ANAEMIA COMPLICATING PREGNANCY
Introduction

- Commonest medical disorder in pregnancy
- Global prevalence of anemia – 30%
- Developing countries – 50 -70%
- 20% of maternal deaths

Anaemia begins in childhood, worsens during adolescence in girls and gets aggravated during pregnancy.
Definition

- Hemoglobin below 11gm/dl in 1st and 3rd trimester and below 10.5gm/dl in second trimester.
- 11gm/dl or less (WHO)
- Degree: Mild: 10-10.9gm%
  Moderate: 7-10gm%
  Severe: <7gm%
- very severe: <4g%
ERYTHROPOIESIS

- Confined to the bone marrow in adults
- RBCs are formed through stages of pro-normoblast – normoblast – reticulocytes – mature non-nucleated arithrocyte.
- After a life span of 120 days RBCs degenerate and haemoglobin is broken down into haemosiderin and bi-pigment.
For proper erythropoiesis adequate nutrients are needed:

1. **Minerals:** Iron, traces of copper, cobalt and zinc.
2. **Vitamins:** Folic Acid, Vitamin B12, Vitamin C, Pyridoxine and riboflavin
3. **Proteins:** For synthesis of globin moiety.
4. **Hormones:** Androgens and thyroxine
Haematological changes in pregnancy

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Normal Adult Women</th>
<th>32-34 Weeks Gestation</th>
<th>Increased / Decreased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma volume (ml)</td>
<td>2600</td>
<td>3850</td>
<td>1250 in</td>
</tr>
<tr>
<td>Red cell mass (ml)</td>
<td>1400</td>
<td>1640-1800*</td>
<td>Increased</td>
</tr>
<tr>
<td>Haemoglobin (g/dl)</td>
<td>12-14</td>
<td>11-12</td>
<td>Decreased</td>
</tr>
<tr>
<td>Red Blood Cells (10^6 /mm^3)</td>
<td>4-5</td>
<td>3-4-5</td>
<td>Decreased</td>
</tr>
<tr>
<td>Packed cell volume</td>
<td>0.36-0.44</td>
<td>0.32-0.36</td>
<td>Decreased</td>
</tr>
<tr>
<td>Mean corpuscular volume</td>
<td>80-97</td>
<td>70-95</td>
<td>Decreased</td>
</tr>
<tr>
<td>Mean corpuscular haemoglobin (pg)</td>
<td>27-33</td>
<td>26-31</td>
<td>Decreased</td>
</tr>
<tr>
<td>Mean corpuscular haemoglobin concentration (%)</td>
<td>32-36</td>
<td>30-35</td>
<td>Decreased</td>
</tr>
<tr>
<td>Serum Iron (µg/dl)</td>
<td>60-175</td>
<td>60-75</td>
<td>Decreased</td>
</tr>
<tr>
<td>Total Iron Binding Capacity (µg/100ml)</td>
<td>300-350</td>
<td>350-400</td>
<td>Increased</td>
</tr>
<tr>
<td>Percentage Saturation (%)</td>
<td>30</td>
<td>15</td>
<td>Decreased</td>
</tr>
<tr>
<td>Requirements of iron (mg/day)</td>
<td>1.5-2.0</td>
<td>4.0</td>
<td>Increased</td>
</tr>
</tbody>
</table>
Iron metabolism

- Iron – absorbed in upper small intestine
Enhancers of Fe absorption

- Haem iron, meat, ascorbic acid, ferrous iron, gastric acidity

Inhibitors –

- Phytates, tannins, calcium, tea and coffee
Iron requirements in pregnancy

- Fetus & placenta - 300mg
- Increase in maternal haemoglobin mass - 500mg
- Basal body losses – 200mg
- Maternal blood loss - 250mg

Average requirement is 4-6mg/day.

- 2.5 mg/day in early pregnancy
- 5.5 mg/day from 20-32 weeks
- 6-8 mg/day from 32 weeks onwards

- Plasma volume increases by 50% and red cell volume increases by 30%

- Physiological anemia of pregnancy
Physiological anaemia

- Hb: 10gm%
- RBC: 3.2 million/mm3
- PCV: 30%
- Peripheral smear showing normal morphology of RBC with central pallor
Causes of anemia

- Nutritional deficiency (iron, B12, Folic acid)
- Blood loss anemia - – *Acute (APH)*
  – *Chronic (Hook worm infestation, bleeding piles etc.)*
- Hemolytic anemia
- Anemia associated with chronic diseases and infections
- **Bone Marrow Insufficiency: Aplastic Anemia**
HERIDITARY:
- Thalassemias
- Sickle cell haemoglobinopathies
- Other haemoglobinopathies
- Hereditary hemolytic anaemias (RBC membrane defects, spherocytosis)
Iron deficiency anaemia

- **Food iron is made up of two pool**
  - **Haem Iron Pool**
  - **Non-Haem Iron Pool**

- **Haem Iron Pool** - animal flesh and viscera. Its absorption is 15-30%, but it can increase to 50% in iron deficiency state. Its absorption is usually not affected by inhibitors.

- **Non-Haem Iron Pool** - cereals, vegetables, milk and eggs. Its absorption can be increased by enhancers and decreased by inhibitors.
Dietary habits: Consumption of low-bio availability diet

Food Fadism

Defective iron absorption due to intestinal infections, hookworm infestation, amoebiasis, giardiasis.

Increased iron loss: Frequent pregnancies, menorrhagia, hookworm infestation, chronic malaria, excessive sweating, piles.

Repeated and closely spaced pregnancies and prolonged period of lactation.
Anemia due to blood loss

- Hookworm infestation
- Antepartum haemorrhage
- Menorrhagia
Haemolytic Anemia

- Haemoglobinopathies – thalassemia,
- Sickle cell disease

- Anaemia associated with chronic diseases and infections – renal disorders,
- Malaria, UTI
Stages of anemia

- Compensated
- Decompensated
- Failure
Signs and symptoms

- Weakness, easy fatiguability, anorexia
- Breathlessness on exertion
- Palpitation
- Pallor, pedal oedema, glossitis
- Koilonychia, brittle hair, angular stomatitis
- Splenomegaly, jaundice
- Hemic murmurs
- Signs of CCF
Fig 1. 'Conjunctival pallor', the classic sign of anaemia, is a confusing term as the conjunctiva is translucent, transmitting the colour of the structures under it. The 'pallor' in fact refers to the vasculature on the inner surface of the lid which lacks haemoglobin.

It is this colour, whereas it should be more like this.
Complications

- **MATERNAL** –
  - **ANTE NATAL**
    - Poor weight gain
    - Preterm labour
    - pre-eclampsia
    - Abruptio placentae
    - Inter current infections
    - PROM
  - **INTRA NATAL**
    - Dysfunctional labour
    - Haemorrhage & shock
    - Cardiac failure
  - **POST NATAL**
    - Puerperal sepsis
    - Sub-involution
    - Embolism

- **FETAL**
  - abortion,
  - prematurity,
  - IUGR
  - Neonatal anaemia
  - Fetal loss
  - Perinatal mortality is high.
Investigations

- Hb %, PCV
- Peripheral smear
- Serum ferritin
- RBC indices
- Urine c/s
- Stool ova/cyst
- Bone marrow examination – no response to treatment after 4 weeks of therapy
For response – haemoglobin and PBS, reticulocyte count
Management

AIM
- To correct iron deficiency
- To restore iron reserve
- To correct associated complicating factor

CHOICE OF THERAPY
- Depends on severity of anaemia
- Duration of pregnancy
- Associated complicating factor
GENERAL TREATMENT

- Dietary advice
- Treatment of associated complicating factor

IRON THERAPY

- Oral
- Parenteral
Management

- Iron-rich foods:
  - Meat, fish, poultry, eggs
  - Organ meats
  - Peas and beans
  - Coriander, fenugreek
  - Dried fruit
  - Whole grain and enriched cereal
Oral Iron therapy

- For women presents in mid trimester or early third trimester
- For treatment more than 180 mg of elemental iron/day is required
- To minimize side effects, start with low dose
- Treatment is continued till blood picture becomes normal, thereafter maintenance of one tablet daily for 3 months to replenish iron stores

- Side effects – gastrointestinal symptoms
Response to treatment

- Sense of well being
- Increased appetite
- ↑ haemoglobin, haematocrit, reticulocytosis within 5-10 days

CAUSES OF FAILURE OF ORAL THERAPY
- Incorrect diagnosis
- Malabsorption syndrome
- Presence of chronic infection
- Continuous loss of iron
- Poor patient compliance
- Concomitant folate deficiency
Parenteral iron therapy

INDICATIONS:
- In tolerance to oral iron
- Poor patient compliance
- Unpredictable absorption
- Patient near term

Two preparations – Iron dextran – IM/IV
Iron sorbitol citrate – IM

Iron req= (N-D hb%) x wt (kg) x 2.21 +1000
- Anaphylaxis
- Iron injections are given daily or on alternate day by deep IMI using ‘Z’ technique
Correct diagnosis of iron deficiency anaemia.
Adequate supervision in hospital setting.
Facility for management of anaphylactic reaction.

Sensitivity test done by 1ml test dose prior to infusion:
- If no reaction iron dextran is diluted in normal saline or 5% dextrose and given over 4-6 hrs.
- If total dose is more than 2500 mg infusion is given in 2 doses on consecutive days.
- Look for reaction – Chest pain, rigor chills, hypotension, dyspnoea, haemolysis & anaphylactic reaction.
Blood transfusion

- Severe anaemia beyond 36 weeks
- Refractory anaemia
- To correct anaemia due to blood loss
- Associated infection
Management of labour

- Not ambulate
- Oxygen
- Sedation
- Antibiotics
- Cut short second stage
- Active management of third stage
PREVENTION OF IRON DEFICIENCY

- **W.H.O RECOMMENDATION:** Universal oral iron supplementation for pregnant women (60 mg of elemental iron and 250 µg of folic acid) for 6 months in pregnancy and additional of 3 months post-partum where the prevalence is more than 40%.

- **National Nutritional Anaemia Prophylaxis Programme**
  - **MINISTRY OF HEALTH, GOVT. OF INDIA RECOMMENDATION:** 100 mg of elemental iron with 500 µg of folic acid in second half of pregnancy for at least 100 days. 2 injections of iron dextran (250 mg each) given IMI at 4 weeks interval with TT injection.

- **Treatment of hook worm infestation**
  - Single albendazole (400 mg) or mebendazole (100 mg x BD x 3 days)
  - Change in defecation habits and avoidance of walking bare footed.

- **Iron fortification**
- Improving pre-pregnancy health status
- Contraceptive advice
- Spacing of pregnancy
Megaloblastic anemia

- Due to impaired DNA synthesis, derangement in Red Cell maturation
- due to Def. of VitB12 or Folic Acid or both.
- Supplementation – VITB12, folic acid
- Folate-poor diet
  - Alcoholism
  - Severe poverty
- Increased folate requirement
  - Pregnancy
  - Severe hemolytic anemia
  - Severe Psoriasis
- Drug therapy
- Malabsorption
  - Tropical sprue
- Hb < 10gm%
- Hypersegmentation of neutrophils
- Megaloblast
- MCV > 100 micrometer$^3$
- MCH > 33 pg, but MCHC is normal
- Serum Fe is normal or high TIBC is low
SPECIFIC THERAPY:

→ Daily administration of folic acid 4mg orally which should be continued for at least 4 weeks following delivery

→ Supplementation of 1mg of folic acid daily along with iron improves the anaemia in 7 to 10 days
Conclusion

- Nutritional anaemia – high maternal and perinatal mortality and morbidity
- Improve prepregnancy health status
- Nutritional education
- Contraceptive advice
- Increasing spacing interval between pregnancies