Anemia in pregnancy

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objectives

- To provide you with recommendations for the prevention, diagnosis and treatment of iron deficiency in pregnancy and in the postpartum period
- Definition
- causes
- Effect of anemia on pregnancy

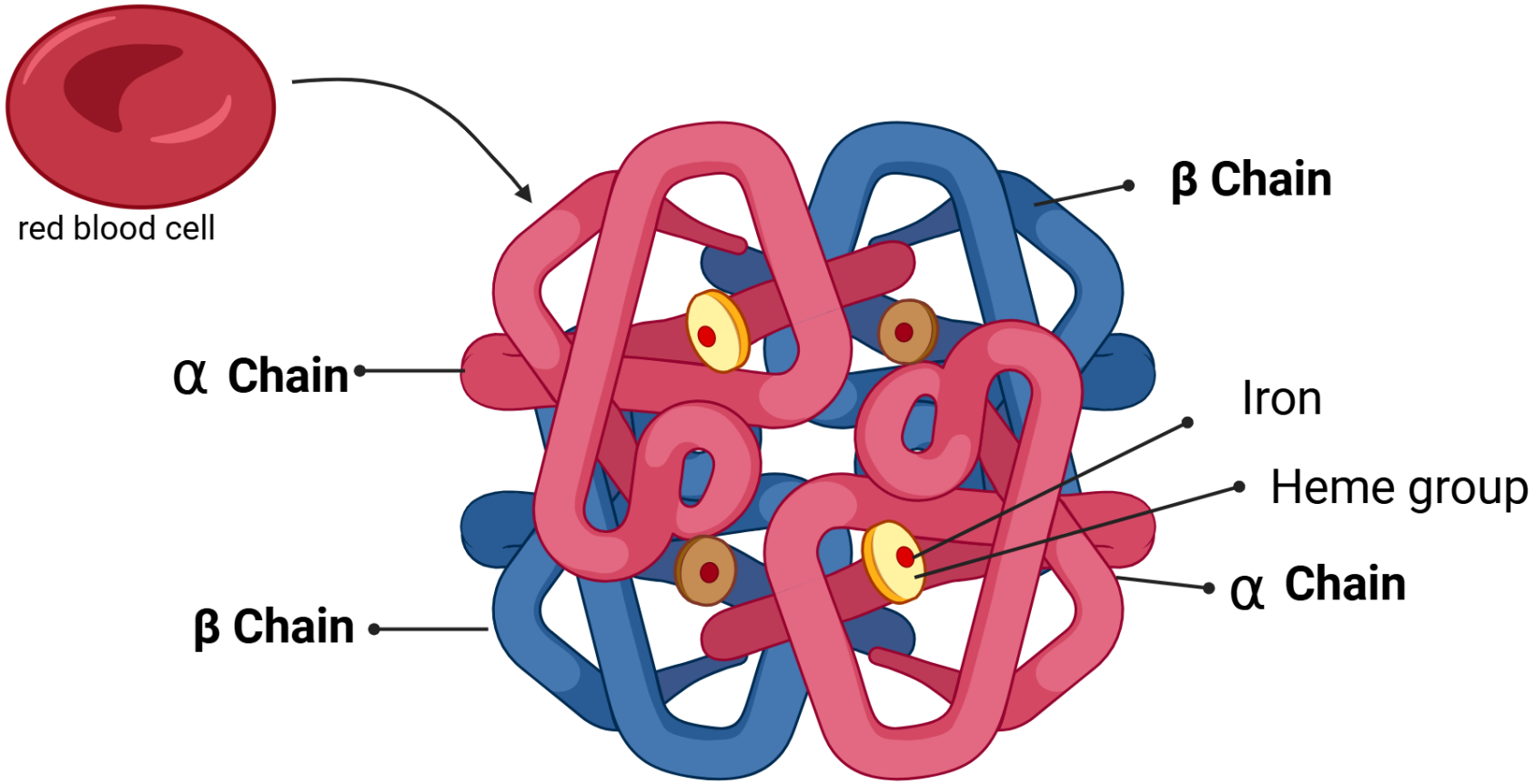
DEFINITION

- **Anemia is Hb concentration below a specific cut-off point which depends on:**
- **age, sex, physiological status, smoking habits and altitude**
- **12 g/dl in non-pregnant women**
- **11 g/dl in 1st trimester**
- **10.5 g/dl in 2nd & 3rd trimesters**
- **10 postpartum**

Types of anemia

- **Iron deficiency anemia is the most common hematological problem in pregnancy**
- **Folate deficiency is the second most common cause of anemia**
- **Hemoglobinpathies (thalassemia & sickle cell)**

Hemoglobin structure



Types of Hemoglobin

- **Adult hemoglobin**: NORMAL
- **Hemoglobin A** (more than 95%)
- **two α (alpha) & two β (beta) subunits**
- **Hb A2:** β-thalassemia
- **2 alpha & 2 delta**
- **Fetal hemoglobin:**
- **two α (alpha) subunits & two γ (gamma) subunits**

Hemoglobin function

- **The primary function of Hb:**
- **Transporting oxygen from the lungs to the tissues and facilitating the return transport of carbon dioxide**

Iron deficiency anemia

Iron deficiency anemia

- **Most common cause of anemia of pregnancy around the world**
- **The global prevalence of anemia is estimated to be 29% in non-pregnant women**
- **38% in pregnant women**
- **highest in undeveloped or developing countries**

Iron deficiency anemia

- **Exacerbated by the increased iron requirements during pregnancy**
- **The recommended daily amount for non-pregnant individuals (8-18 mg/d)**
- **In pregnancy: 27 mg/d**
- **During lactation: 10 mg/d**

Iron requirements during pregnancy:

- Iron is required for fetal growth & development
- Increased maternal erythropoiesis
- Most fetal iron is acquired in the third trimester, in preparation for the high growth rate in the first 4–6 months after birth

Causes:

1. Low iron intake:

- **DIET**
- **NO supplements**

2. Impaired absorption

3. Loss:

1000 mg of iron is lost throughout pregnancy and lactation

Other Causes:

- **multiple pregnancy**
- **Intestinal infestations**
- **Malaria is a common cause of anemia in pregnancy**
- **2-5% of women will have primary post partum hemorrhage**

Iron deficiency anemia

- **Iron deficiency is a progressive process, in which:**
- **iron stores fall**
- **iron stores deplete**
- **iron stores finally absent**
- **consequently resulting in iron deficiency anaemia**

Physiological changes

- **Plasma volume increases by 50%**
- **begins in the first trimester and plateauing by the third**
- **exceeds the increased production of red blood cells and haemoglobin, resulting in haemodilution**
- **Resulting is a fall in Hb concentration**
- **MCV & MCHC not changed**
- **pre-eclampsia (no expansion)**

Effects on pregnancy:Fetal

- **Small for gestational age**
- **low birth weight**
- **preterm birth**
- **long-term neurocognitive effects in childhood**

Effects: Maternal

- **Recurrent infections**
- **Need for blood transfusion**
- **postpartum hemorrhage**
- **Postpartum depression**

Symptoms:

- **non-specific**
- **often dismissed as normal during pregnancy**
- **& attributed to the physiologic changes of pregnancy**
- **Fatigue is the most common symptom**
- **Dizziness, palpitations, irritability & dyspnoea**
- **Rarely pica develops, where there is a craving for non-food items such as ice and dirt**

Diagnosis

1. CBC (low Hb concentration)

- **Diagnosis should be confirmed:**
- **MCV, MCH, MCHC all reduced**
- **Microcytic, hypochromic ★**
- **The first index to become abnormal is MCV**

2. Serum iron < 12 µmol/L

3. TIBG saturation < 15%

4. Serum ferritin < 30 µg/L

5. Blood film :microcytic hypochromic

Diagnosis:

- **Microcytic hypochromic anemia:**
- **1. Iron deficiency anemia**
- **2. Thalassemia**
- **3. Sickle cell disease**
- **4. Sideroblastic anemia**
- **5. Chronic diseases**
- **Megaloblastic anemia:**
- **1. Folate deficiency**
- **2. B12 deficiency**

Diagnosis

- **Although bone marrow reserve is the most reliable indicator of iron insufficiency in iron-deficiency anemia, it is too invasive for pregnant patients**

- **Serum ferritin provides an accurate assessment of iron stores <u>in the absence of inflammation</u>**

Management:

- **Ferritin and hemoglobin should be routinely assessed at the booking and 28-week prenatal visits**
- **Increase iron intake**
- **Enhance absorption**

Management:

- **The average daily iron intake from food 10 mg, only 10–15% is absorbed**
- **The capacity for absorption is enhanced in pregnancy**
- **but physiological iron requirements increase**

Management

1. Diet

2. Oral iron is the first line of management

3. IV iron

4. Blood transfusion

Diet

Management

- **Iron absorption from small intestine enhanced by ascorbic acid and meat**

- **Inhibitors of absorption include:**
- **Phytic acid (present in bread)**
- **Tannins (present in tea, coffee, & chocolate)**
- **Food rich in calcium**

Management

- **Oral iron is an effective, cheap and safe way to replace iron**

- **In non-anaemic women at increased risk of iron depletion, 40–80 mg elemental iron once a day should be offered empirically**
- **or serum ferritin is <30 µg/l**

Iron salt	Preparation	Elemental iron content
Ferrous fumarate	210 mg	65 mg
Ferrous gluconate	300 mg	35 mg
Ferrous sulphate (dried)	200 mg	65 mg
Ferrous feredetate	190 mg/5 ml elixir	27·5 mg/5 ml elixir

Management

S/E of Iron:

- **nausea, epigastric discomft & constipation**
- **S/E are directly related to the dose of iron taken**
- **To reduce S/E of iron, give alternate day dosing or preparations with lower iron content should be tried**
- **Slow release and enteric-coated forms should be avoided**

Management

- **Oral iron supplementation ideally should be taken on an empty stomach, more S/E**

- **It may be taken with water or a source of vitamin C to enhance absorption,**

Management

- **Response:**
- **to oral iron should be evaluated by measuring the hemoglobin level 2–4 weeks after treatment begins**
- **The earliest evidence of response to iron therapy is <u>increased reticulocyte count</u>**
- **Duration:**
- **Treatment should continue for at least 3 months after the hemoglobin level normalizes until 6 weeks postpartum**

Management: I.V. IRON

- **from the second trimester onwards**
- **with confirmed iron deficiency anaemia**
- **& unable to tolerate or do not to respond to**
- **oral iron**
- **who present after 34 weeks' gestation with confirmed iron deficiency anaemia**
- **Maximum rise in Hb with either oral or parenteral iron is 0.8g/dL per week**

Management

- **Blood transfusion:**
- **if Hb < 8 g/dl in late pregnancy**

Megaloblastic anemia

- **Folate deficiency**
- **B12 deficiency**
- **Macrocytic hypochromic anemia**
- **Low Hb, increased MCV**

Folate Deficiency Anemia

- **Folate deficiency is the second most common cause of anemia**

- **Earliest morphological evidence of folate deficiency is <u>hypersegmentation of neutrophils</u>**

Folate Deficiency Anemia

- **Folic acid is necessary for:**
- **CLOSURE OF NEURAL TUBE during early fetal development**
- **Neural tube closure is completed 15 to 28 days from conception ≈ 4- 6 weeks gestation**

Folate Deficiency Anemia

- **All women planning pregnancy are advised to take 400 µg /d folate**
- **for 12 weeks pre-pregnancy**
- **and during the first trimester**
- **to reduce the risk of neural tube defects and other fetal anomalies**

Folic acid 5 mg/day (high-dose)

- **Women whom themselves have spina bifida**
- **Previous fetus with neural tube defect**
- **Taking anti-epileptic drugs or sulfasalazine**
- **Diabetics**
- **Obesity BMI > 30**
- **Hemoglobinopathies**
- **Malabsorption**
- **Proven folate deficiency**

Hemoglobinopathies

- **THALASSEMIA**
- **Sickle cell Anemia**

Hemoglobinopathies

- **<u>In thalassemia</u>:**
- **HbA2 (normally 2% to 3%)**
- **HbF (normaly 0.8% to 2%)**

- **<u>In sickle cell anemia</u>:**
- **HbS (Normally absent)**
- **HbC: (Normally absent)**
- **<u>Hb electrophresis</u>**

Hemoglobinopathies

- **Autosomal recessive**
- **Carriers (Trait) OR diseased**
- **<u>Diagnosis by Hb electrophresis</u>**
- **Offer them PGD (prenatal genetic diagnosis) if her husband is a carrier**

THALASSEMIA

- **The commonest genetic blood disorder**

THALASSEMIA

- Reduced production of normal Hb
- HbA2 > 3%

Sickle cell Anemia

- abnormal HbS, HbC
- Lifespan of RBC 17 days instead of 110 days
- Produced by substitution of valine for glutamic acid at the position 6 of the β-chain of normal haemoglobin
- Deoxygenated state, hemoglobin aggregates causing the red cells to sickle

THALASSEMIA

- **Screening for iron overload (e.g LFT and cardiac echo)**
- **Iron Chelation Desferrioxamine: safe from 20 weeks, SC antenatally & IV in Labor**
- **Cardiac Failure is the primary cause of death**

Sickle cell Anemia

- **prevent crises:**

  hypoxia, stress, infection, hemorrhage
- Prevent infections
- **Screen for PET**
- **Acute chest syndrome**

THALASSEMIA / SICKLE CELL ANEMIA

1. **Multidisciplinary team**
2. **Serial growth scan from 20 weeks**
3. **Correct anemia to maintain Hb 10 (Transfusions)**
4. **Folate 5 mg/d**
5. **low dose Aspirin**
6. **Postnatal Thrombo-Prophylaxis (LMWH)**

Sickle cell Anemia

- **Maternal:**
- **Anemia**
- **Recurrent infections**
- **Chronic hyperbilirubinemia**
- **Acute chest syndrome**
- **Pre-eclampsia**
- **Venous thromboembolism**
- **Death**

Sickle cell Anemia

- **Fetal:**
- **Miscarriage**
- **Fetal growth restriction**
- **Premature labour**
- **Placental abruption**


Thank you!

HYPEREMESIS GRAVIDARUM

Nausea & vomiting in pregnancy(NVP)

- Occurs in 90%
- is one of the most common indications for hospital admission
- with typical stays of between three and four days

DEFINITION:

- NVP is defined as the symptom of nausea and/or
- vomiting during pregnancy when onset is prior to 16 weeks of gestation and where there are no other causes
- typically starts between 4& 7 week of gestation
- peaks in approximately week 9
- and resolves by the 20th week in 90% of women

HYPEREMESIS GRAVIDARUM(HG):

- severe nausea & vomiting
- Occurs only in 0.3-3% of pregnancies
- interfering with quality of life & the ability to eat and drink normally
- Signs of dehydration

HG

- Hypersensitivity to the vomiting hormone growth differentiation factor-15 (GDF15)
- **GDF15** caused loss of appetite, taste aversion, nausea, vomiting and weight loss
- Genetic variants associated with expression of GDF15 in families with HG
- identified as the greatest genetic risk factor for HG and are associated with recurrence in subsequent pregnancies

HG

- hyponatraemia,
- hypokalaemia,
- low serum urea,
- raised haematocrit
- and ketonuria
- with a metabolic hypochloraemic alkalosis
- If severe, a metabolic acidosis may develop

HG

- Abnormal thyroid function in 70% Of women with HG
- (structural similarity between TSH & hCG)
- Biochemical thyrotoxicosis, and raised free thyroxine levels
- Rarely have thyroid antibodies& are euthyroid clinically
- The biochemical thyrotoxicosis resolves as the HG improves
- Treatment with antithyroid drugs is unnecessary
- A raised T4 and low TSH therefore do not need treatment

HG

- Liver function tests are abnormal in up to 40% of women
- The most likely abnormality being a rise transaminases

Diagnosis:

Hyperemesis Gravidarum:

Diagnosis of exclusion

exclusion of:

1. Multiple pregnancy
2. Molar pregnancy
3. Infections: urinary, ear, GIT
4. Endocrine:
   - thyrotoxicosis, hyperparathyroidism
   - Diabetic keto-acidosis, Addison's disease
5. Surgical: peptic ulcer, pancreatitis, cholecystitis
6. **Neurological:** increased intra- cranial pressure
7. **Drugs:** iron supplements, antibiotics

History

- Previous history of HG

- Quantify severity using PUQE/HELP score:
- (nausea, vomiting, ptyalism (hypersalivation), spitting, weight loss, inability to tolerate food and fluids, effect on quality of life and ability to perform daily activities)

- Ask about weight loss

…History

- Ask about **co-morbidities** which may be complicated by lack of oral intake of essential medications such as epilepsy, diabetes, HIV, psychiatric conditions
- Relevant surgical history such as gastric bypass, band or sleeve
- History to exclude other causes:
- ◦ abdominal pain
- ◦ urinary symptoms
- ◦ infection
- ◦ drug history (iron, multivitamins, antibiotics)
- chronic *Helicobacter pylori* infection

Examination

- Temperature
- • Heart rate (tachycardia in dehydration)
- • Blood pressure (hypotension in dehydration)
- • Oxygen saturations
- • Respiratory rate (tachypnoea in dehydration)
- • Abdominal examination
- • Weight

…Examination

- • Signs of dehydration : sunken eyes, dry lips and mouth, oliguria or anuria, tachycardia and hypotension
- • Signs of malnutrition or rapid weight loss (≥5% pre pregnancy weight), and muscle wasting as measured by mid-arm circumference
- • Neurological signs : confusion, nystagmus or ataxia which could indicate Wernicke's encephalopathy

Investigation

- **Urinalysis:**
- Nitrites may indicate infection
- The presence or absence of ketonuria in pregnancy is not an indicator of dehydration
- Assessing urinary ketones does not have a use in the management of NVP or HG and may be misleading
- • **Urea and electrolytes:**
- (to guide intravenous fluid and electrolyte replacement)
- • hypokalaemia/hyperkalaemia
- ◦ hyponatraemia
- ◦ chronic kidney disease
- ◦ high creatinine / urea (acute kidney injury) due to dehydration

…Investigation

- • **Full blood count:**
- ◦ infection
- ◦ anaemia
- ◦ raised haemoglobin and haematocrit
- • **Blood glucose level:**
- ◦ diagnose diabetes
- ◦ exclude diabetic ketoacidosis in patients with diabetes

…Investigation

- • **Ultrasound scan:**
- Viable intrauterine pregnancy,
- Multiple pregnancy
- Trophoblastic disease

Investigation

- In refractory cases or history of previous admissions, check:
- ◦ **TFTs**: hypothyroid/hyperthyroid
- ◦ **LFTs**: exclude other liver disease:
- hepatitis or gallstones◦
- Calcium and phosphate
- ◦ Amylase: exclude pancreatitis
- ◦ VBG: exclude metabolic disturbances to monitor severity

Management:

1. Antiemetics: mild NVP
2. If failed : Ambulatory day care
3. Inpatient care

Management: Inpatient care

- • Continued NV & inability to keep down oral antiemetics
- • Continued NV associated with clinical dehydration or weight loss (greater than 5% of body weight), despite oral antiemetics
- • Confirmed or suspected comorbidity (urinary tract infection & inability to tolerate oral antibiotics)
- •Inability to tolerate oral intake & medication
- (epilepsy, diabetes, HIV, hypoadrenalism or psychiatric disease)

Management: Inpatient care

- **Urea and serum electrolyte daily** in women on IV fluids

- **Antimetics IV**

- **H -2 receptor blockers** or proton pump inhibitors:
- for women developing gastritis or gastro-oesophageal reflux

- **Thiamine supplementation**
- (oral 100 mg tds or intravenous as part of vitamin B complex)
- Should be given to all women admitted with vomiting /severely reduced dietary intake
- Especially before administration of dextrose or parenteral nutrition

Management: Inpatient care

- **Thromboprophylaxis** with LMWH
- Women with previous or current NVP or HG should consider avoiding iron-containing preparations
- Oral iron can cause nausea and vomiting &constipation

Management: Inpatient care

- The most important intervention is intravenous fluid and electrolyte replacement
- This is the most appropriate intravenous hydration
- **Normal saline** with additional potassium chloride
- in each bag
- guided by daily monitoring of electrolytes
- **The use of dextrose infusions for fluid replacement in NVP and HG is not recommended**

Complications:

- 1. Wernicke's encephalopathy

- Due to B1 (thiamine) deficiency
- Precipitated by carbohydrate containing food
- **Fatal but reversible**
- Blurred vision, unsteadiness, confusion, memory problem
- Nystagmus, ophthalmoplegia, 6th nerve palsy, gait or finger nose ataxia
- Diagnosis is clinical, confirmed by MRI
- Associated with 40% fetal loss

Complications:

- 2. Hyponatremia
- Lethargy & seizures
- Avoid rapid correction of Na
- (osmotic demyelination syndrome/ Central pontine myelinolysis)
- 3. Mallory-Weiss tears
- 4.Thrombosis
- 5.Vitamin (B6, B12)deficiency
- 6.Psychological distress

Anti emetics:

- Vitamin B6 10 to 25 mg orally every 8 hours or every 6 hours
- Promethazine 12.5 to 25 mg orally, IM, or rectally every 4 to 8 hours
- Metoclopramide 5 to 10 mg IV or orally every 6 to 8 hours
- Ondansetron 8 mg orally or IM every 12 hours (for use before 10 weeks gestation, potential risks of congenital defects should be considered)
- Prochlorperazine 5 to 10 mg orally, IV, or IM every 6 hours OR 25 mg rectally 2 times a day, as needed
- Corticosteroids in resistant cases


THANKS
FOR YOUR
ATTENTION