

Study of Foetal Outcome in Pregnancy with Iron Deficiency Anaemia

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Abstract:

Background: In pregnancy the demand for iron is increased to meet the needs of the expanding red cells mass and requirements of the developing foetus and placenta. Current knowledge indicates that iron deficiency anaemia in pregnancy is a risk factor for preterm delivery and subsequent low birth weight and possibly for inferior neonatal health.

Methods: This study was conducted in the department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences, Imphal, Manipur State from February 2014 to January 2016. Hundred pregnant women in their last trimester, irrespective of parity, and whose Hb level is below 11.0 gm/dl attending antenatal OPD/admitted in antenatal ward during the period were included for the study. For the iron deficiency anaemia the cut off level for serum ferritin is taken as 12ug/l and below. Fifty randomly selected non-anaemic healthy pregnant women in their last trimester were selected as control group.

Results: Maximum number of anaemic cases were seen in the age group between 21- 30 years of age and gravity 1. The red cell morphology examination showed that majority of cases were of normochromic normocytic. A high incidence of preterm labour was noted in anaemic group as against cases in control group which was statistically significant. The incidence of low birth was higher in anaemic group as compared to control group. A correlation between Apgar Score and haemoglobin levels (mean and SD) are made and found to be significant.

Conclusion: Iron deficiency is well correlated with foetal outcome when preterm labour, low birth weight, Apgar score, and other haematological and biochemical iron profile were considered.

Keywords: Iron deficiency, anaemia, pregnancy, foetal, birth weight.

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I. Introduction

Iron deficiency and iron deficiency anaemia are common nutritional and haematologic disorders worldwide. In young women, it is most often the result of pregnancy. In pregnancy, the demand for iron is increased to meet the needs of the expanding red cell mass and requirements of the developing foetus and placenta. Of the 600,000 deaths from pregnancy related complications world over, anaemia is responsible for 40-60% of them. Most anaemia is however the result of severe iron deficiency and therefore open to prevention and treatment interventions with a very high benefit/cost ratio.

II. Materials And Methods

The study was carried out in the department of Obstetrics and Gynaecology, in collaboration with the department of Pathology and Department of Biochemistry of Regional Institute of Medical Sciences, Imphal, Manipur. Hundred pregnant women in their last trimester, irrespective of parity and whose Hb level is below 11.0 gm/dl attending antenatal OPD/admitted in antenatal ward during the period between February 2014 and January 2016 (2 years) were included in the study. For the categorization of anaemia into mild, moderate and severe types of anaemic pregnancy, the WHO criteria are used; 10-10.9 gm/dl - mild anaemia, 7.0-9.9 gm/dl - moderate anaemia, <7.0 gm/dl - severe anaemia. For the iron deficiency anaemia, the cut off level for serum ferritin is taken as 12ug/l and below. Fifty randomly selected non-anaemic healthy pregnant women in their last trimesters were selected as control group.

Pregnant women suffering from infection and other illness like pregnancy induced hypertension, cardiovascular disease etc. were included for the study. A thorough history, including medical and obstetric history, age, parity, any ill health or chronic infection were recorded and clinical and obstetric examination was followed. For the determination of foetal outcome, the following criteria were considered; Birth weight of the baby, Apgar score, preterm delivery, still birth and intra uterine foetal death.

III. Results And Observations

In the present study, 100 anaemic pregnant women in their third trimester and 50 non anaemic pregnant women in the same trimester were selected as cases and controls respectively. The results and observations are given below.

Table -1 Age wise distribution of cases and controls.

Age in years	Cases		Controls	
	No.	%	No.	%
<20	1	1	4	8
21-30	56	56	36	72
31-40	40	40	8	16
>40	3	3	2	4

Table -1 shows the maximum no. of pregnant ladies in both the groups are between 21-30 yrs of age constituting 56% and 72% respectively.

Table-2 Gravidity wise distribution of cases and controls

Parity	Cases		Controls	
	No.	%	No.	%
0	22	22	8	16
1	32	32	10	20
2	20	20	20	40
3	12	12	10	20
4	14	14	2	4

Table-2 shows the distribution of cases and controls parity wise. Maximum number of cases belong to gravidity 1 (32%) followed by primiparas(22%), while in the control group, gravidity 2 is most common with (40%)

Table-3 Distribution of cases with degrees of anaemia

Degree of Anaemia	Cases	
	No.	%
10-10.9 g/dl (mild)	54	54
7-9.9 g/dl (moderate)	42	42
<7g/dl (severe)	4	4

Table -3 shows the distribution of cases in different degrees of anaemia . Fifty four cases (54%) had mild anaemia while 42 cases (42%) had moderate anaemia among the cases. Four cases(4%) of severe anaemia were encountered in the study.

Table- 4 Haematological Parameters

Parameters	Cases	Controls
	Mean +_ S.D	Mean +_ S.D
Haemoglobins(Hb%)	9.9 +_ 1.02	11.8+_ 0.88
Total leucocyte count (per cu mm)	8440 +_ 1.51	9529 +_ 3.10
Platelet Count (lakhs/cu mm)	1.90+_ 0.34	1.7+_ 0.38
Packed cell volume (%)	30.0 +_ 2.61	35.0+_ 2.88

Table 4 shows the mean +_SD of haemoglobin and PCV was 9.9 gm/dl and 30.0 % which are just on the lower side of normal reference. There are significant differences between the cases and controls. However, total leucocyte count and platelet counts were within normal limits

Table – 5 Distribution of erythrocyte indices in cases & controls

PARAMETERS	Cases	Controls
	Mean+_ S.D	Mean+_ S.D
MCV(fl)	84.7+_ 6.32	91.2+_ 6.32
MCH(pg)	27.7+_ 3.1	28.9+_ 1.68
MCHC(gm/dl)	30.6+_ 1.32	31.6+_ 1.15
RDW (%)	15.2+_ 2.80	13.7+_ 1.35

Table 5 shows the ranges and means of four erythrocytic indices of both cases and controls. The values of MCH, MCV and MCHC are slightly lower than those of the controls but mild increase in the value of RDW is noted in the cases

Table – 6 Morphological type of anaemia among the cases

Red cell morphology (Anaemia)	Cases	
	No.	%
Microcytic hypochromic	10	10
Macrocytic	4	4
Dimorphic(microcytic normocytic)	12	12
Normochromic and normocytic (normal)	74	74

Table 6 shows the distribution of different morphological types of anaemia among cases. Microcytic hypochromic was present in 10% and dimorphic anaemias in 14% cases. However, normocytic normochromic anaemia was predominant in 74% of cases.

Table – 7 Different serum iron levels among the cases

Serum Iron Levels	No. of Cases	%
<40ug/dl	10	10
41-115ug/dl	68	68
>116ug/dl	22	22

Table 7 shows the different levels of serum iron in the 100 cases studied. Majority of the cases (68%) had serum iron levels between 41-115ug/dl (Iron deficiency) and 10% cases had serum iron levels below 40ug/dl indicative of iron deficiency with anaemia. 22 cases (22%) had serum iron levels within normal limits.

Table – 8 Serum Ferritin levels among the cases

Serum Ferritin levels	No. of cases	%
<12ug/l	32	32
13-20ug/l	56	56
>21ug/l	12	12

Table 8 shows that 56% cases had highest S. ferritin levels 13-20ug/l while 32% of cases had serum ferritin level below 12 ug/l which is indicative of iron deficiency anaemia. 12% of the cases had no effect of the anemia on the S. ferritin level

Table – 9 Pregnancy outcome in cases and controls

Pregnancy outcome	Case		Controls	
	No.	%	No.	%
Full term labour	55	55	37	74
Preterm labour	42	42	06	12
Post term labour	03	03	07	14

Table 9 shows a high incidence of preterm labour (42%) as compared to controls (08%) which is statistically significant($p<0.05$) and majority of the patients in both cases and controls had term delivery constituting 55% and 74% respectively. There was no incidence of still birth and IUGR.

Table – 10 Distribution of birth weights of babies in both cases and controls

Birth Weight (gms)	Cases		Controls	
	No.	%	No.	%
<2500(Low)	15	15%	3	6%
2500 and Above	85	85%	47	94%

Table 10 shows the birth weights of the babies of cases and controls. Low birth weight babies in cases and controls constituted 15% and 6% respectively which was statistically significant ($p<0.006$) when correlated with Hb% values. Majority belonged to the 2500gms and above categories both in cases and controls.

Table- 11 Relationship between Apgar score and haemoglobin level

Apgar Score	Cases		Hb (Mean & SD)	F	P-value
	No.	%			
7	10	10%	9.04+1.46	3.4	0.042
8	14	14%	9.23+1.10		
9	76	76%	9.97+0.87		

Table 11 shows the relationship between Apgar scores and Hb values (mean and SD) which is statistically significant ($p\text{-value}=0.042$)

IV. Discussion

The present was conducted to find out the prevalence of iron deficiency and iron deficiency anaemia in pregnant women in their last trimesters. The study also attempted to find out the various haematological and biochemical parameters related to iron deficiency and iron deficiency anaemia and their correlation to the foetal outcome. For these purpose, 100 cases and 50 healthy controls were taken up for the study. In the present study, about 3.95% (670/16920), of the cases have been found to be anaemic (Hb% below 11.0 gm/dl) whereas K Singh et al. (1) found that prevalence of anaemia was 15.3%. In this study, maximum no. of patients (56%) were seen in the age group between 21-30 years of age (Table 1) which is similar to those of Alli R and Satyanarayan M (2). In the parity-wise distribution among the cases in this study, maximum no. were seen in gravidity 1 (32%) followed by primiparas (22%) Table II and similar finding was reported by Agarwal P and Chaturvedi B (3). During the study, it was observed that 54 cases (54%) were suffering from mild anaemia while 42 cases (42%) had moderate anaemia and 4 cases (4%) with severe anaemia were encountered (Table III). In the present study, mean values of PCV was found to be 30.0% and RDW as 15.2% in cases as compared to the 35.0% and 13.7% in controls respectively (table IV & V) which are comparable with those of Casanova BF et al (4) who found that a Hb level <9.7gm% and RDW >15% predicted iron deficiency with high specificity.

The red cell morphology examination showed that majority of the cases (78%) were of normochromic normocytic while 10% cases, each were of microcytic hypochromic and dimorphic red cells respectively (table VI) and are in agreement with Hassan R et al (5) who observed microcytic hypochromic red cells in only 7.7% of cases while 92.3% had normocytic normochromic red cells. In this study, majority of them i.e 68% cases had iron serum levels between 61-115ug/dl while 22% cases were with levels 116ug/dl and above (table VII) where Javed MT et al (6) found the mean serum iron levels as 212.2ug/dl in pre-delivery women which was higher than the present finding. In the present study, serum ferritin level less than 12ug/l was seen in 30% cases, 56% cases had low serum ferritin level between 13-20 ug/l, while only 14% cases had normal serum ferritin levels (table VIII) and similar observations were made Tee E Siong et al (7). A high incidence of preterm labour in 40% cases was noted in anaemic group as against 10% cases in control group which was statistically significant (Table IX). The incidence of low birth weight babies was slightly higher in anaemic group with 14% cases as compared with controls with 5% cases only which was statistically significant (Table XI) but Roy S and Chakravorty PS (8) observed a high incidence of low birth. Majority of the babies 78% had apgar score of 9 while 14% and 10% had apgar score of 8 & 7 respectively. A correlation between AS and haemoglobin levels (mean & SD) are made and found to be significant (p-value <0.042) (Table XII) and these findings are comparable with those of Rusia et al (9).

V. Conclusion

The prevalence of anaemia of pregnancy in the third trimester pregnant women is approximately 4.1%, the incidence of iron deficiency among these women is 84% and the incidence of iron deficiency with anaemia is 32%. Iron deficiency is well correlated with the foetal outcome when preterm labour, low birth weight, Apgar score & other haematological and biochemical iron profile are considered. Significant relationship between levels of Hb%, RDW% and iron were found. Majority of the cases had mild to moderate iron deficiency.

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