Iron Supplements in Pregnancy

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The problem . . .

What levels of haemoglobin would you accept as normal minimum levels during each trimester?

The Consultant replies . . .

The accepted haemoglobin values below which anaemia may be said to exist are 12g/100ml in non-pregnant adult women and 11g/100ml in pregnancy.

Garn's 1981 National Center for Disease Control data [1] indicates that the lowest percentage of unfavourable outcomes (including abnormality, fetal death, low birthweight and prematurity) is associated with minimum haemoglobin levels during pregnancy of between 11 and 12g/100ml. Both lower and higher minimum levels of haemoglobin during pregnancy are associated with an increased percentage of unfavourable outcome.

Both Pitkin [2] and Lind [3] indicate that haemoglobin falls between 13 and 26 weeks irrespective of iron supplementation, whereas with iron supplementation during the third trimester, haemoglobin values returned to first trimester levels, but continued to fall without iron supplementation. In the absence of iron supplementation, the fall appears to be around 1.5g/100ml during the second and third trimesters. Fleming et al. have found a similar rate of fall in a West Australian population [4], i.e.

$$\text{haemoglobin (g/100ml)} = -0.059x + 13.33$$

where x = weeks of gestation.

On this basis one might consider the minimum acceptable level during the first trimester to be 12.5g/100ml, 11.5 to 12g/100ml in the second and 11.0 to 11.5g/100ml in the third.

Is there any value in measuring actual iron levels or ferritin during pregnancy?

It is useful to know the nutritional well-being of a woman prior to the advent of pregnancy, since adequate nutritional reserves at this stage are more important than catching up during pregnancy. However, one purpose in measuring serum iron during pregnancy would be to differentiate iron deficiency from other causes of anaemia in pregnancy since a normal serum iron is not likely to be found in the presence of established iron deficiency. Another reason would be if iron deficiency were of consequence short of the emergence of anaemia. Ferritin might be preferred as an index of iron stores under these circumstances. Acceptable ranges of iron and ferritin during pregnancy require definition.

What is the evidence for adverse effects of iron during pregnancy?

Although constipation and other gastrointestinal disturbances are commonly reported with iron therapy in pregnancy, controlled trials [5,6] have found no significant difference in the incidence of gastrointestinal symptoms between placebo and iron preparations, either in pregnant women or in healthy non-pregnant women.

Lind [3] refers to the fact that in women receiving iron supplements there is an increase in mean cell volume which does not occur in those not receiving iron, and questions whether supplementation is necessarily a good thing.

Can you comment on the availability of iron from plant and animal sources?

Although the bioavailability of iron from non-haem sources (plant food) is less than that from haem iron (animal sources), the bioavailability from non-haem sources increases in the presence of meat and of ascorbic acid-containing foods (see table I).

What is your opinion of substances such as molasses and brewers' yeast as sources of extra iron during pregnancy?

These are non-haem sources and acceptable for those who find them palatable. One tablespoon of each (about 20g) would provide 3 to 4mg of iron; 30g of breakfast cereal fortified with iron also provides about

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Table I.
Availability of iron in different foods

	Iron absorbed (%)	
	non-haem	haem
Low availability < 30g meat, poultry, fish and < 25mg ascorbic acid	3	23
Medium availability 30-90g meat, poultry, fish or 25-75mg ascorbic acid	5	23
High availability > 90g meat, poultry, fish or > 75mg ascorbic acid *or* 30-90g meat, poultry, fish plus 25-75mg ascorbic acid	8	23

3mg. Bioavailability increases in the presence of ascorbic acid-containing foods.

I seem to remember reading that when iron supplements are indicated there is no advantage in giving parenteral dosage when oral absorption is normal. Can you comment?

The objective of treatment with iron supplements is either restoration of the normal haemoglobin level in iron deficiency or prophylaxis against iron deficiency during periods of increased requirement. Castaldi [7] considers that the oral route of administration is preferable for iron supplements and that these could be ferrous gluconate or ferrous sulphate, rather than delayed or sustained release preparations which are less effective as therapeutic agents. The hazards of parenteral administration of iron preclude admin-

Table II.
Some food sources of folate

Food source	Free folate (μg/100g)	Food source	Free folate (μg/100g)
Spinach	175	Oranges	13
Broccoli tops	90	Egg	12
Kidney (ox)	63	Bananas	11
Asparagus	58	Potatoes (fresh)	10
Peanuts	28	White bread	8
Cabbage	25	Beef	4
Lettuce	24	Milk (cow's)	4
Wholemeal bread	17	Apples, grapes	3
Rice	15	Chicken, lamb, pork	1-3

Table III.

Recommended daily amounts of energy and nutrients in Australia for non-pregnant women aged 18 to 35 years, and additional allowances recommended for the second and third trimesters of pregnancy

	Basic allowance (non-pregnant)	Extra allowance (during pregnancy)
Energy (kJ)	8400	600
Protein (g)	58	8
Calcium (mg)	400-800	500
Iron (mg)	12	3
Vitamin C (mg)	30	30
Free folate (μg)	200	200
Vitamin B_{12} (μg)	2	1
Vitamin A (μg)	750	0

Table IV.

Suggested approach for evaluating the nutritional well-being of pregnant women

Details to be elicited

1. **Weight**
   a) Before this pregnancy
   b) Gain during last pregnancy
   c) Expected gain during this pregnancy
   d) Description of any weight-related problems
2. **Eating habits**
   a) Normal appetite (large, moderate, small)
   b) Regularity of mealtimes
   c) Incidence of nausea or vomiting during this or previous pregnancy
   d) Information about the type of food eaten in patient's household (food budget, kitchen facilities, planning and buying)
   e) Description of any diets undertaken during this pregnancy or previously, including for reasons other than weight loss (e.g. diabetic, low salt)
   f) Foods which are not tolerated by patient (why?)
   g) Abnormal cravings
   h) Problems with constipation or diarrhoea
3. **Drugs**
   a) Current medication, including vitamin or mineral supplements, diuretics, weight-control preparations
   b) Alcohol and cigarette consumption
4. **General**
   a) Tactfully ascertain the general standard of living of the patient (welfare recipient? poorly educated in basic nutrition?)
   b) Establish how patient intends to feed her baby

istration via this route except where there is intolerance to oral administration, malabsorption causing failure of oral therapy, or continued bleeding exceeding oral iron intake.

What are the indicators of folate deficiency in pregnancy and what are the best dietary folate sources?

Fleming et al. [4] found that serum folate level declined throughout pregnancy, but considered that this should not be interpreted as evidence of negative folate balance, while red cell folate does not fall appreciably in pregnancy except in association with megaloblastic erythropoiesis. However, one would expect red cell folate to be used only to confirm a folate deficiency suspected on the basis of mean cell haemoglobin and volume rather than as a routine measure.

Another measure of folate status is a percentage of hypersegmented (5-lobed) neutrophilic polymorphs. Fleming et al. [4] recommend that the following estimations should be carried out at the first antenatal visit: haemoglobin, packed cell volume, mean cell haemoglobin concentration and examination of the peripheral blood for microcytosis, hypochromia and hypersegmentation of the polymorphs.

Dietary sources of folate are shown in table II. The values shown are for fresh (uncooked) foods; cooking losses can be considerable.

It is also useful to be aware of the increments in nutrient allowances during pregnancy recommended by the Australian National Health and Medical Research Council (table III) [8].

Finally, can you outline any key questions and advice about diet which could be used in the time-limited situation of most antenatal care?

It would be helpful to have a routine for evaluating the nutritional well-being of pregnant women. A suggested approach is shown in table IV.

References

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