SiderAL

E-BOOK

Children

SiderAL

Table of contents

What are the symptoms of iron deficiency in children?

Iron is an essential nutrient for the body at all ages. **Children and adolescents**, however, may have an **increased body need** for this nutrient to **support the normal development of cognitive function** and **immune system**, as well as the normal formation of haemoglobin, myoglobin and certain enzymes that play a role in important metabolic functions. In this article, we will learn about the **symptoms of iron deficiency in children**.

Iron deficiency in children: causes and symptoms

Iron is involved in the formation of haemoglobin, myoglobin and certain enzymes that play important metabolic roles. In addition, iron contributes to **normal cognitive functions** and the **normal function of the immune system**.

Iron is particularly important in children. In fact, the first years of life require an increased bodily need for iron to **support the normal growth of the body**.

Iron deficiency in the paediatric age is a rather frequent condition precisely due to the body's iron requirements during growth being high. During the first year of age, in particular, there is a rapid development both physically and mentally, but the increased need for iron continues during the rest of childhood and adolescence.

Before talking about the **symptoms of iron deficiency in children**, however, it is important to find out what the main causes are:

A) Reduced iron intake with diet

In children and adolescents, it is quite common for iron deficiency to be related to a poor dietary intake of this nutrient. The **first year of life**, the

prepubertal age and **adolescence** are the most critical moments that deserve more attention.

In the first months of life, the newborn's body can rely on two resources:

1. The **iron deposits** present at birth;
2. **Breast milk** or **formula milk**.

The amount of iron present in breast milk is not very high, but it is an iron with high bioavailability (lactoferrin bound) and therefore more easily assimilated by the newborn. In artificial milk, on the other hand, the proportion of assimilable iron is lower, but the large amount of iron contained in formulas prevents the possibility of a possible iron deficiency due to dietary causes.

From the moment of weaning, which generally begins with the introduction of the first meals from the fourth to sixth month onwards, the iron needed by the body will be provided by a **varied and balanced diet**.

During the **prepubertal age** and during**adolescence**, iron deficiency can be related to an **inadequate diet** that does not provide the body with the right amount of nutrients, including iron.

B) Reduced iron absorption

Certain **inflammatory gastrointestinal diseases**, **coeliac disease** or **intestinal infections** may result in **reduced iron absorption** from diet.

C) Increased blood loss

Certain physiological conditions, such as the **menstrual cycle in adolescents**, can lead to iron deficiency due to increased blood loss. Certain intestinal diseases or infections can also cause blood loss and thus decrease the amount of iron in the body.

D) Low prenatal iron deposit

Low prenatal iron deposit is a condition that occurs especially in prematurely

born babies. This is because most of the iron present at the birth of the baby is absorbed through the placenta during the third trimester of pregnancy. Low iron deposit at birth can also be caused by **maternal iron deficiency during pregnancy**.

Symptoms of iron deficiency in children

Iron deficiency, especially when is caused by poor eating habits, has a slow onset. Sometimes the **symptoms of iron deficiency in children** may not be very noticeable. This is because the body gradually adapts to low iron levels. However, iron deficiency should never be underestimated and it is always important to keep iron levels in the body under control with regular examinations.

The **most frequent symptoms of iron deficiency in children** are:

- General physical and mental fatigue and tiredness (asthenia);
- Slower growth;
- Headaches, migraine, irritability;
- Increased fragility of skin, nails and hair;
- Shortness of breath, even at rest;
- Sleep disorders;
- Tachycardia;
- Difficulty concentrating;
- Pale skin and mucous membranes.

Iron deficiency in children: what to do about it

Iron deficiency (sideropenia) is diagnosed through **laboratory tests.** The **paediatrician** will assess the severity of the **iron deficiency** and propose the most suitable approach.

In general it may include a diet with **iron-rich foods** and the possible administration of **specific nutritional supplements** to overcome the **iron deficiency or increased body iron requirements.**

Low haemoglobin in children: let's learn how to recognise it and keep normal values under control

What do we mean when we talk about **low haemoglobin in children**?

Haemoglobin is a protein present in red blood cells which binds molecular oxygen and transports it to tissues throughout the body. Let's find out **what is meant by low haemoglobin** and **what to do to maintain normal physiological levels.**

Low haemoglobin and low iron

Haemoglobin is a globular protein consisting of four polypeptide chains bound to a haem group, a chemical complex containing an iron ion (Fe^{2+}). It is present in erythrocytes (red blood cells) and carries out two essential tasks for the body:

1. it binds molecular oxygen to transport it from the lungs to the tissues;
2. it binds carbon dioxide to transport it from the body's peripheral tissues to the lungs, where it is released.

Given that iron is a key component of the structure of haemoglobin, **low iron** values, which indicate an **iron deficiency**, can often be related to **low haemoglobin values.**

What are normal haemoglobin values in children?

Whilst **normal haemoglobin (Hb) values** in adults are between 12 and 15.5

g/dL (grams per decilitre) for **women** and between 13.4 and 17.5 g/dL for **men**, in **children**, the average values vary depending on age and gender. In general, the minimum value does not fall below 10 g/dL.

The **average haemoglobin values in children** are as follows:

Birth: average 16.5 g/dL

First month: average 14.0 g/dL

2 months: average 11.5 g/dL

3-6 months: average 11.5 g/dL

From 6 months to 2 years: average 12.0 g/dL

2-6 years: average 12.5 g/dL

6-12 years: average 13.5 g/dL

12-18 year old women: average 14.0 g/dL

12-18 years men: average 14.5 g/dL

When the values are lower than normal, a **low haemoglobin** condition exists**.**

Low haemoglobin in children: what should we do?

If laboratory tests show a moderate condition of **low haemoglobin in a child**, the paediatrician will assess the most suitable approach to bring the values back to normal. The paediatrician will try to investigate the causes that led to a lowering of haemoglobin values in the blood and will act to mitigate them. The therapy could include a diet with **iron-rich foods** or iron supplementation **with food** supplements.

Low haemoglobin in children: causes

Low haemoglobin values can occur in children and adolescents when:

- there is **little iron intake through diet**;

- there are certain **specific physiological conditions that lead to an increased bodily need for iron** (growth of the body during childhood and adolescence; menstrual cycle in girls);
- there are certain diseases that cause poor **intestinal absorption of iron** consumed through diet;
- vitamin B12 deficiency.

How can normal haemoglobin levels be maintained in children?

In some cases, low haemoglobin values are associated with **iron deficiency**. Under normal health conditions, the first cause of an iron deficiency is an inadequate or insufficient dietary intake.

As regards **infants fed exclusively with breast milk**, the paediatrician could consider the administration of an iron supplement to make up the deficit until weaning or, in any case, until such time as the diet guarantees an adequate intake of this essential nutrient. However, it is advisable not to continue exclusive breastfeeding beyond the baby's sixth month of life.

In **infants fed with** formula **milk**, the paediatrician may recommend iron-enriched formulas. However, it is not recommended to use or introduce cow's milk before the first year of age. Cow's milk is rich in calcium, which can hinder the correct absorption of dietary iron.

After weaning and during childhood and adolescence, it is always important that parents encourage proper nutritional education within the family. A varied and balanced diet provides for the intake of two types of iron: **haem iron**, present in animal-based foods (red meat, turkey, horse, tuna, cod, salmon, crustaceans and molluscs) and **non-haem iron,** present in plant-based foods (legumes, green leafy vegetables, whole grains, oat flakes). **Non-haem iron** is more difficult to absorb than **haem iron**, therefore, it is advisable to combine iron-rich **fruits and vegetables** with **foods rich in**

vitamin C (kiwi, pineapple, orange, lemon), a substance that promotes the absorption of iron in the bowel.

In the event of **major iron deficiencies**, it is best to prevent children from consuming large amounts of milk and cheese (calcium-rich foods). Tea and chocolate are also foods that should be avoided due to tannins, which could reduce the absorption of dietary iron.

Iron for children: when is it needed?

Iron is an essential nutrient at all ages, but it plays a fundamental role especially during childhood and adolescence as it **supports the growth and psychophysical development of children.** Therefore, at this stage of life, it may be necessary to keep the daily iron intake under control. Let's discover the importance of **iron for children and adolescents**.

Iron for children: from what age?

Iron is very important for the **growth and normal physical and cognitive development of children and adolescents**. In addition, iron plays a role in the **normal development of immune system** and in the production of **haemoglobin** and **myoglobin**, proteins that facilitate the transport of oxygen in blood and muscle tissue. Iron is also present in enzymes that regulate certain important metabolic functions of the body.

The importance of iron from foetal development to adolescence

Iron is an essential nutrient for the child's body, even before birth. Except for major **iron deficiencies in the mother**, during **pregnancy**, the foetus absorbs iron through the placenta and begins to accumulate iron deposits that will be particularly useful during the first six months after birth. In the first months after birth, in fact, the only other source of iron is **breast milk** or **artificial milk**.

At this stage of the child's life, however, growth is rapid and requires more iron daily than will be needed in adulthood. The **prepubertal phase** and **adolescence** may also require an **increased need for iron**, which can be met

with a varied and balanced diet and, when necessary, with specific nutritional supplements.

Why is iron sometimes deficient in children?

Given that growth leads to an increased need for iron, it is not uncommon to find an **iron deficiency in children.**

The main **causes of iron deficiency in children and adolescents** may be as follows:

- **Reduced iron intake through diet**;
- **Reduced iron absorption** due to conditions that reduce the ability of intestinal cells to assimilate nutrients;
- **Reduced prenatal iron accumulation:** frequent especially in prematurely born babies, given that most of the iron present in the baby at birth has been accumulated in the last three months of pregnancy;
- **Increased blood loss** related to particular physiological conditions **(menstrual cycle**), trauma or conditions and infections affecting the gastrointestinal tract.

When iron deficiency is significant, certain disorders or symptoms typical of what is also referred to **iron deficiency anaemia** or **sideropenic anaemia** may occur. In most cases, this is a temporary condition, which sets in slowly and can be resolved with paediatric intervention involving a diet an **iron-rich diet.**

The **most common symptoms of iron deficiency in children** are the following:

- General feeling of tiredness;
- Irritability, headache, migraine;
- Sleep disorders;
- Pale skin and mucous membranes;

- Increased fragility of nails and hair;
- Shortness of breath and difficulty breathing;
- Tachycardia;
- Difficulty concentrating;
- Slower growth.

Iron for children and increased need to support growth

When a varied and balanced diet is not sufficient to ensure an adequate daily iron intake for the child or adolescent, the paediatrician can assess the use of **useful dietary supplements in cases of deficiency or increased needs for this essential nutrient.**

The **SiderAL® range of food supplements** also includes certain nutritional supplements specific for children. The **Sucrosomial® Iron** contained in the **SiderAL®** range of dietary supplements can be useful in all situations in which an **increased bodily need** for iron is required. **Sucrosomial® Technology** enables iron to pass through the stomach intact and be absorbed in the intestine, thus preventing irritation and discomfort in the gastrointestinal tract, as well as ensuring a better taste and making it easier to administer to children.

Low iron in children: causes and remedies

Iron is a very important nutrient to support children's growth. Under normal health conditions, a diet with iron-rich foods is sufficient to ensure normal levels of this nutrient in the body. In some cases, however, blood tests may reveal **low iron levels**. Let's find out what **causes low iron in children** and what remedies are available to restore normal iron levels in the body.

Low iron levels in children: what are the causes?

The growth and development of the body during childhood and adolescence **require an increased bodily need for iron.** Iron plays a role in numerous metabolic functions that regulate the body's growth, the development of the immune system and normal cognitive function. Iron is also essential for the **formation of haemoglobin** and **myoglobin**, proteins that enable the transport of molecular oxygen in the blood and muscles, respectively.

The **increased bodily demand for iron in children**, if not supported by a diet capable of providing the right daily amounts of this nutrient, can lead to **iron deficiency**. When faced with a deficiency, the analysis of **serum iron**, **transferrin** and **ferritin levels** reveal **low iron** values **in the blood**. As a key component of the haem group structure of haemoglobin, low iron in the blood is often related to **low haemoglobin** values**.**

The **causes of low iron in children** can be as follows:

1. **Low iron intake with diet**, often due to **poor** nutrition.
2. **Physiological conditions requiring increased iron intake**: rapid growth in the first years of life requires more iron than in adulthood.

Therefore, iron deficiencies due to physiological causes have a higher incidence amongst children and adolescents. In the case of girls, another factor that can determine an iron deficiency is the menstrual cycle, especially if it is characterised by heavy blood loss.

3. **Inflammatory pathologies of the gastrointestinal tract** (e.g., Crohn's disease) or **enzymatic deficiencies of the intestinal mucosa** (e.g., duodenal cytochrome B deficiency, which reduces trivalent iron (Fe^{3+}) to bivalent iron (Fe^{2+}), facilitating its absorption). Bacterial or viral infections of the intestine can also decrease **iron absorption.**
4. Most of the iron present at birth is what the baby has absorbed through the placenta during pregnancy. In prematurely born babies, therefore, low iron is caused by a **low prenatal iron deposit. Iron deficiency in the mother during pregnancy** can also lead to a low iron deposit in the new-born.

What are the symptoms of low iron in children?

The **symptoms of low iron in children** are the classic symptoms of iron deficiency:

- General fatigue and asthenia;
- Headache, migraine and irritability;
- Pale skin and mucous membranes;
- Sleep disorders;
- Disorders of breathing and shortness of breath, even at rest;
- Tachycardia;
- Difficulty concentrating;
- Slower growth (in cases of major and prolonged iron deficiencies).

In some cases, **low iron in children** may also not show any symptoms. A mild iron deficiency or a very slow onset iron deficiency can only be diagnosed by blood tests prescribed by the paediatrician.

What are the remedies for overcoming low iron in children?

In normal health conditions, remedies for overcoming **low iron in children** and restoring normal levels in the body are as follows:

- a varied and balanced diet that includes **iron-rich foods**. Foods rich in iron, it must be recalled that animal-based foods (meat, liver, spleen, fish) contain haem iron, a form of iron more easily assimilated by our body. Plant-based foods (green leafy vegetables, legumes, cereals), on the other hand, contain non-haem iron, which is assimilated more slowly by the body. **Foods rich in vitamin C** (citrus fruits, pineapple, kiwi) increase the absorption of iron introduced with the **diet**.
- When diet alone is not sufficient to ensure the correct supply of iron to the body, the paediatrician may also recommend iron supplementation through certain **food supplements** that can meet the body's daily needs.

Which iron-rich foods are most suitable for children?

Iron is an essential mineral for the **normal psychophysical development of children and adolescents**. A correct iron intake through diet helps to counteract iron deficiencies and support **increased iron requirements during growth**. Let's find out which **iron-rich foods** are **suitable for children.**

Which iron-rich foods are most suitable for children?

Diet is a major source of iron at all ages. In the case of children, iron is particularly important during childhood, to support the rapid development of the body during the first year of life and during both the prepubertal age and adolescence.

The main **food source of iron** in the first six months of a child's life is milk. The iron present in breast milk is easily assimilated by the new born as it is **highly bioavailable iron**, being bound to a protein, **lactoferrin**, which regulates its transport. The iron contained in formula milk is less assimilable than the iron contained in breast milk. However, some types of formula milk are "enriched" to ensure a correct iron intake, especially in infants suffering from an iron deficiency at birth.

From the fourth month, with the introduction of the first feeds, the new born baby's diet is enriched with numerous **sources of plant-based iron** (cereal-based foods, fruit and vegetables) **and animal-based iron** (homogenised meat and fish). Cow's milk, on the other hand, is not recommended as it is rich in calcium, a nutrient that can hinder the **normal absorption of iron by the intestinal cells**. Cow's milk can be introduced after the first year of age, when weaning is completed and the child takes iron from numerous sources of animal and plant origin.

Between the first year of age and the prepubertal phase it is important to promote proper nutritional education in the family. A balanced diet, which provides all the necessary nutrients in the right quantities, is the basis for the overall health and well-being of the body. In the case of iron, it is important to correctly balance the intake of animal-based iron and plant-based iron.

The **most iron-rich foods suitable for children and adolescents are as follows**:

- Liver, spleen and offal
- Meat and muscle (turkey, horse, beef)
- Fish (tuna, mackerel, snapper, sardine, anchovy)
- Egg yolk
- Legumes (dried beans)
- Soya flour
- Nuts
- Whole grain cereals
- Oat flakes
- Green leafy vegetables (watercress, cabbage, lettuce, endive)

Iron-rich foods for children: what are the differences between animal-based foods and plant-based foods?

Not all iron consumed through diet is **absorbed in the same way by the human body**. Animal-based foods (e.g., meat, liver, spleen, fish) contain **haem iron**, a form of iron that is more easily absorbed in the intestine than the **non-haem iron** contained in plant-based foods.

The **haem iron** contained in animal-based food comes from the **haemoglobin** and **myoglobin** present in the food matrix (in the portion of meat or fish, in this case). Haem iron is absorbed directly by the enterocytes (cells of the intestinal villi) as it is bound to porphyrins, substances which, together with the same iron, make up the haem group of **haemoglobin** and **myoglobin**.

The **non-haem iron** or **inorganic** iron contained in plant-based food is less bioavailable than **haem** iron as it is found in the intestinal environment in the form of trivalent iron. In order for it to be absorbed by the body, trivalent iron must be reduced to bivalent iron. On the surface of the cells of the intestinal villi is an enzyme, duodenal cytochrome B, which reduces trivalent iron to bivalent iron and enables its absorption through the cell membrane.

The **absorption of non-haem iron**, compared with the **absorption of haem iron**, can be more easily hindered by the action of certain substances present in foods, such as **calcium**, **phytates** (present in cereals), **oxalates** (present, for example, in spinach) and **tannins** (tea and chocolate). **Vitamin C**, on the contrary, **increases the absorption of non-haem iron.**

Foods suitable for overcoming iron deficiency in children

Growth or certain specific physiological conditions, such as heavy menstruation in girls, may require an **increased body need for iron**. A varied and balanced diet is the first step for preventing **iron deficiency.** However, sometimes, diet alone is not enough to ensure the right daily iron intake. In these cases, it is advisable to consult a paediatrician, who will assess the advisability of taking a **food supplement containing iron**.

The **SiderAL®** range of food **supplements** also includes nutritional supplements containing **Sucrosomial® Iron** which are suitable for addressing iron deficiencies or an increased body iron requirements in children and adolescents.

Sucrosomial Iron-based supplements for children. What are they for? What are the advantages?

The **SiderAL® Range of dietary supplements** also includes some specific nutritional supplements for children based on **Sucrosomial®** Iron. **Sucrosomial®** Iron (Sideral® r.m.) is the result of years of research carried out by **PharmaNutra** laboratories with the aim of overcoming the problems related to the daily supplementation of oral iron.

In this article, we discover the advantages of **Sucrosomial®** Iron administration compared with traditional iron and which **food supplements from the SiderAL®** Range can be useful in cases of deficiency or increased need for iron in children and adolescents.

Iron for children: when is it needed?

Iron is an essential mineral for **normal cognitive development** during childhood and adolescence. These periods in the life of each individual may require an **increased body need for iron to support the rapid growth of the whole body**. Iron also supports the **normal development of the immune system** and promotes the production of **haemoglobin** and **myoglobin**, proteins responsible for transporting oxygen in the blood and muscles. Iron is also a constituent of certain enzymes that regulate fundamental biochemical and metabolic functions of our body at all ages.

Source of iron for children

An adequate daily iron intake is of particular importance from the earliest

stages of life. The **primary sources of iron** for the new-born body (and for all the first six months of life) are the deposits accumulated from the prenatal period and the milk (maternal or artificial). From weaning to prepubertal age and adolescence, iron requirements are supported by a varied and balanced diet that includes **iron-rich foods** such as turkey meat, liver, spleen, fish (tuna, mackerel), green leafy vegetables, legumes and grains. Fruit, especially the one rich in vitamin C (kiwi, citrus, pineapple), must also be included in the **diet to overcome iron deficiency**.

When the diet is not sufficient to meet increased needs or in the presence of iron deficiency, it may be necessary to use **iron-based dietary supplements** to **restore the body's iron values to normal**.

Sucrosomial® Iron-based dietary supplements for children: what are the advantages?

There are numerous iron-based nutritional supplements on the market. In most cases, these are supplements that contain inorganic iron salts. Such supplements are useful in cases of iron deficiency or increased need, but sometimes they can have some undesirable effects.

Sucrosomial® Iron (Sideral® r.m.), the result of years of research by PharmaNutra laboratories, may avoid the most common side effects normally associated with conventional iron supplementation (gastrointestinal disorders, heartburn, intestinal irritation, staining of mucous membranes and teeth).

Another advantage of the administration of **Sucrosomial® Iron** is the taste: **Sucrosomial® Technology** patented by PharmaNutra, protects iron in the gastric environment and promotes its intestinal absorption, but, at the same time avoids the typical metallic aftertaste of iron and is therefore more easily accepted by children.

Food supplements containing Sucrosomiale®Iron for children from the SiderAL® Range

The **food supplements of the SiderAL®** Range are characterised by:

- the presence of **Sucrosomial®** Iron with high absorption and high bioavailability;
- excellent taste and high gastrointestinal tolerability;
- easy to dose and administer to children thanks to the formulations in drops and sachets.

Supplements containing **Sucrosomial®Iron from the SiderAL® Range,** suitable for children and adolescents are **SiderAL® Gocce, SiderAL® Gocce Forte, SiderAL® Bimbi** containing **Sucrosomiale® Iron**, **Vitamin C Group B Vitamins** and **SiderAL® ORO 14** containing **Sucrosomial® Iron**, **Vitamin C** and **B Group Vitamins** (specific formulation for young people and adolescents).

Supplements are not intended as a substitute for a varied, balanced diet and a healthy lifestyle.

SiderAL

PHARMANUTRA