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Effectiveness of the use of aquaaerobics in the process of sectional classes in swimming students 18–19 years

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Purpose: *evaluate the effectiveness of the use of aqua aerobics in the sectional swimming lessons program for students aged 18–19 years to improve their overall physical condition.*

Material & Methods: *the study involved students aged 18–19 years (n=46). Evaluation of the effectiveness of aqua aerobics in the process of sectional swimming lessons was carried out on the basis of the results of a comparative analysis of the characteristics of the dynamics of the functional state of the cardiovascular system, external respiration system, the level of functional, general and special physical preparedness of students of the control and experimental groups during the school year.*

Results: *it is shown that the introduction of aqua aerobics into the sectional swimming lessons program for students aged 18–19 years has contributed to a significant improvement in the functional status of the cardiorespiratory system of their body, the level of functional and special physical fitness. At the end of the school year, students of the experimental group were characterized by significantly higher, compared with the control group, the rate of improvement of all indicators of physical condition by 5–14%.*

Conclusions: *the obtained results testified to the high efficiency of using aqua aerobics in the sectional swimming lessons program for students aged 18–19 years in a higher education institution setting.*

Keywords: *functional state, functional preparedness, special physical preparedness, students aged 18–19 years, sectional classes, swimming, aqua aerobics.*

Introduction

Modern living conditions are characterized by a significant complication of the socio-economic and environmental situation in society, reflected in a significant deterioration in the health and physical preparedness of various segments of the population, in particular, students [1; 8; 9; 12; 21].

In connection with the above, today the role of physical culture and sports in increasing the general physical condition of students and forming an adequate form of adaptation to adverse environmental factors significantly increases. At the same time, the last controversial reforms in the system of physical education of students of higher educational institutions, which envisage a significant reduction in the time of compulsory physical education classes and reorientation solely on optional sectional classes in various sports, require the development of new programs of these classes in accordance with modern requirements and motivational student characteristics.

Studies of many experts have proved the high efficiency of swimming lessons in improving the general physical condition and level of health of various groups of the population, in particular, students [5; 13; 18; 22; 23]. At the same time, changes in the system of physical education of students need to improve sectional swimming lessons, in particular, through the use of the most accessible, emotional and popular types of physical exercises, which include aqua aerobics [2; 4; 10; 24; 26].

An analysis of the scientific and methodological literature on this issue allowed us to state a certain limitation of experimental studies in this direction, which became the prerequisites for conducting this research.

Purpose of the study: evaluate the effectiveness of the use of aqua aerobics in the sectional swimming lessons program for students aged 18–19 years to improve their overall physical condition.

Material and Methods of the research

The study involved 46 second-year students of Zaporizhzhya National University, which were divided into control (n=24) and experimental (n=22) groups. The students of the control group were engaged in the traditional program of sectional swimming lessons, and the students of the experimental group - in the program of sectional swimming lessons with the inclusion of aqua aerobics. Physical exercises from aqua aerobics were used as part of general physical training to improve basic physical qualities that are most important for the chosen sport (swimming) (strength, endurance, flexibility, coordination). When planning each aqua aerobics class, the opinion of leading experts in the field of physical education and sport was taken into account [11; 12; 19] regarding the fact that in one class it is possible to use funds aimed at developing no more than two physical qualities. It was suggested that the following combinations be used in one session: coordination and strength exercises; strength and flexibility exercises; exercises to develop solely endurance, strength, speed-strength abilities..

According to the data presented in the framework of the experimental program proposed by us, in the first and second

classes of 3, 6 and 9 weeks, exercises on the development of general endurance alone were used; in the first and second classes of 4 and 10 weeks, exercises were used to develop speed-strength abilities exclusively; in both classes, 1, 2 and 8 weeks – for the development of strength and flexibility, and within 5, 7 and 11 weeks – for the development of strength and coordination.

The assessment of the effectiveness of the use of aqua aerobics in the course of sectional swimming exercises was conducted on the basis of comparative analysis of the features of the dynamics of the functional state of the cardiovascular system, the system of external respiration, the level of functional, general and special physical preparedness of students of control and experimental groups during the school year.

The main features of the experimental program consisted in using within the program elements of aqua aerobics, which were selected for the corresponding development of basic physical qualities (strength, speed, agility, coordination, strength, speed-strength endurance, etc.). It should be noted that, similarly to the traditional program of ZNU, in the framework of the experimental program in the process of sectional swimming lessons, the two most accessible swimming styles (crawl and breaststroke) were used, and young people with an initial level of physical condition not lower than the average were introduced to the classes.

Testing was conducted at the beginning (September) and at the end (June) of the school year.

To assess the level of the functional state of the cardiovascular system (LFScvs, points) and the respiratory system (LFSrs, points), we used traditional physiological methods and the computer program "SSHS-integral" [16]. According to the examination algorithm, the tested person is measured in a state of relative rest, the heart rate, systolic and diastolic blood pressure, lung capacity, breathing time during inhalation and exhalation are recorded, and the length and body weight values are determined. After entering the values of these indicators into the active window of the "SSHS-integral" program, the values of the integral indicators (LFScvs and LFSrs) are automatically calculated with their division into functional levels: "low", "below average", "average", "above average", "high".

To assess the level of functional preparedness in the study, a computer program for rapid assessment of the level of general functional preparedness "SSHS" was used. The examination algorithm in the framework of this program provided for the implementation of the standard submaximal veloergometric test PWC_{170}, as well as measuring the length (cm) and weight (kg) of the body being examined. The program carried out an automatic calculation of the integral index – the level of functional preparedness of the organism (LFP, points) with the distribution into functional classes "low", "below average", "average", "above average", "high" [16].

In order to assess the level of special physical fitness, the students tested the special high-speed students' capabilities (they determined the time to overcome the distance of 25 m in the free style, the reference time to overcome the distance of 50 m and the average time on the interval of 50 m in overcoming the distance of 400 m free style), special stamina for adapted to the aqueous medium by the Cooper test, the special flexibility of the methods of A. D. Vikulov [3], V. Platonov [19] and Yu. V. Menghin [17] and special technical preparation according to the method of L. P. Makarenko [14]. On the basis of the obtained data using the modified SCOLIPE scale, the level of special physical preparedness of students was calculated (SPPz, points).

Statistical processing of the results of the study was carried out using the packages of standard programs "STATISTICA 7.0" and EXEL with the calculation of the following indicators: arithmetic mean ($\bar{X}$), mean deviation (σ), error arithmetic mean (S).

Results of the research

The results of the ascertaining examination of students of the control and experimental groups at the beginning of the school year showed that there were no significant differences in the values of all the indicators of their overall physical condition used in the study (Table 1).

It was shown that the level of the functional state of the cardiovascular system (70,74±2,19 points in the control group and 73,16±2,26 points in the experimental group) and the respiratory system (respectively 69,21±0,80 points) and 71,41±1,16 points) for the representatives of both groups answered the functional class "above average", the level of functional readi-

Table 1

Indicators of the physical condition of students 18–19 years of control and experimental groups at the beginning of the experiment ($\bar{X}$±S)

Indicators	Control group (n=24)		Experimental group (n=22)	
	At the beginning	At the end	At the beginning	At the end
LFScvs, points	70,74±2,19 above average	76,93±2,38* above average	73,16±2,26 above average	83,53±1,8**•• above average
LFSrs, points	69,21±0,80 above average	71,23±0,84 above average	71,41±1,16 above average	86,55±1,4***••• above average
LFP, points	57,19±3,45 average	62,71±3,25 average	58,59±3,17 average	72,27±3,08***••• above average
SPPz, points	47,81±1,92 below average	52,43±1,79* average	48,25±1,84 below average	59,61±1,78***•• average

Remark. ** – p<0,05; ** – p<0,01; *** – p<0,001 compared with the beginning of the study; •• – p<0,01; ••• – p<0,001 compared with the control group.*

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ness (respectively 57,19±3,45 points and 58,59±3,17 points) were considered as average, and special physical preparedness (47,81±1,92 points and 48,25±1,84 points) as below average.

The data presented testified to the relative homogeneity of students from the control and experimental groups at the beginning of the study, which is of great importance for further objective interpretation of the research results.

The results of the final testing allowed us to state the high efficiency of our proposed experimental sectional swimming lesson program using aqua aerobics.

According to the results of Table 1, at the end of the school year, the students of the control group were characterized by a significant improvement only in the level of the functional state of the cardiovascular system (76,93±2,38 points) and the level of their special physical preparedness (up to 52,43±1,79 points), which was already considered as average.

On the contrary, among the students of the experimental group there was a significant improvement in all indicators, namely, the level of the functional state of the cardiovascular system to 83,53±1,8 points, the respiratory system 86,55±1,4 points, the level of functional readiness to 72,27±3,08 points and the functional class are above the average, and the level of special physical preparedness to 59,61±1,78 points.

It should also be noted that the values of all the studied parameters of the students of the experimental group at the end of the study were significantly better compared with the representatives of the control group.

A weighty confirmation of the effectiveness of the experimental sectional swimming lesson program was also the results of a comparative analysis of the values of relative changes in the indices of the general physical condition of students from the control and experimental groups at the end of the study (Figure 1).

It was shown that at the end of the study for the students of the experimental group, the rate of improvement of the functional state of the cardiovascular system (by 5,4%), the system of external respiration (by 18,3%), the level of functional preparedness (by 13,6%) and level of special physical preparedness (by 13,8%).

Thus, the obtained results testified to the higher efficiency of the experimental program of sectional swimming lessons for students 18–19 years in the context of the establishment of higher education.

Conclusions / Discussion

According to the results of the analysis of the problem of optimizing the general physical condition of students in the course of sectional swimming exercises in the conditions of the establishment of higher education, the need for further improvement of the program of these classes through the introduction of means of accessible and popular among the student youth of types of physical exercises, coincides with the data of studies of other authors [6; 7; 15; 20; 25].

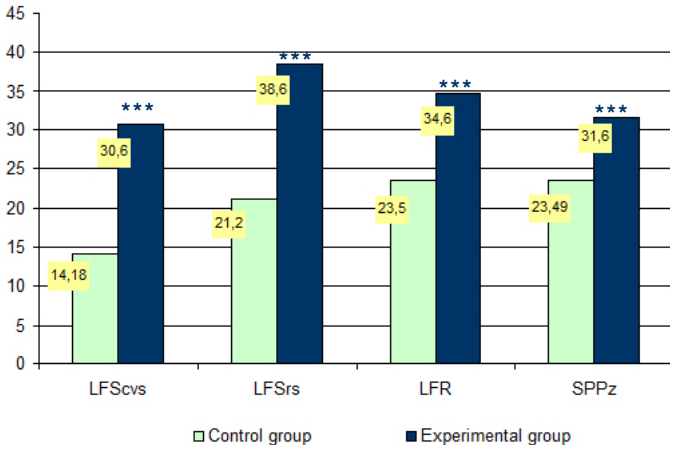

Figure 1. Values of the relative changes in the physical condition of students of the control and experimental groups at the end of the study (in% to baseline values): *LFScvs – level of the functional state of the cardiovascular system; LFSrs – the level of the functional state of the external respiration system; LFP – the level of functional preparedness; SPPz – general level of special physical preparedness; *** – p<0,001 001 compared with the control group.*

It should be noted that for the first time, integral quantitative indicators of the level of functional and special physical preparedness, the functional state of the cardiovascular system and the respiratory system, which include the main structural components, were used to determine and assess the general level of the physical condition of students. These indicators can be considered as objective criteria for evaluating the effectiveness of the sectional classes program for university students.

The results presented showed a pronounced optimization of the functional state of the cardiorespiratory system of the examined students, an improvement in their functional and special physical preparedness, and confirmed the high effectiveness of the proposed sectional swimming program using aqua aerobics.

Prospects for further research in this direction are to further study the dynamics of the general level of the physical condition of students in the process of sectional swimming lessons in a higher education institution.

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