



## Impact of Anaemia in Pregnancy on Feto-Maternal Outcome

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### Abstract

**Introduction:** Anaemia is the most common and widespread nutritional disorder among pregnant women in the world - a global health concern. Prevalence of anaemia is highest in South Asian countries among the world. Among the South Asian countries, India has the highest prevalence of anaemia (70%) and contributes to about 80% of the maternal deaths due to anaemia. Maternal haemoglobin has a positive relationship with the neonatal antropometric measurements. To plan effective intervention strategies to combat both iron deficiency and anaemia there is an urgent need to have better information on the iron status of populations that will enable the right interventions to be chosen in the first place and to make the journey of pregnancy safer.

**Aims and Objectives:** To determine the risk factors for anaemia in pregnancy and it's impact on maternal and foetal outcome.

**Materials and Methods:** A Cross sectional study conducted in the In-patient department of Obstetrics and Gynaecology, RIMS, Imphal, Manipur. Pregnant women with haemoglobin <11 g/dl who were admitted for delivery were included in the study after applying the inclusion and exclusion criteria. The study included 170 anaemic pregnant women who were classified into mild, moderate, severe and very severe anaemia according to ICMR guidelines. These patients were followed up from the time of admission to one week after delivery for maternal and perinatal outcome.

**Results:** The incidence of mild, moderate, severe anaemia and very severe anaemia were 48.8%, 39.4%, 10.6%, 1.2% respectively. Majority of the anaemic women belonged to low socioeconomic status (88.82%) and rural area (84%). 18.8% had maternal complications and fetal outcome were observed in terms of morbidity (59.4%) and mortality (8.8%).

**Conclusion:** Anaemia has an adverse effect on the pregnancy outcome affecting both the mother and the foetus. The improvement in the haemoglobin level of a pregnant woman will have a positive impact on feto-maternal outcome.

### Introduction

Anaemia is the most common and widespread nutritional disorder among pregnant women in the world. It is the only nutrient deficiency which is

also significantly prevalent in industrialised nation. WHO estimates the prevalence of anaemia for the year 2011 in pregnant women as 12 percent in developed countries and 50 percent in

developing countries and 70 percent in India.<sup>1</sup>The percentage of pregnant women with haemoglobin below 11g/dl in Manipur state is 36.7%.<sup>1</sup>

Over 30 percent (2 billion) of world's population are anaemic, many due to iron deficiency and in resource poor areas, this is frequently exacerbated by infectious diseases, malaria, HIV/AIDS, hookworm infestation, schistosomiasis and other infections such as tuberculosis are particularly important factors contributing to high prevalence of anaemia in some areas. Many studies reveal anaemia as the main cause of maternal morbidity and mortality.<sup>2</sup>

Prevalence of anaemia is highest in South Asian countries among the world. Among the South Asian countries, India has the highest prevalence of anaemia (70%). India contributes to about 80 percent of the maternal deaths due to anaemia in South Asian countries. Five major surveys-National family Health Survey (NFHS)-4<sup>3</sup> Indian Council of Medical Research (ICMR)<sup>4</sup> National Centre for Biotechnology Information (NCBI)<sup>5</sup> District Level Household Survey (DLHS)<sup>6</sup>, National Nutrition Monitoring Bureau (NNMB)<sup>7</sup> conducted a study to estimate prevalence of anaemia in the country and showed that over 70 percent of pregnant women and adolescents girls in the country were anaemic. Anaemia begins in childhood, worsens during adolescence and gets aggravated in pregnancy and childbirth.<sup>8</sup>

The National Nutritional Anaemia Control Programme (NNACP) was initiated in 1970 to provide free iron and folic acid supplementation to pregnant women commencing from second trimester to three months postpartum. The Healthcare and Research Association for Adolescents and Nutrition Foundation of India, New Delhi, studied and concluded that prevalence and severity of anaemia in rural pregnant women was 84% of which 9.2% were severely anaemic.<sup>9</sup>

To plan effective intervention strategies to combat both iron deficiency and anaemia there is an urgent need to have better information on the iron status of populations. This will enable the right interventions to be chosen in the first place and

then, once programmes are in place, to have the right indicators to monitor their impact. Therefore the present study aims at finding out the socio-demographic factors associated with anaemia in pregnancy and also to know the impact of anaemia in pregnancy on foeto-maternal outcome.

### Aims and Objects

1. To determine the risk factors for anaemia in pregnancy
2. To determine the impact of anaemia in pregnancy on maternal and foetal outcome.

### Material and Methods

**Study Design:** Cross sectional study

**Study Setting:** In patient department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences, Imphal, Manipur

**Study Duration:** A two year study starting from July 2017 – Oct 2019

**Study Population:** Pregnant women with Hb < 11g/dl admitted to RIMS for delivery or reporting in antenatal clinic with symptoms of anaemia.

### Inclusion Criteria

- a) Pregnant women admitted for delivery and whose Hb < 11 g/dl
- b) Pregnant women of > 24 weeks of gestation.
- c) Patient willing to participate in the study.

### Exclusion Criteria

- a) Anaemia due to acute blood loss
- b) Haemolytic anaemia
- c) Women with past history of preterm
- d) Other medical and obstetrical complication.

### Sample Size: 170

Sample size calculated using the formula  $(n) = \frac{z^2}{p \times q} \times L^2$

P is the incidence of low Apgar score at 1 min in babies born to anaemic mothers.<sup>10</sup>

$n = 169.62$ ; total sample size ~ 170

### Statistical Analysis

Data was entered and analyzed using SPSS version 21.0 IBM for WINDOWS. Descriptive statistics such as frequency, percentage, mean and

standard deviation were used. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. P-value of <0.05 was considered as significant.

**Ethical Issues**

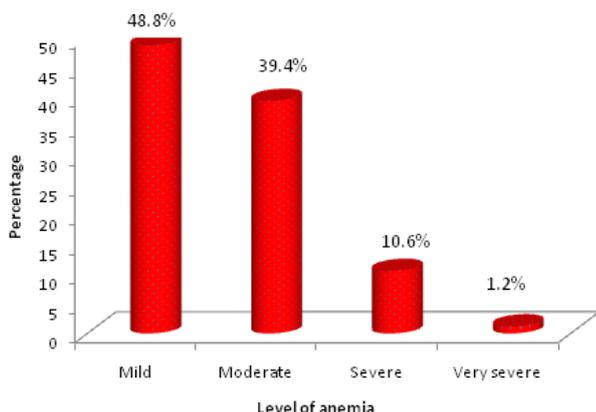
Ethical approval was obtained from the Research Ethics Board, RIMS, Imphal with reference number A/206/REB-Comm (SP)/RIMS /2015/354/97/2017.

**Results and Observation**

**Table 1:** Distribution of anemia according to age group (n = 170)

Age in years	No. of patients	%
<19	9	5.2
19-24	44	25.8
25-29	47	27.6
30 -34	40	23.5
>35	30	17.6
Total	170	100.0

The mean age of pregnant women with anemia were seen in the age group 25 – 34 years (27.6%) followed by 19-24 years (25.8%). Mean age of cases were 28.23±5.67. Maximum and minimum age seen in the study was 42 years and 17 years respectively. Teenage pregnancy is seen in 5.2% of the cases.



**Figure 1:** Bar diagram showing the distribution of patients according to severity of anaemia (n=170)

It was observed that nearly half of the cases (48.8%) had mild anaemia, followed by moderate anaemia (39.4%) and very few had severe anaemia (10.6%) and very severe anaemia (1.2%).

**Table 2:** Distribution of patients by their occupation (n = 170)

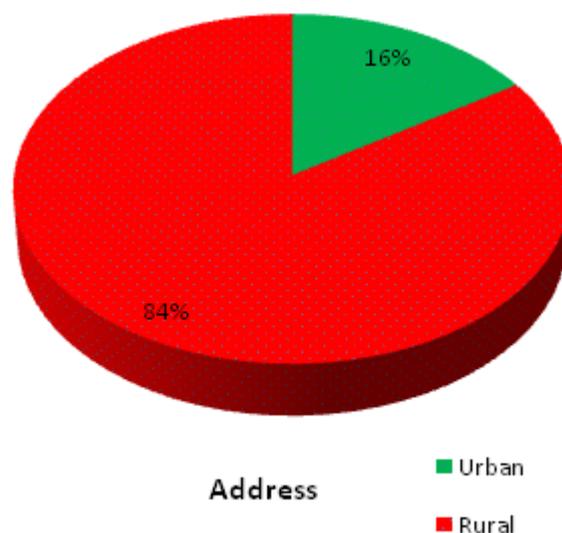
Occupation	No. of patients	%
House wife	142	83.5
Unskilled worker	6	3.5
Semi professional	6	3.5
Skilled worker	6	3.5
Shop keeper	2	1.8
Farm	3	1.8
Professional	2	1.2
Semi-skilled worker	2	1.2
Total	170	100.0

Majority women were House wives (83.5%), other occupations being semi professionals, skilled workers, farm/shop keeper, professional and semi-skilled worker in the decreasing order.

**Table 3:** Distribution of patients by Religion (n=170)

Religion	No. of patients	%
Hindu	87	51.2
Islam	48	28.2
Christian	35	20.6
Total	170	100.0

Majority of the anemic pregnant women belongs to Hindu religion (51.2%), followed by Islamic (28.2%) and Christian (35%).



**Figure 2:** Pie chart showing the distribution of patients according to residence (n=170)

Majority of patients belonged to rural area (84%) and very few belonged to urban (16%)

**Table 4:** Distribution of anemia according to educational Status (n=170)

Educational Status	No. of patients	%
Illiterate	16	9.4
Primary school certificate	1	.6
Middle school certificate	50	29.4
High school certificate	71	41.8
Intermediate/Post high school Diploma	17	10.0
Graduate	11	6.5
Professional degree	4	2.4
Total	170	100.0

Majority of the cases had education only till high school (41.8%), followed by Middle school (29.4%), intermediate/post high school diploma (10%). Out of 170 cases, 16 cases were illiterate (9.4%), 1 had education only till middle school (0.6%) and only 11 cases were graduates (6.5%) and 4 professional degree (2.4%).

**Table 5:** Distribution of anemia according to socioeconomic status (n=170)

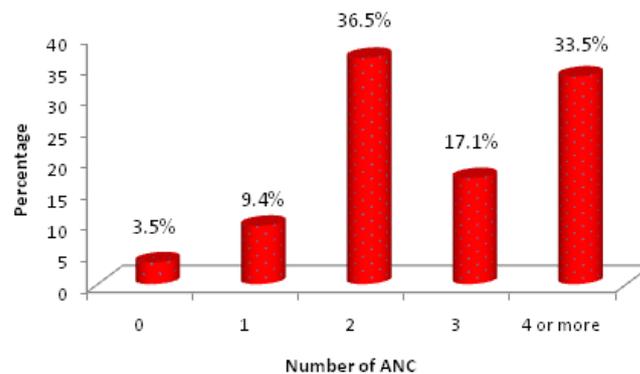
Socio-economic status	No. of patients	%
Upper	3	1.8
Upper middle	16	9.4
Lower middle	106	62.4
Upper lower	40	23.5
Lower	5	2.9
Total	170	100.0

Majority of the patients belonged to lower socioeconomic status (88.82%), which was further classified as lower middle (62.4%), upper lower (40%) and lower (2.9%) class according to modified Kuppaswamy's classification.

**Table 6:** Distribution of anemia according to IFA supplementation (n=170)

IFA Supplementation	No. of patients	%
No	19	11.2
Regular	108	63.5
Irregular	43	25.3
Total	170	100.0

Less than three fourth of the patients had regular iron and folic acid intake and 11.2% had not taken any iron and folic acid tablets.



**Figure 3:** Bar diagram showing the distribution of anemia according to number of antenatal visits (n=170)

In the study it was observed that only quarter (33.5%) of the patients had adequate antenatal checkups (4 or more). Remaining cases had inadequate antenatal check up, out of which 6 patients had zero antenatal visits and majority had only two antenatal visits (36.5%).

**Table 7:** Distribution of patients according to parity (n=170)

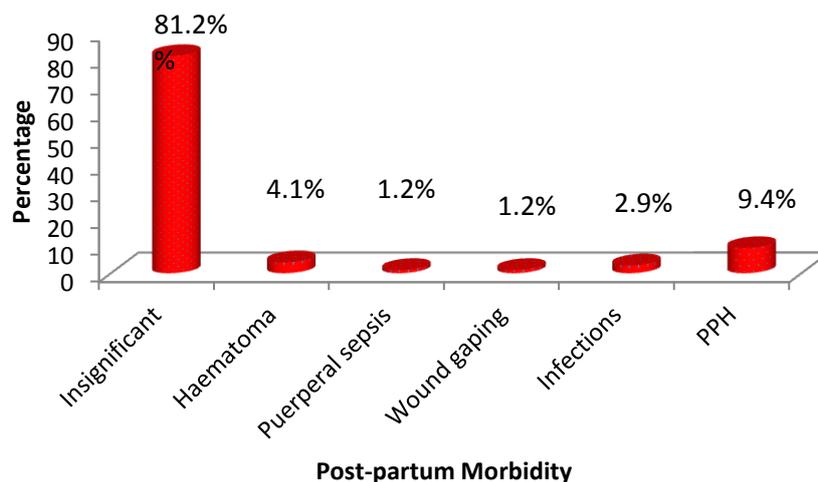
Parity	No. of patients	%
Primi	44	25.9
Multi	91	53.5
Grand Multi	35	20.6
Total	170	100.0

In this study it was observed that majority of the anemic pregnant women were multipara (53.5%) followed by primigravida (25.9%). 20.6% of cases had more than three living issues (grand multipara)

**Table 8:** Distribution according to type of anemia (n=170)

Type of anemia	No. of patients	%
Normocytic normochromic	38	22.4
Microcytic hypochromic	128	75.3
Dimorphic anemia	4	2.4
Total	170	100.0

Peripheral smear showed Microcytic hypochromic anemia in majority of the cases (75.3%) followed by normocytic normochromic anemia (22.4%). Dimorphic anemia was seen only in 4 cases (2.4%) and megaloblastic anemia was not evident.



**Figure 4:** Bar diagram showing distribution of patients according to maternal outcome (n=170)

It is observed that a maternal complication like hematoma is seen in 2.4% of mild anaemic cases, 4.5% of moderate anaemic cases and 11.1% of severe anaemic cases; puerperal sepsis is seen in 1.2% of mild anaemic cases and 1.5% of moderate anaemic cases; postpartum infections are seen in 6% of moderate anaemia and 5.6% of severely

anaemic cases; PPH was observed in 2.4% of mild anaemic cases, 16.4% of moderate anaemic cases, 11.1% of severely anaemic cases. Spontaneous preterm was observed in 4.8% of mild anaemic cases, 23.9% of moderate anaemic cases, 33.3% of severely anaemic cases and 50% of very severely anaemic cases.

**Table 9:** Outcome variables association with levels of anemia of patients studied (n=170)

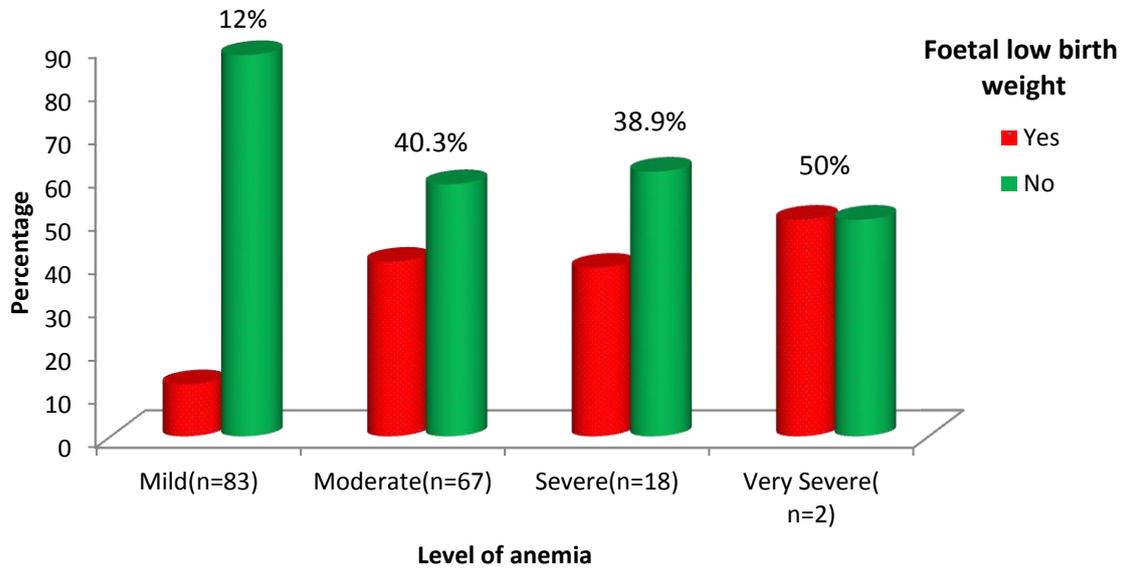
Variables	Level of anemia				Total (n=170)	P value
	Mild (n=83)	Moderate (n=67)	Severe (n=18)	Very Severe (n=2)		
Mode of Delivery						
Vaginal	51(61.4%)	38(56.7%)	10(55.6%)	1(50%)	100(58.8%)	0.634
Operative vaginal	6(7.2%)	11(16.4%)	2(11.1%)	0(0%)	19(11.2%)	
LSCS	26(31.3%)	18(26.9%)	6(33.3%)	1(50%)	51(30%)	
Antepartum infections						
Yes	6(7.2%)	23(34.3%)	5(27.8%)	1(50%)	35(20.6%)	<0.001**
No	77(92.8%)	44(65.7%)	13(72.2%)	1(50%)	135(79.4%)	
Post-partum morbidity						
Insignificant	77(92.8%)	47(70.1%)	13(72.2%)	1(50%)	138(81.2%)	0.006**
Hematoma	2(2.4%)	3(4.5%)	2(11.1%)	0(0%)	7(4.1%)	
Puerperal pyrexia	1(1.2%)	1(1.5%)	0(0%)	0(0%)	2(1.2%)	
Wound gaping	1(1.2%)	1(1.5%)	0(0%)	0(0%)	2(1.2%)	
Infections	0(0%)	4(6%)	1(5.6%)	0(0%)	5(2.9%)	
PPH	2(2.4%)	11(16.4%)	2(11.1%)	1(50%)	16(9.4%)	
Obstetric outcome						
Pre-term	4(4.8%)	16(23.9%)	6(33.3%)	1(50%)	27(15.8%)	<0.001**
Term	79(95.2%)	51(76.1%)	12(66.7%)	1(50%)	143(84.1%)	

In this study, it was observed that one third (32.5%) of mild anaemic cases, 74.6% of moderate anaemic cases, majority of severe anaemic cases (94.4%) and all cases (100%) of very severe anaemia were unbooked.

It is also observed that less than a quarter (27.7%) cases of mild anaemic cases, 28% of moderate anaemic cases, a quarter (33.3%) cases of severe anaemic cases and half (50%) of very severely anaemic cases had inadequate birth spacing.

It is analysed that the incidence of operative vaginal delivery and LSCS in anaemic pregnant women is increased. 31.3% and 7.2% cases of mild anaemia, 26.9% and 16.4% cases of moderate anaemia, 33.3% and 11.1% of severely anaemic cases and half (50%) of very severely

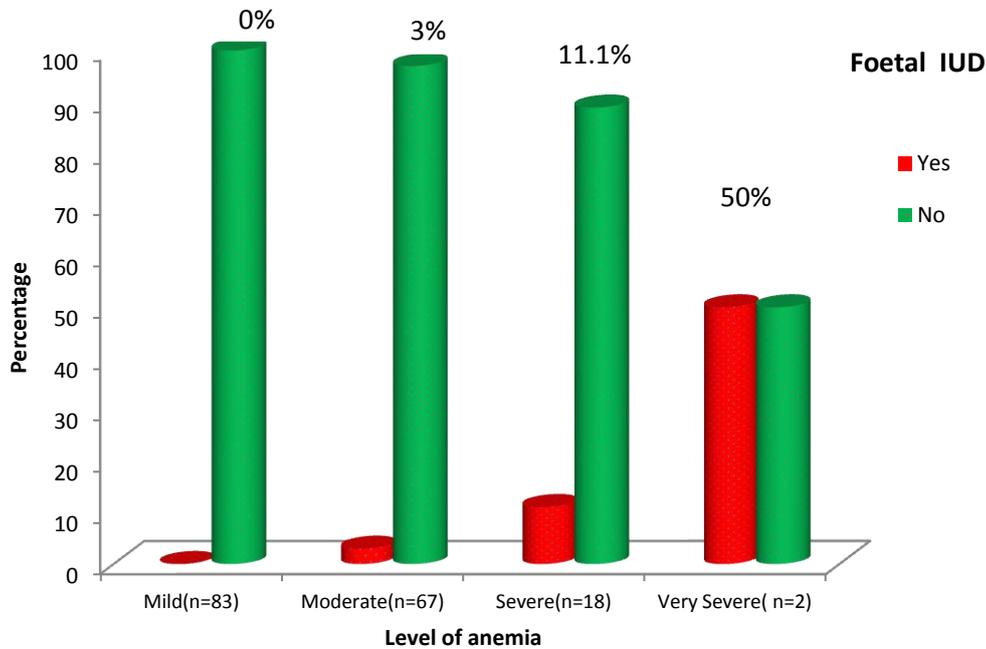
anaemic cases had LSCS and operative vaginal deliveries respectively. Foetal complications observed were Prematurity, low birth weight, fetal growth restriction, IUD, neonatal mortality and low Apgar score.



**Figure 5:** Bar diagram showing distribution of low birth weight babies according to severity of anaemia (n=170)

Low birth weight babies were observed in 12% of mild anaemic cases, 40.3 % of moderate anaemic

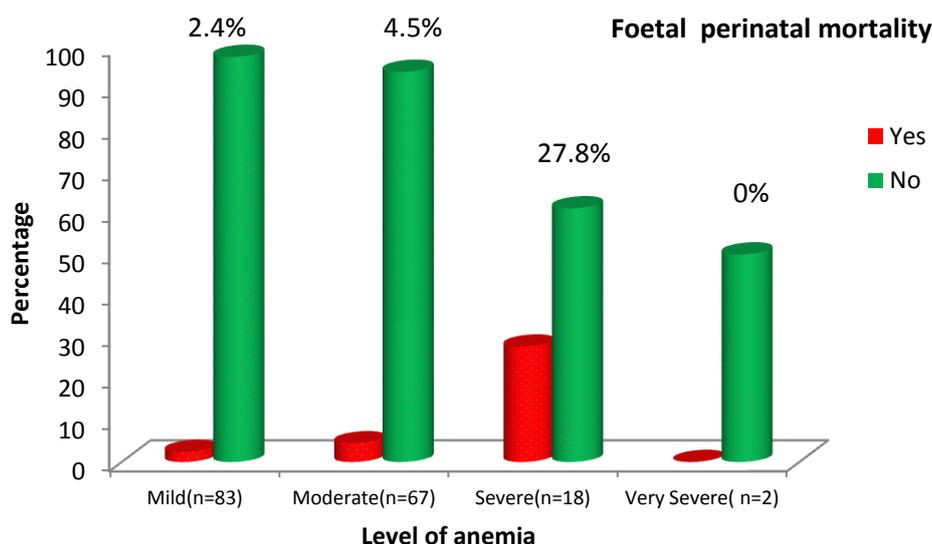
cases, 38.9% of severe anaemic cases and 50% of very severe anaemic cases.



**Figure 6:** Bar diagram showing distribution of intrauterine death according to severity of anaemia (n=170)

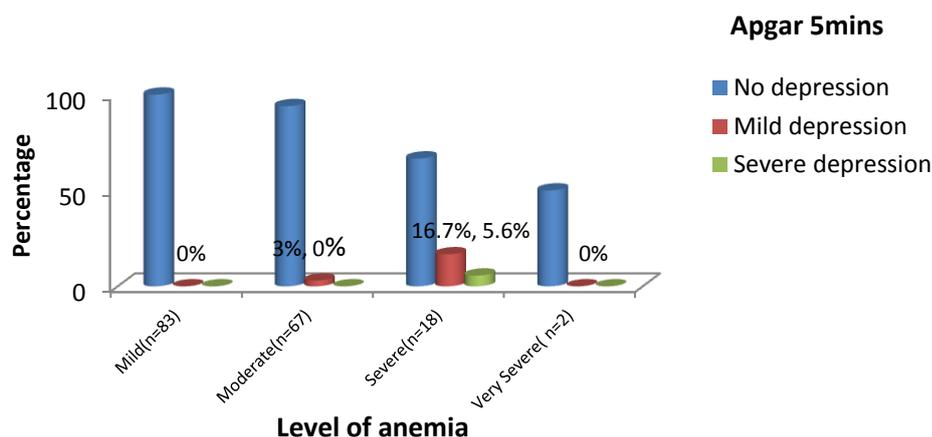
No IUD was seen in pregnant women with mild anaemia, 3% of cases with moderate anaemia,

11.1% of cases with severe anaemia and 50% of cases with very severe anaemia had IUD.



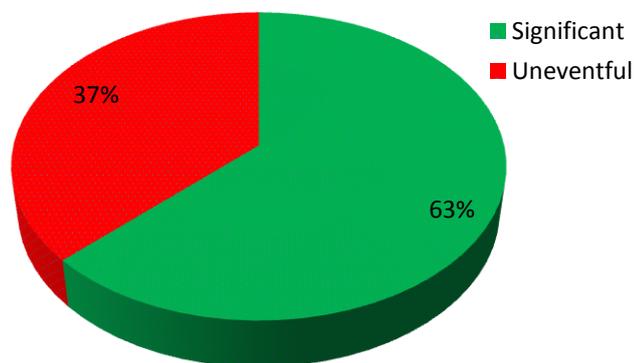
**Figure 7:** Distribution of perinatal mortality according to severity of anaemia (n=170)

Perinatal mortality was seen 2.4% cases of mild anaemia, 4.5% cases of moderate anaemia and 27.8% cases of severe anaemia.



**Figure 8:** Bar diagram showing distribution of low Apgar score according to severity of anaemia (n=170)

Apgar score at 5 min < 7 was seen in 3% of moderate anaemic cases and 12.1% of severe anaemic cases.



**Figure 9:** Pie chart showing distribution of foeto-maternal outcome in pregnancy with anaemia (n=170)

Hence in present study, it was observed that maximum in pregnant women with anaemia adverse foeto-maternal outcome was seen (63%)

## Discussion

In the present study 170 anaemic pregnant women admitted in ward were studied. These women were classified into mild, moderate, severe and very severe group according to ICMR guideline and aimed at studying the risk factors predisposing pregnant women of Manipur to anaemia and to analyse the fetomaternal outcome in different grades of anaemia in pregnancy.

The various parameters of the cases were studied, analysed and evaluated with the standard literatures available.

In the present study 48.8% had mild anaemia, 39.4% had moderate anaemia, 10.6% had severe anaemia and 1.2% had very severe anaemia. The prevalence of varying degree of anaemia in the present study is consistent with the study of Stephen G et al<sup>11</sup> which showed 42.1% mothers had mild anaemia, 45.2% had moderate anaemia and 12.6% had severe anaemia.

In the present study the mean age of pregnant women with anaemia was found to be 28.23±5.67 where majority of cases belonged to the age group of 25-29 (27.6%) years followed by 19-24 years (25.8%) and 30-34 years (23.5%), whereas in a study by Maka SS et al<sup>13</sup> the mean age of pregnant women was 22.4% and in a study by Upadhyay C et al<sup>8</sup>, it was observed that majority of the anaemic study subjects belonged to the age group of 20-24 years (46.5%). However the mean age group of pregnant women with anaemia was found to be statistically significant in the present study. In the present study it is found that anaemia is almost equally distributed between 20 years to 35 years.

In the present study it was observed that majority of the pregnant women with anaemia are housewives (83.5%) and had only up to high school certificate (41.8%) followed by middle school certificate (29.4%) and illiteracy (9.4%). These results were found to be consistent with the study by Tomar GS et al<sup>14</sup> showing that the prevalence of anaemia was relatively more in housewives (86.4%), in those who studied up to secondary level (89.3%), having vegetarian diet (86.8%). However in the present study all cases

found to have mixed diet as in Manipur majority consumes mixed diet.

In the present study majority of the pregnant women with anaemia belong to rural area (84.1%) and lower socioeconomic status (88.8%) of which 62.4% belongs to lower middle, 23.8% belongs to upper lower and 2.9% belongs to lower class of socioeconomic status. This result is consistent with a study by Biswas M et al<sup>15</sup> that showed the higher prevalence of anaemia in lower socioeconomic group (74.37%). Out of 170 patients, 51.2% were Hindus, 28.1% belonged to Islamic religion and 20.6% were Christians. These findings were consistent with the results of study by Khan MS et al<sup>16</sup> that showed the majority of studied patients were Hindus (51.2%) followed by Islam (28.1%) and Christian (20.6%). Majority of the cases were multipara (53.5%) and grand multipara (20.6%) whereas primigravida constituted only 25.9%. These results are consistent with the results of study conducted by Tusimin M et al<sup>17</sup> that showed the prevalence of anaemia was more in multipara (61%). Severe and very severe anaemia were more common among grand multipara. It was also observed that only 33.5% of cases had adequate antenatal checkups and 63.5% cases had regular IFA tablets intake. There were zero antenatal visits in 3.5% cases, 66.5% had inadequate antenatal visit. It was observed that 11.2% cases had no IFA tablet intake and 22.3% had taken IFA for less than two to three months in the entire duration of pregnancy. So, a total of 33.5% cases had regular IFA tablets intake. These findings are consistent with the results of study by Stephen G et al<sup>11</sup> showing that only 31.1% cases had adequate antenatal check up and 44.7% had consumed IFA tablets for less than two months. It is observed that only 42.9% of cases were booked and 48.2% had history of abortion. These findings are consistent with Upadhyay et al<sup>8</sup> where 53% of booked cases were seen. Microcytic hypochromic (75.3%) and normocytic normochromic (22.4%) type of blood picture was predominantly seen suggesting that pregnant women are more prone

for iron deficiency anaemia. This observation was consistent with the result of Maka SS et al<sup>13</sup> in which majority had microcytic hypochromic type of blood picture (82%).

In the present study the anaemic women underwent LSCS were 30% whereas in a study by Suryanarayanan R et al<sup>12</sup>, it was showed that prevalence of LSCS was more in anaemic women (60%). In this study, the association between anaemia and LSCS was statistically not significant and it might be a spurious association as the study was done in a tertiary centre where cases are received in the last stage and also due to logistic constraints.

In the present study, 18.8% of maternal morbidity was observed which constituted of PPH (9%), wound dehiscence (1.2%), postpartum pyrexia (1.2%), haematoma (4.1%) and infections (2.9%). However there was no maternal mortality in the study. These results are consistent with a study conducted by Singal et al<sup>18</sup> which showed that the maternal morbidity associate with anaemia in pregnancy was 14.5% that constituted PPH (7.5%), wound dehiscence (0.5%), postpartum pyrexia (1.2%), respiratory infections (1.5%), failed lactation (1.5%), CCF (1.5%) and retained placenta (1.5%). Maka SS et al<sup>13</sup> showed that the incidence of maternal morbidity in pregnancies with anaemia was 16% which was constituted of PPH (4%), Postpartum pyrexia (9%), Sepsis (2%) and CCF (1%).

In the present study, foetal outcome was observed in terms of fetal morbidity and mortality. It was observed that 15.3% were premature babies, 26.5% were low birth weight (LBW), 14.1% had foetal growth restriction, 2.9% had intrauterine death (IUD), 5.9% had perinatal mortality and 3.5% had Apgar score at 5 minutes < 7. These results were consistent with the results of studies by Maka SS et al<sup>13</sup> that showed the foetal complications in terms of preterm (20%), IUGR (28%) and IUD (3%). A study by Ghimire RH<sup>19</sup> et al showed that the incidence of IUD was 6%, LBW was 22% and low Apgar score at 5 minutes

was 18%. In a study by Upadhyay et al<sup>8</sup> there were 20% preterm babies, 28% IUGR and 3% IUD.

However all the maternal and foetal outcomes in the present study were found to be statistically significant.

### Limitation of Present Study

Sample size of the study could have been larger, however due to the constraints of time and logistics this was not feasible.

### Conclusion

The present study clearly revealed that anaemia is more common among pregnant women who had poor antenatal care with irregular intake of Iron and Folic acid during pregnancy. Among anaemic pregnant women only one third had four or more antenatal visits. Out of 170 women, 2 women had very severe anaemia in whom maternal and foetal outcome was compromised. The maternal and foetal morbidity were directly proportional to the severity of anaemia.

It was observed that there was a statistically significant association between socio-demographic factors and frequency of anaemia. Anaemia is more common among pregnant women who belonged to rural household as they have poor access to antenatal care. Low socio-economic status, illiteracy, multiparity, women with history of abortion, women with suboptimal antenatal care and poor compliance to IFA tablets intake were more susceptible for anaemia during pregnancy.

This study also revealed that anaemia has an adverse effect on the pregnancy outcome affecting both the mother and the foetus. Maternal morbidities in the form of PPH, haematoma, wound dehiscence, sepsis and puerperal pyrexia were more common in anaemic pregnant women. Babies born to anaemic mothers have more frequent complications of IUD, LBW and prematurity along with its attendant complications leading to increased perinatal morbidity and mortality.

It can be inferred that better access to health care facilities, adequate antenatal care, regular IFA intake, lower birth order and use of family planning methods can significantly reduce the risk of anaemia in pregnancy. The improvement in the haemoglobin level of a pregnant woman will have a positive impact on fetomaternal outcome.

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