

STUDY OF THE DEVELOPMENT OF THE CARDIORESPIRATORY SYSTEM IN SCHOOL-AGE CHILDREN

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Abstract:

The article describes the role of physical activity on the physiology of the cardiovascular and respiratory systems, that the indicator of health is the level of activity of the main physiological systems and functional reserves of the body. Changes in heart rate and respiratory rate, vital capacity of the lungs under various loads and age characteristics.

Keywords: health, reaction, adaptation, cardiac system, transient insufficiency, parasympathetic nervous system, sympathetic nervous system.

ИЗУЧЕНИЕ РАЗВИТИЯ КАРДИОРЕСПИРАТОРНОЙ СИСТЕМЫ У ДЕТЕЙ ШКОЛЬНОГО ВОЗРАСТА

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Аннотация:

в статье рассказывается о роли физической активности на физиологию сердечно-сосудистой, дыхательной систем, о том, что показателем здоровья является уровень активности основных физиологических систем и функциональных резервов организма. Изменения частоты сердечных сокращений и частоты дыхания, жизненной ёмкости легких при различных нагрузках и возрастных особенностях.

Ключевые слова: здоровье, реакция, адаптация, сердечная система, транзиторная недостаточность, парасимпатическая нервная система, симпатическая нервная система.

The importance of the act of breathing for a person cannot be overestimated. A person begins to breathe immediately after birth. The whole of life consists of countless breaths and exhalations, which we do not think about, but without which it is impossible. Respiration is a continuous biological process, as a result of which there is a gas exchange between the body and the external environment. In humans, the breathing process is carried out through a number of sequential processes: the exchange of gases between

the external environment and the lungs – pulmonary ventilation; the exchange of gases between the alveoli of the lungs and blood - pulmonary respiration; the exchange of gases between blood and tissues.

Приоритетной задачей общества и государства является сохранение и укрепление здоровья подрастающего поколения.

The term "cardiorespiratory system", as a concept of functional systemic interaction, has been used relatively recently. Currently, the cardiorespiratory system is commonly understood as the functional interaction of the cardiovascular and respiratory systems, which is one of the ways the body adapts to stress. It is known that the change of breathing cycles is accompanied by a change in blood circulation: the filling of peripheral vessels with blood decreases during inhalation, and becomes larger during exhalation. In addition, breathing helps to improve blood and lymphodynamics, affecting the general well-being and mental performance of a person. Sufficient inhalation depth contributes to full-fledged diastolic filling of the heart; shallow breathing is accompanied by a decrease in cardiac output. Increased breathing is unable to compensate for the alveolar hypoventilation that occurs during shallow breathing. Since all cells and organs are constantly experiencing a certain degree of stress, the cardiorespiratory system should be attributed to permanently existing functional systems.

The cardiorespiratory system is one of the most important physiological systems that determines both the mental and physical performance of children in ontogenesis and in adaptation to educational activities.

The function of external respiration attracts special attention of specialists in the field of physical culture and sports, since it is practically the only vegetative function amenable to relative arbitrary regulation. The respiratory system is most strongly influenced by negative environmental factors, which underlies a high percentage of diseases of the upper respiratory tract, bronchi, lungs of children and leads to a decrease in reserve breathing capabilities. It is precisely because of this group of diseases that children have the maximum number of school absences; there is a high interdependence of the physical development of children and the development of respiratory function of the lungs, the mechanisms of its regulation. At the same time, the rate of physical development and the level of functioning of the respiratory system, according to the authors, is significantly influenced by biological age, somatotype characteristics, and the type of adaptive response of the child, the nature of motor activity, environmental and genetic factors.

In children from five to 7 years old, when there is an increased expansion of the bronchial tree, on the contrary, the patency of the respiratory tract is noticeably improved, and bronchial resistance is significantly reduced. This is due to the predominance of an increase in diameter over an increase in the length of the bronchial tree. Between the ages of eight and nine, relative alveolar ventilation and relative oxygen content in the blood decrease significantly against the background of increased growth of the bronchial tree. After 10 years, after relative stabilization of functional indicators, their age transformations increase – pulmonary volumes and lung

extensibility increase, the relative values of pulmonary ventilation and oxygen absorption by the lungs decrease even more, functional indicators begin to differ in boys and girls.

The age-related dynamics of static lung volumes can be traced in the analysis of changes in total and vital lung capacity, functional residual lung capacity and residual volume. Thus, the vital capacity of the lungs and the residual volume from 5 to 12 years increases almost uniformly over the years, with only a slight increase in the growth rate between 6-7 and 11-12 years in boys and 10-11 years in girls. Thus, according to a number of authors, the vital capacity of the lungs at the age of 7 years is 1155-1930 ml, at 8 years 1100-1700 ml, at 9 years 1130-2200 ml, at 10 years 1360-2300 ml, and at 11 years 1480-2700 ml.

The development of the cardiovascular system and blood circulation is closely related to the development of the lungs and respiratory function in children. It undergoes significant morphological and functional changes and at the same time acquires its own structural and functional features. Age-related transformations of the cardiovascular system have pronounced heterochrony and the presence of periods when blood circulation is most vulnerable to environmental factors. It is known that morpho-functional transformations occur at all levels of the system organization and are accompanied by significant changes in the characteristics of regulatory processes in children of different ages, which is accompanied by changes in vegetative regulation, the severity of sympathetic and parasympathetic effects on peripheral vessels from the microcirculatory level to large vessels, which is the result of increased sensitivity of the body to various influences at different stages of individual development. The appearance of such sensitive periods in the development of the circulatory system is associated with heterochronous development, morphological rearrangements and maturation of vegetative mechanisms of regulation of the heart and blood vessels.

One of the main indicators of heart development is its volume and linear dimensions. It is known that the mass of a child's heart doubles by the age of one, triples by the age of 2-3. From seven to 14 years old, the heart increases its volume by 30-35%. By the age of 10, the mass of the heart becomes six times greater than at birth, by the age of 13-14, the thickness of the walls of the heart doubles. The volume of the heart increases most intensively from one to 5 years and during puberty. The formation of the cardiovascular system is closely related to the overall development of the body, including the total size of the body, its length, weight, and the nature of the development of skeletal muscles. The heart volume at 8-9 years old is 340 cm³, at 10 years old – 364 cm³, at 11 years old the heart volume is 451 cm³ and continues to increase until the age of 17.

The study of the peculiarities of the variability of the cardiorespiratory system in children aged 7 to 12 years of different groups of autonomic regulation of heart rate allowed us to identify 4 groups of children with different statistically significant quantitative and qualitative ratios of the mechanisms of autonomic regulation of heart rate, indicating a different degree of tension of the segmental (sympathetic and parasympathetic divisions of the ANS) and suprasedgmental (central) mechanisms of regulation cardiorespiratory system .

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