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FUNCTIONAL STATE OF THE CARDIOVASCULAR SYSTEM AT FEMALE BASKETBALL PLAYERS OF A TEAM OF THE FIRST LEAGUE IN THE COURSE OF CARRYING OUT MEDICAL AND PEDAGOGICAL OBSERVATION

Abstract. ***Purpose:*** *to define types of vascular reactions and tolerance to physical activity at female basketball players of the I-League.* ***Material and Methods:*** *analysis of scientific and methodical literature; medical and pedagogical supervision; methods of mathematical statistics.* ***Results:*** *the data about types of vascular reactions and tolerance to physical activity received by means of carrying out the PWC_{170} test in the course of medical and pedagogical supervision at female basketball players of the I-League are considered.* ***Conclusions:*** *it is revealed that violations of adaptation of the cardiovascular system and the decrease in the level of fitness of an organism to a loading are observed at sportswomen. It is established that the incorrectness of educational and training process is associated with the decrease in tolerance and mainly atypical types of vascular reactions to a loading.*

Keywords: *the PWC_{170} test, arterial pressure, heart rate, types of vascular reactions, tolerance for a loading.*

Introduction. Medical and pedagogical observations (MPO) have to be made systematically for persons who go in for physical culture and sport. MPO provide medical researches in the course of training which are conducted together with a coach. But, as a rule, it is paid not enough attention to the question of training of sportsmen in traditional system. The made observations and researches give the chance to specify the level of a functional condition of an organism, the influence of physical activities on an organism of persons who go in for sports, its fitness and thus to promote the management of the educational and training process.

Enough attention is paid to the question of MPO in literature, but it doesn't reduce its relevance. Medical and pedagogical observations allow deepening and expanding possibilities of an assessment of special fitness of a sportsman, the development of an optimum mode and a technique of training. A team-work of a coach and a doctor – is a basis of the efficiency of the educational and training process. Such activity provides an improving orientation of classes and sports improvement, helps to warn and to find signs of violations in time, promotes the correct development of fitness and he achievement of the highest level of sportswear [1].

The formation of a certain level of fitness during the whole sports season and in a long-term cycle of preparation is caused by a sport, a concrete plan of training, a

degree of its compliance to specific features and a level of preparedness of a sportsman [2].

It isn't possible to reach good results, having avoided loss of health without an optimum balanced control of functional preparedness. The improvement of the training process is connected with the search of the most effective options of combination of loadings with different intensity and new forms of the organization of training classes [3].

At present physical working capacity is the most widely investigated in sports practice, representing undoubted interest for experts both medico-biological, and sports pedagogical directions. Physical working capacity – is one of the most important components of sports success. This quality is also determinative in many types of a production activity, is necessary in everyday life, in sport and is collateral displays a condition of physical development and health of a person, his suitability to classes on physical culture and sport. Modern highest sporting achievements are impossible without the maximum tension of physical and spiritual forces of a person. Therefore, the knowledge of these regularities is necessary both to a coach, a sports doctor, and to a sportsman [4].

The high degree of fitness of a sportsman is characterized by an optimum level of the development of functionality of an organism that predetermines the possibility of achievement of high sports results in combination with technical, tactical and psychological preparedness of an organism.

The main changes which are observed in organisms of sportsmen, happen in the cardiovascular system (CVS) first of all. The cardiovascular system serves as a thin indicator of a price of adaptation of an organism, both to different factors of environment, and to physical activities. If training loads are picked up irrationally, don't answer the age, to the level of preparedness and specific features of the sportsman, in the presence both internal, and external factors can appear different functional violations: overfatigue, overtraining that are followed by the deterioration of adaptation to physical activities, change of functional and psycho-emotional states.

The accounting of cardiovascular reactions of an organism to a training load allows increasing the efficiency of classes by the optimization of norms of loading, depending on its specific features. In our opinion, adaptation of the cardiovascular system to physical activities at basketball players conducts in the training process for the achievement of the level of fitness and sports success. All this also defined the relevance of this work.

Communication of the research with scientific programs, plans, subjects. The research was conducted according to a subject of the plan of RW of Kharkov state academy of physical culture 2.8. "Improvements of the educational and training process in sports" (number of the state registration is 0111U003126).

The aim of the research: to define types of vascular reactions and tolerance to physical activity at basketball players of the first league on a bicycle ergometer due to the PWC_{170} test.

Material and methods of the research. The research was conducted in scientifically problem laboratory on the basis of Kharkov state academy of physical culture. 19 basketball players of a team the I – League of BC "HAI" took part in the

research. Indicators of a type of vascular reaction and tolerance to physical activity were defined due to the PWC_{170} test which was carried out on the bicycle ergometer of the company Kettler by means of the computer system CardiolabSens (production of scientifically research institute "HAI-Medika" in Kharkov) behind the generally accepted technique of V. L. Karpman (1969).

Results of the research and their discussion. It was established that the average age of basketball players of the team makes 16,2±0,58 years old, the weight of sportswomen is 65,3±4,60 kg before carrying out the PWC_{170} test. It allowed establishing a loading size for each female basketball player. The sportswoman carried out the first loading on the bicycle ergometer which is appointed according to her age and weight. The work duration is 3 minutes. Then the female basketball player had a rest 3 minutes. Further the size of the 2nd loading was defined. The operating time is 3 minutes. Pedal frequency on the bicycle ergometer made 60 turns for a minute. Indicators of HR were counted for the last 30 s 3 minutes of each stage and after every minute of rest. The measurement of AP was conducted at the end of each degree of loading, without stopping rotation of pedals of the bicycle ergometer (tab. 1).

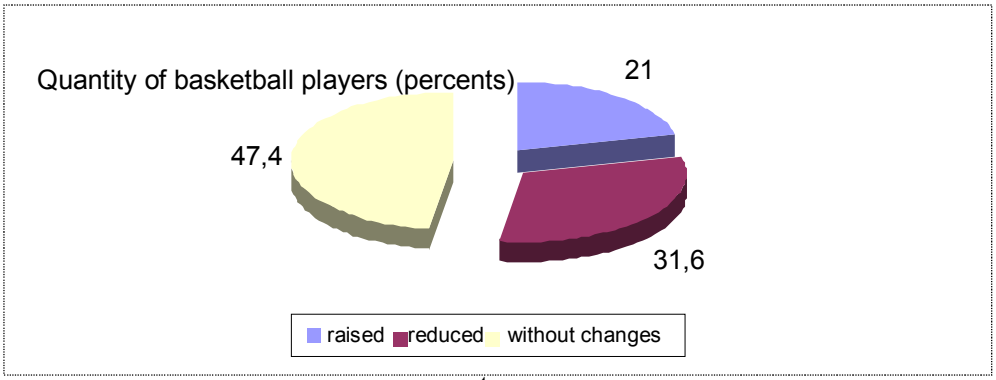
Table 1

Indicators of HR, AP at female basketball players during the PWC_{170} test, X±m

Indicators	At rest	1 stage	2 stage	Relaxation
HR, bpm^{-1}	70,22±1,62	148,89±20,70	173,44±19,58	76,70±9,55
APs, mm mer.col.	102,80±4,60	126,20±14,51	146,11±16,04	100,30±11,97
APd, mm mer.col.	62,8±2,36	56,20±6,33	50,00±6,99	58,80±6,90
Time of renovation of HR			5,23±0,24	
Time of renovation of AP			6,12±0,16	

It was established that HR increased on average on 71,11 bpm^{-1} on the second minute of the 1 stage and continued to rise on average to an indicator of 148,89±20,70 bpm^{-1}. Fluctuations of HR happened at 5 female basketball players within 126–142 bpm^{-1} during the 1 stage. At the 1st stage the loading on the bicycle ergometer was observed the increase of indicators of APs on average on 21,3 mm mer.col. at female basketball players and continued to rise on average to an indicator of 126,20±17,01 mm mer.col. Indicators of APd, on the contrary, lowered on the 2nd minute of the test to an indicator 54,10±7,42 mm mer.col. on average on the group, on the 3rd minute of work rose a little to 56,20±6,33 mm mer.col. But the analysis of individual changes in indicators of APd showed that APs raised at 6 sportswomen at the beginning of the work, at 4 – lowered, and at 9 female basketball players – remained without changes (pic. 1).

Indicators of HR reached 179,78±24,27 bpm^{-1} on average on the group in 2 minutes during the performance of the 2nd stage of loading and in 3 minutes – 173,44±19,58 bpm^{-1}.



Pic. 1. Changes of APd during the 1st stage of the PWC_{170} test, %

Studying of individual indicators found out that HR indicator fluctuated within 156–170 bpm^{-1} generally at female basketball players at the 2nd stage, and such indicators of HR, as 200 and 187 bpm^{-1} were noted at four sportswomen.

Indicators of APs of loading continued to grow and reached on average 131,60±16,04 of mm mer.col. on the group in 1 minute of the 2nd stage, on the 3rd minute – 146,11±16,04 mm mer.col. Studying of individual indicators found out that the indicator of APs fluctuated within 140–160 mm mer.col. generally at basketball players, and four sportswomen had noted the indicator of APs of 120 mm mer.col. APd indicators, on the contrary, tended to decrease and reached on average 45,10±6,99 of mm mer.col. on the group in 2 minutes of the 2nd stage of loading and on 3 minutes – 50,00±6,99 mm mer.col. Studying of individual indicators found out that the indicator of APd fluctuated within 40–50 mm mer.col. generally at basketball players, four sportswomen had noted indicator of APd of 80 mm mer.col., and in two – 30 mm mer.col. There weren't stops during the performance of the planned loading in performing the work at any of sportswomen. During 3 minutes of rest HR indicators gradually came back to initial indicators, but so they weren't reached, that is we observed a delay of renewal of indicators of HR and AP.

Most of sportswomen had no complaints to a state of health during the test of bicycle ergometer, but short wind was observed at three basketball players at the 2nd stage, 3 basketball players complained of fatigue in feet, one had complaints to pain in muscles of shins.

The analysis of changes of indicators of HR and AP gave the chance to establish the reaction of CVS to loading during the test PWC_{170} which allowed finding a type of reaction and tolerance to physical activity at each basketball player. So, it was established that only 22,22% of female basketball players have a normotonic type of vascular reaction to loading, and others – have atypical, namely 44,45% of sportswomen have a dystonic type of reaction to the carried-out loading, 22,22% stepped type, 11,11% hypotonic type (tab. 2).

Table 2

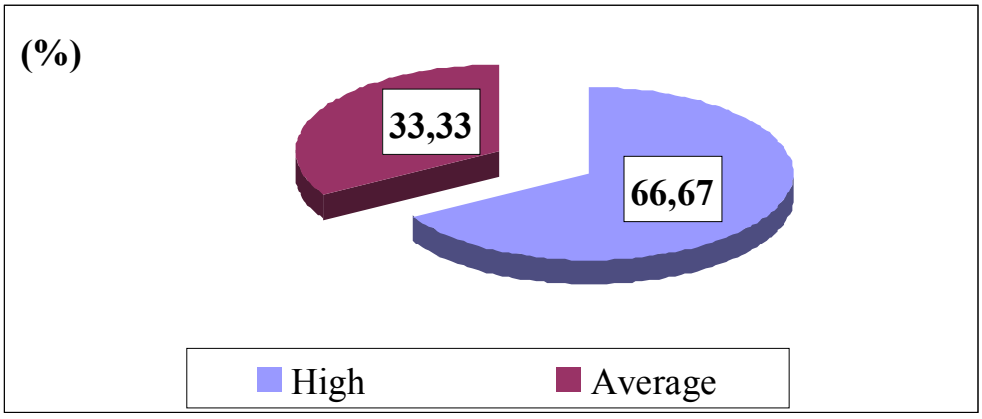
Indicator of a type of vascular reaction and tolerance to physical activity at basketball players of the team of the first league

Indicators	%
Types of vascular reactions, %	
Normotonic	22,22
Hypertensive	–
Hypotonic	11,11
Dystonic	44,45
Stepped	22,22
Tolerance to physical activity	
High	66,67
Average	33,33
Low	–

All types, except normotonic, are atypical vascular reactions and can be predictive as the development of violations from the cardiovascular system. All this needs the corresponding correction of the educational and training process and the optimization of physical activities.

High tolerance to physical activity was found at 66,67% of female basketball players, and in 33,33% was average (pic. 2).

There were not revealed any features at all sportswomen, except one on the electrocardiogram which was removed automatically during the test performance. Violation of processes of the repolarization and the decrease of traffic of myocardium of the left ventricle were recorded at one female basketball player. Consultation of a cardiologist was recommended to the sportswoman.



Pic. 2. Tolerance to physical activity at basketball players during the PWC_{170} test, %

All this gives the chance to claim about the violation of adaptation of the cardiovascular system to loadings, the decrease in the level of fitness of an organism to loading.

Conclusions. Thus, the above gives the grounds to claim that the decrease in functional ability of the cardiovascular system to loadings is observed when carrying

out MPO by means of the PWC_{170} test at basketball players of the first league that needs the corresponding correction of the educational and training process and the optimization of physical activities.

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