

## Status of Anaemia During Pregnancy and Its Association with Adverse Maternal and Foetal Outcomes: A Tertiary Care Teaching Hospital Based Study

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### ABSTRACT

**Background:** Anemia in pregnancy is a common problem in low-income countries. It substantially contributes to poor outcome in both mother and child. Its effects on maternal health include reduction of immune response, danger of heart failure, and aggravation of the risks of childbirth.

**Materials and Methods:** This present study included (60) sixty pregnant women with severe anemia i.e. hemoglobin <7gm/dl, recruited from World College of Medical Sciences Research and Hospital, Jhajjar according to inclusion & exclusion criteria.

**Results:** The mean age of total study population was 27.43 years. The results of analysis of variance shows that there was no statistically significant difference between the age of patient and occurrence of different types of anemia ( $P=0.064$ ). Amongst individual groups, statistically significant relationship was found between microcytic and macrocytic anemia ( $p=0.019$ ); and microcytic and dimorphic anemia ( $p=0.038$ ).

**Conclusion:** Anemia is increasingly becoming prevalent and is associated with poor maternal and perinatal outcomes.

**Keywords:** Maternal Outcome, Fetal Outcome, Low Birth Weight, Pregnancy.


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### INTRODUCTION

In developing countries, pregnancy outcomes show variation based on the type of anemia. The primary cause of anemia during pregnancy is likely to be due to plasma volume expansion, and this type of anemia is not associated with negative birth outcomes. Maternal hemoglobin values during pregnancy are associated with low birth weight and preterm birth in a U-shaped relationship, with high rates of low birth weight at low and high concentrations of maternal hemoglobin.<sup>1</sup> The prevalence of anemia during pregnancy varies considerably because of differences in, for example, socioeconomic conditions, lifestyles, and health seeking behaviors across different cultures.<sup>2</sup> Iron deficiency anemia is one of the most prevalent nutritional deficiencies according to the WHO affecting four to five billion people. Nutritional iron deficiency is the main cause of anemia throughout the world. It is especially common in women of reproductive age and particularly during pregnancy. The demand for iron increases about six to seven times during entire duration of pregnancy.<sup>3</sup> The major concern about the adverse effects of anemia on pregnant women is the belief that this population is at a greater risk of perinatal mortality and morbidity. Aim of the Study was to be status of anaemia during pregnancy and its association with adverse maternal and foetal outcomes in a tertiary care teaching hospital.

### MATERIALS AND METHODS

This present study was conducted in the Department of Obstetrics and Gynaecology, World College of Medical Sciences Research and Hospital, Jhajjar, during the period from September, 2020 to March, 2021. Written informed consent was taken from all the subjects fulfilling the inclusion criteria. All patients were admitted to the hospital. A detailed history was taken followed by thorough general physical and systemic examination. The present study was designed to study details of different types of anemia i.e. microcytic anemia, macrocytic anemia and dimorphic anemia in cases of severe anemia during pregnancy and their association with maternal and fetal outcomes. This present study included (60) sixty pregnant women with severe anemia i.e. hemoglobin <7gm/dl, recruited from World College of Medical Sciences Research and Hospital, Jhajjar according to inclusion & exclusion criteria. They were divided into three groups on the basis of peripheral smear picture. Microcytic hypochromic anemia was most commonly present 28(46.7%) but a significant number of patients were found to have macrocytic anemia 23(38.3%). Dimorphic anemia was present in only a small number of women amongst these cases of severe anemia 9(15%). A thorough general physical examination was done to identify the features of

anemia such as pallor, koilonychia, edema, jugular venous pressure and presence of any lymphadenopathy. Associated features such as stomatitis, angular cheilosis were also looked for. In cardiovascular and respiratory system examination, haemic murmurs and pulmonary basal crepts were looked for. Abdominal examination was done for presence of hepatosplenomegaly. Routine obstetric examination included assessment of gestational age, fetal growth and wellbeing. Examination of peripheral smear was done to diagnose type of anemia. Estimation of red cell indices, serum levels of iron, ferritin, folate and cobalamin was also done.

Data analysis was performed with Microsoft Excel. Significance for continuous variables was calculated using ANOVA while for proportions, Chi-square tests were used. The p-value<0.05 was considered significant. All the analysis was carried out on IBM SPSS -22.0 version.

**OBSERVATIONS AND RESULTS**

Total of 60 pregnant patients with severe anemia out of which Microcytic hypochromic anemia was most commonly present (28 patients, 46.7%). A significant number of patients were found to have macrocytic anemia (23 patients, 38.3%). Dimorphic anemia was present in only a small number of women amongst these cases of severe anemia (9 patients, 15%). Diagnosis of microcytic

anemia was made by presence of microcytosis and hypochromia in peripheral blood smear. Table 1 represents the characteristics of the study population according to the three anaemia groups. Baseline characteristics of the study population according to the three anaemia groups. The mean age of total study population was 27.43 years. The results of analysis of variance (ANOVA) shows that there was no statistically significant difference between the age of patient and occurrence of different types of anemia (P=0.064). Amongst individual groups, statistically significant relationship was found between microcytic and macrocytic anemia (p= 0.019); and microcytic and dimorphic anemia (p=0.038).

Effect on maternal and neonatal outcomes (Table 2 and 3) presents data on the effect of maternal anaemia types during pregnancy on maternal neonatal outcomes. Intrauterine growth restriction was seen in 20.0% of total study population at time of recruitment, this percentage in macrocytic anemia was 30.43% and in microcytic and dimorphic anemia were 14.28% and 11.1% respectively. The same trend was also seen for gestational hypertension with 7.14%. 30.43% and 11.1% patients had gestational hypertension in microcytic, macrocytic and dimorphic anemia groups. Intrauterine fetal demise was seen in only two patients, both patients were from macrocytic anemia group. In total study population, 14(23.3%) patients had low birth weight babies.

**Table 1: Characteristics of the different anaemic patients:**

Variables	Microcytic anemia (n=28)	Macrocytic anemia (n=23)	Dimorphic anemia (n=9)	Total (n=60)
<b>Age in year</b>				
<20	0(0.0%)	1(4.3%)	0(0.0%)	1(1.7%)
21-25	10(35.7%)	5(21.7%)	5(55.6%)	20(33.3%)
26-30	13(46.4%)	15(65.2%)	3(33.3%)	31(51.7%)
>30	5(17.9%)	2(8.7%)	1(11.1%)	8(13.3%)
Mean ± SD	28.32 ± 12.04	27.46 ± 11.2	26.51 ± 10.31	P=0.064
<b>Socio-economic status</b>				
Lower-middle	7(25.0%)	3(13.0%)	1(11.1%)	11(18.3%)
Upper- lower	2(7.1%)	2(8.7%)	2(22.2%)	6(10.0%)
Lower	19(67.9%)	17(78.3%)	6(66.7%)	42(70.0%)
<b>Religion</b>				
Hindu	16(57.1%)	14(60.9%)	4(44.4%)	34(56.7%)
Muslim	12(42.9%)	9(39.1%)	5(55.6%)	26(43.3%)
<b>Gravidity</b>				
1	3(10.7%)	4(17.4%)	2(22.2%)	9(15.0%)
2-3	15(53.6%)	16(69.6%)	6(66.7%)	37(61.7%)
≥4	10(35.7%)	3(13.0%)	1(11.1%)	14(23.3%)
<b>Gestational age in weeks</b>				
<28	3(10.7%)	1(4.3%)	1(11.1%)	5(8.33%)
28-32	4(14.3%)	2(8.7%)	1(11.1%)	7(11.7%)
32-36	13(46.4%)	9(39.1%)	3(33.3%)	25(41.7%)
>36	8(28.6%)	11(47.8%)	4(44.4%)	23(38.3%)
Mean ± SD	34.21 ± 8.54	35.46 ± 9.02	35.24 ± 9.01	P=0.54
<b>Time elapsed since previous gestation</b>				
Median	1.50	2.00	2.25	0.036
(Range)**	(0.50- 7.00)	(0.67- 7.00)	(1.00- 4.50)	
<b>Type of food consumed</b>				
Vegetarian	17(60.7%)	18(78.3%)	6(66.7%)	41(68.3%)
Non- Vegetarian	11(39.3%)	5(21.7%)	3(33.3%)	19(31.7%)

{\*Statistically significant; P-value<0.05}

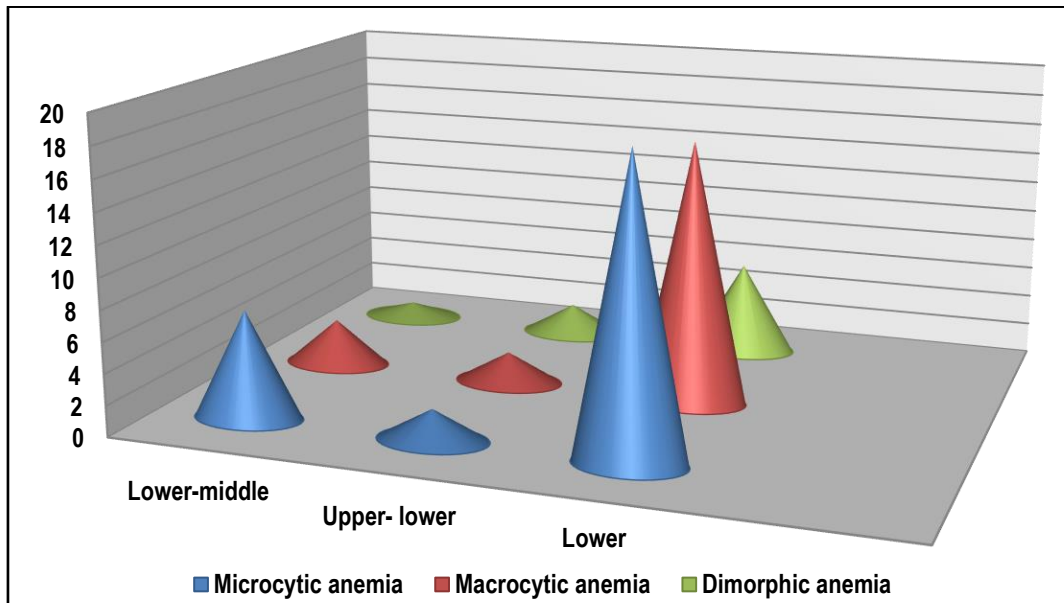


Fig.1: Shows the socio-economic status of different anaemic patients.

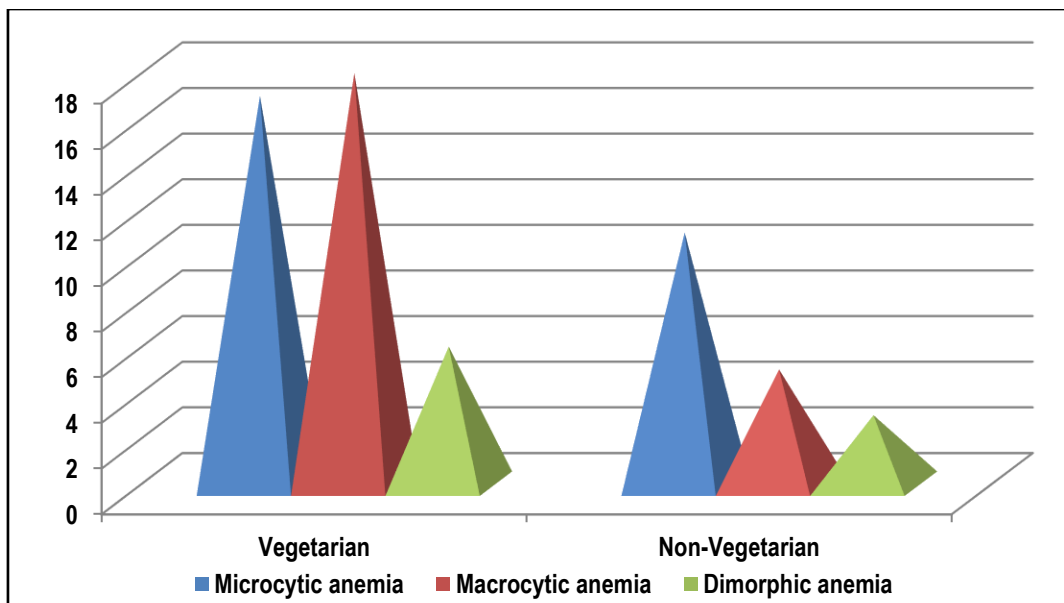


Fig.2: Shows the Type of food consumed.

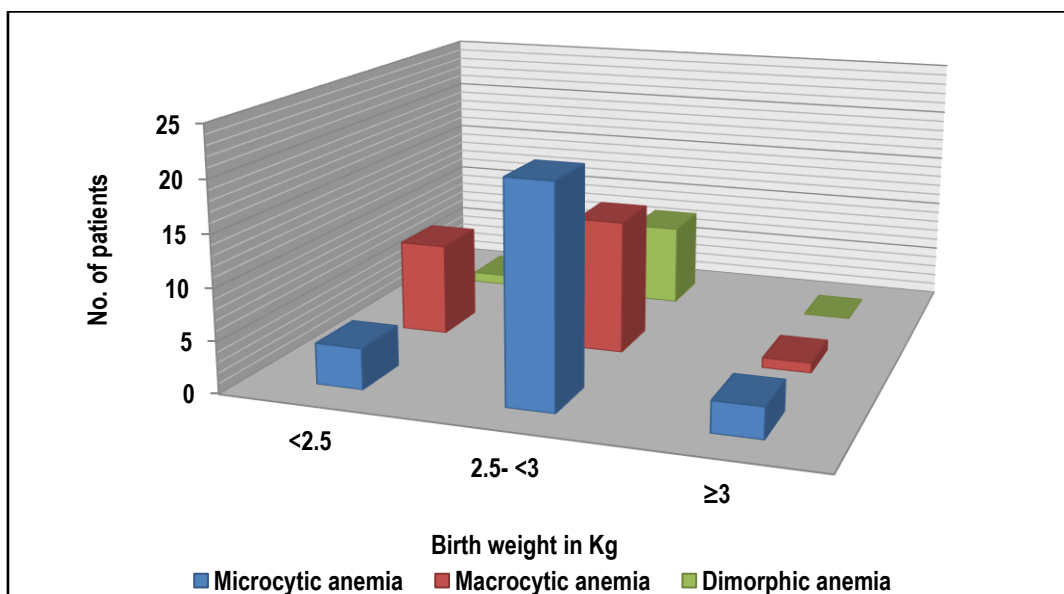


Fig.3: Shows the Birth weight in Kg in different anaemic patients.

**Table 2: Comparison of obstetric complications in different types of anemia:**

Complications	Microcytic anemia (n=28)	Macrocytic anemia (n=23)	Dimorphic anemia (n=9)	Total (n=60)	p value
Gestational hypertension	2(7.14%)	7(30.43%)	1(11.1%)	10(16.7%)	0.002*
Pre-eclampsia	1(3.57%)	1(4.34%)	0(0.0%)	2(3.3%)	0.24
IUGR	4(14.28%)	7(30.43%)	1(11.1%)	12(20.0%)	0.04*
IUD	0(0.0%)	2(8.69%)	0(0.0%)	2(3.3%)	

{Note: IUGR- Intrauterine growth restriction; IUD- Intrauterine death; \*P-value<0.05}

**Table 3: Comparison of birth outcomes in different types of anemia:**

Complications	Microcytic anemia (n=28)	Macrocytic anemia (n=23)	Dimorphic anemia (n=9)	Total (n=60)
<b>Birth weight in Kg</b>				
<2.5	4(14.3%)	9(39.1%)	1(11.1%)	14(23.3%)
2.5- <3	21(75.0%)	13(56.5%)	8(88.9%)	42(70.0%)
≥3	3(10.7%)	1(4.3%)	0(0.0%)	4(6.7%)
Mean ±SD (gm)	2739 ± 232.21	2631 ± 316.52	2649 ± 245.6	P=0.26
<b>Neonatal outcomes</b>				
Prematurity	2(7.14%)	4(17.4%)	1(11.1%)	7(11.7%)
SGA	2(7.14%)	6(26.08%)	1(11.1%)	9(15.0%)
Low Apgar score (<9 at 1 min)*	0(0.0%)	3(13.04%)	0(0.0%)	3(5.0%)
Admission to NICU	0(0.0%)	2(8.7%)	1(11.1%)	3(5.0%)
Intrauterine death	0(0.0%)	1(4.3%)	0(0.0%)	1(1.7%)

{Note: SGA- Small for gestational age; NICU- Neonatal intensive care unit}

## DISCUSSION

Pregnant women with early diagnosis of anemia but without iron treatment had a significantly shorter gestational age at delivery and somewhat higher rate of preterm births. However, this higher rate of preterm birth was not found in anemic pregnant women with iron supplementation during the first trimester of pregnancy. The incidence of pregnancy complications was higher in anemic pregnant women. It has been described in various studies that anemia is associated with obstetric complications such as gestational hypertension<sup>4</sup>, pre-eclampsia, cardiac failure and their incidence increases with severity of anemia but only one study documented association of these obstetric complications with macrocytic anemia.<sup>5</sup> In present study, macrocytic anemia was found to have statistically significant relationship with various obstetric complications such as gestational hypertension, intrauterine growth restriction and intrauterine fetal demise. Intrauterine growth restriction was also seen more frequently in patients of macrocytic anemia and this difference was statistically significant. Pair wise comparison between groups revealed that statistically significant relationship was present only between microcytic and macrocytic anemia and not between other groups. Intrauterine fetal demise was seen in only two patients and both patients had macrocytic anemia. Pre-eclampsia was present in two patients, one patient from microcytic and the other from macrocytic anemia group but the difference was not statistically significant. These results show that obstetric complications were more commonly associated with macrocytic anemia. These findings corroborate with findings of previously published studies.<sup>6</sup> The mean hemoglobin levels were also significantly lower in patients of macrocytic anemia. Macrocytic anemia was found to be associated with very severe anemia in previous study also.<sup>7</sup> Literature is deficient in studies dealing with the problem of macrocytic anemia in pregnancy. Only one study could be identified in literature documenting association of adverse

maternal and perinatal outcomes with macrocytic anemia in pregnancy.<sup>8</sup> In this study, neonatal morbidity was seen more frequently in patients with macrocytosis as compared with patients of microcytic and dimorphic anemia.<sup>9</sup> As all patients were having severe anemia the increase in neonatal morbidity in patients with macrocytic anemia can be attributed to type of anemia. The association between pregnancy anemia and outcome may be more complex than has often been considered. More research is required to comprehend fully the relation between severe anemia in pregnancy and maternal and fetal outcome in low-income countries.

## CONCLUSION

These findings suggest that the anemia is increasingly becoming prevalent and is associated with poor maternal and perinatal outcomes. Public health interventions should be made by way of appropriate food fortifications to reduce prevalence of anemia. Early diagnosis should be made by appropriate investigations and proper therapy should be started as soon as possible according to type of anemia, in order to prevent adverse maternal and foetal outcomes.

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