



**ORIGINAL RESEARCH PAPER**

**Preventive Medicine**

**IRON DEFICIENCY ANAEMIA: GLOBAL HEALTH CONCERN**

**KEY WORDS:** Iron Deficiency, Anaemia, Iron Deficiency Anemia (Ida), Self-Care.

**Dr. Sandhya Thorat**

PhD Scholar, Associate Professor, Department of Community Medicine, Anantrao Kanase Homeopathic Medical College

**ABSTRACT**

**Introduction:** Deficiency of iron is common cause of anaemia that results in iron deficiency anaemia. Low birth weight premature babies, entirely breastfed infants, children, adolescents, pregnant and lactating women, menopausal women, elderly people are at risk of development of iron deficiency anaemia. **Objective:** To understand iron deficiency anaemia scientifically with special emphasis on “self-care” for preventing and controlling iron deficiency anaemia. **Methodology:** Textbooks, WHO global database, PUBMED database, scientific research papers published in journals are studied for basic understanding of iron deficiency anaemia and role of self-care in iron deficiency anaemia. **Results and Discussion:** The study revealed dietary deficiency of iron is an important cause of iron deficiency anaemia. **Conclusion:** Health care professionals should be aware of early detection of iron deficiency and prevention of iron deficiency anaemia through health education on “self-care”

**IRON**

Iron is an important element that can be obtained from food. Dietary iron has two forms haem and non- haem. Non-haem Iron can be obtained mainly from plant foods and haem Iron can be obtained from animal foods like organ meat. Bioavailability of haem iron is higher than non-haem iron. Ascorbic acid (Vitamin C) increases bioavailability of non-haem iron, whereas calcium decreases bioavailability of both haem iron and non-haem iron. Tannin and phytates present in grains reduce absorption of non- haem iron. Iron is absorbed from the small intestine and it transported with the help of transferrin (1,2). Iron is stored in the liver, spleen and bone marrow in the form of ferritin and haemosiderin (1). Hepcidin, a peptide hormone regulates absorption and distribution of iron. It maintains total body iron in normal range and helps to avoid iron deficiency as well as iron excess (3). Small amount of iron is lost in faeces, urine, and cells shed from skin and gastrointestinal tract (1,4).

Iron is required for different important functions in the body. Iron is an important component of haemoglobin and myoglobin. Iron present in haemoglobin plays important role in oxygen transport (1).

**Table – 1 Iron Distribution In Adult Humans**

Compartment	Major iron containing protein	Iron content (mg)
Erythrocytes	Haemoglobin	1500-2500
Storage – Hepatocytes and macrophages	Ferritin	200-1200
Plasma	Transferrin	3-4
Other tissues	Myoglobin in muscles and others	200

Source: (5)

**Iron Deficiency**

Iron deficiency may occur due to inadequate dietary intake, conditions like malabsorption which reduces iron absorption, increased requirement of iron in conditions like pregnancy, physiological blood loss that occur due to heavy menstruation or during labour, pathological blood loss which can occur in helminthic infestations such as hookworm and plasmodial infections like malaria. Improper erythropoiesis can also result in iron deficiency (1,4).

Iron deficiency adversely affects:

- The cognitive performance, behaviour and physical growth of infants, preschool and school-age children;
- The immune status and morbidity from infections of all age groups;
- The physical capacity and work performance of adolescents and adults of all age groups (6).

Progression of iron deficiency can be categorized as follows:

**Table – 2 Iron Deficiency Categories**

Category	Impact on iron store	Laboratory findings
Mild deficiency	Iron stores starts depleting.	Reduced serum ferritin. Reduced level of iron in bone marrow.
Marginal deficiency	Iron stores are depleted. Reduced supply of iron to erythropoietic cells.	Reduced transferrin saturation. But still haemoglobin level is within normal range.
Iron deficiency anaemia	Iron stores are exhausted.	Reduced haematocrit value. Reduced haemoglobin level. Decrease in size of red blood cells. Evidence of microcytic, hypochromic anaemia on the peripheral blood smear.

Source: (1)

**Risk Factors Of Iron Deficiency Anaemia**

**Age:** Premature babies, adolescents, reproductive age group, elder age group.

**Sex:** More risk in females.

**Diet:** Vegans and vegetarians have more risk.

**Physiological conditions:** Pregnancy, lactation, entirely breastfed infants, growing children (4).

**Causes Of Iron Deficiency Anaemia**

Iron deficiency anaemia can occur due to various causes like:

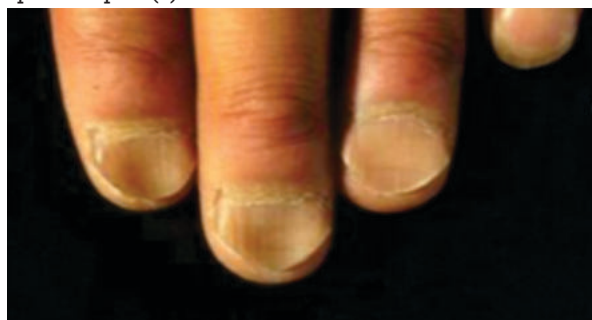
- Low iron stores at birth due to maternal anaemia
- Increased demand of iron in growing children
- Dietary deficiency of iron
- Decreased absorption of iron
- Blood loss due to parasitic infestations
- Blood loss during menstruation or due to post-partum haemorrhage
- Teenage pregnancy and pregnancies with birth spacing of less than two years
- Coeliac disease
- Peptic ulcer
- Oesophageal varices
- Inflammatory bowel disease
- Haemorrhoids

- Stomach or colorectal cancer
- Rheumatoid arthritis
- HIV / AIDS
- Kidney failure
- Gastrectomy
- Use of non-steroidal anti-inflammatory drugs (4,6,7)

**Clinical Features Of Iron Deficiency Anaemia**

Lethargy, weakness, headache, tinnitus, brittle nails, glossitis, angular stomatitis. Rarely there can be oesophageal or pharyngeal webs, in such cases patients may present with dysphagia.

Koilonychia can be seen on examination, where nails are spoon shaped. (4)



**Figure 1:** Koilonychia

**Sources:** <https://epomedicine.com/clinical-medicine/koilonychia/>

**Epidemiology**

Problem of anaemia is major public health concern. One of the most important causes of anaemia is dietary iron deficiency. Dietary deficiency of iron is most common nutritional deficiency that leads to anaemia (8).

Iron deficiency anaemia is more common in developing countries. Risk of development of iron deficiency anaemia is high in children and adolescents (9).

Iron deficiency anaemia is major public health problem in India and it is widely prevalent among all age groups.

**Detection Of Iron Deficiency Anaemia**

Most commonly used tests for early detection of iron deficiency through screening include “haemoglobin” and “haematocrit” (1).

**Serum ferritin:**

Estimation of serum ferritin level helps to measure the amount of iron stored in the body. Currently it is most efficient and cost-effective test for diagnosing iron deficiency. When iron stores start depleting, serum ferritin level also starts decreasing and it happens during initial stage of iron depletion. Hence estimation of serum ferritin level helps us in early detection of low iron status / latent iron deficiency. Thus, with the help of serum ferritin test we can detect iron deficiency in latent form and before the onset of iron deficiency anaemia. However, we must know that serum ferritin level is influenced by inflammation and its level may be increased during inflammatory conditions like infectious diseases (1).

**Table – 3 Cut Off Value Of Serum Ferritin For Diagnosis Of Ida**

Inflammatory disease	Serum ferritin level
Absence of coexisting inflammatory disease	12 to 15 µg/l
Presence of coexisting inflammatory disease	50 µg/l or more

**Source:** (3)

- Stool examination for occult blood to detect parasitic infections
- Endoscopy (oesophagogastroduodenoscopy, colonoscopy) for detecting gastrointestinal causes of iron deficiency anaemia
- Ultrasound examination for detecting gynaecological and obstetric causes of iron deficiency anaemia.
- Haemoglobin electrophoresis
- Small bowel imaging – MRI enteroclysis, CT enterography, barium studies (3,4).

**Serum Markers Of Iron Deficiency Anaemia**

Low ferritin, low iron, low transferrin saturation. Increased total iron binding capacity, increased serum transferrin receptors, increased red cell zinc protoporphyrin (3,7).

**Iron Deficiency Anaemia: Diagnosis And Differential Diagnosis**

**Table – 4 Diagnosis Of Ida**

Haemoglobin	Men < 13.5 g/dl Women < 11.5 g/dl
Mean cell volume	< 76 fl
Mean cell haemoglobin	29.5 pg (27 – 32 pg)
Mean cell haemoglobin concentration	325 g/l (300 – 350 g/l)
Blood film	Microcytic hypochromic red cells with pencil cells and target cells
Serum ferritin	Men < 10 µg/l Women (premenopausal) < 5 µg/l Women (post-menopausal) < 10 µg/l
Serum Iron	Men < 14 µmol/l Women < 11 µmol/l
Total iron binding capacity	>75 µmol/l

**Source:** (4)

**Table – 4 Differential Diagnosis Of Ida**

	Iron deficiency anaemia	Thalassaemia	Sideroblastic anaemia
Mean cell volume	Decreased	Decreased	Normal Decreased or Increased
Serum ferritin	Decreased	Normal	Increased
TIBC (Total iron binding capacity)	Increased	Normal	Normal
Serum iron	Decreased	Normal	Increased
Marrow iron	Absent	Present	Present

**Source:** (4)

**Prevention Of Iron Deficiency Anaemia**

Prevention iron deficiency anaemia should focus on following approaches

1. Nutrition counselling
2. Iron supplementation therapy
3. Fortification of food with iron
4. Control of infection (9)

**Self- Care In Iron Deficiency Anaemia**

- Taking daily diet rich in iron sources.
- Common iron rich food includes meat, poultry, fish, seafoods, chickpea (chana), bengal gram whole (kala chana), red gram (arhar), black gram (urad dal), soybean, lentil, spinach (palak), amaranth (chauli), fenugreek (methi), mint (pudina), colocasia leaves (arvi), onion stalks, pumpkin, custard apple, watermelon
- Consuming vitamin C rich food along with iron rich food.
- Common vitamin C rich food includes lemon and citrus fruits, amla, vegetables like cabbage, drumstick leaves, coriander leaves
- Avoiding tea and coffee specifically after eating iron rich foods.

- Washing hands with soap and water so as to prevent infections.
- Using latrine and avoiding open field or open-air defecation
- Avoiding walking with barefoot in the farms.
- People who require iron and calcium supplements, it should be taken at different times and not simultaneously.
- Females suffering from heavy bleeding during menstruation should take treatment in time.
- People suffering from bleeding piles or bleeding disorders must take proper treatment (6,8).

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