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EFFICIENCY OF APPLICATION OF CARDIOTRAINING'S FACILITIES IN THE INCREASE OF THE CARDIOVASCULAR SYSTEM'S FUNCTIONAL STATE OF JUDOISTS 7–12 YEARS

Abstract. Purpose: *to give the estimation of efficiency of application of cardiotraining facilities in the increase of the cardiovascular system's functional state of young judoists 7–12 years. Materials and Methods :* *in research participated 60 judoists 7–12 years. There was used the method of variation pulsometre and computer program "SHVSM-integral" for the estimation of the cardiovascular system's functional state. Results:* *the positive dynamics of cardiovascular system's indexes of the judoists 7–12 years under act of cardiotraining facilities. Conclusions:* *the use of cardiotraining facilities in the training process of young judoists go to the reliable increase of the cardiovascular system's functional state of their organism.*

Keywords: *cardiovascular system, functional state, the young judoists 7–12 years, training process, cardiotraining facilities.*

Introduction. Problems of the improvement of the system of preparation of a sports reserve in different types of sports activity, including in judo continues to remain one of the most actual problems of the highest achievements in the field of sport now. It is connected with the insufficiently high level of sports results of our judoists at the largest international competitions (championships and Cups of Europe, Cups of the World, the Olympic Games) [1; 4; 12; 13].

Rather large number of researches devoted to the practical solution of the matter in which the possibility of optimization of the training process of judoists is considered at the initial stages of long-term sports preparation at the expense of increase in duration and volume of training classes, active introduction in training process of young judoists of the means of technical training corresponding to later stages of preparation, the use in training classes of young sportsmen of various exercise machines, special adaptations, etc. [2; 3; 4; 6; 10].

Despite of a certain efficiency of the specified means of optimization of the training process of young judoists, the development of new programs of the training classes including a complex of facilities allocated for the increase of the general functional condition of amateur sportsmen and, in particular the cardiovascular system of their organism substantially predetermining a level of the development of various components of the general preparedness of sportsmen is represented by rather perspective direction. According to a number of experts, facilities of cardiotraining can be rather effective in this regard [5; 7; 9; 11; 14].

The relevance and the undoubted practical importance of the presented problem became prerequisites for carrying out the real research.

Communication of the research with scientific programs, plans, subjects.

The work is a part of scientific programs of the faculty of physical training and the chair of the Olympic and professional sport and it is executed within the subject "Studying of adaptive opportunities of an organism of sportsmen at different stages of the educational-training process" (number of the state registration is 0106U000583) of the Consolidating plan of RW of the Ministry of Education and Science of Ukraine on 2010-2014.

The objective of the research: to give an assessment to the efficiency of the use of facilities of cardiotraining in the increase of a functional condition of the cardiovascular system of young judoists of 7-12 years old.

Material and methods of the research. We conducted the examination of 60 boys-judoists of 7-12 years old for a practical realization of the objective of the research which are engaged in this sport at the stages of initial (7–9 years old) and preliminary (10–12 years old) preparation. All young sportsmen were divided on the control group (15 boys at the age of 7–9 years old and 15 boys at the age of 10–12 years old) and the experimental group (15 boys at the age of 7–9 years old and 15 boys at the age of 10–12 years old).

The control group of judoists was engaged according to the traditional program of CYSS on judo for the stages of initial and preliminary basic preparation. Classes with the use of means of cardiotraining were also included in the program of training classes of judoists of the experimental group. The main contents of programs of cardiotraining were made by physical activities of an aerobic orientation lasting 5 minutes in each series. The quantity of series for one training occupation made 3–4 series with a rest interval between them of 5 minutes. The duration of cardiotrainings made 35–45 minutes, and the time for their carrying out was allocated from the general time of training classes of young judoists in the general physical preparation. The control of the pulse mode was carried out by means of special sensors-watches of the brand "Polar".

For the purpose of an assessment of the level of a functional condition of the cardiovascular system of young sportsmen at various investigation phases the following indicators were registered at them by means of methods of a variation pulsometry and the computer program SVSM-integral: systolic blood volume (SBV, ml) and minute blood volume (MBV, $l \cdot \text{min}^{-1}$), cardiac index (CI, $l \cdot \text{min}^{-1} \cdot \text{m}^{-2}$), the general peripheral resistance of vessels (GPRV, $\text{dyn} \cdot \text{s} \cdot \text{cm}^{-5}$), index of tension of regulatory mechanisms of the system of blood circulation (ITrmbc, s.u.), index of vegetative balance (IVB, s.u.), indicator of the efficiency of heart work (IFHW, s.u.), adaptation potential of the cardiovascular system (APcvs, s.u.) and general level of a functional condition of this system (LFS, points) [8].

All results received during the research were processed on the personal computer with the use of a package of the program Statistika 6.0.

Results of the research and their discussion. At the beginning of the forming experiment we carried out the comparative analysis of initial sizes of indicators of the

system of blood circulation of young sportsmen of the control and the experimental groups in the age groups of 7-9 years old and 10–12 years old (tab. 1).

It is shown that there weren't observed reliable distinctions between representatives of the control and the experimental groups at this stage of the experiment. They noted sizes ITrmbc, IVB and cardiac index which are corresponding to physiological standard for this age and average values of an indicator of the efficiency of heart work and the general peripheral resistance of vessels, below an average – the adaptation potential of the system of blood circulation and, on the contrary, above an average – systolic and minute volumes of blood. The general level of a functional state at young sportsmen of 7-9 years old and 10–12 years old, both in the control, and in the experimental groups, was considered as average, and its values fluctuated from $59,87 \pm 2,91$ points in the control group of judoists of 10-12 years old till $68,42 \pm 2,36$ points in the experimental group of judoists of 7-9 years old.

Table 1

Indicators of the cardiovascular system of judoists of 7-12 years old of the control (CG) and the experimental group (EG) at the beginning of the forming experiment, $X \pm S$

Indicators	7–9 years old		10–12 years old	
	CG	EG	CG	EG
ITrmbc, s.u.	153,86±20,41	146,54±16,31	193,63±32,23	177,26±18,01
IVB, s.u.	178,13±16,18	167,23±15,12	223,35±31,56	191,55±19,25
IFHW, s.u.	66,22±2,24	69,44±1,58	67,17±3,18	70,64±1,44
APcvs, s.u.	0,56±0,09	0,58±0,08	0,51±0,10	0,45±0,04
SBV, ml	40,37±0,92	41,4±0,64	44,38±0,85	45,99±0,78
MBV, l·min ⁻¹	2,83±0,06	2,9±0,04	3,11±0,06	3,22±0,05
CI, l·min ⁻¹ ·m ⁻²	2,95±0,08	2,81±0,07	3,55±0,09	3,35±0,09
GPRV, dyn·s·sm ⁻⁵	1272,94±98,14	1315,2±101,4	1716,38±132,33	1645,83±126,89
LFS, points	65,84±2,28	68,42±2,36	59,87±2,91	61,85±3,00

The analysis of results of the repeated testing which was held at the end of the forming experiment allowed to establish the following.

According to the data presented in the tab. 2 reliable changes in sizes of indicators of the cardiovascular system of their organism used in the research weren't noted at the young judoists of the control group who were engaged within the preparatory period of a year cycle of preparation according to the standard program CYSS for a stage of the initial preparation. It was possible to state only a positive tendency to decrease in the level of functional tension of regulatory mechanisms of the system of blood circulation, the increase of its adaptive opportunities and the level of a functional state in general.

Table 2

Indicators of cardiovascular system of judoists of 7-9 years control (CG) and experimental (EG) of groups at the beginning and at the end of the forming experiment, X±S

Indicators	Control group		Experimental group	
	The beginning of the research	The end of the research	The beginning of the research	The end of the research
ITrmbc, s.u.	153,86±20,41	142,77±18,94	146,54±16,31	118,55±13,19
IVB, s.u.	178,13±16,18	162,12±14,73	167,23±15,12	126,26±11,42*•
IFHW, s.u.	66,22±2,24	69,88±2,36	69,44±1,58	81,73±1,86**••
APcvs, s.u.	0,56±0,09	0,64±0,10	0,58±0,08	0,84±0,11*
SBV, ml	40,37±0,92	42,16±0,96	41,4±0,64	44,64±0,69**•
MBV, l·min ⁻¹	2,83±0,06	2,95±0,07	2,90±0,04	3,12±0,05**•
CI, l·min ⁻¹ ·m ⁻²	2,95±0,08	2,83±0,07	2,81±0,07	2,69±0,07
GPRV, dyn·s·sm ⁻⁵	1272,94±98,14	1217,19±93,84	1315,2±101,40	1129,76±87,10
LFS, points	65,84±2,28	70,98±2,45	68,42±2,36	79,23±2,74**•

Note. * – $p < 0,05$; ** – $p < 0,01$ in comparison with indicators at the beginning of the research; • – $p < 0,05$; •• – $p < 0,01$ in comparison with indicators in the control group.

Positive changes of indicators of the system of blood circulation at young judoists of 7-9 years old of the experimental group were more essential, in program of training classes of which the means of cardiotraining were included. To the completion of the forming experiment they registered the reliable decrease in sizes of IVB (till 126,26±11,42 s.u.) and similar increase of sizes of SBV (44,64±0,69 ml), MBV (till 3,12±0,05 l·min⁻¹), IFHW (till 81,73±1,86 s.u.), APcvs (till 0,84±0,11 s.u.) and LFS (till 79,23±2,74 points) which was considered already as above an average.

It is important to note that more optimum were characteristic in comparison with young sportsmen of the control group, size of the majority of the studied system of blood circulation indicators to the end of the research for boys of 7-9 years old of the experimental group.

Almost similar data were obtained by us in the analysis of results of testing of young sportsmen of 10-12 years old which were engaged in judo at a stage of the specialized basic preparation (tab. 3).

Table 3

Indicators of the cardiovascular system of judoists of 10-12 years old of the control group (CG) and the experimental group (EG) of at the beginning and at the end of the forming experiment, X±S

Indicators	Control group		Experimental group	
	The beginning of the research	The end of the research	The beginning of the research	The end of the research
ITrmbc, s.u.	193,63±32,23	178,47±29,7	177,26±18,01	129,04±13,11*•

IVB, s.u.	223,35±31,56	201,35±28,45	191,55±19,25	135,23±13,59**•
IFHW, s.u.	67,17±3,18	72,04±3,41	70,64±1,44	76,03±1,55**
APcvs, s.u.	0,51±0,1	0,59±0,11	0,45±0,04	0,67±0,06**
SBV, ml	44,38±0,85	46,47±0,89	45,99±0,78	49,26±0,83**•
MBV, l·min ⁻¹	3,11±0,06	3,25±0,06	3,22±0,05	3,45±0,06**•
CI, l·min ⁻¹ ·m ⁻²	3,55±0,09	3,39±0,08	3,35±0,09	3,20±0,08
GPRV, dyn·s·sm ⁻⁵	1716,38±132,33	1621,63±125,03	1645,83±126,89	1453,11±112,03
LFS, points	59,87±2,91	65,23±3,17	61,85±3	79,36±3,85**••

Note. * – $p < 0,05$; ** – $p < 0,01$ in comparison with indicators at the beginning of the research; • – $p < 0,05$; •• – $p < 0,01$ in comparison with indicators in the control group.

After the forming experiment the reliable changes of all indicators of the cardiovascular system of their organism weren't noted at young sportsmen of the control group. It was possible to state only the tendency to the decrease in the level of functional tension of mechanisms of regulation of heart rhythm and the increase of their adaptive opportunities and the level of a functional condition of the system of blood circulation.

The reliable positive decrease of ITrmbc, s.u. (129,04±13,11 s.u.), IVB (135,23±13,59 s.u.) and, on the contrary, the reliable growth of sizes of IFHW (76,03±1,55 s.u.), APcvs (0,67±0,06 s.u.), SBV (49,26±0,83 ml), MBV (3,45±0,06 l·min⁻¹) and LFS (79,36±3,85 points) which was considered already as above an average was noted at young judoists of the experimental group after the forming experiment. Besides, authentically lower level of functional tension of the cardiovascular system than at young sportsmen of the control group and higher values of systolic and minute volumes of blood and the general level of a functional condition of the blood circulatory system were registered at them.

Conclusions. In general the results of the made experiment testified to the high efficiency of means of cardiotraining in the increase of a functional condition of young judoists of 7-12 years old at the stages of initial and preliminary basic preparation and the possibility of their use in the training process of the amateur sportsmen.

Prospects of the further researches in this direction. In future the studying of the efficiency of the use of means of cardiotraining in the increase of a functional condition of judoists at the stage of specialized basic preparation is planned.

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