

ANAEMIA IN PREGNANCY

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Classification of Anemia

- ▶ Physiological anemia of pregnancy
- ▶ Pathological
 - Deficiency anemia
 - ← iron deficiency
 - ← Folic acid deficiency
 - ← Vit B₁₂
 - Haemorrhagic
 - ← Acute – following bleeding in early months or APH
 - ← Chronic





- ▶ Hereditary
 - ◀ Thalassemias
 - ◀ Sickle cell haemoglobinopathies
 - ◀ Other haemoglobinopathies
 - ◀ Hereditary haemolytic anemias
- ▶ Bone marrow insufficiency
- ▶ Chronic disease (renal) or neoplasm



Physiological changes in pregnancy

- ▶ Plasma volume increases by 50 %
- ▶ Red cell mass increases by 25 %
- There is a consequent fall in hb concentration , hct due to haemodilution .
- ▶ Mean cell volume increases(MCV) secondary to erythropoiesis
- ▶ Mean cell hb concentration remains stable (MCHC)
- ▶ Serum iron and ferritin concentrations decrease secondary to increase utilization and dilution .
- ▶ TOTAL IRON BINDING CAPACITY INCREASE (not usually depend on)



Physiological changes in pregnancy

- ▶ Iron requirement increase (due to expanding red cell mass and fetal requirement) from 2.5 mg/day in the 1st trimester to 6.6 mg/day in the 3rd trimester .
- ▶ There is a moderate increase in iron absorption .
- ▶ Folate requirements increase in pregnancy (due to fetus , placenta , uterus and expanded maternal and red cell mass)
- ▶ There is no major effect on vitamin b12 stores , although cobalamin levels decrease .



Physiological anemia

▶ AGAIN !In pregnancy:

- Increase in plasma volume, RBC volume
- Marked demand of extra iron specially in the second half which cannot be overcome by diet.

Thus, there always remains a physiological iron deficiency state during pregnancy.

-As a result, there is not only a fall in Hb conc and hematocrit value in the second half of pregnancy, but there is also associated low serum iron.



Hematinic requirements in pregnancy

- **Iron intake** of around **2.5mg/day** increasing as pregnancy progresses
- **Folate intake** of around **400µg/day** (average diet supplies 250µg/day)
- **B₁₂ intake** of **3µg/day**



ANEMIA

- ▶ IS A PATHOLOGICAL condition in which the oxygen-carrying capacity of RBC is insufficient to meet the body's need .
- ▶ Around 30-50 % of women become anaemic during pregnancy (ida 90% , folate def. 5 % , rarely vit b12 def.)

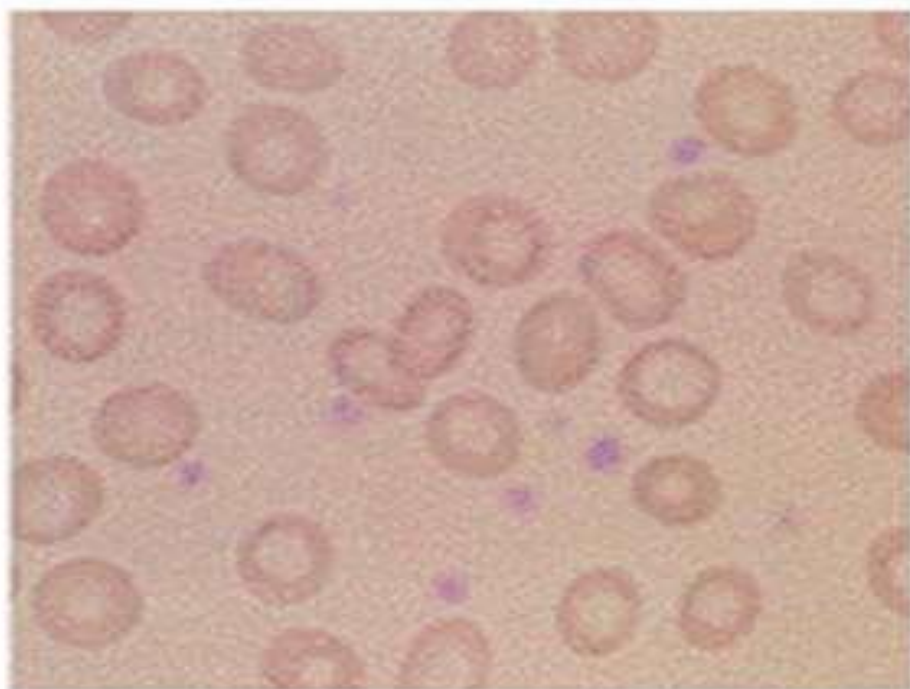


Criteria for physiological anemia

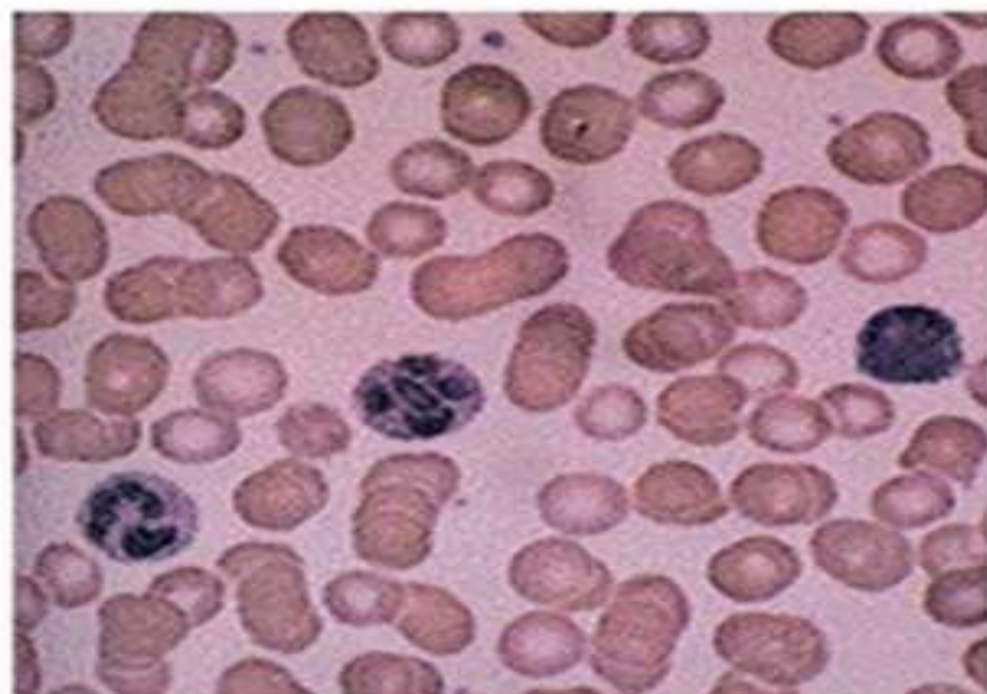
- ← We should exclude other causes of anemia and :
- ← Hb – 10gm% or less
- ← RBC: 3.2 million/mm³
- ← PCV: 30%
- ← Peripheral smear: normal morphology of RBC with central pallor



Iron Deficiency Anemia



anemia



normal blood

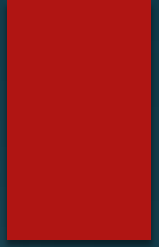


Iron deficiency anemia

- ▶ *Responsible for 80-90 % of causes of non-physiologic anemia during pregnancy*
- ▶ *if iron stores are already depleted (menstruation , recurrent pregnancy , poor intake) anemia will develop rapidly .*
- ▶ *As iron demands exceed supply during pregnancy , ferritin levels falls .*
- ▶ *Decreased hb is a late event in IDA*

- ▶ Degree of anemia :
 - ▶ **Mild (Between 8 -10 gm%)**
 - ▶ **Moderate (Less than 8 – 7gm%)**
 - ▶ **Severe (Less than 7gm%)**





The best source of iron :

- *Lean red meat*
- *Chicken*
- *Turkey*
- *Eggs*
- *Cereal*

The best source of folate :

- *Broccoli*
- *Peas*
- *Spinach*

Boiling and steaming leads to loss of up to 90% of folate content



Clinical Features of Iron Deficiency Anemia

- **Nonspecific symptoms**

- Pallor
- Fatigability
- Palpitations
- Tachycardia
- Dyspnea

- **Severe anemia**

- Angular stomatitis
- Glossitis



Complication of severe anemia

← During pregnancy:

- infection
- Heart failure
- Preterm labour

← During labor:

- PPH
- Cardiac failure
- Shock

← Puerperium:

- Puerperal sepsis
- Subinvolution
- Failing lactation



Effects on baby:

- ← LBW : increased incidence
- ← Intra uterine death



Investigations

▶ *Iron deficiency can be present in the absence of anemia .*

▶ **Blood Tests**

-cbc (low hb , reduced mcv ,mch,mchc) are not as accurate during pregnancy .

- Serum iron

- **Serum ferritin (diagnostic test)**

- Blood film



Treatment

← Prophylactic:

- Avoidance of frequent child births
- Supplementary iron therapy
- Dietary prescription
- Adequate treatment
- Early detection of falling Hb level is to be made (cbc at booking and at 28 week is recommended)





For all pregnant women in the 2nd and 3rd trimester (Prevention)

- **150mg Ferrous Sulfate OD**
- **300mg Ferrous Gluconate OD**

- **Treatment :**
- **1g Ferrous sulfate OD**



Iron therapy

- **Oral route: 1st line**

- ▶ Drawbacks:

- Intolerance (GI)

- Unpredictable absorption rate

- ▶ Maximum increase in hb is .8g/dl per week

- ▶ The recommended dose is 100-200 mg of elemental iron per day

- ▶ Ferrous salt are absorbed better than ferric salts

- ▶ Vit c aid in absorption (advice :fresh orange juice)

- ▶ Improvement is usually within 2-3 weeks





→ Failure:

- ← Improper typing of anemia
- ← Defective absorption
- ← Pt fails to take iron
- ← blood loss

→ Contraindication:

- ← Intolerance
- ← Severe anemia in advanced pregnancy (NEEDS TIME)





- **Parenteral therapy:**
 - ➔ Intravenous and Intramuscular
 - ➔ Indications:
 - ← Contraindications of oral therapy
 - ← Pt not co-operative to take oral iron





← Intravenous route:

- Parenteral iron can reduce the need for blood transfusion when oral therapy has failed .
- Parenteral iron should be avoided in the first trimester .
- Advantages:
 - ← Eliminates repeated and painful intramuscular injections
 - ← Treatment completed in a day

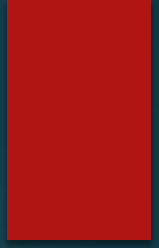




← Intramuscular therapy:

- Total dose to be administered is calculated.
- Drawbacks:
 - ← Painful
 - ← Chance of abscess
 - ← Reactions





← Blood transfusion:

- Limited. But indications are:
 - ← PPH
 - ← Severe anaemia in later months of pregnancy
 - ← Refractory anemia
- Quality and quantity: fresh. Only packed cell. 80 – 100 ml at a time
- Advantages:
 - ← Increased oxygen carrying capacity of the blood
 - ← Hb may be utilised for the formation of new red cells.
 - ← Stimulated erythropoiesis
 - ← Improvement expected after 3 days



summary

- ▶ **At booking (less than 11)** : start trial of oral iron
 - *The necessary dose is 100-200 mg/day
 - *Repeat cbc after 3 weeks
 - * If good response keep it for at least 3 monts
if no increase send ferritin and consider other DDX
- ▶ At booking (less than 7) :urgent referral to hematologist
 - don't offer blood transfusion unless symptomatic or bleeding
 - IV IRON (NOT RECOMMENDED IN 1ST TRIMESTER)



summary

- ▶ AT 28 WEEK : less than 10.5 we consider it anemic
same as 1st trimester but if less than 7 we can consider
IV-IRON

- ▶ Post natal : less than 10 we consider it anemic
 1. 8-10 : asymptomatic , offer iron supplement & cbc after 3 months
 2. Less than 8 : asymptomatic , consider iv iron , recheck 10 days and 3 months
 3. Less than 7 : consider blood transfusion or iv iron



Megaloblastic anemia

- ▶ There is derangement in red cell maturation with the production in the bone marrow of abnormal precursors known as megaloblasts due to impaired DNA synthesis.

folate deficiency (5%)

Vit B₁₂ deficiency (rare)

In pregnancy, due to folic acid deficiency.



Etiology of Vitamin B12 Deficiency

- **Dietary** *Vegans*

- **Malabsorption** *Pernicious anemia*
Partial gastric resection
Ileal resection
Intestinal stagnant loop
Chron's disease
Tapeworms
Tropical sprue



Vit. b12 deficiency

- **Clinical features**

- *mild maternal anemia*
- *demyelinating neuropathy*

- **Treatment**

- **single dose of 1000 μg** of intramuscular B12
- weekly injections should be employed until anemia resolves and lifelong replacement is often necessary



Folate deficiency anemia

- ▶ Most often associated with *iron deficiency anemia*
- ▶ *There is a significant increase in folate requirement during pregnancy .*

- ▶ Folic acid is necessary for closure of neural tube during early fetal development
- ▶ Etiology of Folate Deficiency Anemia :

1) Nutritional

Decreased intake, Nausea, vomiting, loss of appetite , Malabsorption

2) Drugs

- ▶ Phenytoin & Methotrexate

3) Chronic Hemolytic Anemia

4) Multiple Gestation



Epidemiology of Folate Deficiency

- **Incidence varies** from 0.5-25% depending on:
 - ▶ - *region*
 - ▶ - *population*
 - ▶ - *diet*
- Takes approximately 18 weeks of folate deficient diet to produce anemia
- Minimum daily requirement is **0.4 mg**



Clinical features

- ▶ Nausea , Vomiting and Diarrhoea
- ▶ Depression , Pallor , UTI , Sore mouth or tongue

- ▶ Fetal complication :
 - NTD
 - prematurity
 - low birth weight

- ▶ Complication :
 - Miscarriage
 - Prematurity
 - Abruptio placentae
 - Fetal malformation



Haematological examination and other blood values

- ← Hb – 10gm%
- ← Stained blood film: hypersegmentation of the neutrophils, macrocytosis and anisocytosis. Megaloblasts.
- ← MCV- 100 μm^3 (could be associated with IDA leading to mask this)
- ← MCH –high, MCHC –normal
- ← Serum iron is normal or high
- ← Serum folate – 3ng/ml
- ← Serum B₁₂ level below <90 pg/ml (co-existing)
- ← Bone marrow – megaloblastic erythropoiesis



Management

▶ Investigations

- Serum folate and Blood smear

▶ Prevention

- **0.4-1 mg folic acid PO daily** for 1-3 months preconceptually and throughout the 1st trimester
- **4 mg folic acid/ day** in **patients with past history of NTD**



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▶ HAEMOGLOBINOPATHIES



SICKLE CELL ANAEMIA

- ▶ Hereditary disorders in which the red cells contain Hb-S. caused by the production of defective beta chain due to single amino acid shift in the beta-globin gene from glutamine to valine .
- ▶ **Pathophysiology:**
 - Red cells with HbS in oxygenated state behave normally but in the deoxygenated state it aggregates, polymerises and distort the red cells to sickle.
 - These sickle shaped cells block the microcirculation due to their rigid structure.





► **Diagnosis:** Hb electrophoresis & blood film

Sickling crisis; RBCs become *sickle-shaped* and occlude vessels causing widespread **vascular damage, severe pain** and **hemolytic anemia**

-**vaso-occlusion crisis**

-**aplastic crisis (parvovirus 19)**

-**acute chest syndrome**

-**splenic sequestration**



Effects on pregnancy

- ▶ Increased incidence of abortion, prematurity, IUGR and fetal loss.
- ▶ Perinatal mortality is high.
- ▶ Preclampsia, postpartum haemorrhage, thromboembolic events and infection is increased.



Effects on the disease

- ← There is chance of sickle cell crisis which usually occurs in the last trimester.
- ← Hemolytic crisis
- ← Painful crisis.



Management

- ▶ Preconceptional counselling
- ▶ During pregnancy: antenatal supervision, regular blood transfusion at 6 weeks interval is indicated in certain cases.
- ▶ Contraception: sterilization, oral pill, barrier method is ideal.
- ▶ Folate supplements
- ▶ Prompt treatment of infections & vaccination should be upto date .
- ▶ Iron overload aggressively treated before pregnancy .
- ▶



Thalassemia

- ← Commonly found genetic disorders of the blood.
- ← Basic defect is a reduced rate of globin chain synthesis.
- ← As a result, the red cells being formed with an inadequate haemoglobin content.
- ← Types – alpha and beta (depending upon the chain)



Alpha thalassaemia

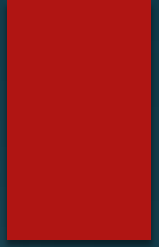
- ▶ A-peptide chain production is controlled by 4 genes, located on **chromosome 16**. Depending upon the degree of deficient synthesis – 4 clinical types.
- ▶ Mutation of one gene: no clinical or laboratory abnormalities. Silent carrier
- ▶ Mutation in 2 – 4 genes: minor. Often goes un-recognised and pregnancy is well tolerated.
- ▶ Mutation in 3 – 4 genes: Hb H disease. →
▶ hemolytic anaemia.
- ◀ Mutation in all four genes: major. No alpha globin chain. Fetus dies either in utero or soon after birth.



Beta Thalassemia

- ▶ beta chain production is directed by 2 genes – one on each copy of **chromosome 11**.
- ▶ Major – when mutation affect both the genes. – red cell destruction- no erythropoiesis – blood transfusion necessary for survival.
- ▶ Minor – mutation of one gene. – can tolerate pregnancy – oral folic acid supplementation is continued.





- **Alpha Thalassemia**

- *major form is incompatible with life and pregnancy ends prematurely in hydrops fetalis*

- **Beta Thalassemia**

- **Folate supplements** should be given

- Blood transfusion is indicated to achieve adequate hemoglobin for delivery at term



Key points management

- ▶ Partner testing and prenatal diagnosis
- ▶ Echo to assess ventricular function
- ▶ Monitor full blood count and ferritin . Transfer as required .
- ▶ Serial growth scan (IUGR , late pregnancy loss)
- ▶ Folic acid supplement
- ▶ Vaccines & antibiotics .



Thank you

