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# Assessment of Constitutional Types and Hemoglobin Levels in Children and Adolescents Living In the South Aral Sea

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**ANNOTATION:** The article presents the results of studies on the evaluation of body structure and hemoglobin in children and adolescents living in the South Aral Sea region (Republic of Karakalpakstan). Asthenic type (more than 82%) was most encountered in representatives of both sexes of all ages, studied by body structure (samototypes). It was noted that the hemoglobin content in all age groups studied was lower in females than in males.

**KEYWORDS:** Aral Sea Region, environment, children and adolescents, samototype, hemoglobin, anemia

## I. INTRODUCTION

Environmental pollution is one of the main factors affecting the health of the population and, first of all, has a direct impact on the increase in the incidence and mortality of socially vulnerable population layers (children and adolescents), reproductive function [11]. According to experts, the main environmental parameters affecting the health of the population in the Southern Aral Sea region are: chemical pollution of drinking water (in water bodies, canals), salinity of soil, pollution of atmospheric air (salt and dust storms), the residual content of pesticides in food [1, 4, 10, 13].

In the southern Aral Sea region (Republic of Karakalpakstan) from 1980 to 1995, about 30 thousand tons of pesticides of different names were used in Karakalpakstan [6], among which chlorogenic and phosphoric compounds have a significant negative impact on human growth and development. As a result of the accumulation of pesticides in the soil, a high level of contamination of food and water with these compounds was observed. Pesticides pass through the food into the blood, absorbed in various organs and tissues. These can lead directly to a high probability of morbidity in the inhabitants of the island and lead to an increase in height, a violation of sexual development [12, 14].

## II. MATERIAL AND METHODS

Somatometric examination was carried out in 407 males and females of different ages (8-16 years) during our study at the 17-th Secondary School located in Nukus city of the Republic of Karakalpakstan. Of these: 204 (49,87%) are male children and 203 (50,13%) are female children. In the course of the study, analysis on the amount of hemoglobin from blood indicators was carried out on the basis of data collected by the school nurse and laboratory staff.

The following parameters of body structure were determined by the generally accepted method [8]: 1. Body weight was measured on an electronic medical scale with a measuring accuracy from 50 g to 150 g, depending on the weight. 2. Height measurement with a measurement accuracy of up to 5 mm in height was assessed using SECA 217 (Germany). 3. Chest circumference was measured with anthropometry tape.

Based on the conducted measurements, the following were calculated: body structure types, according to the index Pin'e, were calculated by the following formula:  $Thread = A - (B + C)$ , where A – height length (cm), B – body weight (kg), C – chest circumference (cm). If the resulting amount is greater than 30 – asthenic type (hypostenic); from 10 to 30 – athletic type (normostenic); from 10 – picnic type (hypersthenic).

According to the results of the measurement of these characteristics, it is possible to control the physical development of a person as well as to determine the anthropometric model of body structure [3, 15]. All calculations

are built-in Excel functionality from the Microsoft Office 2010 application; MicroCAL Origin v.6.10 was carried out using statistical data processing software.

### III. RESULTS AND THEIR DISCUSSION

Somatotype can be considered as a set of genetic and phenotypic signs that characterize the state of reactivity and the profile of individual development. The concepts «constitution» and «phenotype» are close, but not identical. The constitution contains hereditary features [11]. It is very important to know the type of constitution, because it affects the development of certain diseases, determines the way of life for their prevention [2].

The study of body structure allows to determine the characteristics of the morphofunctional development of a person [3]. Body structure types, 82,84% of boys of all ages tested on the index Pin'e were found to have asthenic, 13,72% normostenic and 3,44% hypersthenic body structure, 82,76% asthenic, 15,76% normostenic and 1,48% hypersthenic somatotype. At the moment, this condition, that is, the asthenization of the body, is increasing. A significant increase in the incidence of diseases among the population, especially children and adolescents, is largely determined by social, economic factors and technological pollution of the environment [9].

Hemoglobin is a blood pigment, a complex protein consisting of hem and globin protein in erythrocytes. Its main activity is the transport of oxygen and the management of the acid-alkaline state. Hemoglobin concentration is used to determine anemia or polycythemia. Hemoglobin concentration is a sign of polycythemia, when there is a lot of anemia sign, which is lower than the normative indicators. According to the results of the analysis, the hemoglobin content of male children aged 8 to 11 years was found to be 6,76% lower than the standard indicators of the World Health Organization [16], while female children were found to be 8,33% lower. It was observed that the 12-14-year-old was 8,525% less in males and 12,26% less in females; the hemoglobin content in 15-17-year-old males was 12,3% and in female children 11,475% less.

As you know, a decrease in the number of erythrocytes in the blood is one of the main criteria for having anemic state of the body. However, the degree of erythrocytopenia is common in various forms of anemia. For example, with iron deficiency anemia, the number of erythrocytes can be normal or often decreased (16-24%) [7]. Thus, these indicate the state of hypochromia of all children – the average hemoglobin content in one erythrocyte decreases. Hypochromia is a deficiency of iron in the body or a deficiency of iron. Hypochromia occurs only with anemia. The causes of hypochromia can be iron deficiency anemia, chronic lead poisoning, the synthesis and use of porphyrins, hypovitaminosis B<sub>6</sub>, as well as infectious and non-infectious chronic inflammatory diseases that disrupt iron metabolism.

As a result of the influence of various unfavorable environmental factors of the Aral Sea Region, a violation of the macro - and microelement status of children occurs. Analysis of the study of blood serum status of 160 children showed that Ca deficiency was detected in 44% of children and Fe deficiency was detected in 39% of children. In addition, 78,4% observed a decrease in the total number of erythrocytes in the blood of children [4]. Analysis of literature has shown that there are correlations between the residual amount of pesticides in food products and the indicators of blood content in children under examination. For example, the correlation coefficient with hemoglobin level was  $r = 0,36$ , the correlation coefficient with the number of red blood cells in the blood was  $r = 0,37$  [13].

The effect of anemia on kidney diseases is explained by the mechanism of tissue hypoxia. A decrease in the number of erythrocytes leads to insufficient oxygen access to tissues (as well as to the kidneys), that is, to hypoxia. The retrospective analysis of the disease history of children who were in inpatient treatment between January-December of 2018 showed that 63% of cases of anemia had «mild», 26% - «moderate», 11% - «severe» levels. It was found that with an increase in the level of anemia, the development of kidney disease also increased [5].

The ecological situation of the southern Aral Sea Region (including the Republic of Karakalpakstan) has deteriorated significantly in recent years. And this, of course, causes a significant deterioration in the health status of children and adolescents, who are much more sensitive to changes in the external environment, according to a number of indicators. Therefore, we conducted research on the evaluation of body structure and hemoglobin content in children and adolescents living in this area.

### IV. CONCLUSION

1. Asthenic type (more than 82%) was most encountered in representatives of both sexes of all ages, studied by body structure (somatotypes).
2. It was noted that the hemoglobin content in all age groups studied was lower in females than in males.

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