



Iron Deficiency Anemia in Young Children

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Abstract: Despite the relative ease of diagnosis and treatment, iron deficiency remains a major health problem worldwide. According to the World Health Organization (WHO), iron deficiency occurs in almost 30% of the world's population, and in some risk groups, in particular in children aged 5–14 years, its frequency reaches an alarming 82%.

Key words: pediatrics, anemia, treatment, iron, method, diagnosis.

INTRODUCTION

Iron is a microelement necessary for the normal functioning of the biological systems of the body, is an indispensable other metal in complex biochemical processes, such as respiration, hematopoiesis, immunobiological and redox reactions, is part of hemoglobin and myohemoglobin. Iron is present in more than 100 enzymes that control cell energy metabolism, DNA synthesis, cholesterol metabolism, the quality of the immune response to a viral or bacterial infection, and the formation of free radicals in body tissues. In children, the daily need for iron varies and can be 4–18 mg depending on age [2].

MATERIALS AND METHODS

In newborns and infants, iron deficiency anemia (IDA) occupies a significant place among all types of anemia. IDA in children is a disease of the blood system caused by iron deficiency in the body, it is accompanied by changes in metabolic parameters, a decrease in the concentration of hemoglobin in erythrocytes, their quantitative and qualitative changes, and clinical manifestations [5].

RESULTS AND DISCUSSION

Symptoms of IDA are different: development of IDA, headaches and dizziness, weakness, fatigue, intolerance to cold, decreased memory and concentration, mental and physical development retardation in children, inappropriate behavior, rapid heart rate with little physical exertion, cracking mucous membranes in the corners of the mouth, redness and smoothness of the surface of the tongue, atrophy of the taste buds, brittleness, thinning, deformation of the nails, taste perversion (craving to eat non-food substances), especially in young children, difficulty swallowing, constipation, inhibition of humoral immunity, increased general morbidity (colds and infectious diseases in children, pustular skin lesions, enteropathy), increased risk of developing tumor diseases (Table 1).

Table 1. Clinical signs of IDA	
Symptoms of anemia	Symptoms of sideropenia
Complaints	
<ul style="list-style-type: none"> ➤ Weakness, lethargy, fatigue ➤ Decreased exercise tolerance ➤ Headaches, tinnitus, shortness of breath, fainting 	<ul style="list-style-type: none"> ➤ Weakness, dizziness ➤ Perversion of taste, smell, appetite (pica chlorotica) ➤ Dysphagia, dyspepsia ➤ Drowsiness
Objectively	
<ul style="list-style-type: none"> ➤ Pale skin and mucous membranes ➤ Tachycardia, hypotension ➤ Expanding the boundaries of the heart ➤ Muffled heart sounds ➤ Systolic murmur ➤ The noise of the "top" over the jugular veins 	<ul style="list-style-type: none"> ➤ Dry skin, cheilitis, eating at the corners of the mouth ➤ Dryness, brittleness, hair loss ➤ Thinning, brittleness, transverse or longitudinal striation of nails ➤ Dental caries, enamel defects ➤ Glossitis (redness and smoothness of the surface of the tongue), atrophy of the taste buds

Signs of anisocytosis (detected morphologically or recorded by an increase in the RDW index of the distribution width of erythrocytes over 14.5%) due to microcytosis (a decrease in the MCV index - the average volume of erythrocytes, less than 80 fl) appear in peripheral blood analyzes even before decrease in hemoglobin and erythrocyte count.

A decrease in the level of serum ferritin to a level of less than 30 µg/l (normal 58–150 µg/l) is a biochemical criterion for IDA. Ferritin is a water-soluble complex of iron hydroxide with the protein apoferritin. It is found in the cells of the liver, spleen, bone marrow and reticulocytes. Ferritin is the main human iron storage protein. Although ferritin is present in small amounts in the blood, its plasma concentration reflects the iron stores in the body. The determination of serum ferritin is used to diagnose and monitor iron deficiency or excess, differential diagnosis of anemia. Other indicators, such as serum iron, serum iron-binding capacity, transferrin saturation coefficient, are less sensitive, labile, and therefore not informative enough. The normal content of iron in the blood serum is 12.5–30.4 µmol/l [7].

The most important factor in the prevention of iron deficiency is a balanced diet, and primarily breastfeeding [4]. Although the content of iron in breast milk is low (1.5 mg/l), its bioavailability is up to 60%. This is facilitated by the special form in which it is presented - in the form of the iron-containing protein lactoferrin. As the child's diet expands, it should be taken into account that the greatest amount of iron is found in beef, egg yolk, beans, sesame, seaweed, wheat bran, buckwheat, pistachios, peaches, oatmeal, spinach, hazelnuts and others. Iron is more easily absorbed in the composition of heme (meat products) – 9–22%.

The American Academy of Pediatrics makes the following recommendations for prophylactic iron supplementation in infants:

- children born prematurely should receive an additional 2 mg of iron per 1 kg of body weight per day during breastfeeding, starting from the 1st month of life and until the transition to artificial feeding with milk formulas enriched with iron, or until the introduction of complementary foods, - baking intake of 2 mg of iron per 1 kg of body weight per day;
- Breastfed children are advised to prescribe 1 mg of iron per 1 kg of body weight per day, starting from the age of 4 months and until the introduction of cereals into their diet.

Treatment of anemia in children should be comprehensive and based on the normalization of the regimen and nutrition of the child, the possible correction of the cause of iron deficiency, the appointment of iron preparations, and concomitant therapy.

Iron preparations for IDA are usually prescribed orally. The exceptions are conditions accompanied by malabsorption, or severe side effects of iron therapy - in this case, intramuscular or intravenous administration is indicated. The duration of therapy is from 3 to 6 months, depending on the severity of anemia. Such long-term treatment is necessary because the recovery of iron stores occurs slowly, after the normalization of hemoglobin levels. The daily dose of iron preparations is selected in accordance with the weight and age of the child, the severity of iron deficiency. Given the duration of treatment, it is important that iron preparations have good tolerance, a sufficient degree of assimilation, and effectiveness.

Modern iron preparations used in pediatric practice are divided into 2 groups: preparations containing iron salts (sulfate, chloride, fumarate, gluconate) and preparations based on the polymaltose complex. It should be noted that the following problems may occur during the treatment of IDA with iron salt preparations:

- overdose and even poisoning due to uncontrolled absorption by the body;
- interaction with other drugs and food;
- pronounced metallic taste;
- staining of the enamel of the teeth and gums, sometimes persistent;
- frequent refusal of patients from treatment (up to 30–35% of those who started treatment), i.e. low compliance [4].

CONCLUSION

The urgency of the problem of iron deficiency in children is due to their high prevalence in the population and frequent development in various diseases, which requires close attention of doctors of any specialty. Currently, at the present stage, there are enough diagnostic and therapeutic options for early detection and timely correction of anemia in children.

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