

ASSESSMENT OF HEMODYNAMIC PARAMETERS OF THE CADETS OF THE COSSACK CORPS

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ABSTRACT — The study of the adaptive capacity of the cardiovascular system of students of specialized schools based on the assessment of hemodynamic indices.

KEYWORDS — adaptation, cardiovascular system, children, schoolchildren, hemodynamic indices.

The child's body, unlike an adult, is significantly more affected by the environment. Exogenous and endogenous factors that have a direct impact on physical development, health and psycho-emotional state, form the basis of his future adult life [1, 9]. Adapting to the new conditions, the child's body responds with an increase in sustainability due to the economical operation and rational use of energy [2, 10]. Improving the functioning of organ systems and regulatory mechanisms in children is a manifestation of adaptive restructuring at the level of the whole organism [9].

The cardiovascular system, being an integral system, is one of the first to respond to changing conditions. The need for adequate blood supply to organs and tissues in changing conditions, causes a change in the functional and structural reserves of the circulatory system. The study of its functional state gives an idea of the physiological and adaptive status of the organism [3].

Training in specialized cadet corps with round-the-clock stay has distinctive features: compulsory execution of orders, regulation of life, increase in training and physical activity, mandatory self-preparation, the need to wear a military uniform [8]. As a result, there is a tension in the mechanisms of adaptation to new conditions, manifested by a decrease in physical performance, an increase in psycho-emotional stress and morbidity.

The aim of the study is to study the processes of adaptation of the cardiovascular system of students in specialized schools.

30 cadets aged 13–17 years studying in the Cossack Cadet Corps from 2015 to 2018 were surveyed. General educational curriculum, includes elements of drill and mandatory participation in sports clubs and sections.

Calculation of indicators was carried out according to the results of the survey at the beginning and at the end of education in the Cossack cadet corps. With the help of the hardware-software complex HEALTH-EXPRESS, the following parameters were determined: physical development indicators using standard anthropometric methods; the state of the cardiovascular system - heart rate (HR), blood pressure (BP) according to standard unified methods. On their basis, hemodynamic indices were calculated: double product, blood circulation efficiency coefficient, Kerdo index, Kvass endurance coefficient, type of blood circulation self-regulation.

RESULTS AND DISCUSSION

Blood pressure indicators, at the beginning and end of training, meet age standards for all students.

Pulse rates after four years of education in the Cossack school decreased from 83.2 ± 12.5 to 80.2 ± 12.7 beats/min, which indicates a positive trend in the cardiovascular system.

The double product at rest is used to characterize the cardiovascular system (CVS) in children. This indicator reflects the growth of the mechanical work of the heart and, indirectly, oxygen consumption [4]. Students have high rates of double work, which indicates the stress of the CVS. However, by the end of education, this figure decreases.

Despite the fact that by the end of the education, the systolic and minute volume figures slightly decreased, their values exceed the age norm as a result of adaptation of the CVS.

The coefficient of profitability of blood circulation characterizes the body's costs for the movement of blood in the bloodstream. Normally, the coefficient of profitability of blood circulation for this age group is 2600–3000, with pronounced fatigue, the indicator increases, which is observed among the cadets of the Cossack corps.

The Kerdo index reflects the degree of adaptation of the organism to environmental conditions, in which a deviation from the zero line is considered as a sign of violation of adaptation mechanisms. A positive Kerdo index characterizes the strengthening of catabolism processes, which is characteristic of intense functioning and expenditure of body reserves, a negative one about an anabolic variant of metabolism and an economical mode of functioning [7]. Among

the cadets, there is an increase in this indicator by the end of education in the Cossack corps.

Among the students, the vascular type of blood circulation self-regulation prevailed both at the beginning of education (78.3%) and at the end (85.2%). A change in the regulation of blood circulation towards the predominance of the vascular component indicates its economization, an increase in functional reserves.

The Kvas endurance coefficient among the cadets is above average, but it is declining by the end of the year. An increase in this indicator indicates a weakening, and a decrease indicates an increase in the functional capabilities of the cardiovascular system.

CONCLUSIONS

The training program of the Cossack cadet corps has a positive effect on the development of effective adaptive mechanisms of the cardiovascular system. However, there are deviations in some indicators of the cardiovascular system from the age norm, which reflects the need to further study the influence of learning conditions in specialized schools on the health and physical development of students.

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