населення. Спортивний вісник Придніпров'я. 2015. № 1. С. 4-9.
   Andreeva, O. (2015), "Rozrobka ta vprovadzhennya tekhnolohiyi proektuvannya aktyvnoyi rekreatsiynoyi diyal'nosti riznykh hrup naselennya" [Development and implementation of technology for designing active recreational activities of different groups of the population]. *Sports Bulletin of the Dnieper*, No 1, pp. 4-9. [in Ukraine].
3. Андрєєва О. Соціально-психологічні чинники, що детермінують рекреаційно-оздоровчу активність осіб різного віку. Теорія і методика фізичного виховання і спорту. № 3(106). С. 25-31.
   Andreeva, O. (2014), "Sotsial'no-psykholohichni chynnyky, shcho determinuyut' rekreatsiyno-ozdorovchu aktyvnist' osib riznoho viku" [Socio-psychological factors that determine the recreational and health activity of people of different ages]. *Theory and methods of physical education and sports*, No 3(106), pp. 25-31. [in Ukraine].
4. Андрєєва О. В., Гакман А. В. Основні напрями оптимізації рекреаційно-оздоровчої діяльності осіб похилого віку. Науковий часопис Національного педагогічного університету імені М. П. Драгоманова. Серія 15 : Науково-педагогічні проблеми фізичної культури (фізична культура і спорт). 2020. Вип. 1(121). С. 7–10.
   Andreeva, O. V., Hakman A. V. (2020), "Osnovni napryamy optymizatsiyi rekreatsiyno-ozdorovchoyi diyal'nosti osib pokhyloho viku" [The main directions of optimization of recreational and health activities of the elderlyї. *Scientific journal of the National Pedagogical University named after M.P. Drahomanov. Series 15: Scientific and pedagogical problems of physical culture (physical culture and sports),* Issue 1(121), pp. 7–10. [in Ukraine].
5. Бочелюк, В. Й., Бочелюк, В. В. Дозвіллєзнавство : навч. посіб. Київ : Центр навчальної літератури, 2006. 208 с.
   Bocelyuk, V. Y., Bocelyuk, V. V. (2006), *Dozvillyeznavstvo* [Inquiry]. Center for Basic Literature, Kyiv, 2006, 208 p. [in Ukraine].
6. Буліч, Е. Муравов, І. Стартегія активності і оптимізму – валелогічне обґрунтування принципів здоров'я і довголіття. Молода спортивна наука України. 2002. Т. 1. № 7. С. 45.
   Bulich, E. Muravov, I. (2002), "Startehiya aktyvnosti i optymizmu — valelohichne obgruntuvannya pryntsypiv zdorov□ya i dovholittya" [The strategy of activity and optimism is a valeological substantiation of the principles of health and longevityї. *Young sports science of Ukraine,* Vol. 1, № 7, pp. 45. [in Ukraine].
7. ВООЗ. На пути к достижению международного консенсуса в вопросах политики по оказанию долгосрочной помощи лицам пожилого возраста. –Режим доступу: http://www.who.int/ageing/publications/ru/
   VOOZ. Na puti k dostizheniyu mezhdunarodnogo konsensusa v voprosakh politiki po okazaniyu dolgosrochnoy pomoshchi litsam pozhilogo vozrasta [Towards an international consensus on long-term care policies for the elderly]. – http://www.who.int/ageing/publications/ru/ [in Russia].
8. Гакман А. В., Байдюк М. Ю. Закордонний досвід рекреаційно-оздоровчої діяльності у рамках дозвілля з людьми похилого віку. *Молодий вчений.* 2016. № 11. С. 116–120.
   Hakman, A. V., Baidyuk, M. Yu. (2016), "Zakordonnyy dosvid rekreatsiyno-ozdorovchoyi diyal'nosti u ramkakh dozvillya z lyud'my pokhyloho viku" [Foreign experience of recreational and health activities in the framework of leisure with the elderly]. *Young scientist,* No 11, pp. 116-120. [in Ukraine].
9. Гакман, А. В., Байдюк, М. Ю. Мотиваційні чинники рекреаційно-оздоровчої діяльності людей похилого віку. *Молодий вчений.* 2016. 11(39). С. 70–73.
   Hakman, A. V., Baidyuk, M. Yu. (2016), "Motyvatsiyni chynnyky rekreatsiyno-ozdorovchoyi diyal'nosti lyudey pokhyloho viku" [Motivational factors of recreational and health activities of the elderly]. *Young scientist,* No 11(39), pp. 70-73. [in Ukraine].
10. Гакман А. В. Балацька Л. В., Лясота Т. І. Вплив рекреаційно-оздоровчої діяльності на уповільнення старіння організму. Вісник кам'янець-подільського національного університету імені Івана Огієнка. Фізичне виховання, спорт і здоров'я людини. 2016. Вип. 8. С. 91–97.

Hakman, A. W. Balatska, L. V., Lesota, T. I. (2016), "Vplyv rekreatsiyno-ozdorovchoyi diyal'nosti na upovil'nennya starinnya orhanizmu" [The influence of recreational and health activities on slowing down the aging of the body]. *Bulletin of Kamenets-Podolsky National University named after Ivan Ogienko. Physical education, sports and human health,* Issue 8, pp. 91-97. [in Ukraine].

11. Гакман А. В. Роль рухової активності та процесів старіння для осіб похилого віку. Молодий вчений. № 55(3.3). С. 34–37.
Hakman, A. W. (2018), "Rol' rukhovoyi aktyvnosti ta protsesiv starinnya dlya osib pokhyloho viku" [The role of motor activity and aging processes for the elderly]. *Young scientist,* No 55(3.3), pp. 34–37. [in Ukraine].
12. Дудіцька С. П. Мотиви й різновиди рекреаційно-оздоровчої діяльності людей похилого віку. Вісник Прикарпатського Університету імені Василя Стефаника. Фізична Культура. 2019. Випуск 31. С. 45-49.
Duditska, S. P. (2019), "Motyvy y riznovydy rekreatsiyno-ozdorovchoyi diyal'nosti lyudey pokhyloho viku" [Motivational and recreational activities of people of a sick age]. *Bulletin of Vasyl Stefanyk Precarpathian University. Physical Education,* Issue 31, pp. 45-49. [in Ukraine].
13. Житинська М. О. Соціально-педагогічне середовище університету третього віку як чинник формування життєдіяльності людей похилого віку. Соціальна робота в Україні: теорія і практика. 2016. № 1–2. С. 131–139.
Zhitinska, M. O. (2016), "Sotsial'no-pedahohichne seredovyshche universytetu tret'oho viku yak chynnyk formuvannya zhyttyediyal'nosti lyudey pokhyloho viku" [Social and pedagogical medium to the university of the third century as an official in the form of life-saving people]. *Social work in Ukraine: theory and practice,* No. 1–2, pp. 131–139. [in Ukraine].
14. Коваль О. Г., Коваль О. Г., Чередніченко Т. М. Обґрунтування занять фізичною культурою в людей похилого віку. Сучасні проблеми фізичного виховання, спорту та здоров'я людини. 2011. С. 199-202.
Koval, O. G., Koval, O. G., Cherednichenko, T. M. (2011), "Obґruntuvannya engage in physical culture in the people of the elderly viku" [Rationale for physical education in the elderly]. *The current problems of physical exhilaration, sports and healthy people,* pp. 199-202. [in Ukraine].
15. Кривчикова О. Д., Фандикова Л. О. Фізкультурно-оздоровчі заняття як фактор збереження здоров'я та довголіття людей похилого і старшого віку. Вісник Чернівецького національного педагогічного університету. 2011.№ 86. Т. 2. 47–50.
Krivchikova, O. D., Fandikova, L. O. (2011), "Fizkul'turno-ozdorovchi zanyattya yak faktor zberezhennya zdorov'ya ta dovholittya lyudey pokhyloho i starshoho viku" [Cultural and health-improving employment is a factor in preserving healthy and satisfying people who are older and older]. *Newsletter of the Chernivtsi National Pedagogical University,* No. 86, Vol. 2, pp. 47–50. [in Ukraine].
16. Круцевич Т. Ю., Андрєєва О. В., Благій О. Л. Рекреативні заняття як чинник формування дозвіллєвої культури. Спортивний вісник Придніпров'я. 2008. № 1. С. 3–8.
Krutsevich, T. Yu., Andryova, O. V., Blagiy, O. L. (2008), "Rekreatyvni zanyattya yak chynnyk formuvannya dozvillyevoyi kul'tury" [Recreational employment as an official in the form of dialed culture]. *Sports Bulletin of the Dnieper,* No 1, pp. 3–8. [in Ukraine].
17. Литовченко Г. О., Ткаченко С. В., Буланов О. М. Дослідження факторів, які можуть впливати на тривалість життя людини. Педагогіка, психологія та медико-біологічні аспекти фізичного виховання і спорту. 2007. № 1. С. 73–76.
Litovchenko, G. O., Tkachenko, S. V., Bulanov, O. M. (2007), "Doslidzhennya faktoriv, yaki mozhut' vplyvaty na tryvalist' zhyttya lyudyny" [Further factors, so that you can add to the life of people]. *Pedagogy, psychology and medical and biological aspects of physical fitness and sports,* No 1, pp. 73–76. [in Ukraine].
18. Манучарян С. В., Зайцев В. П., Крамской С. И. Физическая рекреация и физкультурно-оздоровительный досуг: проблема и теоретический взгляд : 1 Межд. научная конф. «Здоровьесберегающие технологии, физическая реабилитация и рекреация в высших учебных заведениях» (25.11.2008 г.). Харьков, 2008. С. 69–74.
Manucharyan, S. V., Zaitsev, V. P., Kramskoy, S. I. (2008), "Fizicheskaya rekreatsiya i fizkul'turno-ozdorovitel'nyy dosug: problema i teoreticheskiy vzglyad" [Physical recreation and fitness and leisure activities: a problem and a theoretical view]. *Health-saving technologies, physical rehabilitation and recreation in higher educational institutions: 1 international scientific conference (November 25, 2008)*. Kharkiv, pp. 69–74. [in Russia].
19. Сидоренко А. В., Михайлова О. Н. Осуществление Мадридского Международного плана действий по проблемам старения в странах СНГ: Первые 10 лет. Успехи геронтологии. 2013. № 26(4). С. 585–593.
Sidorenko, A. V., Mikhailova, O. N. (2013), "Osushchestvleniye Madridskogo Mezhdunarodnogo plana deystviy po problemam stareniya v stranakh SNG: Pervyye 10 let" [Implementation of the Madrid International Plan of Action on Aging in the CIS: The First 10 Years]. *Advances in Gerontology,* No 26(4). pp. 585–593. [in Russia].
20. Томенко О. Міжнародний досвід організації проектів та програм зі здоров'язбереження і рухової активності різних груп населення. Спортивна наука України. 2014. № 3 (61). С. 12–18.
Tomenko, O. (2014), "Mizhnarodnyy dosvid orhanizatsiyi proektiv ta prohram zi zdorov'yazberezhennya i rukhovoyi aktyvnosti riznykh hrup naselennya" [International organization of projects and programs for health and safety and social activities of the population group]. *Sports science of Ukraine,* No 3(61), pp. 12–18. [in Ukraine].
21. Andrieieva, O., Hakman, A., Kashuba, V., Vasylenko, M., Patsaliuk, K., Koshura, A., & Istyniuk, I. (2019). Effects of physical activity on aging processes in elderly persons. *Journal of Physical Education and Sport, Vol. 19* (Supplement issue 6), pp. 1308-1314. doi:10.7752/jpes.2019.s4190
22. Hakman, A., Andrieieva, O., Kashuba, V., Omelchenko, T., Carp, I., Danylchenko, V., Levinskaia, K. (2019). Technology of planning and management of leisure activities for working elderly people with a low level of physical activity. *Journal of Physical Education and Sport*, *Vol. 19* (Supplement issue 6), pp. 2155-2166. doi:10.7752/jpes.2019.s6324

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DEVELOPMENT OF PSYCHOPHYSIOLOGICAL FUNCTIONS IN STUDENTS WHO STUDY IN DIFFERENT EDUCATIONAL PROFESSIONAL PROGRAMS, IN THE PROCESS OF PHYSICAL EDUCATION

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The question of the influence of physical education on the development of psychophysiological functions of students studying in different educational and professional programs during their studies in higher education institutions is considered. *The purpose of the study*: to identify the impact of physical education classes according to a differentiated program for students studying in different educational and professional programs, on the state of their psychophysiological functions. *Material and methods*. The experiment involved 80 students (boys) who study in various educational and professional programs (humanities and technical specialties) at Lviv Polytechnic National University during a three-year course of physical education. To implement the experiment, psychophysiological test tests were used, the results of which were processed by methods of mathematical statistics. *Results*. According to the results of statistical processing of test results, students who study in different educational and professional programs have differences in the development of psychophysiological functions. As a result, between groups of students of humanities and technical specialties revealed a significant difference in the development of attention parameters and sensorimotor properties of the nervous system. There are no significant differences between the final average values of the coefficient of mental performance in students of the studied experimental group at the end of the experiment ($p>0.05$), and the positive dynamics is almost at the same level. *Conclusions.* Differentiated correction of the variable part of the program of physical education of students of higher education institutions according to the peculiarities of training in different educational and professional programs leads to better results in the formation of professionally important psychophysiological functions significant in the chosen future activity. This is evidenced by the improvement in the state of the studied parameters in students of the experimental groups compared with the control.

Key words: physical education, student, efficiency, specialty, psychophysiological functions.

Introduction

The new educational paradigm and integration of the higher education system of Ukraine into the European educational and scientific space involves the formation of a highly qualified specialist. In the modern strategy of higher education, the issue of students' health is especially relevant as one of the priority areas of its humanization, which is the basis of physical, mental and social wellbeing, condition and basis for the full development of student youth [2; 10].

The effectiveness of higher education is equated with the quality of training of employable professionals, which is ensured by the proper state of their health and is the main driver of progress in all spheres of society and the state [3]. The problem of deteriorating health of young people, both physical and psychological, is a topical issue of the modern education system.

A significant increase in educational and psycho-emotional load against the background of lack of physical activity that accompanies the modern learning process, has led to a significant deterioration in the psychophysical readiness of student youth to perform their professional duties. The issue of preserving the health of students of higher education institutions (HEIs) cannot be considered outside the context of physical education, which has a very social significance in this perspective.

Quite a large number of studies are devoted to finding the effectiveness of physical education of students in HEI. There are opinions that establishing the effectiveness of physical education requires a study of the state of psychophysiological functions of students [2; 3; 10]. It is generally accepted that the correlator of the psychophysical state and the integral indicator of the overall functional state is the level of development of psychophysiological functions [1; 6]. The view of well-known authorities in this field on the strong relationship between the functional state of the body and psychophysiological mechanisms for ensuring professional performance is convincing [6; 7]. A number of empirical developments have substantiated and proved the conditionality of physical performance from the state of psychophysiological functions [2; 3; 10]. In addition, psychodiagnostic assessment is the basis for correlation of influences aimed at meeting the requirements of various types of professional activity of the employee [5; 9].

At the same time, the development of psycho-physiological functions in students of different professional specializations remains insufficiently studied.

Material and research methods

The purpose of the study is to identify the impact of physical education classes according to a differentiated program for students studying under various educational and professional programs on the state of their psychophysiological functions.

Participants: the study was conducted by the Department of Physical Education of the National University "Lviv Polytechnic" during a three-year course of physical education. The experiment involved 80 students (boys) studying under various educational and professional programs. The study was conducted in accordance with the WMA Declaration of Helsinki - Ethical principles for medical research involving human subjects.

For the period of the study, according to the results of the medical examination, all students of the study sample for physical education classes were assigned to the main medical group. The study was conducted with the written consent of students. Two groups: control (CG) and experimental (EG) were formed on the principle of cluster analysis for the distribution of the sample into homogeneous groups with the satisfaction of its volume at the level of $p < 0.05$

For empirical research, given the differences in the content of specialized educational activities, the intensity of physical and mental workload, the requirements of future professional activities, students of different specialties were selected. The 1st EG included students studying in educational and professional programs of the specialty "International Relations". Their professional activity is humanitarian and is connected with communication and interaction with people, ability to analyze and systematize a large amount of information and a high level of memory development. The 2nd EG included students studying in educational and professional programs of the specialty "Computer Science", professional activity is technical, which requires a long-term static tension in a sitting position, possession of a high level of concentration, distribution and switching of attention, the ability to focus on one object or subject for a long time, without distraction and the ability to extrapolate.

The tools of the experiment are selected taking into account the need for an integrative assessment of psychophysiological functions with the removal of sufficiently discriminated parameters for professional competencies in the presence of relationships between the research parameters. It was noted that the establishment of professional skills integrates the control of cognitive, regulatory and sensorimotor spheres, to control the psychophysiological functions of students with an assessment of mental endurance, performance, cognitive functions and attentional abilities, speed and accuracy of reaction [6; 9].

A short informative "Tapping test" was used to diagnose the effectiveness of mental processes that determine the quality of mental activity; Bourdon-Anfimov proofreading test to assess the parameters of attention, the pace of psychomotor activity, efficiency and resistance to monotonous activity; Pieron-Rouzer test to control the properties of attention, its concentration, stability, selectivity and speed of switching, accuracy and reliability of information processing and level of performance. The tests used are standardized, short, time-limited, suitable for use on the same sample and do not require special conditions [5; 6; 9].

Organization of the research: a variable component of the basic physical education program was used for the empirical study. Means of physical education, which were selected taking into account recommendations on the requirements for training of students studying under various educational and professional programs. Formation of special qualities, significant for specialists of different professional orientation, the use of special means of physical education is realized. The proposed innovations were tested during the academic course of physical education in HEI. The research was conducted annually within the terms defined by the curricula, following the same order of the organization.

Statistical analysis. For of the, Indicators of descriptive statistics were used to characterize the obtained results. Basic one-dimensional: arithmetic mean value (X), standard deviation (S), median (Me), asymmetry coefficients (As,), coefficient of variation (V). All statistical analyzes were performed using SPSS Version 21. The results of descriptive statistics in this study were presented as percentages. Since the indicators analyzed were subject to the law of normal distribution according to the Mann-Whitney test, Student`s t criterion was used to determine the statistically significant difference between the samples at a significance level of not less than 0.05. Probability 0.05, 0.01 and 0.001 was used to indicate statistical significance.

Results

To ensure the completeness of the results of the experimental study, a statistical analysis was performed at the beginning of the experiment of qualitative characteristics of the studied parameters of psychophysiological functions. The results of the study of EG and CG students in this period did not differ significantly, which is statistically confirmed ($p>0,05$) and indicates the homogeneity of the contingent of the studied sample of students (Table 1).

Table 1 – Indicators of parameters of psychophysiological functions of students of the studied sample at the beginning of the experiment

Parameters studied		EG (n=20)					CG (n=20)					Significance of differences (p)
		X	*S*	As	Me	V	X	S	As	*Me*	*V*	
IDE, conventional units	I	5,26	0,51	0,75	5,12	37,2	5,30	0,47	0,49	5,20	35,7	>0,05
	II	5,51	0,37	0,35	5,42	31,2	5,49	0,41	0,53	5,31	42,2	>0,05
LMS, conventional units	I	4,11	1,01	0,64	4,01	33,4	4,17	0,92	0,74	4,00	34,5	>0,05
	II	3,86	1,18	0,20	3,74	42,3	3,90	1,01	0,63	3,70	43,5	>0,05
CMNS, %	I	0,82	0,24	0,55	0,79	47,5	0,82	0,18	0,67	0,79	26.7	>0,05
	II	0,79	0,22	0,63	0,77	47,8	0,75	0,25	0,80	0,73	36.4	>0,05
Evaluation of "TT" , points	I	9,84	1,14	0,48	9,55	45,7	9,75	1,01	0,91	9,69	37,5	>0,05
	II	9,01	1,02	0,53	8,99	37,2	8,99	1,15	0,19	8,10	37,4	>0,05
A, points	I	7,01	0,66	0,78	7,00	31,2	7,21	0,71	0,64	7,00	36,2	>0,05
	II	8,16	0,12	0,33	8,09	33,4	8,77	0,56	0,55	8,12	34,7	>0,05
T, %	I	77,68	1,03	0,60	71,44	35,1	78,15	2,35	0,56	77,29	34,5	>0,05
	II	80,4	2,01	0,27	79,7	29,7	82,42	1,81	0,58	82,11	23,8	>0,05
E, value	I	1394	97,1	0,73	1391	43,4	1355	108,3	0,27	1349	36,9	>0,05
	II	1452	111,3	0,42	1448	39,1	1417	113,7	0,54	1409	43,4	>0,05
K, %	I	48,25	3,1	0,71	47,44	33,5	49,61	5,4	0,30	48,5	39,1	>0,05
	II	55,21	2,7	0,50	54,32	26,7	56,82	5,1	0,71	56,11	33,5	>0,05
Pr, %	I	51,11	2,4	0,63	50,2	33,4	52,2	3,7	0,83	52,7	26,7	>0,05
	II	55,44	3,1	0,50	54,2	30,1	57,0	2,8	0,83	56,4	33,4	>0,05
K_u , c.u.	I	59,17	3,1	0,44	58,97	28,4	63,2	4,0	0,33	63,0	30,1	>0,05
	II	65,31	2,7	0,26	64,76	32,1	64,9	5,2	0,54	64,2	28,4	>0,05
t, s	I	183,5	25,1	0,75	181,4	33,5	198,1	29,7	0,49	196,2	44,1	>0,05
	II	171,7	31,1	0,35	170,4	43,1	176,2	22,4	0,53	175,4	32,1	>0,05
CMP, c.u.	I	0,77	0,06	0,64	0,69	26,7	0,76	0,08	0,74	0,72	28,7	>0,05
		0,74	0,04	0,20	0,73	34,6	0,75	0,03	0,63	0,74	33,1	>0,05

N o t e. Legend: IDE – indicator of dynamic endurance; LMS – lability of the musculoskeletal system, CMNS – coefficient of mobility of the nervous system; A – switching attention; T – accuracy of attention; E – mental productivity coefficient; K – concentration of attention; K_u – attention resistance; Pr – efficiency of work; t – selectivity of attention, CMP – mental performance coefficient; I – first EG, II – second EG

Thus, the formed sample fully meets the requirements of representativeness, as it reproduces the characteristics of the general aggregate.

At the beginning of the experimental study the nervous system mobility coefficient (CMNS), which is an indicator of dynamic performance, 28.2 % of students had the first grade, all others – the second. There were no students with high grade of the CMNS (Table 2).

The impact of physical education for students enrolled in various educational and professional programs, we observe in the results of the «Tapping Test» at the end of classes. According to the latter, the students of the first grade of EG are significantly superior in terms of the results of the students of the second grade of EG, 87.3 % of whom have achieved a high level of CMNS testing. In the second EG such students were much less: 39.2 %. The level of attention parameters before the study was within the average of students of the research groups. At the end, there is an advantage of students of the second EG regarding the results of the final testing. Due to the fact that qualitative parameters of attention are well developed, after the study we observe a very good level of concentration in 75.2 % of the 2nd EG, in others – a very good level of concentration.

The coefficient of mental capacity (CMP) in EG students in the established values is close to one. It was found that there are no significant differences between the final average values of CMP in students of the studied EG at the end of the experiment ($p > 0.05$), and the positive dynamics is almost at the same level.

Table 2 – Indicators of parameters of psychophysiological functions of students of the studied sample at the end of the experiment

Parameters studied		EG (n=20)						CG (n=20)					
		before		after		+ (%)	p	before		after		+ (%)	p
		X	S	X	S			X	S	X	S		
IDE, conventional units	I	5,26	0,51	4,33	0,71	17,6	<0,05	5,30	0,47	5,22	0,54	1,5	>0,05
	II	5,51	0,37	4,59	0,53	10,6	<0,05	5,49	0,41	5,42	0,37	1,2	>0,05
LMS, conventional units	I	4,11	1,01	5,19	0,78	28,7	<0,01	4,17	0,92	4,25	0,98	1,9	>0,05
	II	3,86	1,18	4,94	0,98	15,3	<0,01	3,90	1,01	4,06	1,01	4,1	<0,05
CMNS, %	I	0,82	0,24	0,93	0,22	25,6	<0,01	0,82	0,18	0,86	0,14	0,4	>0,05
	II	0,79	0,22	0,88	0,15	13,9	<0,01	0,75	0,25	0,74	0,23	0	>0,05
Evaluation of "TT", points	I	9,84	1,14	12,3	1,11	24,2	<0,05	9,75	1,01	10,1	1,12	1,5	>0,05
	II	9,01	1,02	11,8	1,20	14,1	<0,01	8,99	1,15	8,85	0,94	0,6	>0,05
A, points	I	7,01	0,66	9,23	1,33	32,1	<0,001	7,21	0,71	7,66	0,68	0	>0,05
	II	8,16	0,12	10,11	1,01	27,8	<0,05	8,77	0,56	8,86	0,72	0,3	>0,05
T, %	I	77,68	1,03	84,14	2,33	9,02	<0,05	78,15	2,35	81,84	2,33	3,1	>0,05
	II	80,4	2,01	89,31	2,65	11,1	<0,05	82,42	1,81	84,11	2,11	2,4	>0,05
E, value	I	1394	97,1	1800	95,1	25,7	<0,05	1355	108,3	1406	87,1	4,4	<0,05
	II	1452	111,3	1879	108,6	28,7	<0,01	1417	113,7	1495	107,5	5,2	<0,05
K, %	I	48,25	3,1	58,19	3,7	20,8	<0,05	49,61	5,4	50,16	4,7	0,1	>0,05
	II	55,21	2,7	68,33	5,1	23,2	<0,01	56,82	5,1	57,14	5,9	0,5	>0,05
Pr, %	I	51,11	2,4	60,1	3,0	18,6	<0,05	52,2	3,7	53,4	3,9	1,9	>0,05
	II	55,44	3,1	64,7	3,4	17,2	<0,05	57,0	2,8	58,8	4,1	2,1	>0,05
K_u , c.u.	I	59,17	3,1	75,3	5,7	27,3	<0,05	63,2	4,0	65,3	3,8	3,1	>0,05
	II	65,31	2,7	81,2	5,2	23,6	<0,05	64,9	5,2	66,1	4,1	1,5	>0,05
t, s	I	183,5	25,1	131,6	27,3	28.4	<0,01	198,1	29,7	190,2	21,9	4,04	<0,05
	II	171,7	31,1	122,7	31,2	28,6	<0,001	176,2	22,4	170,4	28,1	3.4	<0,05
CMP, c.u.	I	0,77	0,06	0,95	0,05	18,5	<0,05	0,76	0,08	0,83	0,05	3,6	>0,05
		0,74	0,04	0,94	0,06	17,5	<0,05	0,75	0,03	0,86	0,07	4,3	>0,05

The results obtained are substantiated in terms of formation of psychophysiological functions, which is determined by the influence of internal (psychophysiological properties) and external (environment) factors [1]. The environment in our case are characteristic features defined by the learning process, namely its professional specificity.

Training in technical specialty contributes to the priority formation of the function of attention, and in humanitarian - sensorimotor properties of the nervous system. That was taken into account when choosing the means of physical education.

The study found that the change of psychophysiological functions in CG students during the course of classes is characterized by the absence of a positive trend. In certain parameters, slight positive changes were found, but at the end they are generally significantly indistinguishable (p>0,05) from the initial stage of the study.

Discussion

In today's educational space, the problem of researching the effectiveness of training highly qualified able-bodied professionals is very relevant, as evidenced by numerous scientific works [2-4; 10; 11]. Our study expands scientific information [2; 3; 10], on priorities in choosing the means of physical education, which should be provided with the development of professionally important qualities for the successful adaptation of students after graduation from higher educational institutions to professional activities.

The significance of the chosen topic of the study is due to the existence of a sustainable negative trend of deterioration of the psychophysical state of student youth.

The study is consistent with the data [2; 3], regarding a significant proportion of HEI graduates who do not have sufficient health and working capacity potential. This requires finding action measures aimed at improving the effectiveness of the physical education process as a significant factor influencing the elimination of negative phenomena regarding the health of students [4; 11]. Data on the feasibility of permanent control in the course of physical education in order to correct pedagogical influences will also contribute to solving this problem [2]. The relevance of the problem raised is partly evidenced by the scientists' interest in analyzing and interpreting data on such control as a prerequisite for the creation of differentiated physical education programs [7; 10]. The need to address the problem of pedagogical control is explained by its theoretical and practical importance for optimal management of the effectiveness of physical education [3; 11]. Qualitative implementation of control procedures provides an information on the feasibility of pedagogical actions, which is a factor of the effectiveness of physical education in general. That is consistent with the provisions on quality assurance of higher education of students [2-4].

Therefore, the results of the study complement the data [3; 4] on pedagogical control in physical education of students. We support scientific approaches to ways to optimize control in physical education [7; 10]. Scientific provisions [2; 11] on the place and role of control of psychophysiological functions in physical education of students, as a correlator for the choice of means used in the process of physical education of students in the formation of a variable part of the program, have been further developed. Thus, despite the fragmentation and ambiguity of the data, it is possible to distinguish the areas in which a positive effect of the use of a variable part of the program on physical education of the HEI is achieved. That contributed to the obtaining of new data in the perspective of similar trends and discrepancies to justify effective directions of differentiation of classes, as one of the determining factors limiting the effectiveness of physical education.

Information about the state of psychophysiological functions and their changes in the course of physical education of students studying in various educational and professional programs is of practical importance, as it will help teachers in their professional activities. A certain list of scientific works [2; 3; 7; 10] certifies the need to control psychophysiological functions in the course of physical education, as a possibility of obtaining data on changes in the functional state of the student's body. Taking into account the above to some extent will help solve the problem of the effectiveness of physical education of students in solving both basic and related problems of ensuring their proper psychophysical condition.

The mechanism of managing the mental performance of students using various means of physical education remains fragmentary, under-studied and insufficiently grounded. In the study, we relied on available views [5; 6; 8] about psychophysiological functions as one of the important criteria of mental performance, which is the basis for controlling the level of professional readiness. Our study is consistent with the available information [7; 10] that the peculiarity of mental performance of students is the formation of psychophysiological functions depending on the direction of special training.

Scientific data [2; 3] on the low effectiveness of the current system of physical education of students without taking into account the experimental factor has been confirmed. The predictable effect of the experiment is the effectiveness of a differentiated approach in physical education of students studying under various educational and professional programs.

Conclusions

Differentiated correction of the variable part of the program of physical education of HEI students according to the peculiarities of training in various educational and professional programs, leads to better results in the formation of professionally important psychophysiological functions, significant in the chosen type of future activity.

Statistical analysis of the results of test control of psychophysiological functions of students of the studied sample showed their improvement in students of EG. This is reflected in the positive significant changes in the parameters of these functions after graduation. Only certain parameters of the studied indicators are improved in CG from these parameters, but their dynamics are much smaller than that of EG students. Other control indicators remain at the achieved level.

Summarizing the results of statistical analysis of test results of psychophysiological functions of students gives grounds for concluding the feasibility of introduction into physical education of differentiated program for students studying in various educational and professional programs. The results of statistical and mathematical processing of materials showed an increase in mental performance and positive dynamics of attention parameters in students of EG. Quantitative growth of these parameters is due to the peculiarities of their professional specialization.

The experience of conducting classes on EG gives reason to state the positive effect of targeted correctional

influences in the course of physical education. This is evidenced by the absolute values of psychophysiological functions at the final stage. Thus, the dynamics of the studied parameters demonstrated the advantage of EG students over CG in the development of psychophysiological functions. In turn, this indicates the possibility of improving the quality of psychophysiological functions through the purposeful correction of the physical education program, as a prerequisite for a significant increase in the overall level of psychophysical state of the students of the HEI and indicates the effectiveness of the methodical approach proposed in the study.

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

References:

1. Апанасенко Г. Л., Михайлович С. О. Фізіологічні основи фізичної культури і спорту. Ужгород, 2004. 144 с.
   Apanasenko, G. L., Mykhailovych, S. O. (2004), *Fiziolohichni osnovy fizychnoi kultury i sportu* **[Physiological bases of physical culture and sports]. Uzhhorod, 144 p. [**in Ukraine].
2. Блавт О. Перманентність взаємозв'язку розумової та фізичної працездатності в системі контролю студентів спеціальних медичних груп. Молодіжний науковий вісник Східноєвропейського національного університету імені Лесі Українки. 2014. № 16. С. 43–48.
   Blavt, O. (2014), "Permanentnist vzaiemozviazku rozumovoi ta fizychnoi pratsezdatnosti v systemi kontroliu studentiv spetsialnykh medychnykh hrup" [Permanence of the relationship between mental and physical performance in the control system of students of special medical groups]. *Youth Scientific Bulletin of the Lesia Ukrainka East European National University***,** Issue 16, pp. 43–48. [in Ukraine].
3. Горелов А. А., Кондаков В. Л., Усатов А. Н. Интеллектуальная деятельность, физическая работоспособность, двигательная активность и здоровье студенческой молодежи : монография. Белгород : ИПЦ «ПОЛИТЕРРА», 2011. 101 с.
   Horelov, A. A., Kondakov, V. L., Usatov, A. N. (2011), *Yntellektualnaia deiatelnost, fyzycheskaia rabotosposobnost, dvyhatelnaia aktyvnost y zdorove studencheskoi molodezhy* [Intellectual activity, physical performance, physical activity and health of students]. YPTs «POLYTERRA», Belhorod, 101 p. [in Russian].
4. Єдинак Г. А., Плахтій П. Д., Яценюк Ю. П. Фізична культура в школі (молодому спеціалісту) : навч.-метод. посіб. Кам'янець-Подільський : Абетка. 2000. 232 с.
   Iedynak, G. A., Plahtyi, P. D., Jatsenjuk, Yu. P. (2014), *Fizyčna kul'tura u zahal'noosvitn'omu navčal'nomu zakladi* [Physical Culture at a General Educational Institution], Drukarnja Ruta, Kamyanets-Podilsky, 232 p. [in Ukraine].
5. Кокун О. М. Оптимізація адаптаційних можливостей людини: психофізіологічний аспект забезпечення професійної діяльності : монографія. Київ : Міленіум, 2004. 265 с.
   Kokun, O. M. (2004), *Optymizatsiia adaptatsiinykh mozhlyvostei liudyny: psykhofiziolohichnyi aspekt zabezpechennia profesiinoi diialnosti* [Optimization of adaptive abilities of people: psychophysiological aspect of securing professional professions]. Milenium, Kyiv, 265 p. [in Ukraine].
6. Коробейников Г. В. Психофизиологические механизмы умственной деятельности человека: монография. Київ : Український фітосоціологічний центр, 2002. 123 с.
   Korobeinykov, H. V. (2002), *Psykhofyzyolohycheskye mekhanyzmы umstvennoi deiatelnosty cheloveka* [Psychophysiological mechanisms of human mental activity: monograph]. Ukrainskyi fitosotsiolohichnyi tsentr», Kyiv, 123 p. [in Russian].
7. Коробейніков Г. В., Петров Г. С., Улізько В. М. Розумова працездатність студентів вищого навчального закладу. Педагогіка, психологія та медико-біологічні та медико-біологічні проблеми фізичного виховання і спорту. 2010. № 4. 68-72.
   Korobeinikov, H. V., Petrov, H. S., Ulizko, V. M. (2010), "Rozumova pratsezdatnist studentiv vyshchoho navchalnoho zakladu" [Psychophysiological mechanisms of human mental activity: monograph]. *Pedagogy, psychology and medical-biological and medical-biological problems of physical education and sports***,** Issue 4, pp. 68–72. [in Ukraine].
8. Лизогуб В. С. Формирование силы нервных процессов в онтогенезе человека. Вестник Киевского университета имени Т. Шевченко. 1999. Вып. 5. С. 65-68.
   Lyzohub, V. S. (1999), "Formuvannia syly nervovykh protsesiv u ontohenezi liudyny" [Formation of the force of nervous processes in human ontogenesis]. *Visnyk Kyivskoho universytetu imeni Tarasa Shevchenka***,** Issue 5. pp. 65–68. [in Ukraine].
9. Психофизиология / Под. ред. Ю. И. Александрова. С.-П. : ПИТЕР, 2001. С. 43–93.
   Psykhofyzyolohyia (2001), [Psychophysiology] / Red. Yu. Y. Aleksandrova. PYTER, St. Petersburg, pp. 43–93. [in Russian].
10. Ровный А. С. Физическое воспитание в вузе как средство повышения умственной работоспособности студентов. Педагогіка, психологія, методика, біологічні проблеми фізичного виховання і спорту. 2012. № 27. С. 82-86.
    Rovnyi, A. S. "Fyzycheskoe vospytanye v vuze kak sredstvo povыshenyia umstvennoi rabotosposobnosty studentov" [Physical education in high school as a means of increasing the mental performance of students]. *Pedagogy, psychology, methodology, biological problems of physical and sports***.** No 27. pp. 82–86. [in Russian].
11. Adyrkhaiev, S. G. (2014), Psychophysical condition of visually impaired students during physical education classes. *European Scientific Journal*, 10 (3), 62–69.

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PEDAGOGICAL PREREQUISITES OF PHYSICAL THERAPY OF PATIENTS WITH MYOCARDIAL INFARCTION AT THE STATIONARY STAGE

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The incidence of myocardial infarction is increasing in most countries of the world and in Ukraine. About 50 thousand new cases of myocardial infarction are registered annually in Ukraine. One in five patients die within a year after suffering a myocardial infarction. All this requires finding effective ways of rehabilitation of patients with myocardial infarction. *Purpose and methods of research.* The purpose of the study is to analyze the literature, to establish and evaluate the features of physical therapy of patients with myocardial infarction at the inpatient stage. To solve the tasks used theoretical analysis, generalization of scientific and methodological literature. The clinical course of the disease was carefully studied. Assessing the functional status of patients with myocardial infarction, determined the electrical activity of the heart using electrocardiography and holter monitoring of the electrocardiogram. *Results of work.* The article identifies the problem of incidence of myocardial infarction, the task of the stationary phase of rehabilitation. The tasks of physical therapy at the stationary stage are considered. The distribution of patients with functional myocardial infarction is analyzed. The groups of complications of myocardial infarction were identified. The classification of severity of the condition of patients with myocardial infarction at the stationary stage is considered. The substantiation of the program of physical rehabilitation of patients with myocardial infarction at different stages of the inpatient stage in accordance with the functional class. The criteria of estimation of the patient's reaction to physical activity with the expansion of the regime are outlined. The volume of exercise and the types of exercises used in the first four stages of rehabilitation are analyzed. The indications for transfer of the patient from one stage of the stationary stage to the next are considered. *Key findings.* Many aspects of rehabilitation - medical, physical, psychological and, to some extent, a social plan - must be addressed at the inpatient stage. The distinctive features of the physical rehabilitation program for patients with myocardial infarction at this stage at present are early activation and discharge from the hospital, as well as the use of individualized rehabilitation programs, which is especially important for patients with complicated disease. During the stay of the patient with myocardial infarction in the hospital, a number of major rehabilitation problems are solved, which determine the timing of the implementation of all subsequent rehabilitation measures and their effectiveness.

Key words: inpatient, physical therapy, functional class, complications, rehabilitation program.

Introduction

The incidence of myocardial infarction (MI) in most countries and in Ukraine is increasing, about 50 thousand new cases of MI are registered annually in Ukraine, which requires finding effective ways of prevention, medical treatment and rehabilitation of patients with MI. During the stay of a patient with MI in the hospital, a number of important rehabilitation problems, which determine the timing of all subsequent recovery activities and their effectiveness, are solved. The task of the inpatient phase of rehabilitation includes prevention and elimination of complications limiting recovery activities, normalization or achieving optimal condition for this patient and stabilization of basic clinical, instrumental and laboratory parameters, the formation of such a level of physical activity of the patient at which he could serve himself, go up one floor on stairs or walk up to 2-3 km in 2-3 passes during the day without significant negative reactions. Also an important task is to form an adequate psychological response of the patient with MI and to prevent and treat mental disorders of these patients, which often occur in the acute phase of the disease. In this phase, the issues of restructuring habits and lifestyle, outlook on the patient's life should also be solved. [3]

The tasks of medical rehabilitation at the inpatient stage — achieving positive dynamics and stabilization of clinical condition, indicators of instrumental and biochemical methods of research, prevention, elimination or reduction of severity of complications — are solved within the treatment [1] .

Material and research methods

Theoretical analysis, generalization of data of scientific and methodological literature were used to solve the tasks. The clinical course of the disease was carefully studied. Assessing for 24 hours the functional status of patients with MI, the electrical activity of the heart was determined using electrocardiography (ECG) on the electrocardiograph Cardiolab+ (Ukraine) and Holter

ECG monitoring on the device «Dia Card» (Ukraine). Blood pressure (BP) was determined by the automatic device Microlife BP A200 AFIB (China) with a universal cuff [5].

The purpose of the study is to analyze the literary sources, to establish and evaluate the peculiarities of physical therapy of patients with MI at the inpatient stage.

Results

The tasks of therapeutic physical training at the inpatient stage are [4]:

- positive impact on the mental state of the patient;
- activation of peripheral blood circulation;
- reduction of tension of segmental muscles;
- prevention of disorders of gastrointestinal tract, development of pneumonia, muscular hypotrophy, arthrosis of the left shoulder joint;
- activation of anti-clotting blood systems;
- improvement of trophic processes, increase of a capillary bed, anastomoses and collaterals in a myocardium;
- increase the function of the respiratory system;
- gradual increase of tolerance to physical activity and adaptation to household loads.

The pace and success of the tasks depend on which functional class (FC) the patient belongs to. The division of patients with MI into 4 FC severity is based on such indicators as the prevalence and depth of myocardial infarction, the presence and nature of complications, the severity of coronary insufficiency. Complications of MI during inpatient treatment are divided into three groups [8].

Complications of the first group: infrequent extrasystole (no more than 1 in 1 min) or frequent extrasystole, but passing as an episode; atrioventricular blockade of the I degree that existed before the development of MI; atrioventricular (A-V) blockade of the I degree only at the rear MI; sinus bradycardia; heart failure (HF) without congestive phenomena in the lungs, liver, lower extremities; epistenocardic pericarditis; His blockade of legs of the bundle (with the absence of A-V blockade).

Complications of the second group: reflex shock (hypotension); A-V blockade above I degree (any) at rear MI; A-V blockade of the I degree at the anterior MI or against the background of the blockade of the legs of the His bundle; paroxysmal rhythm disorders, except ventricular paroxysmal tachycardia; rhythm driver migration; extrasystole frequent (more than 1/min), and/or polytopic, and/or group, and/or R on T, lasted (throughout the observation period) or frequent repetitive episodes; degree IIA of HF; Dressler's syndrome; hypertensive crisis (excluding crisis in the most acute period of MI); stable arterial hypertension (AH) (systolic blood pressure (SBP) ≥200 mmHg, diastolic blood pressure(DBP) ≥100 mmHg).

Complications of the third group: recurrent or prolonged course of MI; clinical death condition; complete A-V blockade; A-V blockade above I degree at anterior IM; acute heart aneurysm; thromboembolism in various organs; actual cardiogenic shock; pulmonary edema; HF treatment-resistant; thromboendocarditis; gastrointestinal bleeding; ventricular paroxysmal tachycardia; combination of 2 or more complications of second group.

Table 1 presents the classification of the severity of MI of patients at the inpatient stage [6].

Table 2 presents the program of physical rehabilitation of patients with MI at different stages of inpatient stage according to the functional class (FC) [4] .

When assessing the patient's response to physical activity, especially when expanding the regime, the heart rate (HR), respiratory rate, blood pressure in response to therapeutic gymnastics (TG) classes are assessed, electrocardiograms, holter ECG monitoring during TG classes, as well as samples with dosed exercise ((at the end of the inpatient stage of treatment) are carried out.

The amount of load and types of exercises used in the first four stages of rehabilitation are presented in Table 3 [5].

The program of physical rehabilitation of patients with MI in the hospital phase is based on the patient's belonging to one of the 4 classes of condition severity. The severity class is determined on the 2nd or 3rd day of the disease after the elimination of pain and complications such as cardiogenic shock, pulmonary edema, severe arrhythmias.

This program involves prescribing a patient of a particular nature and volume of physical activity of domestic nature, training regime in the form of TG, leisure activities in different terms depending on his belonging to one or another class of severity.

These terms of the activation of patients are certainly approximate. The decision to transfer the patient to each subsequent stage of activity is made collectively – by a doctor, a physical therapy (PT) instructor, a rehabilitation

specialist and senior colleagues, taking into account a number of indicators.

Due to the dynamic condition of the patient with MI and the known stage of the disease, the criteria for transferring the patient from one stage of activity to another cannot be unchanged — they vary widely from stage to stage.

TG provides a gradual expansion of the patient's motor activity at this stage [1]. During this period, the complex of TG No 1 is prescribed. Classes are conducted individually with each patient with the help of a PT instructor, or a rehabilitologist. The main purpose of this complex is to fight hypokinesis in the conditions of the bed regimen offered and to prepare him for the possible early expansion of physical activity. The use of TG in the early days of MI also plays an important psychotherapeutic role.

The pace of exercise is slow, and is associated with the breathing of the patient. PT instructor, rehabilitation specialist, if necessary, helps the patient to perform exercises. The patient's pulse should be monitored during exercise. When the heart rate increases by more than 15-20 beats, pause for rest.

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Table 1 – Characteristics of FC of patients with MI

Myocardial infarction	Complications	Coronary failure	Severity class (FC)
Small focal IM	1. No complications or group I	a) there is no stenocardia or attacks once a day, there are no changes in the ECG;	I
		b) stenocardia (attacks 2-5/day.);	II
		c) stenocardia more than 6 times/day.	III
	2. One complication II gr.	a) there is no stenocardia or attacks once a day, there are no changes in the ECG;	II III
		b) stenocardia (attacks 2-5/day);	III
		c) stenocardia more than 6 times/day;d) regardless of stenocardia	IV
	3. Any complication III gr.		
Transmural or circular subendocardial MI	1. No complications or group I	a) there is no stenocardia or attacks once a day, there are no changes in the ECG;	III
		b) stenocardia (attacks 2-5/day);	III
		c) stenocardia more than 6 times/day	IV
	2. One complication II gr.	a) there is no stenocardia or attacks once a day, there are no changes in the ECG;	III
		b) stenocardia (attacks 2-5/day);	IV
		c) stenocardia more than 6 times/day;	IV
		d) regardless of stenocardia	IV
	3. Any complication III gr.		
Large focal nontransmural MI	1. No complications or group I	a) there is no stenocardia or attacks once a day, there are no changes in the ECG;	II
		b) stenocardia (attacks 2-5/day);	III
		c) stenocardia more than 6 times/day	III
	2. One complication II gr.	a) there is no stenocardia or attacks once a day, there are no changes in the ECG;	IV
		b) stenocardia (attacks 2-5/day);	IV
		c) stenocardia more than 6 times/day;	IV
		d) regardless of stenocardia	IV
	3. Any complication III gr.		

Table 2 – Program of physical rehabilitation of MI patients at the inpatient stage

Activity degree	Household loads	PT	Leisure, training program	Days of illness classes of heaviness			
				I	II	III	IV
I	1. Active turn to the side, use of the bed pan, a bedside chair, washing lying on your side, staying in bed with a raised headboard 2-3 times a day for 10-20 min, food consumption while sitting in bed with a raised at 45° headboard.			1	1	1	1
	2. The same + sitting on the bed with the help, hanging legs (support) for 10-15 minutes 2-3 times a day; shaving and washing while sitting	K 1	Reading, headphones. Brief acquaintance with the rehabilitation program. Pulse Counting Training	2	2	2-3	3
II	3. The same + sitting up to 20 min 2-3 times a day, hanging legs; toilet use. Moving to a chair.	K 2	Information about MI, physical rehabilitation, self-control	3–4	5–6	6–7	7–8
III	4. The same +walking around the room, eating while sitting at a table, self-service.	K 3	Board games, reading at the table (15-20-30 mins).	4–5*	6–7*	7–8*	10*
	5. The same + stay sitting without restrictions, entering the corridor, walk along the corridor up to 50 m in 2-3 steps.		Same + occupational therapy with small isometric tension (15 min work — 10 min rest)	5–6*	8–10*	9–12**	Ind.
	6. The same + walks along the corridor up to 200 m in 2-3 steps, training walking on the stairs for 1 flight			6–10	11–13*	10-15*	Ind.
IV	7. Walks along the corridor without restrictions, climbing the stairs on the 1st floor; dosed walking at a pace of 70-80 steps/min up to 200m. Full self-service. Shower.	K 3-4	Classes at the school for patients MI	11-15*	14-16**	16-18**	Ind.
	8. Dosed walking: up to 500 m, 80 steps/min.	K 4	Consultation of psychologist	16-20*	17-20**	19-21**	Ind.
	9. Dosed walking: 500-1000 m (70-80 steps/min), with acceleration on the 400-meter segments (85-90 steps/min).			21-23*	21-23**	21-23**	Ind.
	10. Dosed Walking 500-1200 m (80krok/min); 200-400 m (up to 90 steps/ m). Bicycle ergometry.			24-26	24-30*	27-32**	Ind.
	11. Walks up to 2-3 km in 2-3 steps (70-80 steps/min); acceleration: 200-400 m (90-110 steps/min).			25-30**	25-30**	25-30**	Ind.

* For patients over the age of 60 or those suffering from the current MI hypertension, diabetes mellitus (age does not matter), the specified period is extended by 2-3 days.

** For the above patients, the term increases by 3-4 days.

Table 3 – Therapeutic physical training in myocardial infarction at the inpatient stage

Degree	I	Ii	Iii	Iv
Means of PT	Initial position – lying on your back • Exercises for small and medium muscle groups of the limbs (separately, simultaneously). • Exercises to relax the muscles of the face, arms, legs, and trunk.	Initial position – lying on your back, on the right side • Exercises for small and medium muscle groups of the limbs and neck with isometric tension (20-25 % of maximum strength) for I-II FC). • Exercises for large muscle groups of the limbs (separately), trunk without tension. • Isometric tensions of the quadriceps femoris muscle 2-5 s x 4-5 times • Muscle relaxation exercises. • Static breathing exercises with elongated exhalation	Initial position – sitting on a chair • Exercises for small and medium muscle groups with isometric tension (20-30 % of maximum strength) for I-III FC. • Relaxation exercises. • Exercises for large muscle groups of the limbs without tension, with full amplitude and stretching of strained muscles. • Exercises for the trunk muscles, limiting bilateral tension of the trunk flexors. • Isometric tension of the thigh and legs muscles (separately). • Static breathing exercises with elongated exhalation. • Dynamic breathing exercises with hand movement. • Walks along the corridor.	Initial position – sitting, standing • Exercises for all muscle groups with isometric tension (20-50 % of max, strength) for I-III FC. • Exercises for the trunk muscles with full amplitude of movement in the joints. • Exercises to relax all muscles. • Breathing exercises. • Dosed walking.
Methodology of the classes	Individual Duration – 10 min. Density – 30-40%. Relaxation exercises: fortifying: rest pauses = 1:1:1	Individual 10-15 mins 35-45% Relaxation: general strengthening: respiratory: pauses = 1:1:1:1	Small group 15-20 mins 45-55% 1:1:2:1	Group 25-30 mins 50-60% 1:2:2:1
Forms of the classes	TG, self-execution of the tasks	Morning hygienic gymnastics, TG, independent classes	Morning hygienic gymnastics, TG, independent classes, walks	Morning hygienic gymnastics, TG, walks, dosed walking, independent classes
3 mins after TG: Can be	HR 10-15 BC. Resting breathing rate +6-9 SBP: + 20-40 mmHg DBP: + 10-12 mmHg ↓HR for 10 heart beats/min and BP per 10 mmHg	HR. spok. +15-20 heart beats	HR. spok. +15-20 heart beats	HR. spok. +15-20 heart beats

After 2-3 days of successful implementation of the complex and improvement of the patient's condition, it is possible to recommend the re-execution of this complex in the afternoon in a shortened version. Duration of classes — 10-12 minutes.

Next, the patient is prescribed a complex of TG No2, which is also carried out individually, under the guidance of the PT instructor, a rehabilitologist in a sitting on a chair position.

The main purpose of the complex No 2 is to prevent hypodynamics, gentle training of the cardiorespiratory system, preparation of the patient for free walking along the corridor, climbing the stairs. The pace of exercise is slow and medium. The number of exercises and their repetitions is regulated by an instructor, a rehabilitologist especially in the first 2-3 classes. Duration of classes is 10-15 min. Exercises of the complex No 1 can be recommended to the patient for independent classes in the form of morning hygienic gymnastics.

Next, the patient is prescribed a complex TG No3, which involves small group classes in the position of sitting and standing.

The main tasks of TG No 3 are to prepare the patient for going for a walk, for dosed walking and for complete

self-service. Performing this set of exercises promotes gentle training of the cardiovascular system.

In the first 2 days, reduce the number of repetitions of each exercise and increase the intervals for rest. The pace of exercise is slow, with gradual acceleration. Class

duration is up to 20 minutes. Patients are recommended to perform additionaly the complex No 1 in the form of morning hygienic gymnastics or in the afternoon.

Further, on the IV degree of activity, the patient is prescribed a complex of TG No4.

The main purpose of TG No 4 is to prepare the patient to be transferred to a local sanatorium for the second stage of rehabilitation or to be discharged home under the supervision of a cardiologist, district therapist.

The period of execution of this set of exercises is one of the longest. Until now, scarring of the affected area of the myocardium is mainly completed, compensatory mechanisms of cardiac and extracardiac origin are activated. Classes are held in groups (6-8 people).

Patients of III and IV classes of severity should perform the exercises for the hands and shoulder girdle (especially in the first days and during periods of slight deterioration of health) with a small number of repetitions (2-4) or temporarily exclude it. Patients of I and II classes of severity can perform a full range of exercises and increase the load not only by increasing the number of repetitions and accelerating the pace of movements, but also by complicating individual exercises with special techniques. To this end, you can additionally include walking with a high knee, swinging movements of straightened leg, standing sideways to the back of the chair, vigorous rotating movements in the shoulder joints of bent arms [10].

During exercises, heart rate at a top load can reach 120-130 per minute, that is, affects the training effect on the cardiovascular system and the body as a whole. Particular attention should be paid to the patient's condition and his reaction to the load. When complaining of discomfort (chest pain, shortness of breath, fatigue, etc.) it is necessary to stop or facilitate the exercises technique, reduce the number of repetitions and make additional breathing exercises.

Indications for transferring a patient from one activity degree to the next, except because it is time, are [5] :

• when transferring to the II degree − the beginning of formation of the coronary prong T on ECG, satisfactory reaction of the patient to physical activity on the I stage, including TG;

• when transferring to the III degree — a satisfactory reaction to the load on the II stage, the formation of the coronary prong T and the approach of the ST segment to the isoelectric line;

• when transferring to the IV degree of activity — a satisfactory reaction to the load on the III stage, the absence of new complications, frequent attacks of angina pectoris (more than 5 times a day), HF of a II A degree and above, frequent paroxysmal arrhythmias (1 time in 2 days) and conductivity disorders accompanied by severe hemodynamic disorders, the beginning of the formation of scar tissue.

Discussion

Pedagogical preconditions for the rehabilitation of patients with myocardial infarction at the inpatient stage involve a step-by-step and individual approach [3].

When expanding the regime at each stage, if any significant complications develop and the patient's condition deteriorates, temporarily reduce the amount of loads; reduce the rate of activation, without completely stopping physical rehabilitation, herewith not exaggerating the value of fluctuations of the end of the ventricular complex of ECG, which is often observed in patients with MI. The timing of expansion of the regime is indicative and in each case the question of a mode of activity must be solved individually taking into account not only clinical and laboratory data, but also the reaction of the patient to the expansion of the regime, as well as his\her psychological status [1; 9] .

Upon completion of the inpatient physical rehabilitation program, patients should be fully prepared for transfer to specialized rehabilitation departments of cardiac sanatoriums or discharged home for treatment and rehabilitation (if there are any contraindications to continuing rehabilitation in the sanatorium) [6] .

Conclusions

Thus, at the inpatient stage, many aspects of rehabilitation — medical, physical, psychological and to some extent social, should be solved.

Distinctive features of the program of physical rehabilitation of MI patients at this stage at present are early activation and discharge from the hospital, as well as the use of individualized rehabilitation programs, which is especially important for patients with complicated disease.

During the stay of a patient with MI in the hospital, a number of important rehabilitation problems are solved, which determine the timing of all subsequent recovery measures and their effectiveness.

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References

1. Вакуленко Л. О., Клапчук В. В., Вакуленко Д. В. та ін. Основи реабілітації, фізичної терапії, ерготерапії / Заг. ред. Л. О. Вакуленко, В. В. Клапчука. Тернопіль : ТДМУ, 2018. 372 с.
   Vakulenko, L. O., Klapchuk, V. V., Vakulenko, D. V. (2018), *Osnovy reabilitaciji, fizychnoji terapiji, erghoterapiji* [Fundamentals of rehabilitation, physical therapy, ergotherapy]. TDMU, Ternopil, 372 p. [in Ukraine].
2. Долецкий А. А., Свет А. В. Кардиореабилитация. М. : Медицинское информационное агентство, 2016. 240 с.
   Doletsky, A. A., Svet, A. V. (2016), *Kardyoreabylytacyja* [Cardiorehabilitation]. Medical Information Agency, Moskow. 240 p. [in Russia].
3. Заболевания сердца и реабилитация / Под общей ред. М. Л. Поллока, Д. Х. Шмидта. Київ: Олімп. л-ра, 2000. 406 с.
   Pollock, M. L., Schmidt, D. H. (2000), *Zabolevanyja serdca y reabylytacyja* [Heart disease and rehabilitation]. Olympic Literature, Kyiv. 406 p. [in Ukraine].
4. Кардиореабилитация / Под ред. Г. П. Арутюнова. М. : МЕДпресс-информ, 2014. 336 с.
   Arutyunova, G. P. (2014), *Kardyoreabylytacyja* [Cardiorehabilitation]. MEDpress-inform, Moskow, 336 p. [in Russia].
5. Клинические рекомендации по кардиологии / Под ред. Ф. И. Белялова. М. : ГЭОТАР-Медиа, 2017. 288 с.
   Belyalova, F. I. (2017), *Klynycheskye rekomendacyy po kardyologhyy* [Clinical guidelines for cardiology]. GEOTAR-Media, Moskow, 288 p. [in Russia].
6. Основы кардиологии: Принципы и практика / Под ред. проф. Клива Розендорффа]. 2-е изд. Львов : Медицина світу, 2007. 1064 с.
   Rosendorf, C. (2007), *Osnovy kardyologhyy: Pryncypy y praktyka* [Cardiology Basics: Principles and Practice]. 2-nd Edition. Medicine of the World, Lviv, 1064 p. [in Ukraine].
7. Руководство по кардиологии / Под ред. В. Н. Коваленко. Київ : Морион, 2008. 1424 с.
   Kovalenko, V. N. (2008), *Rukovodstvo po kardyologhyy* [Guide to cardiology]. Morion, Kyiv, 1424 p. [in Ukraine].
8. Швед М. І., Левицька Л. В. Сучасні стратегії лікування та реабілітації хворих на інфаркт міокарда. Київ : Медкнига, 2015. 152 с.
   Shved, M. I., Levitskaya, L. V. (2015), *Suchasni strateghiji likuvannja ta reabilitaciji khvorykh na infarkt miokarda* [Modern strategies of treatment and rehabilitation of patients with myocardial infarction]. Medknig, Kyiv, 152 p. [in Ukraine].
9. Antman, E. M., Hand, M., Armstrong, P. W. et al. (2008). Focused update of the ACC/ AHA 2004 Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Group to Review New Evidence and Update the ACC/AHA 2004 Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction). *Circulation*. 117, 296-329.
10. Zhang, Y, Cao, H, Jiang, P, Tang, H. (2018). Cardiac rehabilitation in acute myocardial infarction patients after percutaneous coronary intervention: A community-based study. *Medicine (Baltimore)*. 97(8), 97-98.

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PSYCHOPROPHYLAXIS AND CORRECTION OF EMOTIONAL BURNING OUT OF ATHLETES IN THE CONDITIONS OF HIGHER EDUCATION INSTITUTION

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The article is devoted to the study of students-athletes' emotional burnout syndrome as a consequence of stressors in competitive sports. *The purpose of the study* is to prove the need for psychological prevention and correction of emotional burnout of athletes, to propose a set of psychological measures for their implementation in a higher education institution. To achieve this goal, the dynamics of the emotional burnout syndrome of students-athletes who are engaged in athletics in a higher education institution has been empirically studied. A longitudinal study was conducted, which consisted of 2 stages and lasted a year – from February 2019 till February 2020. Namely, in February 2019, a primary psychological diagnosis was conducted according to the questionnaire for the diagnosis of emotional burnout V. Boyko. And in February 2020, re-diagnosis was performed using the same method. Between these two stages, students-athletes trained intensively and took an active part in sports competitions at the local, regional and All-Ukrainian levels. Non-parametric U-Mann-Whitney test was chosen for mathematical and statistical processing of the obtained results to determine the presence of changes in mental state and differences in the indicators of emotional burnout of students-athletes between the first and second stages of the study. *The results* of a longitudinal study proved that students-athletes of Oles Honchar Dnipro National University, after a year of participation in competitions and intensive training, have signs of emotional burnout, which are in the formation phase. The most pronounced are the indicators of resistance and stress. The formation of emotional burnout of students-athletes occurs due to the experience of traumatic circumstances, self-dissatisfaction, which contributes to the inadequate selective emotional response, removal, depletion of mental and emotional resources.

The empirical study substantiates the ways and directions of providing psychological support and assistance to athletes: relieving emotional stress, regulation of emotional well-being, adequate emotional response, development of self-confidence and increasing of self-esteem. A set of psychotechnical exercises has been selected, which contains five blocks – breathing, body-oriented exercises, removal of clamps and relaxation, exercises to develop self-confidence and increase self-esteem, the development of intragroup interaction.

Key words: emotional burnout, students, athletes, institution of higher education, longitudinal research, stress, resistance, exhaustion, psychotechnical exercises.

Introduction

Currently, in Ukraine much attention is paid to the development of physical education (PE) and sports in higher educational institutions. This corresponds to the tasks of higher education institutions to train future professionals with an awareness of the values of a healthy lifestyle. The Law of Ukraine «On Higher Education», which entered into force in 2014, opened new horizons for the implementation of initiatives in the field of physical culture aimed at improving the quality of higher education. The Law emphasizes that the developed student sports, a culture of motor activity and health skills are essential components of the quality of higher education [4]. This thesis is realized in the fact that in higher education institutions (HEI) students study whom, having joined them, already have significant success in professional sports. Therefore, getting a certain profession, they continue to train and participate in sports competitions of various levels. Thus, at the Oles Honchar Dnipro National University (DNU), athletics is one of the leading sports for which two teams have been created and have existed for many years. The first team (main) includes current student-athletes. The second team includes students who did not do athletics before studying at the university, but have the desire or ability to train, or did other sports related to athletics.

Athletics is a individual-team sport. The analysis of individual-team capabilities of the Oles Honchar National Athletics Team compared to other teams of higher education institutions (non-physical education) of Dnipropetrovsk region demonstrates that athletes of the University in the individual-team competition for many years have been performing quite steadily at competitions of different levels – city, regional, All-Ukrainian and international competitions within the national team of Ukraine. Members of the athletics team of the Oles Honchar DNU repeatedly became winners and prizewinners at the Cups and Championships of Ukraine among the HEIs in Yalta, Sumy and others. The athletics team has been among the 15 best teams of Ukraine of higher education institutions of non-physical education profile for many years.

Authors in the psychology of sports emphasize that the essence of sports of any level is competition [5-7; 9-10, etc.]. Sports and sports competitions are characterized by strong and vivid emotional experiences. With no emotions, sport is impossible. Emotional experiences during the competitions are characterized by significant

saturation, the rate of change of states, and the intensity of the processes [9; 10]. Post-competitive mental states can be both sthenic, cause pleasure, euphoria, emotional uplift, self-confidence, pride in yourself and the team, the desire to train, as well as asthenic, that is, to cause depression, insecurity, disappointment, anger, envy, reluctance to train, and sometimes lead to the abandonment of sports [8].

Well-known authors in the psychology of sports, such as A.V. Rodionov [8], M.G. Samoylov [10] and others, emphasize that sport is a constant, excessive tension, which is a stressful phenomenon for athletes. The constant extremity of conditions cause significant physical and mental strain. Though, research on the effects of extreme factors on the psyche of athletes is currently insufficient; there are only a few works [6; 8; 9; 10, etc.]. However, it is known that one of the most serious consequences of stressors of any activity, including sports, is the syndrome of «emotional burnout» [1; 2; 8-10, etc.]. It is a defense mechanism in the form of a certain emotional attitude to professional activity [1; 2] Emotional burnout leads to such negative consequences as decreased efficiency, mental fatigue, deterioration of mental and physical health, decreased motivation, deformation of the system of interpersonal relationships. Some aspects of professional burnout of athletes were examined by B. White, V. Kovalchuk, B. Melnykovich, V. Mogran, V. Sitkar, R. Smith, R. Weinberg, A. Hackney, etc.

Recently, the issue of psychological training, athletes support and psychological assistance to them at various stages of sports activities has increasingly raised in the literature [3, etc.]. However, now the problem of psychological prevention and correction of emotional burnout of track and field athletes in a higher education institution, in our opinion, is insufficiently researched and uncovered.

The purpose of the article is to prove the need for psychological prevention and correction of emotional burnout of track and field athletes and to select a set of psychological measures for their implementation in higher education institutions.

The study was conducted on the basis of Oles Honchar Dnipro National University. The study involved students who are members of the university athletics team – 24 people, including 13 boys and 11 girls aged 19-21. All of them are students of different faculties: chemical; applied mathematics; mechanical-mathematical; law; economic; Ukrainian and foreign philology and art history; physics, electronics and computer systems; social sciences and international relations.

Members of the national team have the following sports qualifications: 2 students are candidates for master of sports, 5 students have the 1st adult category, 10 students have the 2nd adult category, 7 students have the 3rd adult category.

All participants agreed to participate in the study, they were interviewed about the ethics and correctness of the use of the results. The following methods were chosen for the study: theoretical analysis and generalization of scientific and methodical sources; longitudinal empirical research; methods of mathematical and statistical processing of the results obtained; analysis and interpretation of the results obtained of empirical research.

Psychodiagnostic tools were used to collect empirical data: a method of diagnosing the level of emotional burnout of V. Boyko [1]. This personal questionnaire allows us to identify indicators of such psychological phenomenon as «emotional burnout syndrome», which can be formed in humans as a result of various activities and is associated with the effect of long-term impact on the psyche of adverse stress factors. The questionnaire contains 84 statements to which the subject should express his attitude, namely, to agree or disagree. As a result of the test, we can investigate the manifestation of 3 phases of stress: «tension», «resistance» and «exhaustion». Each of these phases contains the leading symptoms of emotional burnout: experiencing traumatic circumstances; self-dissatisfaction; «caged»; anxiety and depression; inadequate selective emotional response; emotional and moral disorientation; expanding the sphere of saving emotions; reduction of professional responsibilities; emotional deficit; emotional detachment; personal detachment (depersonalization); psychosomatic and psycho-emotional disorders.

To find out the changes that have taken place in the mental state of student-athletes as a result of intensive training and participation in competitions, we conducted a long-term study consisting of 2 stages and lasted a year – from February 2019 to February 2020. Namely, in February 2019, the primary psychological diagnosis was carried out according to the questionnaire of emotional burnout V. Boyko [1]; and in February 2020, a re-diagnosis was carried out according to the same methodology. Between these two stages, track and field athletes trained intensively and took an active part in 13 sports competitions of local, regional and All-Ukrainian levels (Dnipro Championship among HEIs, February 2019; All-Ukrainian competitions dedicated to the memory of Merited Coach of Ukraine Piskunov Yu.O., March 2019, Nova Kakhovka; Regional Team Athletics Cross Country Championship, April 2019, Nikopol; «Sport day» and Open Championship of Dnipro in cross country, April 2019, Dnipro; Dnipro Championship among HEIs, May 2019, Dnipro; Dnipro Championship among the HEIs in athletic cross, October 2019, Dnipro; Team Championship of Dnipro among HEIs, October

2019, Dnipro; Dnipropetrovsk Region Athletic Cross Championship, October 2019, Novomoskovsk; Region Cup among young men 2003-2004, December 2019, Dnipro; Team Championship of the region among adults and Team Championship of the region among juniors, January 2020, Dnipro; Championship among HEIs, February 2020, Dnipro, etc.

For mathematics and statistical processing of the results, we chose a nonparametric U-Mann-Whitney criterion to determine the presence of changes in mental state and discrepancies in indicators of emotional burnout syndrome in student-athletes between the first and second stages of empirical longitudinal research.

Table 1 – Establishing discrepancies between the indicators of the components of emotional burnout syndrome of students-athletes in the 1st and 2nd stages of longitudinal research by the U-Mann-Whitney criterion

Components of emotional burnout syndrome	Stages of research		U-Manna Whitney Criterion Value and the level of significance of discrepancies
	Stage 1 (February 2019) (n = 24)	Stage 2 (February 2020) (n = 24)	
Tension phase	**25,80475**	**36,08205**	**Uemp = 254.0, p < 0.05 discrepancies significant**
1. Experiencing psycho-traumatic circumstances	6,25238	10,19473	Uemp = 386.0, p < 0.05 discrepancies significant
2. Dissatisfaction with yourself	6,72381	11,14522	Uemp = 250.0, p < 0.05 discrepancies significant
3. "Trapped in a cage"	6,31428	7,38424	Uemp = 553.0 p > 0.05 discrepancies insignificant
4. Anxiety and depression	6,51428	7,35786	Uemp = 484.0 p > 0.05 discrepancies insignificant
Phase of resistance	**25,72347**	**37,49438**	**Uemp = 264.0 p < 0.05 discrepancies significant**
1. Inadequate selective emotional response	6,57144	10,02632	Uemp = 257, p < 0.05 discrepancies significant
2. Emotional-and-moral disorientation	6,66637	8,84215	Uemp = 445.0 p > 0.05 discrepancies insignificant
3. Expanding the sphere of saving emotions	7,10472	9,39437	Uemp = 345.0 p > 0.05 discrepancies insignificant
4. Reduction	5,38094	9,23154	Uemp = 251, p < 0.05 discrepancies significant
Depletion phase	**24,97942**	**35,722**	**Uemp = 152, p < 0.01 discrepancies significant**
1. Emotional deficit	5,98574	10,23884	Uemp = 269.0 p < 0.05 discrepancies significant
2. Emotional detachment	6,42867	10,07295	Uemp = 245.0 p > 0.05 discrepancies significant
3. Depersonalization	6,61935	9,13176	Uemp = 445.0 p > 0.05 discrepancies insignificant
4. Psychosomatic and psycho-emotional disorders	5,94566	6,27845	Uemp = 645.0 p > 0.01 discrepancies insignificant
Overall emotional burnout	**76,50764**	**109,2984**	**Uemp = 121, p < 0.01 discrepancies significant**

Results

After the empirical study, we summarized the results and presented them in Table 1.

The analysis of the data obtained proves that during the year of intensive training and participation in sports competitions there is an emotional burnout of students-athletes in track and field athletics, namely in all phases of emotional burnout syndrome we see an increase in indicators. Tension rates increased significantly (Uemp =254.0; p<0.05), and the symptoms that increased significantly in this phase were the experiences of psycho-traumatic circumstances (U emp = 386.0; p<0.05) and self-dissatisfaction (Uemp= 250.0; p<0.05).

We see that the indicators at the stage of resistance increased significantly (Uemp = 264.0; p<0.05), namely, significantly increased the rate of inadequate selective emotional response (Uemp = 257.0; p<0.05) and reduction (Uemp= 251.0; p>0.05).

In the depletion phase, there were also statistically significant changes in the direction of increasing indicators

(Uemp = 152.0; p<0.01), namely due to the increase of emotional deficits indicators (Uemp = 269.0; p<0.05), and emotional detachment (Uemp= 245.0; p<0.05).

Overall emotional burnout also showed a significant increase (U imp =121.0; p<0.01).

The results obtained are indicative in term of the fact that in the first stage of empirical research all phases of emotional stress and their symptoms, in general, have not yet been formed. In the second stage, after a year of intense training and competition, both the phases and some of their symptoms were at the stage of formation.

Thus, as a result of the longitudinal study, it was found that students-athletes of Oles Honchar DNU, who train and participate in sports competitions for the honor of the University, after a year of participation in competitions, have signs of emotional burnout, which are in the formation phase. All phases have approximately the same level of forming, but resistance rate (37.49 points) and tension rate (36.08 points) are dominant.

We can also say that the formation of emotional burnout in students, track and field athletes, at the tension stage is due to the experience of traumatic circumstances, dissatisfaction. This probably contributes to the emergence of inadequate selective emotional response, detachment and depletion of mental and emotional resources of athletes. We can explain this by the increased chronic emotional tension, responsibility and feelings for the final joint result during sports competitions

Consequently, the results of the empirical study suggest ways and directions of providing psychological support and assistance to track and field athletes. Namely, the removal of emotional tension, regulation of emotional well-being, adequate emotional response, increase of self-esteem.

Therefore, we have selected a complex of psycho-technical exercises aimed at psychological prevention and correction of emotional tension and harmonization of psychophysical functions, development of self-confidence, increase of self-esteem, development of intragroup interaction of student-athletes. Such a program of psychological assistance to track and field athletes contains five blocks – respiratory, bodily-oriented exercises, removal of clamps and relaxation, exercises on the development of self-confidence and increased self-esteem, exercises to develop intragroup interaction. The set of selected exercises of psychoprophylaxis and correction of emotional burnout of students the track and field athletes is presented in Table 2.

Currently, the selected set of exercises is being implemented in the Palace of Sports of Oles Honchar Dnipro National University with the participation of practical psychologists of the social and psychological service of the university. Classes are held in the format of psychological training once a week for 2 hours.

Table 2 – Complex of exercises for psychological prevention and correction of emotional burnout of students-athletes of higher education institution

1. Block: Relieving emotional and muscular tension before and after stress	Breathing relaxation exercises: "Upper (clavicular) breathing"; "Average (pectoral) breathing"; "Lower (abdominal) breathing"; "Deep (complete) breathing"; "Breathing on a square" and others.
	Breathing exercises with a tonic effect: "Mobilizing breathing"; "Ha-breathing"; "Lock"; "Voice discharge" and others.
	Breathing exercises with a calming effect: "Find your rhythm"; "Soothing breathing"; "Light breathing" and others.
2. Block: removing the clamps and relaxation	Relaxation exercises: "The Pendulum of Relaxation"; "Inner gaze"; "Tension-relaxation"; "Compression in a circle" and others.
3. Block: harmonization of psychophysical functions	Bodily-oriented exercises: "Wave"; "Polyphony"; "Pendulum" and others.
4. Block: increasing self-esteem	Self-confidence development and self-esteem improvement exercises: "Pleasant moments"; "And you are great"; "My portrait in the rays of the sun"; "Break into a circle"; "Confident refusal"; "Open your fist"; "I am the master", "Power Aikido"; "Psychological aikido".
5. Block: development of intragroup interaction	Interpersonal interaction exercises: "Synchronization"; "Polyphony", "Row", "Stretching", "Mine", "Blind and Guide" and others.

Discussion

The fact that sports and sports competitions are an extreme activity and have a stressful effect on the psyche of athletes has already been proven by some authors in the field of sports psychology [8; 9; 10, etc.]. There are also some attempts to investigate empirically the manifestation of emotional burnout syndrome, in particular in female judokas in the stage of preparation for competitions [6]. I this study, the authors compare the features of the manifestation of emotional burnout

syndrome in female judokas of national and world class and describe these differences. The authors prove that the dynamics of emotional burnout are observed in athletes of world class, and in athletes of national level, emotional burnout does not occur. This is explained by the greater responsibility of world class athletes for sports results and a deeper understanding and awareness of the importance of competitive activities.

We have not discovered the longitude studies of emotional burnout of students the track and field athletes in higher education institutions so far. The results of our study prove the presence of the dynamics of emotional burnout of student-athletes during the year as a result of intensive training and participation in competitions. It is found out that during one year there is a formation of all phases of emotional burnout, especially phases of depletion and resistance. It also found symptoms of emotional burnout that are most sensitive to the stress-related effects of sports burden on the mental state of student-athletes, these are such as: experiencing psycho-traumatic circumstances, self-dissatisfaction, inadequate selective emotional response, detachment and exhaustion of mental and emotional resources of athletes. Therefore, according to such results, the ways and directions of psychoprophylaxis and correction of symptoms of emotional burnout of student-athletes are determined: removal of emotional tension, regulation of emotional well-being, adequate emotional response, increase of self-esteem and development of intragroup interaction.

The selected program of psychological assistance to track and field athletes is consistent with the existing developments of psychological support and training of qualified athletes [3], but in our case, it is substantively selected for the symptoms of emotional burnout of athletes engaged in professional sports in the Oles Honchar DNU.

Conclusions

The dynamics of emotional burnout syndrome in students-athletes who are engaged in track and field athletics in higher education institution has been empirically studied. A longitudinal study conducted, was consisted of 2 stages and lasted a year – from February 2019 to February 2020.

It is empirically proved that students-athletes of Oles Honchar DNU after a year of participation in competitions and intensive trainings have signs of emotional burnout in the formation phase. The most pronounced are the indicators of resistance and stress. The formation of emotional burnout in students the track and field athletes ccurs due to the experience of psychotraumatic circumstances, dissatisfaction with themselves, which probably contributes to the inadequate selective emotional response, emotional detachment, depletion of mental and emotional resources. The empirical study substantiated the ways and directions of psychological prevention and correction of emotional burnout of track and field athletes: removal of emotional tension, regulation of emotional well-being, adequate emotional response, development of self-confidence, increase of self-esteem, development of intragroup interaction.

The set of psychotechnical exercises was selected, which contains five blocks – breathing, bodily-oriented exercises, removal of clamps and relaxation, exercises on the development of self-confidence and increase of self-esteem, the development of intragroup interaction.

The prospect of further research may be to check the effectiveness of the implementation of a complex of psychotechnical exercises on the prevention and correction of emotional burnout of track and field athletes, as well as expanding the sample of athletes researched by involving students-athletes who are professionally engaged in other sports in Oles Honchar Dnipro National University.

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

References

1. Бойко В. В. Энергия эмоций в общении: взгляд на себя и других. М. : Филинъ, 1996. 472 с. – https://psytests.org/book/boyko-energy-of-emotions.html
   Boyko, V. V. (1996), *Energiya emoziy v obshchenii: vzghlyad na sebya i druhgih.* [Energy of emotions in communication: a look at yourself and others]. Filin, Moskow, 472 p. – https://psytests.org/book/boyko-energy-of-emotions.html [in Russia].
2. Водопьянова Н. Е., Старченкова Е. С. Синдром выгорания: диагностика и профилактика. СПб. : Питер, 2008. 336 с.
   Vodopyanova, N. E., Starchenkova, E. S. (2008), *Sindrom vyhgoraniya: diahgnostika i profilaktika* [Burnout Syndrome: Diagnosis and Prevention]. Piter, St. Peterburg, 336 p. [in Russia].
3. Гринь О. Р. Психологічне забезпечення та супровід підготовки кваліфікованих спортсменів : навч. посібник. Київ : Олімп. л-ра, 2014. 233 с.
   Gryn, O. R. (2014), *Psihologichne zabezpechenia ta suprovid pidgotovki kvalifikovanih sportsmeniv* [Psychological of providing and accompaniment of preparation of skilled sportsmen]. Olimpiyska literature, Kyiv, 233 p. [in Ukraine].
4. Закон України «Про вищу освіту» № 1556-VII, ухвалений Верховною Радою України 1 липня 2014 року. – https://zakon.rada.gov.ua/laws/show/1556-18
   (Jul 1, 2014), *Zakon Ukrainy «Pro vishchu osvitu»,* № 1556-VII, The 1556-VII [Low of Ukraine «About higher education»]. Verkhovna Rada of Ukraine [in Ukraine]. – https://zakon.rada.gov.ua/laws/show/1556-18

5. Ильин Е. П. Психология спорта. СПб. : Питер, 2008. 352 с.
Ilyin, E. P. (2008), *Psiholohgiya sporta* [Sports Psychology]. Piter, St. Petersburg, 352 p. [in Russia].
6. Курилюк С., Матійчук І. Прояви синдрому емоційного вигорання дзюдоїсток в передзмагальний період. «Фізична культура, спорт та здоров'я»: XV Міжнародна науково-практична конференція. Харків, 2015. С. 50–51.
Kuryliuk, S., Matiychuk, I. (2015), "Proyavi sindromu emosiynogo vihgoraniya dzudoistok v predzmahgalniy period" [Manifestations of the syndrome of emotional burnout of judokas in the pre-competition period]. *"Physical culture, sports and health": XV international scientific-practical conference.* Kharkiv, pp. 50–51. [in Ukraine].
7. Родионов А. В., Сопов В. Ф., Непопалов В. Н. Психологические модели в управлении комплексной подготовкой спортсменов. *Спортивний психолог.* 2007. № 1. С. 6-13.
Podionov, A. V., Sopov, V. F., Nepopalov, V. N. (2007), "Psihologhicheskie modeli v upravlenii kompleksnoi podhgotovkoi sportsmenov" [Psychological models in a management complex preparation of sportsmen]. *The Sporting psychologist*, No 1, pp. 6–13. [in Russia].
8. Родионов А. В. Влияние психологических факторов на спортивный результат. М. : Физкультура и Спорт, 1996. 112 с.
Podionov, A. V. (1996), *Vliyanie psichopogicheskih faktorov na sportivnii rezultat*. [Influence of psychological factors on a sporting result]. Physical Education and Sport, Moscow, 112 p. [in Russia].
9. Самойлов М. Г. Особливості психологічної підготовки спортсменів до діяльності в екстремальних умовах. *Проблеми екстремальної та кризової психології.* Харків : УЦЗУ, 2008. Вип. 5. С. 171–177.
Samoilov, M. G. (2008), "Osoblivosti psihologichnoi psdgotovki sportsmeniv do diyalnosti v ekstremalnih umovah" [Features of psychological preparation of sportsmen are to activity in extreme terms] *Problems of extreme and crisis psychology,* Issue 5, pp. 171–177. [in Ukraine].
10. Самойлов М. Г., Перелигіна Л. А. Заняття спортом як екстремальний вид діяльності. Проблеми екстремальної та кризової психології. Харків : УЦЗУ, 2007. Вип. 2. С. 181–187.
Samoilov, M. G., Perelygina, L. A. (2007), "Zanyttiya sportom yik tkstremalnii vid diyalnosti" [Sports as an extreme kind of diactivity] *Problems of extreme and crisis psychology.* Issue 2, pp. 181–187. [in Ukraine].

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