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Yu. A. Rakhmonov
Assistant
Samarkand State Medical University
Samarkand, Republic of Uzbekistan

CHARACTERISTICS OF IRON DEFICIENCY ANEMIA IN CHILDREN

ABSTRACT

Iron deficiency anemia (IDA) in children is a leading cause of anemia in childhood and is one of the most pressing issues in modern pediatrics. The high prevalence of IDA is due to a combination of factors, including the anatomical and physiological characteristics of a growing organism, intensive tissue growth and differentiation processes, increased iron requirements at different ages, and inadequate dietary intake of this micronutrient. Iron deficiency in children leads not only to decreased hemoglobin levels but also to delayed physical and psychomotor development and increased susceptibility to infectious diseases.

Keywords: iron deficiency anemia, children, diagnosis, treatment, prevention.

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Рахмонов Ю.А.
Ассистент
Самаркандский государственный медицинский университет
Самарканд, Республика Узбекистан

ОСОБЕННОСТИ ЖЕЛЕЗОДЕФИЦИТНОЙ АНЕМИИ У ДЕТЕЙ

АННОТАЦИЯ

Железодефицитная анемия (ЖДА) у детей занимает ведущее место в структуре анемических состояний детского возраста и является одной из наиболее актуальных проблем современной педиатрии. Высокая распространённость ЖДА обусловлена совокупностью факторов, включающих анатомо-физиологические особенности растущего организма, интенсивные процессы роста и дифференцировки тканей, повышенную потребность в железе в различные возрастные периоды, а также недостаточное поступление данного микроэлемента с пищей. Дефицит железа у детей приводит не только к снижению уровня гемоглобина, но и задержке физического и психомоторного развития, а также повышенной восприимчивостью к инфекционным заболеваниям.

Ключевые слова: железодефицитная анемия, дети, диагностика, лечение, профилактика.

Introduction. Iron deficiency anemia (IDA) in children is the most common pathological condition resulting from an imbalance between the body's iron requirements and its actual stores. According to the World Health Organization, signs of latent or overt iron deficiency are observed in 30–60% of children under five years of age [1–5].

The disease develops significantly faster in children than in adults due to their rapid growth, immaturity of the hematopoietic system, and high metabolic demands [6–9].

These characteristics of the child's body determine the specific clinical course of the disease, the diversity of its clinical manifestations, and their impact on the child's physical development [1,5,13,14].

At the onset of the disease, the pathological process is latent and may remain unnoticed, as there are no pronounced clinical symptoms. Iron depletion manifests itself primarily through changes in behavior and general well-being: children become lethargic, tire quickly, have difficulty tolerating physical activity, and become more irritable and capricious. Infants experience feeding difficulties, sleep disturbances, and decreased weight gain.Gradually, the child's resistance to infectious agents decreases, which is explained by impaired enzymatic activity and a decrease in the functional capacity of the immune system [10-12].

Risk Factors for Iron Deficiency Anemia

The main factors contributing to the development of iron deficiency anemia (IDA) in children include:

- anemia in pregnant women;
- prematurity;
- poor nutrition;
- gastrointestinal diseases;
- helminthic infestations;
- blood loss of various origins.

Clinical Manifestations of Iron Deficiency Anemia in Children

The clinical picture of IDA in children can be characterized by a predominance of symptoms from various syndromes: asthenovegetative, epithelial, dyspeptic, cardiovascular, immunodeficiency, and hepatosplenic.

Asthenovegetative syndrome develops as a result of tissue hypoxia, including cerebral hypoxia. Children may experience muscle hypotonia, delayed physical and psychomotor development (in severe cases, intellectual disability), increased irritability, tearfulness, dizziness, fainting, episodes of orthostatic collapse, and signs of vegetative-vascular dystonia.

Epithelial syndrome manifests itself through changes in the skin and its appendages: dry skin, hyperkeratosis on the elbows and knees, cracks at the corners of the mouth (angular stomatitis), glossitis, cheilitis, dullness and hair loss, and brittle and striated nails.

Dyspeptic syndrome is characterized by decreased appetite, including anorexia, dysphagia, flatulence, constipation, or diarrhea. Taste perversion is often observed—a craving for inedible substances (chalk, earth, etc.)—and altered olfactory preferences (an attraction to the smells of gasoline, paint, and varnish). Gastrointestinal lesions exacerbate iron malabsorption, which contributes to the progression of anemia.

Cardiovascular changes are observed in severe forms of IDA and are manifested by tachycardia, shortness of breath, arterial hypotension, systolic murmurs, and signs of myocardial dystrophy.

Secondary immunodeficiency syndrome is characterized by prolonged low-grade fever, frequent acute respiratory and intestinal infections, and their protracted course.
Hepatosplenomegaly (hepatosplenomegaly) is typically found in children with severe iron deficiency anemia, often associated with rickets or other chronic diseases.

Diagnosis of Iron Deficiency Anemia in Children

The diagnosis of iron deficiency anemia (IDA) is based on a combined assessment of clinical manifestations and laboratory parameters, which help determine the presence, severity, and nature of iron metabolism disorders in the child's body.
The key laboratory criteria confirming the presence of IDA are:
• decreased hemoglobin levels - Hb <110 g/L;
• decreased color index (CI <0.86);
• decreased serum iron concentration - <14 μmol/L;
• increased total iron-binding capacity of serum (TIBC >63 μmol/L);
• decreased serum ferritin level — <12 μg/L [2–10].

The primary diagnostic method for IDA is a complete blood count, which includes assessment of the following parameters:
• red blood cell count;
• hemoglobin level;
• color index;
• mean corpuscular hemoglobin content (MCH);
• mean corpuscular hemoglobin concentration (MCHC);
• mean corpuscular volume (MCV);
• morphological features of red blood cells;
• reticulocyte count.

Total iron-binding capacity (TIBC) characterizes the amount of iron that can be bound by the transport protein transferrin. The normal range is 40.6–62.5 μmol/L.
Determining serum iron levels and performing a complete blood count are possible in an outpatient setting.
More in-depth tests—determination of ferritin, TIBC, transferrin saturation, and other biochemical parameters—are performed in a hospital setting [9–11].

Treatment of Iron Deficiency Anemia in Children

The main principles of treating iron deficiency anemia (IDA) in children are:
1. Eliminating the underlying causes of iron deficiency;
2. Adjusting diet and daily routine;

3. Prescribing iron supplements to replenish iron stores.

Diet Therapy and Breastfeeding

Exclusive breastfeeding is recommended until the child reaches six months of age as it provides the optimal source of bioavailable iron. Breastfed children with established iron deficiency should be given iron supplements starting at six months of age.

Formula-fed children should use iron-fortified formula until they begin eating solid foods (approximately 12 months).

Teaching parents the principles of a balanced diet for their children—one that includes sufficient iron-rich foods (meat, liver, fish, buckwheat, apples, and green vegetables)—is important.

Drug Therapy

The basis of treatment is the correction of iron deficiency with iron-containing supplements [3, 6].

The most commonly used are:

• divalent iron supplements: Aktiferrin, Sorbifer Durules, Tardiferon, Totema, Ferroplex, and Fenuls;

• trivalent iron supplements in the form of a hydroxide-polymaltose complex: Maltofer, Ferrum Lek.

For young children, iron supplements are primarily prescribed in liquid dosage forms (drops, syrups, suspensions).

It is recommended to take the supplements 1–2 hours before meals, with water or fruit juices (not milk, as calcium reduces iron absorption).

The use of injectable iron supplements is only justified in exceptional cases, such as posthemorrhagic anemia or impaired iron absorption in the intestine [4]. The course of the disease is largely determined by the timeliness of diagnosis and the comprehensiveness of the treatment. Adequate treatment includes eliminating the causes of the deficiency, normalizing nutrition, replenishing iron stores with oral medications, and ongoing monitoring.

Thus, iron deficiency anemia in children remains a pressing and social problem in pediatrics, characterized by a variety of clinical manifestations and a significant impact on the child's physical and psycho-emotional development. Early diagnosis and comprehensive treatment are key to preventing adverse consequences of the disease and ensuring the child's healthy development.

LITERATURE

1. Baranov A.A. Ed. Handbook of Outpatient Pediatrics. Moscow: GEOTAR-Media, 2006. 608 pages.

2. Gorodetsky V.V., Godulyan O.V. Iron Deficiency States and Iron Deficiency Anemia: Treatment and Diagnosis // Medpraktika - 2004. No. 1 - 28 pages.

3. Demikhov V.G., Morshchakova E.F., Pavlov A.D., Baranov A.P., Globin V.I., Inyakova N.V., Isakova O.V. Prevalence and Probability of Iron Deficiency Progression to Anemia in School-Age Children. Hematology and Transfusiology. Moscow, 2001. No. 6, pp. 17-18.

4. Korovina N.A., Zaplatnikov A.L., Zakharova I.N. Iron deficiency anemia in children / Manual for doctors - M., 2001. - 56 p.

5 Kovrigina E.S., Karamyan N.A., Kazanets E.G. Zinc protoporphyrin in screening for iron deficiency in adolescents // Hematology and transfusiology. - 2007. - No. 5. - P. 22-26.

6. Kamushkina O.N. Demikhov V.G., Pavlov A.D., Tavintsev V.D. Diagnostic significance of determining the level of serum transferrin receptors in a mixed group of children. Vopr. hemat./oncol. i immunopath. v pediatrii 2004; 3 (1): 32-35.

7. Papayan A.V., Zhukova L.Yu. Anemia in Children / Manual for Physicians - St. Petersburg: 2001. - 384 p.
8. Rakhimova K.V., Devyatko V.N. Organization of Outpatient Clinical Monitoring of Children. - Almaty: 2005. - 154 p.
9. Samsygina G.A., Kazyukova T.V., Levina A.A. Iron Deficiency in Children and Adolescents. Russian State Medical University. - Moscow: 2006. - 32 p.
10. Ibatova Sh. M., Mamatkulova F. Kh., Ruzikulov N.Y. The Clinical Picture of Acute Obstructive Bronchitis in Children and the Rationale for Immunomodulatory Therapy. International Journal of Current Research and Review. Vol 12 Issue 17. September 2020. - P.152-155.
11. Sh. M. Ibatova, N.B. Abdukadirova, F. Kh. Mamatkulova, Yu. A. Rakhmonov, M. M. Kodirova. Risk Factors for Development of Broncho-Ostructive Syndrome in Children. International Journal of Current Research and Review. Vol 12. Issue 23 December 2020.-P. 3-6.
12. Ibatova Sh.M., Mamatkulova F.Kh., Rakhmonov Y.A., Shukurova D.B., Kodirova M.M. Assessment of the Effectiveness of Treatment of Rachit in Children by Gas-Liquid Chromatography. International Journal of Current Research and Review. Vol 13, Issue 06, 20 March 2021. P.64-66.
13. Sh.M. Ibatova, F.Kh. Mamatkulova, D.S. Islamova. Efficiency of combined application of apricot oil and aevit as a regulator of lipase activity of blood serum in children with vitamin D-deficiency rickets. Journal of Critical Reviews. // ISSN-2394-5125. VOL 7, ISSUE 11, 2020. P.1266-1274.
14. Ibatova Sh.M., M.M.Kadirova, D.T. Rabbimova, E.S.Mamutova, N.B.Abdukadirova, Gas-chromatographic appraisal of aplication of apricot oil and aevit in complex therapy of vitamin D-deficiency rickets in children. International Scientific Journal Theoretical &Applied Science, 24.04.2019, Philadelphia, USA, P.333-336.