

ROLE OF SERUM IRON STUDIES IN PREGNANT WOMEN WITH ANAEMIAN. Sumathi¹, J. Rajam², M. N. Swathika³¹Professor, Department of Obstetrics and Gynaecology, Government Rajaji Hospital, Madurai.²Postgraduate Student, Department of Obstetrics and Gynaecology, Government Rajaji Hospital, Madurai.³Postgraduate Student, Department of Obstetrics and Gynaecology, Government Rajaji Hospital, Madurai.**ABSTRACT****BACKGROUND**

Serum iron studies are recommended only for those not showing improvement after transfusion.

The aim is to study the role of estimation of serum iron, serum ferritin and TIBC in the management of anaemic pregnant women.

MATERIALS AND METHODS

Among the 100 anaemic pregnant women admitted in the antenatal ward of Government Rajaji Hospital Madurai, between January 2017 and June 2017, in randomly selected 50 cases (Group I), serum iron studies were done. In another 50 cases, complete haemogram with peripheral smear was done (Group II) to assess the haemoglobin status.

RESULTS

Among group I, 40 cases (80%) had serum iron levels below 40 mcg/dL. Serum ferritin was below 20 ng/mL in 28 cases (56%). TIBC <200 mcg/dL seen in 43 cases (86%). Group II, in whom complete haemogram with peripheral smear was done, 45 cases (90%) showed microcytic hypochromic anaemia. Peripheral smear was done in group I cases in which 47 cases (94%) had hypochromic microcytic anaemia. Among which 6 patients in group I, 2 patients in group II had three transfusions. 25 patients in group I and 23 patients in group II had two transfusions.

CONCLUSION

In developed countries, iron supplementation is based on serum ferritin levels. But pregnant women in India should continue to get iron supplementation based on haemoglobin estimation. Peripheral smear can be done in a tertiary care centre and Serum iron studies can be done in cases whom haemoglobin is not improving after transfusion and when the cause is doubtful.

KEYWORDS

Anaemia, Pregnancy, Serum Ferritin, Packed Cell Transfusion.

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BACKGROUND

In developing countries like India, the maternal nutritional status and the outcome of pregnancy can be aggravated by undernutrition contributing to micronutrient deficiency particularly iron. Serum iron level serves as an index of state of iron metabolism. So, correction of iron deficiency and resulting anaemia in pregnancy decreases maternal and foetal mortality and morbidity.

Aim

To study the role of estimation of serum iron, serum ferritin and TIBC compared with simple haemoglobin estimation and peripheral smear study in the management of anaemic pregnant women.

MATERIALS AND METHODS

Among the 100 anaemic pregnant women admitted in the antenatal ward of Government Rajaji Hospital, Madurai,

between January 2017 and June 2017, in randomly selected 50 cases (Group I), serum iron studies were done. In another 50 cases, complete haemogram with peripheral smear was done (Group II).

RESULTS

Anaemia is very prevalent among pregnant women in developing countries. The results of the abovementioned study are as follows:

Age Group	Group I		Group II		Total
19-25	35	70%	37	74%	72
26-30	13	26%	12	24%	25
>30	2	4%	1	2%	3

Table I. Age Distribution

Anaemia is more common among teenage pregnancies. 70% group I and 74% in group II belong to the age group 19-25 years.

	Group I		Group II		Total
PRIMI	11	22%	22	44%	33
Gravida 2	21	42%	13	26%	34
Gravida 3 and above	18	36%	15	30%	33

Table II. Obstetric Code

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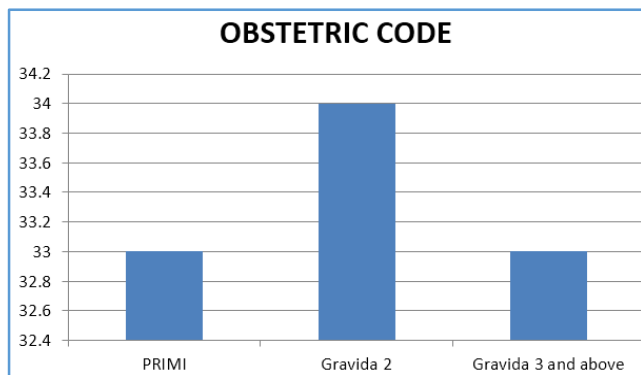
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As the parity increases, generally the incidence of anaemia also increases. About 30-35% of pregnant women with obstetric code 3 and above were anaemic.



The table shown below gives a gestational age wise distribution of the study group.

GA	Group I		Group II	
<20 weeks	6	12%	5	10%
20-28 weeks	6	12%	15	30%
28-36 weeks	24	48%	20	40%
>36 weeks	14	28%	10	20%

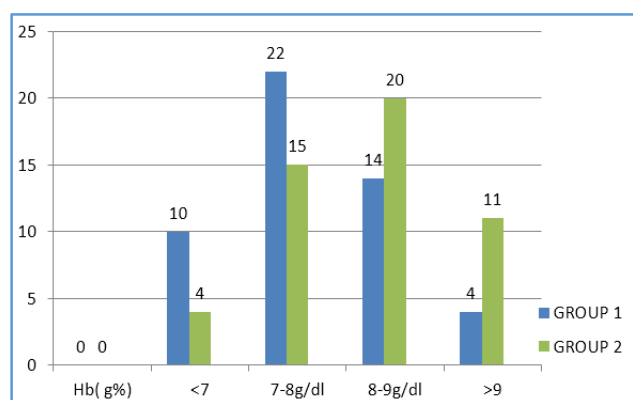
Table III. Gestational Age Distribution

In the present study, anaemia was detected most commonly in pregnant women of gestational age 28-36 weeks. 48% in group I and 40% in group II were between 28-36 weeks.

Hb (g%)	Group I		Group II	
<7	10	22%	4	8%
7-8	22	44%	15	30%
8-9	14	28%	20	40%
>9	4	8%	11	22%

Table IV. Haemoglobin Level

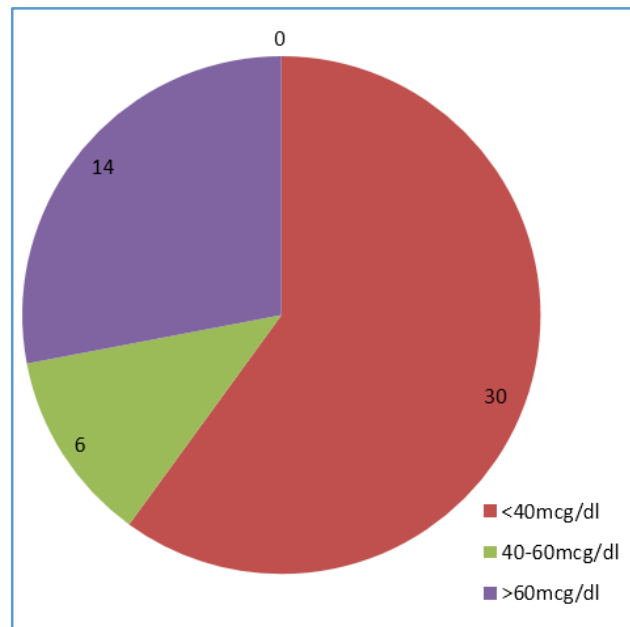
Among the randomly selected anaemic patients, 44% in group I had haemoglobin levels between 7-8 g% and 40% in group II had 8-9 g% suggesting the prevalence of moderate anaemia in pregnant women.



Serum Iron (mcg/mL)	Group I	
<40	30	60%
40-60	6	12%
>60	14	28%

Table V. Serum Iron Level

60% of Group I anaemic mothers were found to have a serum iron level of less than 40 mcg/mL.



Serum Ferritin (ng/mL)	Group I	
<20	28	56%
20-40	3	6%
>40	19	38%

Table VI. Serum Ferritin Level

Serum ferritin was less than 20 ng/mL in 56% study group.

TIBC (mcg/dL)	Group I	
<200	43	86%
200-300	2	4%
>300	5	10%

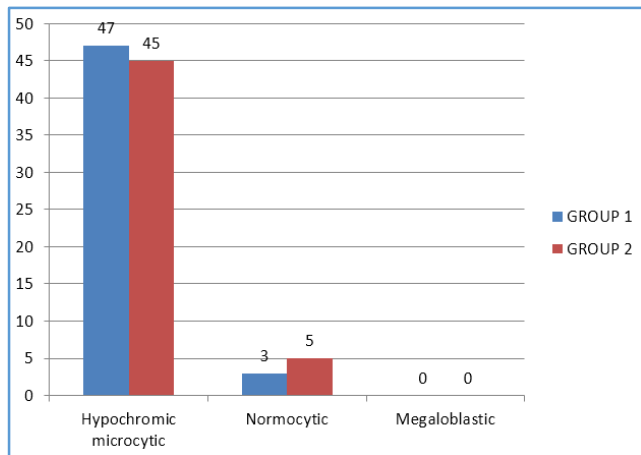
Table VII. TIBC

TIBC level was less than 200 mcg/dL in 86% of study population making it a better index for anaemia status. Only in 10% of cases TIBC was elevated more than 300 mcg/dL.

PS	Group I	Group II
Hypochromic microcytic	47	45
Normocytic	3	5
Megaloblastic	0	0

Table VIII. Peripheral Smear Study

Hypochromic microcytic anaemia was the most common finding in the peripheral smear of both study groups, 94% and 90% respectively, signifying iron deficiency as the most common cause.



	Group I	Group II
I unit	19	25
2 units	25	23
3 units	6	3

Table IX. Packed Cell Transfusion

DISCUSSION

In developing countries like India, nutritional anaemia is the most widespread nutritional disorder. It affects 30% of world population. A high percentage of pregnant women are iron deficient due to factors like high parity, poor dietary intake and low socioeconomic status. Maternal anaemia results in 12-28% foetal loss, 30% perinatal, 7-10% neonatal death. Moderate iron deficiency anaemia during pregnancy is not accompanied by obvious morphological changes in erythrocyte. So, measurements of Hb (g%), haematocrit, red cell indices, peripheral smear and serum iron, ferritin levels should be included in the evaluation of moderate anaemia.

Serum iron studies are especially useful in stage two of iron deficiency wherein the clinical symptoms are not evident but erythropoiesis has been affected. Ferritin is the storage form of iron. Decreased levels indicate depletion of stores. Normal serum level of ferritin in first, second and third trimesters are 6-130 ng/mL, 2-230 ng/mL, 0-116 ng/mL respectively. In a non-pregnant state, iron is preferentially used by bone marrow whereas in pregnancy the trophoblastic cells of the placenta attract more iron and iron is delivered against a concentration gradient to the foetus. The reference range for Serum iron level are 72-143 mcg/dL, 44-128 mcg/dL, 30-193 mcg/dL respectively. TIBC increases with severity of anaemia as the liver attempts to produce more transferrin to maximise the use of iron. TIBC ranges between 28-403 mcg/dL in the first trimester and 259-609 mcg/dL in the third trimester.

In our study, about 70% of pregnant women belong to the age group 19-25 years. 40-48% were anaemic in the gestational period between 28-32 weeks of pregnancy. 44% had haemoglobin 7-8 g%, 40% had Hb between 8-9 g%. Serum iron level was less than 40 mcg/dL in 60% of cases and serum ferritin was less than 20 ng/mL in 56% of cases. Both in group I and group II, 94% and 90% had hypochromic microcytic anaemia picture in peripheral smear study. Iron deficiency anaemia is the most common type of anaemia in our study.

A serum ferritin level of less than 10-15 ng/mL confirms iron deficiency anaemia. According to the study by Raja N, Sarwan I, there is a significant decrease in haemoglobin,

serum ferritin, iron, percentage saturation of transferrin and increase in TIBC in second and third trimester compared to first trimester in iron deficient pregnant woman.⁽¹⁾

Serum iron studies done by Milman N showed that in women serum ferritin levels remain low from adolescence till menopause. In pregnant women, 19% had depleted iron stores and 12% had iron deficiency anaemia.⁽²⁾

The uncertainty of histological variability is accompanied by the uncertainty of concentration dependent indices (ferritin, plasma iron, haemoglobin) caused by volume expansion.⁽³⁾ Serial measurements to determine iron status in pregnant women may be needed in about 70% pregnant women. Teenagers who have depleted iron stores, even though they are on iron supplementation, depletion of iron stores continue through the pregnancy.

Serum ferritin measurement is not required as a routine test. A two-week trial of oral iron with a subsequent improvement in haemoglobin level confirms the diagnosis of iron deficiency anaemia.⁽⁴⁾ However, when a woman has haemoglobinopathy or when the case is in doubt, it should be checked.

Manu Tiwari studies revealed no correlation between ferritin levels and Hb, MCV, MCH and MCHC. Serum ferritin level was less than 12 ng/mL in 30 out of 52 non-anaemic cases suggesting the prevalence of sub-clinical iron deficiency in 58% cases.⁽⁵⁾

All pregnant women in India should continue to get iron supplementation unlike recommendations in developed countries, where the iron supplementation is based on serum ferritin level. Serum transferrin level is not showing any parallel result as iron with haemoglobin concentration. Its level increases in late pregnancy in all groups irrespective of anaemia status. So it cannot be taken as a better index of anaemia. However, the percentage saturation of transferrin decreases with decrease in haemoglobin concentration and serum iron level.⁽⁶⁾ So it can be taken as a better index. Maternal ferritin concentration in pregnancy is a reflection of maternal iron status and high level is associated with good outcome.⁽⁷⁾ In India, there is a high prevalence of not only iron deficiency anaemia, but also sub-clinical iron deficiency in non-anaemic women.⁽⁸⁾

CONCLUSION

Since serum iron and ferritin levels vary in each trimester of pregnancy, correlation according to period of gestation must be done to confirm iron deficiency status and repeated estimation may be required. A simple, cost-effective and easy technique for detecting anaemia is haemoglobin estimation, and peripheral smear is more helpful in diagnosing and treating anaemia in pregnancy and followup.

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