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Improving the physical qualities of volleyball players using aerobics at the stage of specialized basic training

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Purpose: *theoretically develop and experimentally substantiate aerobic complexes to improve the physical qualities of volleyball players at the stage of specialized basic training.*
Material & Methods: *24 athletes of the main medical group (16–18 years old, girls and boys) took part in the experimental part of the study. 2 groups were formed, control and experimental with 12 athletes each. A set of scientific research methods was used: analysis of special scientific and methodological literature, pedagogical observations, pedagogical experiment, pedagogical testing, methods of mathematical statistics.*
Results: *studied the current state of the training process and existing methods for improving the physical qualities of volleyball players at the stage of specialized basic training. Developed differentiated aerobic complexes for the development and improvement of the leading physical qualities of volleyball players. The effectiveness of using aerobics in the process of improving the physical qualities of volleyball players at the stage of specialized basic training has been confirmed.*
Conclusions: *an increase in the level of development of the basic physical qualities of athletes was obtained. Indicators of coordination abilities increased by (7%), speed-strength (3,9–1,79%), strength (4,5%, 3,1% and 2,8%) and speed qualities (4,5–3,7%) and, as a result, an increase in endurance indicators (6,2%) and flexibility (6,5%).*

Keywords: *volleyball, physical qualities, aerobics, stage of specialized basic training.*

Introduction

Volleyball is characterized by intensification of competitive activity, manifested in an increase in the density of game actions, a decrease in the execution time of both technical techniques in general and their individual phases, in the speed and swiftness of tactical interactions [2; 5; 7 etc.]. All this is based on a high level of physical fitness of players [8; 9; 10; 16], which is based on the ability of each volleyball player to display opportunities in the process of competitive activity [2; 3; 17].

In the process of competition, the maximum voltages and durations of the load affect the body of volleyball players, they require the utmost mobilization of the players' capabilities [3, 4, 11; 15 etc.]. Volleyball teams more and more need players who have not only high growth, but also high speed, endurance, dexterity, good coordination and can navigate in space, with increased functionality and special abilities based on them (high-speed, power and high-speed power) , stability of receptions and actions [2; 6; 11; 20 etc.].

The evolution of the rules of the game of volleyball has led to changes in the system of training players [3; 4; 18 etc.]. With a relatively constant arsenal of techniques over the course of a century, the existing system of technical and tactical actions has undergone significant modernization, which has led to the need for changes in the physical fitness of volleyball players [6; 13; 21].

Changes in the competitive activity of volleyball players should undoubtedly lead to changes in the methodology of training players in modern conditions, including using non-traditional means of developing the physical qualities of players.

Aerobics classes are an effective means of a comprehensive effect on the body of athletes [1], they help strengthen all muscle groups, develop joint mobility, elasticity of ligaments and tendons, increase the level of development of aerobic capabilities, strengthen the cardiovascular and respiratory systems, improve coordination, enrich the motor arsenal [1; 7; 14 etc.]. Diverse, logically structured, science-based programs allow aerobics to maintain a high rating among other types of non-traditional means, helping to increase physical fitness and improve motor skills of volleyball players. The problem of improving the physical fitness of volleyball players is devoted to a large number of basic research in sports [8; 13; 19 etc.], However, aerobics – such studies are fragmented. Therefore, the problem of developing complexes for aerobics to improve the physical qualities of volleyball players is relevant.

Purpose of the study: theoretically develop and experimentally substantiate aerobic complexes to improve the physical qualities of volleyball players at the stage of specialized basic training.

Objectives of the study:

1. To study the current state of the training process and existing methods for improving the physical qualities of volleyball players at the stage of specialized basic training.
2. Theoretically develop and experimentally verify the effectiveness of using aerobics in the process of improving the physical qualities of volleyball players.

Material and Methods of the research

The study was conducted on the basis of the National Law School named after Yaroslav Mudryi (Kharkov) in the conditions of training sessions during the one-year training cycle of volleyball players from September 2018 to September 2019. 2 groups were formed – control and experimental with 12 athletes each. The contingent that took part in the study was of one age group, first and second year students of the

main medical group (17–19 years old, girls and boys). All players had the first sports rank, experience in participating in student competitions, the University Spartakiad and amateur volleyball teams. We studied the training regime, planning documents for the training process of teams. Based on the data of the scientific and methodological literature, 9 tests were selected, most of which are traditionally used in the practice of scientific research for a comprehensive assessment of the level of development of physical preparedness of volleyball players. Indicators were measured at the beginning and at the end of the annual preparation macrocycle [8; 10].

To solve the tasks and obtain objective data, we used a set of scientific research methods: analysis of special scientific and methodological literature, pedagogical observations, pedagogical experiment, pedagogical testing, methods of mathematical statistics [12].

Results of the research

The pedagogical experiment was carried out in specialized basic training groups during the year. Classes were held four times a week for a duration of 120 minutes. The control group was engaged in a curriculum for sports schools and clubs [4], and aerobics complexes were introduced in the experimental group as a means of increasing and improving the physical qualities of volleyball players. The volume and intensity of training in the groups were the same, but in the experimental group aerobics complexes were used, which allow to purposefully increase the level of physical qualities of athletes. The complexes are based on taking into account the specifics of the motor activity of this sport [1; 3; 8], sensitive periods of development of physical qualities and contribute to comprehensive physical development, comprehensive physical fitness, laying a specific functional base for effective training in movement technique and further improvement of athletes.

We have put together differentiated aerobic complexes for the development and improvement of the physical qualities of volleyball players:

- sets of exercises of classical aerobics – contributed to the development of the general endurance of players;
- step aerobics complexes – aimed at improving special (power and hopping) endurance and speed-power qualities;
- dance aerobics – contributed to the development of coordination of movements;
- power aerobics;
- TAI-BO, the direction of aerobics using boxing exercises, kick-boxing and various martial arts;
- Stretching was used to increase the flexibility of muscle groups, ligaments and joints.

The content of the complexes was formed from the exercises described in the scientific and methodological literature, which are used in aerobics practice. In the training process the following methods were used: interval training method, combined, repetitive, holistic training method, right and in parts [1; 8]. The ratio of aerobic complexes used in training volleyball players at the stage of specialized basic training is shown in Figure 1.

In the experimental group, step aerobics, power aerobics and stretching were used, in addition, with the goal of more intensive training of the cardiovascular system, muscle strength, coordination of movements, providing the greatest load on the muscles of the hands, shoulder girdle, back, improving the reaction rate, reducing unnecessary emotionality, mental tension for volleyball players, we recommended Tai-Bo complexes using movements from different types of martial arts. For volleyball players, dance aerobics was used, which allows improving the state of the cardiovascular system, improving endurance and flexibility of muscle groups, coordinating movements using the isolated work of various parts of the body, develops the ability to maintain balance, and also provides emotional coloring for the session. In the classes, regardless of gender, power equipment was used (fixed and adjustable encumbrances for arms and legs, tubular and tape shock absorbers, aerobics rods, dumbbell balls, gymnastic sticks for strength fitness training), as well as additional equipment – step platforms , allows you to develop coordination, as well as vary the level of load, changing the height of the platform.

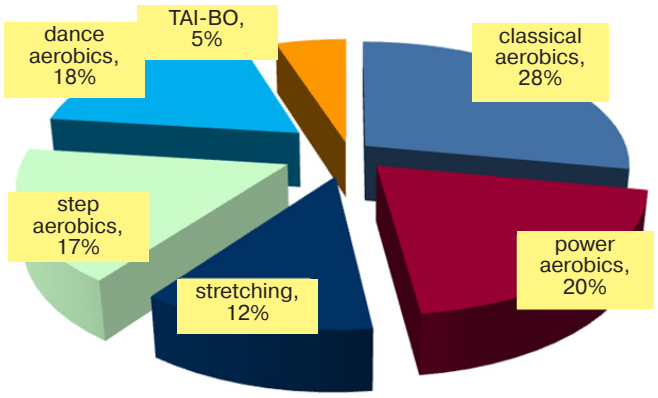

Fig. 1. Ratio of aerobic complexes in the experimental group in the annual training cycle

Before and after the experiment, the volleyball players of both groups were examined according to a unified methodology (Table 1).

As a result of the use of aerobic complexes, more substantial gains of the studied parameters were obtained. So, in the experimental group, the strength indicators statistically significantly increased, the increase is 6,7%, 3,7% and 4,0% ($p<0,05$) relative to the control group, where 4,5% ($p<0,001$), 2,8% and 3,1%, respectively ($p<0,05$). Speed-strength abilities increased by 3.9% and 1,79% ($p<0,05$), relative to the control group, where 3,5% ($p<0,01$) and 1,6% increase ($p<0,001$) . Flexibility increased by 6,5%, respectively, of the control group, where this indicator was 5.2% ($p<0,01$). Performance abilities improved by 4,5% ($p<0,05$) and 3,7% ($p<0,001$), relative to the control group, where the increase is 4,2% ($p<0,05$). and 3,07% ($p<0,001$), and endurance increased by 6.2% in the experimental group, compared with the control – 4,7% ($p<0,001$).

It should be noted that in the main group there was an increase in the indices of coordination abilities by 7,0%, relative to the control group – 5,2% ($p<0.05$).

Thus, the use of differentiated aerobic complexes developed by us is an effective means of developing and improving the physical qualities of volleyball players at the stage of specialized basic training, and creates a functional basis for the growth of special technical preparedness in long-term training of volleyball players.

Conclusions / Discussion

Theoretically developed and experimentally justified aerobic complexes as a means of increasing and improving

Table 1

Indicators of the level of development of the physical qualities of volleyball players before and after the experiment

No. i/o	Indicators	Experimental group (n=12)				Control group (n=12)			
		BE ($\bar{X}\pm\sigma$)*	AE ($\bar{X}\pm\sigma$)	%	t; p	BE ($\bar{X}\pm\sigma$)	AE ($\bar{X}\pm\sigma$)	%	t; p
	Coordination abilities								
1.	Shuttle running 4x9 (s)*	9,66±2,5	8,98±2,2	7,0	0,68<0,05	9,62±2,1	9,05±1,9	5,2	0,57; <0,05
	Strength abilities								
2.	Flexion and extension of the arms in the supine position (number of times)	47,25±1,9	50,67±1,8	6,7	3,42<0,05	47,63±1,9	49,88±1,9	4,5	2,25; <0,01
3.	Throwing a stuffed ball 1 kg behind the head with two hands (m) - sitting - standing	 9,31±1,7 13,55±1,9	 9,67±1,5 14,12±1,8	 3,7 4,0	 0,36<0,05 0,57<0,05	 9,01±1,4 10,25±1,9	 9,27±1,3 10,58±1,8	 2,8 3,1	 0,26; <0,05 0,33; <0,05
	Speed abilities								
4.	Running 30m (s)	4,87±1,5	4,66±1,3	4,5	0,21<0,05	4,96±1,5	4,76±1,2	4,2	0,2; <0,05
5.	Running 92 m with a change in direction (s)	25,75±1,9	24,83±1,8	3,7	0,92<0,001	25,03±2,0	24,28±1,9	3,08	0,75; >0,001
	Speed-strength r qualities								
6.	Long jump from place (m)	246,18±1,9	256,26±1,7	3,9	10,08<0,05	247,21±1,5	256,22±1,4	3,5	9,01; <0,01
7.	Jump up from place (m)	71,75±1,8	73,05±1,5	1,79	1,31<0,05	72,15±1,5	73,35±1,5	1,6	1,2; <0,001
	Flexibility								
8.	Torso forward from sitting position (cm)	12,8±0,7	13,7±0,5	6,5	0,9<0,01	12,06±0,5	12,73±0,5	5,2	0,67; >0,01
	Endurance								
9.	Running 3000 meters (s)	14,32±1,5	13,43±1,2	6,2	0,89<0,001	14,55±1,7	13,89±1,5	4,7	0,66; <0,001

Remark: *BE – initial data (before the experiment); AE – final data (after the experiment) (cm) – centimeters; (s) – seconds; (m) – meter; (Number of times) – the number of times.*

the physical qualities of volleyball players at the stage of specialized basic training. Differentiated complexes contribute to the improvement of basic physical qualities, comprehensively affecting the body of athletes, providing a more significant increase in indicators: coordination abilities (7%), speed-strength (3,9–1,79%), strength (4,5%, 3,1% and 2,8%) and speed qualities (4,5-3,7%) and, as a result, indicators of endurance (6,2%) and flexibility (6.5%).

Prospects for further research: it is planned to develop aerobic complexes not only with the deduction of gender differences, but also taking into account the game role of athletes.

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