

Definition, etiopathogenesis, clinical manifestations, nonpharmacological and pharmacological management of the diseases associated with Haematological disorders

Iron Deficiency Anemia (IDA)

Definition:

- Iron deficiency anemia is a microcytic, hypochromic anemia caused by inadequate iron levels in the body, leading to reduced hemoglobin synthesis and impaired oxygen transport.
- It is the most common type of anemia worldwide, especially in women and children.

Etiopathogenesis:

- Iron is essential for:
 - Hemoglobin synthesis
 - Myoglobin (muscles)
 - Enzymes (cytochromes, catalase)
- When iron intake, absorption, or storage is impaired or when loss exceeds intake, iron deficiency results.

Causes:

1. Increased iron loss:

- **Chronic blood loss:**
 - GI bleeding (e.g., peptic ulcer, hemorrhoids, colon cancer)
 - Menorrhagia (heavy menstrual bleeding)
 - Hookworm infestation

2. Decreased iron intake:

- Poor dietary iron (common in vegetarians or low socioeconomic groups)

3. Decreased absorption:

- Malabsorption syndromes (e.g., celiac disease)
- Post-gastrectomy
- Chronic diarrhea

4. Increased demand:

- Pregnancy

- Infancy
- Adolescence
- Lactation

Stages of Iron Deficiency:



1. **Depletion of iron stores** (low ferritin)
2. **Iron-deficient erythropoiesis** (low serum iron, high TIBC)
3. **Iron deficiency anaemia** (low Hb, microcytic RBCs)

Clinical Manifestations:

General symptoms of anemia:

- Fatigue
- Weakness
- Dizziness
- Pallor (especially conjunctiva, palms)
- Shortness of breath on exertion
- Palpitations

Specific to iron deficiency:

- Koilonychia (spoon-shaped nails)
- Angular stomatitis
- Glossitis (smooth, sore tongue)
- Pica (craving for non-food items like clay, ice, paper)
- Restless leg syndrome (occasionally)

Non-Pharmacological Management:

• Dietary Counseling:

- Iron-rich foods: red meat, poultry, liver, eggs
- Plant sources: legumes, green leafy vegetables, dried fruits
- Enhance iron absorption with vitamin C (citrus fruits, tomatoes)
- Avoid tea/coffee with meals (tannins inhibit iron absorption)

- **Treat underlying causes** (e.g., bleeding ulcers, menstruation)

Pharmacological Management:

1. Oral Iron Therapy:

- **Ferrous sulfate**, ferrous gluconate, ferrous fumarate
- Typical dose: 100–200 mg elemental iron per day
- Take on an empty stomach with vitamin C
- Side effects: constipation, nausea, black stools

2. Parenteral Iron Therapy:

- Indicated if oral iron is not tolerated, not absorbed, or rapid correction is needed
- Preparations: iron sucrose, ferric carboxymaltose, iron dextran

3. Blood Transfusion:

- Only in severe anemia or symptomatic patients with very low hemoglobin

4. Monitoring:

- Check hemoglobin, reticulocyte count, ferritin (iron stores)
- Continue iron therapy 3–6 months after normalization to replenish stores

Megaloblastic Anemia

Definition:

- Megaloblastic anemia is a macrocytic anemia characterized by defective DNA synthesis in the bone marrow, resulting in the production of large, immature, and dysfunctional red blood cells (megaloblasts).
- The most common causes are vitamin B12 and/or folic acid deficiency.

Etiopathogenesis:

- Pathogenesis involves impaired DNA synthesis due to lack of cofactors required for nucleotide formation.
- This leads to:
 - Delayed nuclear maturation
 - Asynchronous maturation of nucleus and cytoplasm
 - Ineffective hematopoiesis and destruction of immature cells in the marrow

Causes:

A. Vitamin B12 Deficiency:

- **Nutritional deficiency** (e.g., strict vegetarians)
- **Pernicious anemia:** Autoimmune destruction of intrinsic factor
- **Gastrectomy** or gastric atrophy (loss of parietal cells)
- **Ileal disease:** Crohn's disease, resection
- **Chronic alcoholism**

B. Folic Acid Deficiency:

- Poor diet (especially in alcoholics)
- **Increased demand:** pregnancy, hemolytic anemia, malignancy
- **Malabsorption:** celiac disease
- **Drugs:** methotrexate, phenytoin, trimethoprim

Clinical Manifestations:

Common to all megaloblastic anaemias:

- Fatigue, pallor, weakness
- Glossitis (beefy red tongue)
- Diarrhea or anorexia
- Mild jaundice (due to intramedullary hemolysis)
- Weight loss

Vitamin B12 Deficiency Specific:

- **Neurological symptoms** (not seen in folate deficiency):
 - Peripheral neuropathy (numbness, tingling in hands/feet)
 - Ataxia (loss of coordination)
 - Spasticity, positive Babinski reflex
 - Memory loss, irritability
- **Subacute combined degeneration** of spinal cord (posterior and lateral columns)

Non-Pharmacological Management:

- Dietary counseling:
 - **B12-rich foods:** animal products (meat, dairy, eggs)
 - **Folate-rich foods:** green leafy vegetables, legumes, fortified cereals



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