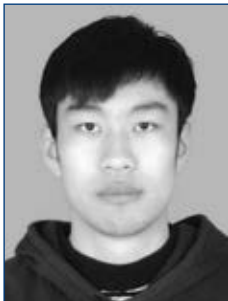


Physical fitness and adaptive abilities of the cardiovascular system of the organism of foreign students involved in basketball

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Abstract

Objective of the study was to determine the level of physical fitness and the level of functioning of the circulatory system of the body of foreign students involved in basketball.

Methods and structure of the study. The experiment involved Russian (n=32) and foreign students (n=24) of the 1st year who have been involved in basketball for at least three years. To determine the general and special physical fitness, the tests of the RUDN University physical culture program for the "basketball" specialization were used. To determine the adaptive capacity of the cardiovascular system, blood pressure, heart rate, and adaptive potential (AP) were used.

Results and conclusions. Foreign students have poorly developed speed-strength abilities. In Russian and foreign students, there is a tension in the adaptive processes of the circulatory system; it is necessary to pay special attention to the development of general endurance, strength in both Russian and foreign students in basketball lessons. Foreign students are recommended to additionally perform exercises to develop speed and speed-strength endurance. It is also necessary to constantly monitor the state of the cardiovascular system of students involved in basketball. With indicators of the circulatory system indicating a breakdown in adaptive capabilities, students should be recommended an additional medical examination.

Keywords: *basketball, students, general physical fitness, special physical fitness, circulatory system, adaptive capacity.*

Introduction. Basketball is a very popular sport in the world. In our country, basketball is a basic sport and is included in the physical culture program in general education, special and higher educational institutions [7]. At the Peoples' Friendship University of Russia, students have the right to choose the sport that they like during physical education classes [9], basketball is chosen by a considerable number of students, including those who come from different countries. Usually, students who have been involved in basketball for more than one year come to classes. Students who come from other countries have their own specifics of gaming activity, frequent stops. Perhaps this is due not only to the peculiarities of learning to play basketball in the native country, but also to adaptive, social changes caused by arrival in another state, where, in addition to climatic and geographical conditions, sociocultural ones also change [2, 9]. The

psycho-emotional state of foreign students can also affect the adaptive capabilities of the body associated with moving to another country [4, 6]. In order to organically and comfortably build the learning process for foreign students, it is necessary to understand with what preparedness they came to classes and how their adaptation processes "turned on". The activity of the cardiovascular system is a marker of the main adaptive processes in the body [1].

Objective of the study was to determine the level of physical fitness and the level of functioning of the circulatory system of the body of foreign students involved in basketball.

Methods and structure of the study. Scientific work was carried out at the Peoples' Friendship University of Russia in physical education classes. The study involved practically healthy first-year male students (according to a medical examination) who



have been involved in basketball for at least three years in the amount of 56 people. Control group (n=32) - students from Russia, experimental group (n=24) - foreign students. To determine the general and special physical fitness, the tests of the RUDN University physical culture program for the "basketball" specialization were used. General physical fitness: 100 m run (s), 3000 m run (min, s), pull-ups (number of times), standing long jump (cm). Special physical fitness: passing the ball in pairs from the chest (number of times in 30 s), free throw (number of hits out of five attempts), shuttle run 3 × 10 s. The adaptive abilities of the body were assessed in terms of heart rate (HR), blood pressure (BP) and the magnitude of the adaptive potential of the circulatory system (AP).

Results of the study and their discussion. As a result of the general physical fitness data obtained during testing, it was revealed that foreign students have poorly developed such physical qualities as speed and speed-strength abilities (Table 1). Based on the results of the control exercises, the values in running and in the standing long jump are at a reliable level ($p < 0.01$ and < 0.1 , respectively), which corresponds to the "unsatisfactory" rating according to the standards of the physical culture program, and these qualities are very important, since the activity of a basketball player is characterized by an almost constant stay in conditions of limited time [5]. In both groups, a very low level of development of such an important quality as general endurance was recorded, judging by the results of running 3000 meters, the result is 20% worse than the "satisfactory" rating. General endurance is a basic physical quality. The level of development of the strength of the muscles of the shoulder girdle is also at a very low level for both Russian and foreign students, and in order to play basketball, it is necessary to develop this muscle group as well.

Considering the indicators of testing special physical fitness, it was determined that foreign students playing basketball have a lower indicator that reflects a whole range of qualities - speed, speed-strength and coordination abilities ($p < 0.1$) than Russian students, however, this result is assessed in accordance with the program of physical culture for the assessment of "good". In exercises that reflect not only physical abilities, but also technical preparedness - passes and throws - all foreign students have an "unsatisfactory" rating. For effectiveness in the process of playing activity of students playing basketball, it is necessary to master the free throw technique [8]. In the group of Russian students, only 6 students performed a free throw for grades "3" and "4", which amounted to 18%. No one passed for a positive assessment (Table 2).

It is possible that low results in most physical tests are associated with the state of the adaptive capabilities of the circulatory system, the indicators of which are presented in Table. 3. Moreover, Russian students have a slightly elevated level of systolic blood pressure with a high rate of pulse pressure (by 40% of the norm), reflecting the course of adaptive processes [3]. At the same time, foreign students are diagnosed with low systolic pressure at low pulse values and lower than Russian students by 1.75 times. Diastolic blood pressure is at the lower limit of normal in both study groups. The heart rate of foreign students involved in basketball is significantly higher (< 0.1) than that of students from Russia and exceeds the limits of standard values.

The adaptive potential of the circulatory system is a complex indicator that reflects the functionality of the circulatory system [3]. According to the average values of this indicator in both groups of students, there is a risk of a decrease in adaptive abilities. However, 15% of Russian students and 19% of foreign students have an unsatisfactory level of adaptive abilities of the

Table 1. General physical fitness of foreign students involved in basketball

Physical tests	Russian students	Foreign students	p
100 m run, s	13,29±0,48	14,58±0,31	<0,01
3000 m run, min, s	17,01±0,30	17,14±2,06	>0,5
Pull-ups, number of times	5,83±1,62	5,33±0,68	>0,5
Long jump, cm	226,42±4,06	205,00±11,08	<0,1

Note: p is the level of reliability between the indicators of average values in the groups of Russian and foreign students.

Table 2. Special physical fitness of foreign students involved in basketball

Physical tests	Russian students	Foreign students	p
Transmission from the chest for 30 s, number of times	18,36±0,29	18,50±0,65	>0,5
Free throw, number of hits	1,69±0,39	1,33±0,34	>0,5
Shuttle run	7,56±0,14	8,71±0,36	<0,1

Note: p is the level of reliability between the indicators of average values in the groups of Russian and foreign students.

**Table 3.** Adaptive capabilities of the cardiovascular system of foreign students involved in basketball

Indicators of adaptation of the CVS	Russian students	Foreign students	p
SBP	125,46±3,53	105,25±6,97	<0,01
DBP	70,08±2,16	73,50±2,17	>0,5
PP	56,00±2,41	32,25±5,22	<0,001
HR	86,23±3,00	99,00±6,24	<0,1
AP	2,26±0,10	2,27±0,06	>0,5

Note: p is the level of reliability between the indicators of the average values in the groups of Russian and foreign students.

circulatory system, which indicates an overstrain of adaptation mechanisms.

Conclusions. Foreign students involved in basketball showed poor speed-strength training. Both Russian and foreign students have a low level of general endurance and strength of the muscles of the shoulder girdle. The students of both studied groups have a low rate of performance of technical elements (pass, free throw).

In our opinion, it is necessary to pay special attention to the development of general endurance, strength of both Russian and foreign students in basketball lessons. Foreign students are recommended to additionally perform exercises to develop speed and speed-strength endurance.

Improving the performance of technical elements must be worked out subject to the physical readiness of students. It is also necessary to constantly monitor the state of the cardiovascular system of students involved in basketball. With indicators of the circulatory system indicating a breakdown in adaptive capabilities, students should be recommended an additional medical examination.

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