Iron deficiency is a consequence of: (a) decreased iron intake, (b) increased iron loss from the body or (c) increased iron requirements.

(a) Decreased iron intake may be due to inadequate diet or impaired absorption.

Inadequate diet
In infancy, iron deficiency is most often the result of use of unsupplemented milk diets which contain inadequate amounts of iron. Milk products are very poor sources of iron and prolonged breast or bottle feeding of the infant frequently leads to iron deficiency, unless there is iron supplementation. This is especially true for premature infants.

Increasing use of refined foods such as white bread and white rice leads to consumption of a diet poor in iron. Similarly increasing use of “junk” foods like pizzas, potato chips, French fries and packaged snack foods – all have high fat content, are conducive to obesity, atherosclerosis and type II diabetes – but are low in iron content.

Iron requirements of adult males are very small; needs to absorb only about 1 mg iron daily from diet in order to maintain normal iron balance. But women in child bearing age need to absorb at least 3 mg iron daily. Blood losses during menstruation and increased iron requirements during pregnancy and lactation predispose the women to have poor iron stores. Traditionally, the Indian housewife eats last after all male members and children have eaten, and in many families, the women eat only the left over. Hence, even though food prepared for family is same, women are more prone to develop IDA than other members of the family.

In older children, a predominantly milk and cereal based diet and food fads can also lead to iron deficiency anemia (IDA). An average American diet provides around 6 mg iron per 1000 Kcal and nearly half of this is in the form of fortified cereals. Hence amount of absorbable and assimilable iron is nearly 50% of total iron intake. In India, since cereals are not routinely fortified with iron, the total iron consumption is still less. Also a large proportion of Indian population is strictly vegetarian, and most vegetables and fruits are poor in iron content.

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Deficient absorption
Iron absorption is enhanced by gastric acidity.
so, hypochlorhydia or achlorhydia due to any cause affects iron absorption from food. Components in the diet like vitamin C and meat enhance iron absorption where as phosphates, phytates and tenants retard absorption. Partial gastrectomy or gastrojejunostomy affects iron absorption by reducing acid content of gastric juice and bypassing duodenum – the site of maximum iron absorption. Diarrhea due to any cause impairs iron absorption. Intake of antacids, acid suppressive agents significantly reduces iron absorption.

(b) Increased iron loss

More than 50 causes of G. I. bleed have been documented. Steady losses of small amounts of blood may go unnoticed. Hook worm infection is very common in India. Each adult hook worm sucks 0.1ml of blood everyday. Severe hook worm infestation thus forms a major cause of IDA in India.

25% of world population suffers from piles and a large majority of them have bleeding, thus forming an important cause of IDA. IDA occurs in 15% of all cases of hiatus hernia. 10 to 15 ml of blood may be lost everyday. Bleeding is due to stretching of gastric mucosa at the neck of the hernial sac.

80% of patients with ulcerative colitis have IDA

Other causes include esophageal varices, peptic ulcers, polyps and diverticulosis. Cancer of the stomach and colon not uncommonly, present as IDA. Aspirin and other non steroidal anti-inflammatory drugs, steroids and anticoagulants are some of the medications which can cause bleeding from the G. I. tract. Hereditary telangiectasis is a frequently missed cause of IDA. One should always look for telangiectasis on the tips of fingers, lips and other parts of the body in a patient with unexplained G. I. bleed.

Bleeding from the genital tract in a female is a very common cause of iron deficiency. Menorrhagia due to any cause e.g. fibroids, endometriosis, bleeding disorders etc. causes recurrent blood loss and thus IDA. Ante partum and postpartum hemorrhage are other causes of iron loss.

Each unit of blood contains 250mg of iron. Even one unit of blood donation in a susceptible woman and 3 to 4 donations by men may exhaust their iron stores. Iron supplements are necessary if the frequency of blood donation is more than one per year.

IDA is very common in patients undergoing hemodialysis. Diagnostic tests, loss of blood during dialysis, diminished oral intake and malabsorption due to aluminum hydroxide given for hypophosphatemia and hyperacidity, are the factors acting together to develop IDA in these patients.

Conditions that cause intravascular hemolysis like malaria, G6PD deficiency etc also causes IDA.

(c) Increased iron requirements

Iron requirements are increased during the period of active growth in childhood, especially from six months to 3 years and during adolescence. Iron requirements are proportionately greater in premature and underweight babies. During pregnancy and lactation, iron requirements are increased. Failure to meet these increased requirements is the commonest cause of IDA.

Clinical Features

Iron deficiency is well tolerated. Anemia does not develop till the storage iron is exhausted. IDA develops in well defined, identifiable stages from normal to pre-latent, latent, early and late stage; this may gradually progress over a period of many months or years. The patient may have experienced tiredness, fatigability, headache, body ache, paraesthesia and lack of concentration for months or years before medical attention is sought. A perverted appetite leading to ingestion of mud may be a symptom of iron deficiency. Apart from the signs and symptoms of anemia in general, there are certain features which are specific to IDA – like smooth tongue, angular stomatitis, brittle, flattened or spoon shaped nails (koilonychia). Some patients develop upper esophageal mucosal web formation with resultant dysphagia. The combination of splenomegaly, koilonychia and dysphagia in a case of IDA has been described as Plummer-Vinson or Paterson-Kelly syndrome.

Iron deficiency has been said to cause menorrhagia thereby setting up a viscous cycle perpetuating and aggravating IDA. With severe anemia, there may be amenorrhea. When IDA is severe and has been present from early childhood, it may lead to impairment of physical growth and sexual development.

Investigations

These fall into two categories: (1) investigations to establish and assess the severity of IDA and (2) investigations to determine the cause of IDA.

A complete blood count offers us some indications about iron deficiency. In the red cell morphology the hallmark of iron deficiency is the presence of microcytosis and hypochromia. As many hematologists in the country have started using semi automated or automated hematology counters, these counters if properly calibrated gives a very accurate measurement of various red cell indices of which MCV, MCH, RDW gives us a good picture of state of iron nutrition. In classical iron deficient erythropoiesis MCV and MCH are reduced and red cell diameter width (RDW) which is a measure of anisocytosis is increased. This assessment is important because in our country α- that trait and β- that trait are not uncommon and both the conditions can give rise to low MCV, low MCH like IDA but normally they do not alter the RDW unless it is complicated by additional iron, folate or B12 deficiency. Platelet counts are some times increased in patients with IDA particularly so when the iron deficiency state is associated with continued blood loss.

Serum iron is reduced to less than 15%. This helps us to differentiate IDA from other conditions which also show hypochromia and microcytosis on smear like alpha and beta thalassemia, sideroblastic anemia etc. However if along with IDA there is...
presence of vitamin B12 and folic acid deficiency also, or if there is chronic infection or any other chronic disease, serum iron studies lose their diagnostic value.

In pure IDA, bone marrow smears show normoblasts which are smaller in size and their cytoplasm is vacuolated and has ragged margins. Deficiency of B12 and folic acid produce diametrically opposite effects. As a result when there are multiple deficiencies the bone marrow may be micronormoblastic, macronormoblastic or even normoblastic.

Bone marrow smears can be stained for hemosiderin by Prussian blue stain. In IDA marrow iron is diminished or even absent. Marrow iron is diminished even before the hemoglobin drops and so in cases of latent iron deficiency or in multiple nutrient deficiency this can be a useful test to tell us about iron status of the body.

Though the commonest cause of iron deficiency is inadequate iron intake, all effort should be made to detect other iron deficiency, especially blood loss. Stool examination for hook worm infection and for presence of occult blood should be done in all patients. In patients with suspected GI blood loss or stool occult blood positivity, an upper and/or colonoscopy may be required. Similarly in female patients, a pelvic ultrasound should be done to determine the cause of menorrhagia if present.

GLOBAL STRATEGY: BREASTFEEDING CRITICAL FOR CHILD SURVIVAL
UNICEF and WHO call for increased commitment to appropriate feeding practices for all infants and young children
23 MARCH 2004 | NEW YORK — Calling on governments to promote and protect breastfeeding, UNICEF and WHO today jointly launched the Global Strategy for Infant and Young Child Feeding. The document, developed over two years of global consultation, pinpoints the main problems affecting infant and young child feeding and identifies approaches to their solution. “There is no better way than breastfeeding to make sure that a child gets the best start in life,” said UNICEF Executive Director Carol Bellamy. “The strategy is an invaluable roadmap for governments to create supportive environments where women can make informed choices about feeding their children.”

Breastfeeding alone provides the ideal nourishment for infants for the first six months of life as it provides all the nutrients, antibodies, hormones, immune factors and antioxidants an infant needs to thrive. It protects babies from diarrhoea and acute respiratory infections and stimulates their immune systems.

“Virtually all mothers can breastfeed provided they have accurate information, and support within their families and communities and from the health care system,” said LEE Jong-wook, Director-General of WHO. “Governments should move swiftly and effectively to implement this important strategy.”

Lack of breastfeeding - and especially lack of exclusive breastfeeding during the first half-year of life - are important risk factors for infant and childhood morbidity and mortality. These risk factors are compounded by inappropriate complementary feeding as infants grow.

“Exclusive breastfeeding in the first half-year of life and continued breastfeeding coupled with appropriate foods reduce the number of children under five who die from malnutrition,” said Dr Lee. Malnutrition is associated with more than 50% of deaths among children under five.

The strategy calls for a dramatic increase in the number of infants who are exclusively breastfed. Currently, no more than 35% of infants worldwide are exclusively breastfed during even the first four months of life. Complementary feeding frequently begins too early or too late, and foods are often nutritionally inadequate and unsafe. Malnourished children who survive are more frequently sick and suffer the life-long consequences of impaired development.

“The long-term impact of poor feeding practices in infancy and early childhood include poor school performance, reduced productivity and impaired intellectual and social development,” Bellamy said. In addition to stressing the link between the health and nutritional status of mothers and children, the strategy addresses the challenges of feeding in exceptionally difficult circumstances, such as natural or man-made emergencies.

The strategy also highlights the issue of optimal feeding of the roughly 2.6 million children who are born to HIV-infected women each year. The absolute risk of HIV transmission through breastfeeding - globally between 5% and 20% - needs to be balanced against the increased risk of morbidity and mortality when infants are not breastfed. All HIV-infected mothers should receive information about the risks and benefits of various options and guidance in choosing the most