

Iron and iron deficiency anaemia in pregnancy

Case Definition

Anaemia

Anaemia in pregnancy is defined by low haemoglobin (Hb).

- Symptoms: tiredness, fatigue and shortness of breath.
- Signs: pale conjunctiva, palms and nails and in severe cases may lead to heart failure.

Women may have no signs or symptoms.

There is a physiological drop in Hb most pronounced in second trimester due to an expansion of plasma volume (also known as haemodilution).

Iron deficiency

Iron deficiency (ID) in pregnancy is an inadequate level of iron stores to meet the physiological requirements of the mother and infant and is highly prevalent in the Kimberley region. It may exist with or without anaemia and in pregnant women is associated with iron deficiency in infants which can impact on mental and motor development of the child.

Iron deficiency is the most common cause of anaemia in pregnancy. See Table 1 for details on tests used to diagnose iron deficiency.

Functional iron deficiency

Ferritin is an iron store but is also an acute phase reactant (goes up in the presence of infection, inflammation and chronic disease).

Low transferrin saturation with normal ferritin can be due to functional iron deficiency (the body has iron, but can't use it). Anaemic women with low transferrin saturation and a normal ferritin may still benefit from iron therapy – refer/discuss with GP and/or physician.

Anaemia without iron deficiency

Anaemia without iron deficiency, where functional iron deficiency has been ruled out, requires further investigation. (e.g. B12, folate).

Table 1: Selected tests used to diagnose iron deficiency

Test (normal range*)	Interpretation
Iron Studies	
Serum iron (9-30 µmol/L)	Iron in blood circulation Low with iron deficiency (low specificity) and inflammation Normal/high with iron supplementation
Transferrin (23-46 µmol/L)	Carrier protein for iron High with iron deficiency Low with inflammation
Transferrin saturation (13-45%)	Amount of serum iron bound to transferrin Low with iron deficiency and functional iron deficiency
Ferritin (see Table 2)	Measurement of iron stores Low with iron deficiency (high specificity) High with inflammation
Full Blood Count (FBC)	
Haemoglobin (Hb) (see Table 2)	Oxygen carrying molecule Low with anaemia of any cause
Mean Cell Volume (MCV) (80-100fL)	<u>Average size of red blood cells</u> Low with iron deficiency anaemia and haemoglobinopathies (e.g. thalassaemia) High with B12 or folate deficiency or excessive alcohol consumption
Mean Corpuscular Hb (MCH) (27-32pg)	Average amount of Hb in red blood cells Low with iron deficiency anaemia and haemoglobinopathies

*Normal range may vary between different laboratories.

Table 2: Ranges for Hb and ferritin by trimester

	1 st trimester	2 nd trimester	3 rd trimester
Hb (g/L)			
Normal	>110	>105	>110
Mild anaemia	100 – 110	100 – 105	100 – 110
Moderate anaemia	90 – 100		
Severe anaemia	<90		
Ferritin (µg/L)*			
Normal	>70	>40	
Mild ID	50 – 70	30 – 40	
Moderate ID	30 – 50	20 – 30	
Severe ID	<30	<20	

*Reference ranges for ferritin in 2nd and 3rd trimester are poorly defined.

Screening

Iron deficiency and anaemia screening

Screen for iron deficiency and anaemia in pregnancy routinely at booking and at 28 weeks (FBC, iron studies).

Haemoglobinopathy screening

Haemoglobinopathies are disorders which result in abnormal haemoglobin production, and can mimic iron deficiency anaemia. Women with haemoglobinopathy may also have iron deficiency, but they can also be at risk of iron overload.

Screen at booking visit with Hb electrophoresis women with:

- A history or family history of unexplained anaemia or of haemoglobinopathy, or women with an 'at risk' ethnic background for haemoglobinopathies (see Resources section).
- MCV ≤80fL, MCH ≤27pg and a normal ferritin level.

Abnormal screening for haemoglobinopathy has implications for foetal wellbeing. The partner will also need to be assessed for the trait in question. Discuss with the obstetric doctor and/or physician (see Resources section).

Principles of Management

Iron deficiency in pregnancy requires appropriate iron supplementation, which may be given orally, but often requires intravenous (IV) infusion.

Indications for a trial of oral iron:

- Mild to moderate iron deficiency with a normal Hb or with mild anaemia (see Table 2).
- Women waiting for an iron infusion (including patients in the first trimester).

Indications for intravenous iron:

- **Moderate to severe anaemia and/or severe iron deficiency.** These women should be referred early for an IV iron infusion as increased iron requirements in

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pregnancy make it unlikely that they will absorb sufficient iron from oral supplementation.

- **Failure of oral iron therapy.** Oral iron may be poorly tolerated or poorly absorbed even if taken according to instructions. Refer women with failure of oral iron therapy (or whom it is felt oral therapy is likely to fail) for an iron infusion regardless of the suspected cause of failure of iron therapy.

Therapeutic Protocols

Oral supplementation

Offer a trial of oral iron starting with at least 60mg of elemental iron daily, aiming for 180mg daily in divided doses (see Table 3).

Optimise oral iron absorption by administering with fruit or foods high in vitamin C. Preparations exist that include vitamin C in the tablet to simplify the regime (e.g. Ferro-grad C) (see Table 3).

Avoid consuming agents that reduce the absorption of iron (e.g. tea, coffee, milk, milk products or calcium supplements, eggs, whole grain bread or cereals, thyroxine, gastric acid lowering medications (e.g. antacids, proton-pump inhibitors)) for two hours either side of taking the iron tablet.

Monitor for constipation and treat as necessary. Lactulose, sorbitol and glycerol are safe to use in pregnancy. Increasing water and dietary fibre intake and undertaking regular exercise may help to prevent constipation (see [Nutrition, weight and exercise in pregnancy](#) protocol).

Dietary iron

Women should maintain a healthy diet as per the [Nutrition, weight and exercise in pregnancy](#) protocol. Foods high in iron include lean beef and lamb, kangaroo, goanna, sardines, cooked mussels, green leafy vegetables, dried fruit, legumes and beans (see Resources section).

Women can increase their intake of these foods to help prevent iron deficiency and increase their iron stores. Dietary modification alone is not sufficient to treat iron

deficiency in pregnancy and should be used in conjunction with oral or parenteral supplementation as indicated.

Iron infusions

Different formulations of IV iron vary in their infusion times, side effect profile and dose calculations.

Newer formulations of IV iron (e.g. ferric carboxymaltose (Ferinject®)) are being increasingly used in the out-of-hospital setting as they have much shorter infusion times than older formulations (e.g. iron polymaltose (Ferrosig®)).

IV iron is currently not licensed to be used in first trimester.

Locally approved protocols should be used when administering IV iron.

Women with more severe iron deficiency or iron deficiency with anaemia should be prioritised for an IV iron infusion (see flowchart).

Table 3: Formulations for oral iron supplementation

Brand name	Components	Elemental iron equivalent	Daily dose (180mg daily)*
Available on KSDL (10th Ed.)/PBS (preferred option)			
Ferro-tab*	200mg ferrous fumarate	66.7mg	3 tablets daily
Not available on KSDL (10th Ed.)/PBS (patients may elect to purchase from pharmacy)			
Ferro-f-tab	310mg ferrous fumarate and 350mcg folic acid	100mg	2 tablets daily
Ferro-grad (controlled release)	325mg ferrous sulphate	105mg	2 tablets daily
Ferro-grad C (controlled release)	325mg ferrous sulphate and 500mg ascorbic acid	105mg	2 tablets daily
Fefol	270mg ferrous sulphate and 300mcg folic acid	87.4mg	3 tablets daily
Ferro-liquid	Oral liquid ferrous sulphate	30mg/5mL	30mL daily

* Consider starting at a smaller dose and titrating up as tolerated.

Delayed cord clamping

Delayed cord clamping is recommended by King Edward Memorial Hospital (KEMH), the World Health Organisation (WHO) and the lead obstetrician for the Kimberley region, unless resuscitation requirements necessitate early clamping.

Delaying umbilical cord clamping (by 1-3 minutes) following a normal birth of a full-term infant does not appear to increase the risk for postpartum haemorrhage (PPH) however it appears to be protective against anaemia in the infant's first six months of life.

Deworming in pregnancy

There is currently no evidence that routine deworming of pregnant women on the basis of anaemia confers any benefits for mother or baby. Symptomatic worm infections (e.g. visible worms in stool) can be treated with mebendazole 100mg BD for three days (ADEC category B3) in second or third trimester.

Eosinophilia can be associated with strongyloides infection (a parasite endemic to the Kimberley region), but it is not a sufficient indication for anti-parasitic treatment in pregnancy.

Women with eosinophilia who also have a complicated pregnancy, are on immunosuppressant medications, or have other chronic medical conditions should be followed up with strongyloides serology discuss with obstetric doctor and physician (may recommend Ivermectin (ADEC category B3)).

Follow Up

Recheck the FBC and iron studies of women on treatment after 8 weeks for first trimester results, or after 4 weeks for second or third trimester results and routinely at 28 weeks.

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Refer/Discuss

Women with severe anaemia or women who require an IV iron infusion where this cannot be administered locally.

Women with unexplained anaemia.

Women with abnormal haemoglobinopathy screening.

Women with haemochromatosis (predisposes to iron overload, these women should not receive iron supplementation without discussion with their physician.

Resources

KEMH: Haemoglobinopathies Screening and Referral
http://www.kemh.health.wa.gov.au/development/manuals/O&G_guidelines/sectionb/1/b1.1.12.pdf

Womens Health and Family Services: High Iron Foods
<http://www.whfs.org.au/pdf/High%20Iron%20Foods%20-%20revised%20Jun%20'11.pdf>

Figure 1: Management of iron deficiency and iron deficiency anaemia in pregnancy

