CONDITION

Anemia caused by low iron - children

Learn how iron-deficiency anemia affects children, including symptoms, common causes, testing, treatment, follow-up, and when to seek urgent care.

WHAT IT IS
Anemia from insufficient iron for healthy red blood cells

BODY SYSTEM
Blood and circulation

MAIN SYMPTOMS
Pale skin, tiredness, difficulty concentrating, shortness of breath

WHAT CAUSES IT
Iron absorption below the body's needs

HOW IT IS DIAGNOSED
Complete blood count and ferritin test

MAIN TREATMENT
Iron replacement and cause management

CAN IT BE CURED?
Yes, treatment can restore iron

IS IT AN EMERGENCY?
Sometimes, with severe trouble breathing

LONG-TERM OUTLOOK
Early treatment can restore iron and reduce complications

Overview

Iron-deficiency anemia occurs when a child does not have enough iron to make healthy red blood cells. Iron is needed to produce hemoglobin, the protein that carries oxygen throughout the body.

Iron deficiency develops gradually. First, stored iron becomes low. If the shortage continues, red blood cells may become smaller and contain less hemoglobin. Anemia means the hemoglobin level is below the expected range for the child's age and clinical circumstances.

Children may be at increased risk during periods of rapid growth. Babies need iron from breast milk, iron-fortified formula, iron-rich complementary foods, or supplements when medically recommended. Toddlers may develop low iron if they drink a large amount of cow's milk and eat few iron-rich foods. Teenagers may be affected by growth, restricted diets, heavy

menstrual bleeding, or conditions that interfere with absorption.

Iron also supports brain development, learning, attention, muscle function, and immune health. Early treatment can restore iron and help identify why the deficiency occurred.

Symptoms

Mild iron deficiency or anemia may cause no obvious symptoms. When symptoms develop, they may include:

Eating nonfood substances is called pica . It can be associated with iron deficiency but has other possible causes. Eating soil or paint chips may expose a child to lead or parasites, so tell a healthcare professional.

Some children have uncomfortable or restless sensations in their legs, especially at night. Infants may have feeding difficulty, sleepiness, irritability, or reduced activity.

Symptoms cannot confirm iron-deficiency anemia; a blood test is usually needed.

Seek emergency care for severe trouble breathing, fainting, chest pain, blue or gray lips, marked weakness, confusion, or difficulty waking. Contact the child's healthcare professional promptly for black or bloody stools, vomiting blood, ongoing heavy menstrual bleeding, a very fast heartbeat at rest, or rapidly worsening paleness and fatigue.

- Pale skin, lips, or lower eyelids
- Tiredness, weakness, or reduced interest in play
- Irritability or difficulty concentrating
- Headaches or dizziness
- Shortness of breath or tiring quickly during activity
- A fast heartbeat
- Poor appetite
- Slower-than-expected growth or development
- Craving or eating dirt, clay, paper, ice, or other nonfood substances

Causes and risk factors

Iron deficiency develops when the amount absorbed does not meet the body's needs. Premature or low-birth-weight babies may begin life with lower iron stores. As babies grow,

they need a reliable, age-appropriate iron source.

Diet is a common factor in young children. Cow's milk is low in iron, and large amounts can replace iron-rich foods. In some children, it may also contribute to small amounts of intestinal blood loss. Cow's milk should not be the main drink before 12 months of age.

Heme iron from meat, poultry, and seafood is generally absorbed more easily than nonheme iron from beans, lentils, tofu, fortified cereals, leafy vegetables, nuts, and seeds. Vitamin C helps the body absorb plant-based iron.

Risk factors include:

Vegetarian and vegan diets can provide enough iron when carefully planned, but plant iron is absorbed less efficiently. A clinician or registered dietitian can help with food choices and decide whether testing or supplements are needed.

Blood loss becomes a more important consideration in older children and adolescents. Possible sources include heavy periods, intestinal inflammation, ulcers, polyps, and repeated nosebleeds. The cause should be evaluated rather than assuming diet is responsible.

- Premature birth or low birth weight
- Rapid growth during infancy or adolescence
- A diet low in iron-rich or fortified foods
- High cow's milk intake in toddlers and young children
- A highly restricted diet or limited access to nutritious food
- Heavy or prolonged menstrual bleeding
- Frequent blood donation
- Digestive tract blood loss
- Celiac disease, inflammatory bowel disease, or other absorption problems
- Previous stomach or intestinal surgery
- Chronic inflammation, kidney disease, or another long-term illness
- Lead exposure

Diagnosis

A healthcare professional will ask about diet, milk intake, growth, birth history, menstrual bleeding, digestive symptoms, medicines, and family history. The examination may assess growth, heart rate, skin color, and signs of bleeding or chronic illness.

A complete blood count , or CBC, measures hemoglobin and provides information about red blood cell size and number. Iron deficiency often causes smaller cells with less hemoglobin, but inherited conditions such as thalassemia can produce similar findings.

A ferritin test estimates stored iron. Low ferritin strongly supports iron deficiency. However, ferritin can rise during infection or inflammation, so a result within the laboratory range does not always exclude deficiency. Clinicians may interpret it with the CBC and an inflammation marker such as C-reactive protein.

Other tests may include a reticulocyte count or reticulocyte hemoglobin measurement. Additional testing depends on the history and may screen for lead exposure, celiac disease, intestinal inflammation, hidden blood loss, pregnancy in some adolescents, or inherited red blood cell conditions.

A clinician may sometimes assess whether anemia improves during a supervised course of iron. A poor response does not mean the child should automatically receive more. Possible explanations include missed doses, poor absorption, continued bleeding, an incorrect diagnosis, or multiple conditions.

Treatment and management

Treatment replaces iron and addresses the cause of the deficiency.

Oral iron medicine is commonly prescribed for confirmed or strongly suspected iron-deficiency anemia. The dose depends on the child's weight, age, test results, and product. Use the preparation and measuring device recommended by the healthcare professional. Different liquids and tablets contain different amounts of elemental iron and are not automatically interchangeable.

Follow instructions from the clinician or pharmacist about when and how to give the product. Side effects may include nausea, stomach discomfort, constipation, diarrhea, and dark stools. Liquid iron can temporarily stain teeth; appropriate administration and cleaning may reduce staining.

Iron overdose can be life-threatening. Keep every iron product in a child-resistant container, locked away and out of children's sight and reach. If a child may have swallowed an unintended amount, contact local poison control services or emergency care immediately. Do not wait for symptoms.

Diet helps recovery and reduces the chance of recurrence. Options include meat, poultry, fish, beans, lentils, tofu, iron-fortified cereals, and leafy green vegetables. Pairing plant iron with vitamin C-rich fruit or vegetables can improve absorption. A clinician may recommend limiting

excess cow's milk so it does not replace balanced meals.

Diet alone may not restore iron quickly enough after anemia develops. Do not start high-dose iron or continue it indefinitely without medical guidance. Excess iron can be harmful, and some types of anemia are not caused by iron deficiency.

Intravenous iron may be considered when oral iron is not tolerated, is not absorbed, does not work despite appropriate use, or must be replaced more quickly. It is given in a monitored healthcare setting. Blood transfusion is rarely required but may be considered for severe anemia with serious symptoms or heart or circulation problems.

Complications

Untreated anemia can reduce stamina and interfere with school, sports, and play. Children may experience fatigue, headaches, and difficulty concentrating.

Iron deficiency in infancy and early childhood is a particular concern during rapid brain development. Studies have linked it with developmental, behavioral, and learning difficulties, although its effect on an individual child cannot always be predicted.

Severe anemia makes the heart work harder to deliver oxygen. It may cause a rapid heartbeat and, rarely, strain the heart. The underlying cause-such as heavy menstrual bleeding, intestinal disease, or lead exposure-may also cause complications.

Giving iron without follow-up can delay diagnosis of another condition. Inherited blood disorders, inflammation, vitamin deficiencies, kidney disease, and blood loss can resemble or accompany iron deficiency.

Follow up

Follow-up testing confirms whether treatment is working. Timing depends on the child's age, symptoms, anemia severity, and treatment plan. A clinician may repeat the CBC and later check ferritin or other iron tests.

Hemoglobin may improve before iron stores are replenished. Treatment therefore often continues after hemoglobin returns to the expected range, but the clinician should determine the duration.

If results do not improve, the healthcare team may check how the medicine is measured and given, whether doses are missed, and whether side effects interfere with treatment. Further assessment may look for continued bleeding, poor absorption, inflammation, lead exposure, or

another type of anemia.

Follow-up should also address the underlying risk through dietary changes, management of heavy periods, treatment of digestive disease, or dietitian support. Do not wait for a routine appointment if the child develops severe breathing difficulty, fainting, chest pain, confusion, vomiting blood, or significant ongoing bleeding.

Sources

- Baker RD, Greer FR; American Academy of Pediatrics Committee on Nutrition. "Diagnosis and Prevention of Iron Deficiency and Iron-Deficiency Anemia in Infants and Young Children (0-3 Years of Age)." Pediatrics . 2010;126(5):1040-1050. doi:10.1542/peds.2010-2576.
- World Health Organization. Guideline: Daily Iron Supplementation in Infants and Children . Geneva: World Health Organization; 2016.
- World Health Organization. WHO Guideline on Use of Ferritin Concentrations to Assess Iron Status in Individuals and Populations . Geneva: World Health Organization; 2020.
- National Institutes of Health, Office of Dietary Supplements. Iron: Fact Sheet for Health Professionals . Bethesda, MD: National Institutes of Health.
- Powers JM, Buchanan GR. "Diagnosis and Management of Iron Deficiency Anemia." Hematology/Oncology Clinics of North America . 2014;28(4):729-745. doi:10.1016/j.hoc.2014.04.007.
- Centers for Disease Control and Prevention. "Recommendations to Prevent and Control Iron Deficiency in the United States." Morbidity and Mortality Weekly Report: Recommendations and Reports . 1998;47(RR-3):1-29.