

ANEMIA IN THIRD TRIMESTER OF PREGNANCY AND BIRTH WEIGHT: A RETROSPECTIVE CASE CONTROL STUDY IN A TERTIARY CARE HOSPITAL IN RURAL MAHARASHTRA

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Abstract

Background: Both maternal anemia and low birth weight are very common problem in rural India. Our aim is to study the association between maternal anemia and low birth weight. **Materials and Methods:** This was a retrospective case control study done in a teaching hospital in Rural Maharashtra. We enrolled 298 cases of anemia and 300 normal, healthy pregnant women as controls. The birth weight was compared between the 2 groups. **Result:** We did not find any statistical difference in the birth weight of babies born to anemic and non anemic mothers. There was also no difference in the percentage of low-birth-weight babies born to anemic and non anemic women. **Conclusion:** There was no association between anemia at term in pregnant mothers and low birth weight. We need studies on larger scale, preferably cohort studies with follow up of patients from early pregnancy, in order to assess the impact of anemia on birth weight of babies.

INTRODUCTION

Anaemia is defined as a decrease in the haemoglobin concentration and a concomitant impairment in the capacity to transport oxygen. Anaemia is a major public health problem, specially in low- and middle-income countries.

The global prevalence of anemia in pregnant women has been estimated by the WHO at 41.8 %.^[1] According to the WHO study, anaemia affects one in four people around the world. It is seen more in pregnant women and preschool children, mostly those living in Southeast Asia and Africa.^[1,2] The most common cause of anemia has been found to be iron deficiency anemia.^[2]

Prevalence of anaemia in pregnant women in India is much higher than the global average of 41%. The recently released NFHS-5 findings reveal that the prevalence of anaemia has increased among Indian pregnant women to 52% compared to the previous NFHS 4 survey, where it was 50%.^[3] West Bengal, Assam and Jharkhand report the highest burden of anemia in pregnant women.^[3]

There is a higher risk of low birth weight, preterm birth and perinatal mortality in pregnant women with anemia. Around 12% of babies with low birth weight have been found to be associated with maternal anemia.^[4]

Predominantly vegetarian diet with low B12 intake and poor bioavailability of dietary iron in the Indian diets is the major factor responsible for high prevalence of anaemia in our country.^[5] Kalaivani has reported that the rate of low-birth-weight babies doubles when haemoglobin falls below 8 gm%.^[5] Shekhavat et al has reported that Hb levels less than 10 gm% in pregnant women are associated with increased incidence of low birth weight babies.^[6] A systematic review on adverse birth outcomes in maternal anemia by Rahman has found that significantly higher risk of low birth weight was observed in pregnant patients with anemia and this risk was more in low- and middle-income countries.^[4]

Though many studies have demonstrated a strong association between maternal anemia and adverse pregnancy outcomes, some studies have reported an insignificant association. The link between maternal Hb level and adverse pregnancy outcomes has remained inconsistent.

Steer has found in his study that though severe anemia is associated with the birth of small babies, lowest incidence of babies with low birth weight occurs when hemoglobin levels of mothers lies between 9 and 10.5 gm%, that is, in cases of mild maternal anemia.^[7] This inverse association of anemia in late pregnancy with low birth weight has

been linked to the effect of expansion of plasma volume in pregnancy.^[7]

A Cochrane review on the effect of daily oral iron supplementation during pregnancy by Pena Rossa et al has found that though iron supplementation reduces the incidence of maternal anemia in pregnancy, the benefit on birth weight is not conclusive.^[8]

In a review of iron supplementation during pregnancy by Milman, no relationship was found between the maternal haemoglobin and birth weight of the babies.^[9]

A systematic review of association between anemia in pregnant women and low birth weight babies by N. Kozuki has found no relation between mild anemia and low birth weight babies. But, they have reported a strong relationship between moderate to severe anemia and low birth weight.^[10]

A large population based cohort study by Catherine Smith et al has also reported that mild anemia leads to most favourable perinatal outcomes while moderate to severe anemia leads to poor perinatal outcomes.^[11]

A metaanalysis by Xiaong to study the relation between anemia in pregnant women and birth outcome has found an inverse relationship between anemia in late pregnancy and low birth weight. This beneficial relation between maternal anemia and low birth weight maybe due to the expansion of plasma volume.^[12]

Though many studies are available about the association between anemia during pregnancy and birth weight, not many studies have studied the relation between anemia at time of labour and birth weight. The objective of this study is to evaluate the association between maternal anemia at time of labour and birth weight.

There is a high incidence of both maternal anemia and low birth weight babies in a rural population like ours. Finding a significant relationship between the two will help us to design interventions to correct maternal anemia and hence reduce the burden of LBW babies.

Aims

To study the association between maternal anemia at time of labour and birth weight of neonates born at our institute.

MATERIALS AND METHODS

Ethics Statement and Subject Consent

The study was approved by Scientific Research committee and clearance was obtained from Ethics Committee of SMBT Institute of Medical Science and Research Centre, Nashik.

Study Enrolments

This was a retrospective record based case control study conducted at a Tertiary care hospital in Rural Northern Maharashtra. Records of all women

admitted for delivery during the period from January 2020 to December 2020, were reviewed.

Information such as sociodemographic details and hemoglobin levels at the time of admission were retrieved from the records using standardized forms by trained personnel.

Outcomes in terms of birth weight, period of gestation at the time of delivery, mode of delivery and fetal wellbeing were recorded. The outcomes were compared among anemic and nonanemic women.

Patients with multiple pregnancy and any complicated pregnancy were excluded from the study. A complicated pregnancy included any of the following conditions: diabetes (pregestational or gestational), hypertensive disorder of pregnancy or any medical disorder like heart disease complicating pregnancy.

Study definitions for birth outcomes and maternal variable

Gestational age was calculated based on the last menstrual period given in the records. Ultrasound report was used to confirm the gestational age.

PTB was defined as births < 37 weeks' gestational age.

Low birth weight (LBW) infants were those that weighed < 2500 g at birth.

Definition of anemia and its categorization was based on WHO guidelines.^[13]

Mild Anemia 9-10.9 gm%

Moderate Anemia 7-8.9 gm%

Severe Anemia < 7 gm%

Data entry was done in Microsoft Excel. Data Analysis was done with Microsoft Excel and Epi Info software. Descriptive analysis is presented as mean ± standard deviation (continuous variables) and percentages for categorical variables. Comparison was done using chi square test and Students t test. p-value less than .05 was considered significant.

RESULTS

During the study period, 301 patients were enrolled in the study group (with anemia) and 298 patients were enrolled in the control group (without anemia). Majority of patients in both the study and control groups were in the age group of 19-25 years. The mean maternal age in the study was 23 years.

67% of multiparous patients had anemia while only 53 % of primiparous patients had anemia. The difference was found to be statistically significant.

47% patients in the anemia group underwent a lower segment cesarean section while 49% patients in the control group had a cesarean section.

10% of patients with anemia and 11% without anemia had a preterm delivery. There was not a significant statistical association between anemia and preterm delivery in our study.

Table 1: Demographics of the sample population

Name of the Variable		Anemia				p-value
		Present (n=301)		Absent (n=298)		
		f	%	f	%	
Age	≤18 years	3	1	5	1.66	0.106
	19-25 years	205	68.11	223	74.09	
	>25 years	93	30.9	70	23.26	
Parity	Primipara	99	32.89	161	53.49	0.000
	Multipara	202	67.11	137	45.51	
Mode of Delivery	FTND	158	52.49	149	49.5	0.542
	LSCS	143	47.51	149	49.5	
Gestational Age	Preterm(<37 weeks)	30	9.97	33	10.96	0.659
	Term(≥37 weeks)	271	90.03	265	88.04	

*Maternal Age (Mean±S.D)=23.9±3.59.

Table 2: Profile of anemia in patients and Rates of Low Birth Weight

Name of the Variable	Profile of Anemia					
	Mild (10-10.9)		Moderate (7-9.9)		Severe (<7)	
	f	%	f	%	f	%
Number of patients with anemia (n=301)	129	42.86	156	51.83	16	5.32
Babies with Low Birth Weight (n=107)	45	34.88	57	36.53	5	31.2

Table 3: Comparison of anemia with neonatal birth weight

Anemia	Birth weight			P
	>2.5 kg	<2.5 kg		
Test (with anemia)	194	107		0.306
Control (without anemia)	180	118		

35 % of patients with anemia had babies with birth weight less than 2.5 kg.39% of patients without anemia had low birth weight babies. The difference was not statistically significant.

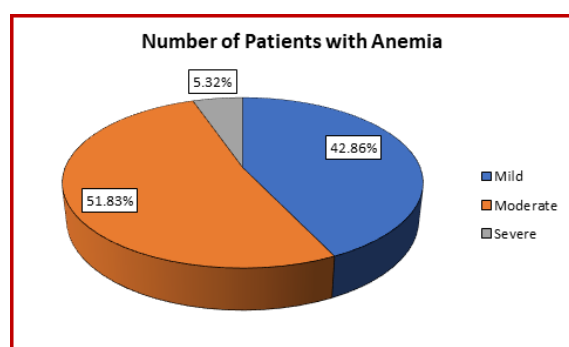
35% of mothers with mild anemia had babies with weight less than 2.5 kg.36% of mothers with anemia had low birth weight babies and 31% of mothers with severe anemia had LBW babies.

Table 4: Mean birth weight in Test and Control patients

Birth weight	Test (with anemia)	Control (without anemia)	p
Mean birth weight	2.60±0.45	2.57±0.46	0.375*

*t-test

The mean birth weight in patients with anemia was found to be 2.6 kg and the mean birth weight in non-anemic mothers was 2.57 kg. This difference was not found to be statistically significant.

**Figure 1: Percentage of Patients with Anemia**

In the patients with anemia (n=301), 42 % had mild anemia, 51 % had moderate anemia and 5 % had severe anemia.

DISCUSSION

In our study, majority of patients were in the age group of 19 to 25 years, and this corresponds to

other studies.^[14] Also, anemia was seen more in multiparous women and this was statistically significant. This correlation of anemia with increasing parity has been reported in many studies.^[14,15] This maybe because of repeated pregnancy causing inadequate replenishment of iron stores.

5% of patients were severely anemic in our study. Suryanarayan et al in his study in Kolar district of Karnataka has also reported 3% rate of severe anemia.^[14] Another study from Tirupati too has reported similar rate of severe anemia at 6%.^[16]

There was no statistical difference in the mode of delivery between anemic and non anemic patients in our study. In a study conducted in Udaipur too ,the rate of Caesarean delivery was 50% in anemic patients.^[15] This proves that anemia is not an indication for Caesarean section.

We did not find any statistical difference between the rate of preterm delivery in anemic and non anemic women. This is in contrast to the many studies who have found increased rate of preterm delivery in anemic patients.^[12,14,16,17]

We have also not found any statistical difference in the birth weight of babies born to anemic and non anemic mothers. There was also no difference in the

percentage of low birth weight babies born to anemic and non anemic women. The rates of low birth weight babies in mild, moderate and severe anemia were also not different. Similar result has also been reported by in a study conducted in Haryana.^[17] Kaur et al in their study in a teaching hospital in Delhi has also reported no significant association between anemia in pregnant women admitted in labour and birth weight.^[18] A retrospective cohort study by Nair et al conducted in Assam has found a 9 fold increased risk of small for gestational age babies born to anemic mothers.^[19] This is similar to many studies done in India and outside. But this finding was not reflected in our study, which goes against the widely held view that anemia is a cause of low birth weight in delivering mothers.

The limitation of our study is that it is a retrospective record based study. We had the problem of missing data which is commonly seen in retrospective studies. We were also not able to get records of treatment taken by the patients for anemia. We also did not get any record about the type of anemia.

CONCLUSION

Low Birth weight is a major public health problem in a developing country like India. It is an important cause of perinatal morbidity and mortality. A number of social and maternal factors have been reported to cause Low Birth Weight. Mothers with anemia have been reported to have higher risk of delivering babies with low birth weight. To confirm the association between maternal anemia and low birth weight, we need studies on a larger scale, preferably multicentre trials. We also need to follow up the expectant mothers from early pregnancy, so that we may be able to get a trimester wise impact of hemoglobin levels on birth weight.

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