Cardiaspirator Expenditures on the Conditions of Traditional and Experimental Options of Annual Sports Training in Volleyball Players and Speed Loads

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Annotation: To study the possibilities of reducing cardiorespiratory costs of jumping and speed activity in volleyball players using traditional and experimental options of the annual cycle of sports training.

Key Words: volleyball players, jump endurance, speed activity, pulse value, loads, experiment, preparation stages, CG, EG

Introduction.

One of the distinguishing features of modern volleyball is the performance of an extremely large volume of multidirectional speed-strength loads not only during one training session or competitive game, but also during the entire year-long period of sports training, and especially during competitive cycles. Specialists have established that such loads, which are saturated with a huge number of jumps, high-speed movements, turns, rotations and falls to receive the ball, lead to a limiting increase in heart rate and breathing rhythm, accompanied by motion sickness, loss of balance and movement discoordination [1,2,3,5]. Based on this, it can be assumed that for the effective development, for example, of jumping and speed-strength qualities in volleyball, it is necessary to know their functional value when applying the appropriate exercises at specific stages of the annual cycle of sports training.

Materials and methods of research conducted at various stages of the 11-month experiment were involved in the volleyball players of the Orient club team (Tashkent) as a control group (CG), which trained according to the program of the traditional version of the annual cycle of sports training, and the volleyball players of the SKUF team of the Uzbek State University of Physical Culture and Sports (Chirchik), who participated in the experiment as an experimental group (EG).

In the experimental group during the experiment, daily in the morning during “exercises”, during each pre-training and pre-game warm-up, as well as at the end of loads, the following were used: serial jumping exercises with imitation of diverse attacking blows from different zones and starting positions, jumps with imitation of blocking, power serving and passing the ball, jumping without and with weight; shuttle-running exercises with maximum speed with imitations of receiving the ball from below with two hands, receiving the ball in the fall with a roll on the back and on the chest in the directions: 6-1-6-5-6-4-6-3-6-2- 6 and in the opposite direction three times; 6x6 m.; 9-3-6-3-9 m; "Yolochka-92 m.".

The following methods were used in the research: determination of jumping endurance according to the data of the maximum number of jumps with two hands touching the marker-sensor installed at a height of 43 cm from outstretched arms using a sensor-computer measuring device (patent No. FAP 01422); determination of speed activity according to the shuttle running test "Yolochka – 92 m". The determination of the cardiorespiratory cost of test jumping and speed loads was carried out according to the heart rate (HR), which was recorded using the M: Band 2 device (Foxconn, China) and by the respiratory rate (RR).

Note: the test "Yolochka- 92 m" is carried out as follows: on one half of the volleyball court along the side lines, 6 stuffed balls are installed every 3 meters and in the center of the front line there is another stuffed ball denoting "Start"; the subject, putting his hand on the ball, is preparing to start the movement; on a signal, the test begins: the subject starts running to each ball in turn with a return to the starting ball; time is fixed only if each ball is touched by the hand [1-2].

Results and its discussion. The results of the study made it possible to reveal a relatively even initial level (at the beginning of the experiment and before the start of the basic stage of training) of the manifestation of indicators of jumping activity and cardiorespiratory response, registered in both groups of subjects (CG, EG) [3]. So, for example, before the start of the basic stage of the annual training cycle or before the experiment, the maximum number of jumps, recorded by means of a computer measuring device and by which jump endurance was estimated, in the control group averaged 30.5 ± 3.09 times, and in the experimental group it was equal to 29.7±3.02 times **(**Table 1**).**

Table 1. Indicators of jumping endurance and its cardiorespiratory value in volleyball players under experimental conditions - $\overline{X}\pm\delta$

Tests / Stages of experiment and preparation cycle	Before the test		The number of hops according to SKU (Network controllers of executive devices)	After the test		functional value	
	HR (Heart rate) Beats/min	RR (respiratory rate) Times / min.		HR (Heart rate) Beats/min	RR (respiratory rate) Times / min.	HR	RR
Before the experiment - before the start of the annual training cycle, July, 2017	66,3±3,09 67,7±3,12	13,8±1,12 14,4±1,19	30,5±3,09 29,7±3,02	132,4±4,21 135,7±4,28	37,2±2,69 36,8±2,55	66,1 68,0	23,4 34,4
4 months before the start of competitive cycles, October 2017	71,5±4,07 65,4±3,08	15,2±1,21 14,5±1,13	32,9±3,34 35,6±3,53	138,8±4,31 128,7±2,97	39,4±2,83 33,5±2,14	67,3 63,3	24,2 19,0
After the experiment - at the end of the competitive cycles, May, 2018.	73,6±4,12 67,2±3,01	14,7±1,17 12,6±1,03	29,4±2,75 36,9±3,15	139,9±4,37 126,7±2,48	39,8±2,73 31,6±2,05	66,3 59,5	25,1 19,0
Difference between source and results	-7,3 +0,5	-0,9 +1,8	-1,1 +7,2	-7,5 +9,0	-2,6 +5,2	-	-

Note: - in the numerator - indicators of CG

- in the denominator - EG indicators

At the same time, before this hopping test load, the heart rate in the CG was 66.3±3.09 bpm, and the respiratory rate was 13.8±1.12 times/min. In the EG, these indicators were equal to 67.7±3.12 beats/min, respectively. and 14.4±1.19 times/min. It should be noted that immediately after the jump load, the heart rate in the CG increased to 132.4±4.21 beats/min, and the respiratory rate increased to 37.2±2.69 times/min. The pulse value of this load in this case was 66.1 beats/min., and the respiratory value (according to the respiratory rate) was equal to 23.4 times/min. For volleyball players from the EG, the above indicators increased on average: up to 135.7±4.28 bpm by heart rate; up to 36.8±2.55 times/min. by respiratory rate; the pulse value was 68.0 beats/min, and the respiratory value was 22.4 times/min.

It can be seen that despite the relatively short jumping load in terms of volume, their cardiorespiratory cost turned out to be quite significant, which indicates an insufficient level of development of the functional readiness of the examined volleyball players of both groups. It is important to emphasize that among volleyball players from the CG, who during the period of the experiment trained according to the traditional program, neither jumping endurance nor indicators of its cardiorespiratory value were characterized by a pronounced progression at the subsequent stages of the annual training cycle [4-5]. At the same time, in the EG, which was trained for 11 months according to the experimental program, jumping endurance consistently increased from stage to stage (29.7±3.07; 35.6±3.53; 36.9±3.15 times). And the indicators of its cardiorespiratory cost differed by a tendency to a pronounced decrease (68.0; 63.3; 59.5 beats / min. and 22.4; 19.0; 18.3 times / min. - respectively), which, apparently, it is the result of the positive impact of the experimental exercises used in this group with the use of relaxation-breathing exercises in between their series on the restoration of working capacity.

It is known that in modern volleyball, jumps with the subsequent implementation of one or another technical and tactical technique are made after preliminary high-speed movements in the form of jerks, jumps, turns or rotations. The total volume of these actions, affecting the functional state of the body, can cause not only a sharp increase in heart rate and respiratory rate, but, as a rule, is accompanied by the occurrence of motion sickness, an increase in tremor of body parts, loss of balance and discoordination of precision-target motor acts. Such negative consequences can occur only when the athlete does not have enough functional fitness or this can occur if the concentration of signs of fatigue increases in the body. That is why, as a model, we studied the level and dynamics of the manifestation of the cardiorespiratory cost of speed-strength loads in the form of a test exercise "Yolochka - 92 m" according to the determination of heart rate and respiratory rate at different stages of the annual training cycle with an 11-month pedagogical experiment, where we were involved above marked categories of the group (CG, EG) of the subjects.

As noted above, training sessions and competitive games in modern volleyball are characterized by extremely high intensity, where it is possible to maintain working capacity with high efficiency of technical and tactical actions for a long time only with an appropriate level of perfection of the functional preparedness of volleyball players. It is known that the effective implementation of any technical and tactical action in volleyball depends on the quality and timeliness of such actions as high-speed movements at the address, jerks, jumps, run for a jump, turns and rotations, which requires not only a high level of development of the relevant physical qualities, but and is associated with the readiness of the body to endure heavy loads. However, our studies carried out in this direction have established that traditional trainings carried out in the practice of training volleyball players of club teams in Uzbekistan do not differ in a property that reduces the limits of the functional cost of loads of different volume and intensity, which was confirmed when studying the cardiorespiratory cost of a model speed load, which was evaluated according to the test "Yolochka - 92 m". So, for example, the results of the study made it possible to reveal that the initial indicators of speed ability in volleyball players of both groups according to the test exercise “Yolochka - 92 m” (25.8±2.78 seconds in the CG and 26.3±2.87 seconds in EG), turned out to be noticeably lower (Table 2) than the standard values established for volleyball players of the highest ranks (24.2-23.4 seconds according to [4, p. 98]). It should be noted that the fulfillment of this test load HR in the CG averaged 64.3±3.54 bpm, and in the EG it was 66.5±3.60 bpm. The mean RR values were 14.2±0.36 times/min, respectively. and 13.6±0.32 times/min.

Table 2. Indicators of speed activity and its cardiorespiratory cost in volleyball players under experimental conditions - $\overline{X}\pm\delta$

Tests / Stages of the experiment and preparation cycle	Before the test		The results of the test "Yolochka - 92 m" (seconds)	After the test		functional value	
	HR (Heart rate) Beats/min	RR (respiratory rate) times / min.		HR (Heart rate) Beats/min	RR (respiratory rate) times / min.	HR	RR
Before the experiment - before the start of the annual training cycle, July, 2017	64,3±3,54 66,5±3,60	14,2±0,36 13,6±0,32	25,8±2,78 26,3±2,87	131,2±3,39 136,7±3,44	37,6±2,61 38,3±2,72	66,3 70,2	23,4 24,7
4 months before the start of competitive cycles, October 2017	69,6±3,72 65,2±3,27	14,7±0,55 12,9±0,30	26,5±2,88 24,6±2,13	137,6±3,21 132,4±3,15	39,7±2,81 33,6±2,18	68,0 67,2	25,0 20,7
After the experiment - at the end of the competitive cycles, May, 2018.	72,2±3,47 67,8±3,07	15,3±0,41 13,0±0,29	26,9±2,83 23,8±2,07	139,5±3,31 130,8±2,92	40,6±2,87 34,9±2,47	67,3 63,0	25,3 21,9
Difference between source and results	-7,9 -1,3	-1,1 +0,6	-1,1 +2,5	-8,3 +5,9	-3,0 +3,4	-	-

Note: - in the numerator - indicators of CG

- in the denominator - EG indicators

It can be seen that the given cardiorespiratory indicators in terms of the level of manifestation are within the physiological norms established for a healthy person. At the same time, such background indicators of heart rate were characterized by an extremely sharp increase at the time of the aftereffect of the used test loads and reached, respectively, up to 131.2±3.39 bpm. in CG and up to 136.7±3.44 bpm. in EG. And these RRs also differed by a pronounced increase up to 37.6±2.61 times/min. in CG and up to 38.3±2.72 times/min. in EG. It is noteworthy that such a short high-speed test load (running “Yolochka – 92 m”) had an acute effect on the functional state of the cardiorespiratory system of both the control and experimental groups. Such a consequence gives reason to believe that the degree of functional tolerance of speed loads in volleyball players of both groups is extremely insignificant and thus indicates the low efficiency of the traditional version of training sessions.

4 months after the start of the experiment, the studied indicators of speed ability in the CG

tended to a contrast lengthening of the execution time of the “Yolochka – 92 m” test, and the degree of cardiorespiratory cost of this test load increased to significant limits (HR – 68.0 bpm; RR - 25.0 times / min.). A similar negative dynamics of speed quality indicators and its cardiorespiratory cost in this group was found after the completion of the experiment or by the end of the annual training cycle (HR - 67.3 beats/min; RR - 25.3 times/min.). And in the EG, which during the period of the experiment systematically performed in training the complexes of experimental exercises developed by us, the speed ability according to the test "Yolochka - 92 m" at the end of the experiment increased significantly, where the time of running the distance decreased from 26.3 ± 2.87 sec. up to 23.8±2.07 sec., which is 2.5 sec. better than its original value. And the pulse value of this load decreased from 70.2 to 63.0 beats/min., respiratory - from 24.7 to 21.9 times/min. It can be seen that the data established in the EG testify to the high efficiency of the experimental exercises developed and used during the training of this group, between the series of which short-term relaxation-breathing exercises were used, aimed primarily at eliminating signs of fatigue localized in the tissues of the muscles of the lower extremities.

Conclusion. Comparative characteristics of the results of a study of the effectiveness of an 11-month pedagogical experiment involving volleyball players from the control and experimental groups allows us to state that the traditional year-round training conducted with volleyball players from club teams of Uzbekistan does not have the proper backbone property in terms of improving jumping and speed qualities with a focus on reducing the functional cost of the corresponding loads. At the same time, the results of the experiment established that the complexes of jumping and speed-strength exercises developed by us with the use of short-term relaxation-respiratory pauses of a restorative nature and used in the EG training are extremely effective both in the development of jumping and speed qualities, and in reducing their functional cost by all stages of the annual cycle of sports training. It should be emphasized that the increase in jumping endurance and speed activity, including the decrease in the functional value of these qualities in this group, occurred not only due to the effectiveness of the jumping and speed exercises themselves, but short-term relaxation-breathing exercises also play an important role in this.

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