FEATURES OF THE ADAPTIVE REACTIONS OF THE BODY OF CHILDREN LIVING IN THE ENVIRONMENTAL CONDITIONS OF THE ARAL SEA REGION

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Abstract: The article discusses the problems of studying the state of functional indicators of children in different ecological zones of the South Aral Sea. In diseases of the upper respiratory tract, an increase in the average volume of erythrocytes is observed with a simultaneous decrease in the average concentration of hemoglobin in erythrocytes.

Keywords: Southern Priaralie, morphofunctional indicators, red blood system, erythropoietin, erythropoiesis.

Introduction

The functional features of the body of children who are not yet physiologically and mentally mature and therefore most prone to various exogenous influences are of great interest from an ecological and physiological point of view and are necessary for a reasonable prognosis on their functional resources of the organism and health of the population of the Republic of Karakalpakstan in the current ecological situation. The formation of the ecological situation in the Southern Aral Sea region has affected the functional state of the cardiovascular system in the pediatric population.

One of the integrative systems that allow you to track shifts at different levels of functioning is the blood system. The functional feature of the child's body is its sensitivity, which determines not only health indicators, but also affects the further morphological and functional development of children and adolescents. Currently, it seems to be the most possible to assess the state of the body according to the indicators of the blood system.
The preservation of the adaptive potential of the organism under conditions of intense influence of various anthropogenic factors is one of the key problems of ecology and physiology. The study of the adaptive reactions of the child's body under the influence of various factors will make it possible to diagnose the onset and development of prenosological conditions in the early stages. This is necessary for timely correction, which consists in taking adequate measures to prevent the development of chronic pathological conditions.

The main purpose of our research was to study the indicators of the erythron system in children living in unfavorable environmental conditions of the Southern Aral Sea region (by the example of the Republic of Karakalpakstan and the Khorezm region).

When the conditions of the body’s vital activity change the amount of bone marrow production increases or decreases, depending on the body’s needs for erythrocytes, erythron - is one of the most important systems of hematopoietic tissue, derived from a pluripotent stem cell, including the earliest precursors of the erythroid series, morphologically identifiable, synthesizing hemoglobin, nucleated cells, proliferating and non-proliferating reticulocytes and mature erythrocytes [6, 8, 11, 17].

**The Main Findings and Results**

Destruction of red blood cells is carried out by macrophages of the spleen. By the time a person is born, erythropoiesis is completely carried out in the bone marrow. Erythron cells can be divided into synthesizing and non-synthesizing hemoglobin, and, in addition, classes can be distinguished: parental, proliferating, maturing and mature, specifically functioning cells. Regulation of erythropoiesis is carried out in a humoral way with the help of the hormone erythropoietin, which is produced in the kidneys in peritubular cells [6, 8, 11, 17].

Erythropoietin causes the differentiation of the stem cell into the erythroid series and activates the proliferation and maturation of erythroblasts. The synthesis of the hormone is determined by the oxygenation of the kidneys. With sufficient oxygenation, the oxyform of the hemprotein blocks the production of the hormone.
Inhibition of erythropoiesis is caused by inhibitors of erythropoiesis, which lengthen the cycle of division of erythroid cells and inhibit the synthesis of hemoglobin in them. In addition, androgens and estrogens affect erythropoiesis. Androgens - increase the sensitivity of the bone marrow to erythropoietin, and estrogens - on the contrary [6, 8, 13, 17].

Individual adaptation is a process that develops in the course of life, as a result of which the body acquires resistance to environmental factors and gets the opportunity to live in conditions previously unsuitable for life.

Currently, many researchers [1, 2, 17] have shown that along with genetic factors, environmental factors have a great influence on the development of a child's body. The scientific significance of studies devoted to the problem of the physical development of children has especially increased in recent years [6, 8, 9]. The acceleration process has significantly slowed down or even stopped, in connection with which there is a need for new scientific research. According to numerous data, indicators of physical development and health status of certain groups of the child population over the past two decades have acquired a negative trend [22]. At the same time, the specification of the situation in terms of timely and reliable information about the state of physical development of children and adolescents is constantly necessary for the organization of preventive work.

The physical development of children and adolescents is currently being studied in various directions, and one of the topical problems continues to be the study of its features in unfavorable environmental conditions of residence, for example, in the Southern Aral Sea region. The study of the state of functional indicators of children and adolescents in various geographical zones of the South Aral Sea region in a positive way will provide a broader systematic approach to the organization of preventive work to preserve the health of the population.

The study of the adaptive reactions of the body of children is determined by the ability to diagnose and predict the development of the disease at the prenosological level and to more successfully carry out preventive and health-improving measures [21].
The child’s body has a potentially greater ability to adapt to different climatic and geographical conditions, if their action does not go beyond biologically determined boundaries. Therefore, at an early age, the child’s body is more labile, as a result of which new environmental and social conditions can significantly affect the state of the functional systems of the body, including the erythron system, which is manifested in various quantitative indicators of the red blood system [4, 9, 18].

For a correct assessment of the child's condition, the ability to timely detect deviations from the norm, to make a clear diagnosis, it is necessary to know the composition of the peripheral blood of healthy children of all ages, because each age period is characterized by age characteristics. There is no doubt that when assessing peripheral blood, one should use the standard, developed for children, taking into account their age and climatic conditions, which have a certain effect on the composition of the child’s peripheral blood [11, 13].

The study of indicators of red blood in children living in the South Aral Sea region (120 people) at the age of 13 to 16 years, who are hospitalized for diseases of the upper respiratory tract. All surveyed children were divided into 10 groups depending on age and gender, as well as depending on the area of residence. As a control, we used the indicators of peripheral blood, obtained by us during the examination of relatively healthy children living in the city of Nukus (120 people).

The analysis of the obtained parameters of the red blood of the examined adolescents showed that the characteristics of the cellular composition of the peripheral blood mainly obey the laws that have been studied in detail and are well known in the literature [16, 17].

In relatively healthy children living in the territory of Karakalpakstan, the number of erythrocytes, although it did not go beyond the physiological norm, was close to its lower limit. In addition, it was revealed that in boys aged 13-14 years, the number of erythrocytes is higher than in 15-16 year olds, and in the group of 10 year old children this indicator is significantly lower than in 8 year old children (p <0.05). The hemoglobin (Hb) concentration indicator in healthy children examined
by us was at the upper limit of the physiological norm and did not have significant differences depending on age and gender.

When studying the incidence of diseases of the upper respiratory tract in the examined children, it was found that pathologies such as tonsillitis and acute bronchitis are more common. Considering that the respiratory and red blood systems are aimed at performing one function - supplying tissues with oxygen, we tried to find out the effect of respiratory diseases in children on the picture of red blood [5, 20].

When examining children suffering from diseases of the upper respiratory tract, it was noted that the number of erythrocytes and the concentration of hemoglobin did not go beyond the indicators of healthy children. It was found that in 15-year-old boys, the number of erythrocytes is significantly higher than in 13 and 14-year-old children (p <0.05), and the hemoglobin concentration in 14-year-old boys is higher than in 15-year-old children (p <0.05). The average hemoglobin content in the erythrocyte in children with upper respiratory tract diseases does not go beyond the physiological norm, since this indicator is more deterministic. The indicator of the average concentration of hemoglobin in the erythrocyte in children with respiratory diseases is lower than in healthy children in the same region. Apparently, this is due to an increase in the volume of erythrocyte cells in sick children.

Thus, in the children examined by us, changes in the erythron system are observed, which, in general, do not depend on the type of disease and are mainly determined by the direct presence of a pathological process. The most pronounced changes in the average volume of the erythrocyte and the average concentration of hemoglobin in the erythrocyte. In all groups of children, ESR was significantly higher than the standard indicators. The fact we have noted testifies in favor of the fact that in any disease of the respiratory system, compensatory mechanisms are turned on aimed at increasing the supply of oxygen to tissues, since, according to experts, an increase in the average volume of an erythrocyte cell leads to an
increase in the respiratory surface of an erythrocyte, and, consequently, a better supply tissues with oxygen.

**Conclusion**

Thus, it can be noted that in the body of the examined children under various pathological conditions observed an increase in the average volume of erythrocytes with a simultaneous decrease in the average concentration of hemoglobin in erythrocytes. In connection with the above, it has been proved that the prevailing environmental conditions in the Southern Aral Sea cause tension in the regulation of erythropoiesis itself, as well as various deviations in the functioning of the child’s hematopoietic system body. In children studied in the ecological conditions of the Southern Aral Sea, changes in the parameters of the erythron system are one-way, regardless of the type of disease.

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