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IRON AND NUTRITIONAL ANAEMIA

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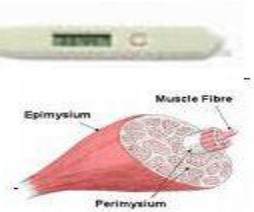
- Iron is a mineral, having great importance in human nutrition.
- Adult human body contains 3-4 gm of iron. About which 70% present in blood (Hb iron) as circulating iron. Rest 30% as storage iron.
- Each gram of hemoglobin contains about 3.34 mg of iron.

Functions of Iron

1. Formulation of hemoglobin
2. Binding O2 to RBC and transport
3. Formulation of cytochrome myoglobin
4. Regulation of Body temperature
5. Muscle activity
6. Catecholamine metabolism
7. Immune system
8. Brain Development & function
9. Thyroid function



• SOURCES OF IRON

Haem Iron (from animal foods)	Non-haem Iron (from plant foods)
✓ Fish/Seafood 	✓ Dark green leafy vegetables 
✓ Meat: Beef/Lamb/Pork/Kangaroo	✓ Legumes (kidney beans, baked beans, chickpeas) 
✓ Poultry: Chicken or Turkey	✓ Eggs
✓ Offal: Liver and Kidney 	✓ Nuts/nut pastes
	✓ Tofu
	✓ Iron-fortified breads and cereals

: Iron absorption :

- Iron is absorbed from duodenum and upper small intestine in the form of ferrous.
- Absorption is influenced by iron reserves, inhibitors and promoters and disorders of duodenum and jejunum.
- Absorbed iron is transported as plasma ferritin and stored in liver, spleen, bone marrow and kidney.
- When red cells are broken down, the liberated iron is reutilized in the formation of new red cells.
- Milk, tea and eggs inhibit iron absorption.

: IRON LOSSES :

- Total daily iron loss of an adult is – 1mg and 12.5mg per 28 days cycle in menstruating women.
- Routes of iron losses are ;

1. Hemorrhagic : physiological and pathological
2. Basal losses : excretion through urine, sweat, bile and desquamated surface cells.

- Wide spread of IUCD's is an additional cause of iron loss.
- Where as Hormonal contraceptives decrease menstrual blood loss.

: IRON DEFICIENCY :

- **1st stage** : Decreased storage of iron without any other dectatable abnormalities.
- **2nd stage** : Intermediate stage of " latent iron deficiency " – iron stores are exhausted but anemia has not occurred yet. Depends on serum ferritin levels.
- **3rd stage** : Overt iron deficiency – decrease in the concentration of circulating hemoglobin due to impaired hemoglobin synthesis.

- End result of iron deficiency is " Nutritional Anemia " – It's a syndrome caused by malnutrition rather than disease.
- Besides anemia, there may be other functional disturbances like – impaired cell mediated immunity, reduced resistance to infection, increased morbidity and mortality and diminished work performance.
- **EVALUATION OF IRON STATUS :**

1. Haemoglobin concentration.
2. Serum iron concentration.
3. Serum ferritin.
4. Serum transferrin saturation.

- **Diagnosis of anaemia :**

Age/Gender Groups	Hb Below (g/dL)
Children	
6 months to 4 years	<11.0
5 to 11 years	<11.5
12 to 14 years	<12.0
Adults	
Non-pregnant women ≥15 years	<12.0
Pregnant women ≥15 years	<11.0
Men ≥15 years	<13.0

: NUTRITIONAL ANAEMIA :

- **Definition** : A condition in which the haemoglobin content of blood is lower than normal as a result of a deficiency of one or more essential nutrients, regardless of the cause of such deficiency.
- Most frequent cause of nutritional anaemia is iron deficiency and less frequently folate or vitamin B12.
- Nutritional anaemia is a worldwide problem with highest prevalence in developing countries.
- It is found especially among women of child bearing age, young children and during pregnancy and lactation.

- **India** : has probably the highest prevalence of nutritional anaemia in women and children.
- About one half of non pregnant women and young children are estimated to suffer from anaemia.
- 60 – 80 % of pregnant women are anaemic.
- 19% of maternal deaths are due to anaemia.
- **Detrimental effects :**

1. Pregnancy.
2. Infection.
3. Work capacity.

: INTERVENTIONS :

- Estimation of Hb% should be done to assess the degree of anaemia.
- Severe anaeima – less than 10mg/dl – high doses of iron or BT.
- If Hb% is between 10 – 12mg/dl, the interventions are ;

a) Iron and folic acid supplementation.
b) Iron fortification.
c) Other strategies.

a) Iron and folic acid supplementation: Dosage

Mothers	1 tablet of iron and folic acid contains 100mg of elemental iron and 0.5mg of folic acid.	1 tablet * 3 months	Hb% estimation at every 3 – 4 months interval
Infants	20mg of elemental iron and 0.1mg of folic acid.	1 tablet * 100 days	Screening at 6, 12 and 24 months if anaemia is suspected
6 – 60 months children	Preferably liquid formation 1ml	1ml * 100days	
Children 6 – 10 years	30mg of elemental iron and 0.25mg of folic acid	1 tablet * 100 days	
adolescents	Same as adults		

b) Iron fortification :

- National institute of nutrition Hyderabad showed that simple addiction of ferric ortho phosphate or ferrous sulphate with sodium bisulphate was enough to fortify salt with iron.
- When consumed over a period of 12 – 18 months , iron fortified salt was found to reduce prevalence of anaemia.
- Commercial production of iron fortified salt was started in 1985.
- Advantageous as salt is universally consumed dietary item.

c) other strategies :

- Changing dietary habits.
- Control of parasites.
- Nutrition education.

: PROPHYLAXIS AGAINST NUTRITIONAL ANAEMIA :

- National programme for the prevention of nutritional anaemia was launched by the government of India during 4^{th} five year plan.
- Programme consists of distribution of Iron and Folic acid tablets (Folifar) to pregnant women and young children under 1 – 12 years.
- MCH centers in Urban areas, PHC in Rural areas and ICDS projects are engaged in the implementation of this programme.
- Iron fortification of common salt.

THANK YOU