

## Obstetric Outcome of Iron Deficiency Anemia

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### ABSTRACT

**Objectives:** To determine the frequency of iron deficiency anemia in pregnancy, the impact of iron deficiency anemia on maternal and fetal outcome and to reduce the frequency of iron deficiency anemia in pregnancy by antenatal detection and iron supplementation.

**Design:** A cross-sectional study.

**Setting:** Sir Ganga Ram Hospital from 1<sup>st</sup> June to 31<sup>st</sup> December 2010 .(6 months ongoing study)

**Patients and methods:** All pregnant women attending outpatient department and emergency unit of Sir Ganga Ram Hospital for antenatal and delivery with a hemoglobin concentration of <11/dl were included in the study and their obstetric outcome was monitored through follow up. The patients were divided into mild anemia (Hb 8 -10.9 g/dl) moderate anemia (Hb 4—7.9 g/dl) and severe anemia (Hb, 4g/dl).Hb estimation was done in lab of SGRH on automated counter. All pregnant ladies attending Gynae III department of SGRH for antenatal or delivery during study period. All women with anemia who were not pregnant and all pregnant ladies diagnosed with anemia due to other causes including thalassemia or Sickle cell anemia.

**Results:** During a 6 month study 661/1128 women were admitted in Gynae unit III with hemoglobin concentration of <11g/dl with a total admission of 1128.. Frequency of iron deficiency anemia is 58.5%. 649 women (98%) of them had moderate anemia (Hb 7—10.9g/dl). and 63 women (9.5%) women had severe anemia (Hb <4g/dl) and 69 women (10.4%) had mild anemia ( Hb 8—10.9g/dl). Out of these 661 women 99 women(15.0%) presented with preterm prelabour rupture of membranes and delivered before 37 completed weeks. 13 women (2%) presented with abruption , 99 (15%) pregnancies were complicated with pre-eclampsia. Postpartum hemorrhage was seen in 79 women (12%) uterine atony was the main cause of postpartum hemorrhage. 4 women ( 0.6 % ) underwent obstetric hysterectomy for uncontrolled PPH, out of which one expired( 0.15% ) due to cardiac failure staying on ventilator for six days.. Ceasarean section was done in 86 women (13%) due to fetal distress. 216 babies (32.7%0 were low birth weight < 2000g. the neonatal admission rate was high but all babies survived.

**Conclusion:** Iron deficiency anemia is a major health problem among women of reproductive age group, particularly in developing countries.

Preterm labour, Prelabour rupture of membranes, prematurity, low birth weight and abruption and preclampsia are common in pregnancy complicated with iron deficiency anemia.

**Keywords:** Iron deficiency, low birth weight, preterm labour, abruption, preclampsia.

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### INTRODUCTION

Anemia is defined as reduction of hemoglobin level below reference value. WHO considers a hemoglobin level of less than 11g/dl as an indicative of anemia. It may be moderate ( Hb 7—10.9 g/l ) , severe ( Hb 4—6.9 g/l ) or very severe ( Hb <4 g/l ). Most women in Pakistan are anemic when they start their pregnancy. They may present with weakness, tiredness, lethargy, palpitations, breathlessness or dizziness. It is common to regard these features as common in pregnancy, especially if anemia is not severe. An anemic woman is more likely to succumb to complications like hemorrhage or sepsis and thus

anemia contributes significantly to maternal morbidity and mortality.

Anemia may be due to iron deficiency (microcytic hypochromic) or folic acid deficiency (megaloblastic) .In Pakistan, pregnant women usually have mixed deficiency anemia. It is therefore recommended that all pregnant women be given iron and folic acid during the antenatal period.

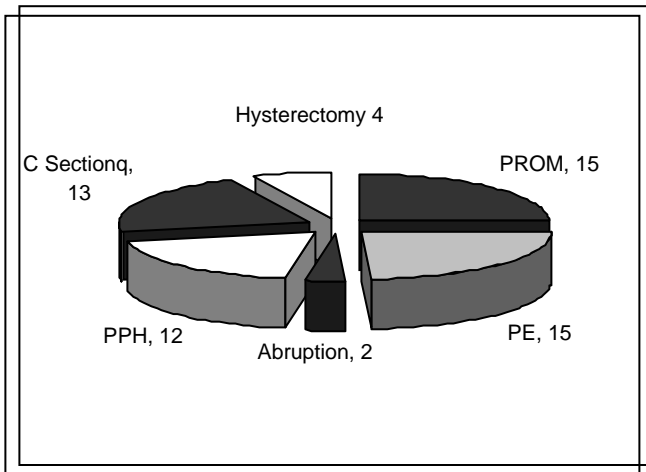
The management of anemia depends upon the severity of the condition and duration of pregnancy . In early pregnancy, even severe iron deficiency anemia is manageable by high doses of oral iron. In severe anemia and in cases of malabsorption or non-compliance parenteral iron therapy (TDI) may be recommended. In moderate to severe anemia close to term blood transfusion may have to be considered.

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**PATIENTS AND METHODS**

All pregnant women attending outpatient department and emergency unit of Sir Ganga Ram Hospital for antenatal and delivery with a hemoglobin concentration of <11/dl were included in the study and their obstetric outcome was monitored through followup. The patients were divided into mild anemia (Hb 8—10.9 g/dl) moderate anemia (Hb 4—7.9 g/dl) and severe anemia (Hb, 4g/dl).Hb estimation was done in lab of SGRH on automated counter. Data was collected on age, social status, dietary habits, past obstetric history including parity, birth spacing, contraceptive practices, menorrhagia, postpartum hemorrhage was noted. Medical history of worm infestation, hemorrhoids and bleeding disorders was also documented. Serum ferritin level were done to document iron deficiency. Patients were followed through their delivery and fetomaternal outcome was recorded. Data was entered and analyzed on SPSS version. Postnatal follow up was provided with iron supplementation and appropriate contraceptive advice.

**RESULTS**



**Iron Costs of Pregnancy**

Factor	Milligrams of iron	
	Range	Median
Fetal iron	200-450	270
Placental iron	30-170	80
Partum and puerperium losses	90-310	250
Hemoglobin and tissue expansion	130-430	200*
Maintenance during amenorrhea	160-220	190
Subtotal 1 (total iron costs)	610-1580	990
Postpartum involution iron	130-430	200
Total	480-1150	790

\*Iron-unsupplemented women. For iron-supplemented women this value is 450 mg.

**Red Blood Cells**



**DISCUSSION**

It is estimated that about 2,150 million people are iron deficient<sup>1</sup> and that this deficiency is severe enough to cause anemia in 1,200 million people globally. About 90% of all anemias are iron deficiency anaemias. In the developing world nearly half of the population is iron deficient. However the industrial world is not free from it; 11% of its population has iron deficiency<sup>2</sup>.

Roughly 60% of pregnant women have anemia worldwide..In our study 59% of pregnant ladies are anemic. In the industrial world as a whole, anemia prevalence during pregnancy averages 18%, and over 30% of these populations suffer from iron deficiency. The socially deprived are more affected. Normal ferritin levels in females range 12—150ng/L<sup>13,14</sup>.

In our study 58.5% women are diagnosed as iron deficiency anemia which is equivalent to these studies. The risk of pregnant women for incurring negative balance and iron deficiency is due to their increased iron needs because of menstruation and the substantial iron demands of pregnancy.<sup>14</sup> Median requirements of absorbed iron are estimated to be 1.36 and 1.73 mg per day among adult and teen-age menstruating females<sup>3</sup>. However, 15% of adult menstruating women require more than 2.0 mg per day, and 5% require as much as 2.84 mg per day.<sup>4</sup> The superimposition of menstrual losses and growth in menstruating teenage girls increases the demands for absorbed iron; 30% need to absorb more than 2.0 mg of iron per day; 10% as much as 2.65 mg, and 5% 3.21 mg. These requirements are very difficult, if not impossible to satisfy even with good quality, iron-fortified diet. The following table shows the total iron requirements during pregnancy

Iron needs exhibit a marked increase during the second and especially during the third trimesters when median daily needs increase up to an average of 5.6 mg per day (that is, 4.1 mg above median pre-pregnancy needs). The approximate range would be

3.54 and 8.80mg per day. This amount of absorbed iron needs cannot be met from food iron even if iron fortification is in place. Thus the importance of two factors: pre-pregnancy iron reserves upon which to draw; and iron supplementation during pregnancy<sup>5,6</sup>. Iron deficiency during lactation is mostly a residual from that resulting from pregnancy and delivery and can be partially alleviated because of lactational amenorrhea. However, once menstruation returns, if lactation continues, iron requirements become higher to reach a median of about 1.81 mg/day. Dietary iron absorption in most populations of the developing world may not be sufficient to fulfil these needs. Iron deficient anemic women have shorter pregnancies than non-anemic, or even anemic but not iron deficient pregnant women. This study has demonstrated a causal relationship between severe anemia and various maternal and perinatal complications. The underlying cause is postulated to be iron deficiency. Iron deficiency anemia results in impaired transport of hemoglobin and thus oxygen to uterus, placenta and fetus. It also causes tissue enzyme and cellular dysfunction. This mechanism can explain impaired myometrial contractility resulting in atonic uterus, as well as placental dysfunction leading to preterm birth, low birth weight and growth restricted babies and perinatal deaths. Reduced oxygen delivery can also result in impaired wound healing.

We have found that severe anemia results in post-partum hemorrhage in a significant proportion of patients. Kavle JA, et al also found strong association of moderate to severe anemia with increased blood loss at delivery and in the post-partum period<sup>14</sup>. Wandabwa J has also indicated chronic anemia as a predictor for post-partum hemorrhage<sup>15</sup>. Another study from Zimbabwe highlights the importance of anemia in causation of post-partum hemorrhage<sup>16</sup>. We have also observed that severely anemic patients developed infection of caesarean section/ episiotomy wound far more commonly as compared to controls. Maharaj D has also proposed anemia to be a predisposing factor for puerperal pyrexia<sup>17</sup>. Dare FO and colleagues found that amongst patients with puerperal sepsis, 69.2% were anemic<sup>18</sup>. A population based study conducted in Israel by Levy A et al<sup>19</sup> found that abruption placentae was more common in anemia. An elegant prospective study showed that all anemic pregnant women had a higher risk of pre-term delivery in relation to non-anemic women<sup>7,8</sup>. This effect has been substantiated in our study. The iron-deficient, anemic group had twice the risk of those with anemia in general. Inadequate gestational weight gain (for gestational age) was significantly higher for all anemic cases, particularly among those that were iron-deficient. Inadequate weight gain has

also been associated with pre-term delivery. Mild maternal iron deficiency and anemia have little significant repercussions on the hematological status of newborns. It has been suggested that placental transferring receptors protect the fetus. However, it appears that the capacity of iron to transfer from placenta to fetus is limited by a threshold mechanism so that fetal iron deficiency exists in severe maternal iron deficiency and anemia. Also, the fetus of iron deficient mothers accumulates less iron reserves, and has smaller hemoglobin mass than their normal counterparts. This has been termed "hidden iron deficit" and is further magnified by low birth weight, mainly due to preterm delivery. Correction of iron deficiency anemia in pregnant women have met with little success<sup>9,10</sup>. Also, there are no concerted efforts to control these conditions in the populations of fertile age women and in infants and toddlers.

Food-based strategies, including general or targeted food fortification with iron, are very difficult to implement in many developing regions. Iron fortification of salt, sugar and other foods and condiments with iron alone or combined with vitamin A and iodine appear promising in certain regions, but even then, about 20% of women do enter pregnancy in a state of iron deficiency and most women will not have adequate reserves<sup>(6)</sup>. The need for targeted iron supplementation during pregnancy is evident and has been the accepted practice. However its effectiveness has been frustratingly poor. There is a need to explore new approaches that modify current practices by seeking greater effectiveness and safety as well as means to increase coverage<sup>8</sup>. New information that supports new approaches to iron supplementation is becoming available. Based on this emerging data the current practices of iron supplementation to targeted groups must be modified as follows:

1. The target for iron supplementation should be expanded to cover all women of fertile age who might become pregnant, with a different philosophy and practice of iron supplementation so they enter pregnancy with iron reserves.
2. Current philosophy of iron supplementation is basically therapeutically oriented, dominated by the aim of correcting established iron deficiency. This philosophy must be changed to one that is primarily oriented to prevent iron deficiency.
3. New supplementation practices must be explored. Two recent developments are important in this regard<sup>9</sup>. Theory would support a single weekly iron dose of 60 mg consumed by fertile-age women as an effective scheme to cover menstrual losses in the vast majority of women, who would enter pregnancy with improved iron nutritional status<sup>10</sup>. Once this practice is established, as soon as

pregnancy is detected the weekly dose would be doubled. This scheme is more economical, could be handled by community organisations and the weekly dose of iron should not interfere with the daily absorption of other micronutrients in foods (i.e. zinc)<sup>11</sup>.

Today effective alternatives to oral iron only or blood transfusion such as parenteral iron sucrose complex and in selected cases also recombinant erythropoietin have been investigated and show promising results concerning effective treatment of anaemia during pregnancy and postpartum<sup>(12)</sup>

## CONCLUSION

1. Iron deficiency during pregnancy is extremely common even among otherwise well nourished populations because of the reasons reviewed above. The risk of iron deficiency in pregnancy and lactation begins with inadequate pre-pregnancy iron reserves among women of fertile age.
2. Current philosophy of iron supplementation is basically therapeutically oriented, dominated by the aim of correcting established iron deficiency. This philosophy must be changed to one that is primarily oriented to prevent iron deficiency micrograph of red blood cells take from <http://clinicalcenter.nih.gov/> 1999.

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