

Influence of karate training lessons on functional parameters of the heart in first-year students

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Abstract

Objective of the study was to monitor the impact of regular karate training on the heart characteristics of first-year students.

Methods and structure of the study. 15 male first-year students who had experience in karate training for at least six months 3 times a week were examined. The comparison group consisted of 16 clinically healthy, physically untrained first-year boys. Ultrasound diagnostics of the heart condition were carried out. The Student's t-test value was calculated.

Results and conclusions. Those who began to practice karate had a tendency to develop hypertrophy of the left ventricular myocardium, which consisted in an increase in its mass and the development of its walls. The external size of the left ventricle and the volume of its cavity in karatekas remained normal. In addition, they showed a slightly higher rate of myocardial relaxation than in the comparison group. It is clear that karate training for six months strengthens the myocardium of the left ventricle, maintaining the optimum of its internal volume, external dimensions and functionality.

Keywords: *first-year students, heart, myocardium, left ventricle, karate, sports.*

Introduction. Strong muscular loads, experienced regularly as part of any sport, form a number of positive changes in the body [10], which are clearly adaptive in nature [2]. Provided that systematic physical activity is dosed, a lot of positive metabolic, neuroendocrine and bioenergetic changes develop in the musculoskeletal, nervous and cardiovascular systems [9]. Regular physical activity most clearly affects heart parameters, adapting the body to their frequent repetition [11].

It becomes clear that physical training systems in any sport lead to a number of changes in the morphofunctional characteristics of the heart [5, 8]. The differences here may have a certain scientific significance and can help build a holistic picture about the characteristics of the impact of different durations of various types of sports on the heart [12].

The importance of the parameters of the functioning of vital organs for obtaining maximum sports results requires continued clarification of their main characteristics in athletes of different specializations [8]. Clarification of the upcoming morphofunctional changes in various internal organs in those who have recently started regular sports training remains of great importance [1].

Objective of the study was to evaluate the impact of regular karate training on the heart characteristics of first-year students.

Methods and structure of the study. The observed group included 15 young men studying full-time in their first year at the university and training in the karate section for the last six months three times a week.

The comparison group recruited for the study consisted of 16 clinically healthy freshman boys who had low physical fitness and did not engage in sports.

In the work, the morphofunctional parameters of the heart were determined using an ultrasound device SSD-80, "Aloka" (Japan). Based on the results of the study, Student's t-test was calculated.

Results of the study and discussion. As a result of the assessment of the main morphofunctional parameters of the heart in the observed patients, differences were noted between the observation groups under consideration for the left heart sections (see table).

The diameter of the left atrium in karatekas had a slight tendency to exceed (by 2.2%) this value in the comparison group. The left ventricular diameter in the anterior-posterior projection during diastole tended to be 2.3% higher in trainees than in physically inactive young men. The rate of contraction of the anterior-posterior diameter of the left ventricle had a slight tendency to be higher in beginner karatekas than in the comparison group (by 5.6%). In young athletes, the diastolic wall thickness of the left ventricle in the posterior part tended to exceed this parameter in the comparison group by 7.4%. The value of the final diastolic volume of their hearts had a slight tendency to be inferior to that of physically untrained young men (by 3.1%), with the values of stroke volume being similar in both observed groups.

In beginning karatekas, the myocardial mass was 9.5% higher than in the boys in the comparison group. There is no doubt that this was a consequence of working hypertrophic changes in the heart of the young men against the backdrop of six months of regular karate training. A small degree of myocardial hypertrophy in young karatekas did not affect the value of cardiac output, which maintained optimal hemodynamics in them.

The highest rate of myocardial relaxation in the region of the posterior left ventricular wall is rightly

considered as a significant indicator reflecting the reserves of the heart muscle. Systematic training in the karate section led to its increase by 14.3% compared to that in the control group.

In beginner karatekas and their physically inactive peers, the external and internal volumes of the left ventricle were comparable. This was accompanied by comparable characteristics of myocardial contractile capabilities in both groups.

The work carried out gave reason to believe that regular training in the karate section leads to the appearance of adaptive hypertrophy phenomena in the walls of the left ventricle. This was proven by the thickening of its walls and an increase in its mass while maintaining the optimum of its capacity and external dimensions [7].

The high rate of diastolic relaxation of the left ventricle in the posterior wall region found in beginning karatekas can be regarded as an important marker of a high level of physical fitness [3]. This indicator in the control group was inferior to that in the group of young karatekas, confirming that even not very long training in the sports section can have a positive effect on the functional parameters of the heart [4].

Conclusions. Karate classes for six months have a positive effect on the heart parameters of first-year students. Beginning young karatekas are characterized by a slight increase in the mass of the left ventricle while maintaining the optimum of its contractile abilities and normal capacity.

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Characteristics of a karateka's heart

Heartfelt indicators	Karatekas, M±m, n=15	Control, M±m, n=16
Left ventricular diastolic posterior wall thickness, cm	1,16±0,32	1,08±0,19
The value of the final diastolic volume, cm ³ /kg	1,92±0,18	1,98±0,15
The value of the impact volume, cm ³ /kg	1,10±0,15	1,08±0,06
The diameter of the left atrium, cm/m ²	1,85±0,23	1,81±0,31
Diastolic size of the left ventricle in anteroposterior projection, cm	5,22±0,33	5,10±0,29
Contraction of the left ventricle in the anteroposterior projection, %	36,0±0,53	34,1±0,67
Myocardial mass, cm ³ /kg	2,41±0,46	2,20±0,38; p<0,05
Maximum rate of relaxation of the posterior wall of the left ventricle, cm/s	12,0±0,86	10,5±0,75; p<0,05
Ejection fraction percentage, %	63,4±1,56	60,7±0,98

Note: p – existing differences between the groups of first-year students under consideration.



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