

Original Research Article

Effect of maternal anaemia on birth weight of term babies

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ABSTRACT

Background: Low birth weight is the major determinant of mortality, morbidity and disability in infancy and childhood and has a long-term impact on health outcome in adult life. The objectives of this study were to study the relationship between maternal anemia and birth weight of babies and to study anthropometric measures of babies born to anemic and non-anemic mothers and to correlate the timing of anemia with birth weight of babies.

Methods: Term babies born in Institute of Maternal and Child Health, Government Medical College, Kozhikode from November 2014 to October 2016 fulfilling the criteria were divided into 2 groups, cases (term babies with birth weight <2500g) and controls (term babies with weight >2500g) and studied and their maternal hemoglobin values were compared.

Results: Maternal anaemia in all three trimesters was found to be more in cases compared to controls. Mean 1st trimester hemoglobin of cases was 10.68 g/dl which was significantly lower when compared to controls. Mean 2nd trimester hemoglobin of cases was 10.36 g/dl compared to 11.47 g/dl in controls. Mean 3rd trimester hemoglobin of cases was 10.42 g/dl which was also significantly lower compared to 11.32 g/dl in controls. SGA babies were also found to be more in cases, 89%, compared to 18% in controls. The difference in head circumference between two groups was not statistically significant. Mean length of babies were higher in controls compared to cases. Mothers with anemia at any time during pregnancy was found to have 4.3 times higher risk of giving birth to low birth weight babies compared to non-anemic mothers

Conclusion: Anemia during pregnancy is a risk factor for low birth weight and SGA, independent of the trimester. Length of babies born to anaemic mothers is also low. But it does not have a significant effect on head circumference of babies.

Keywords: Birth weight, Head circumference, Length, Maternal anemia, SGA

INTRODUCTION

Low birth weight is the major determinant of mortality, morbidity and disability in infancy and childhood and has a long-term impact on health outcome in adult life.¹

Birth weight is the first weight of the baby taken just after the baby is born. According to birth weight babies can be classified as low birth weight, very low birth weight and extremely low birth weight.

The incidence of low birth weight is generally highest in those countries where the mean birth weight is low and as such varies from 5% to 40% of live births. In India, about a third of infant weight less than 2500g.² Birth weight is the single most important determinant of infant chance of survival, healthy growth as well as development. Across the world, neonatal mortality is 20 times more likely for low birth weight (LBW) babies compared to heavier babies. It is also established as an important risk factor for neonatal morbidity.³

Previously the birth weight of less than 2500g was taken as the index of prematurity without taking consideration of gestational period or any other factors. But infant born at term or post term may weigh less than 2500 g even before term. Therefore, survival outcome depends upon both gestational age as well as birth weight. New-borns can be classified according to weight for gestation as small, appropriate or large for gestational age.

There are several maternal factors which cause low birth weight babies, which include anaemia, hypertension, multiple pregnancies, poor nutrition, drug addiction, alcohol abuse, insufficient prenatal care, socioeconomic status, ethnic background and genetic factors, out of which maternal anaemia is one of the risk factor for low birth weight in developing countries like India.⁴

Anaemia is the commonest hematological disorder that may occur in pregnancy. incidence of anaemia in pregnancy has been noted to be as high as 40%.⁵ It is associated with fetal and neonatal morbidity and mortality significantly. Maternal anaemia is also responsible for 20% maternal death in developing countries.

According to WHO criteria anaemia in pregnancy is defined as hemoglobin concentration of less than 11g/dl or hematocrit of less than 33%.⁶ However in India and most of the other developing countries the lower limit is accepted as 10 gm%. Anaemia is a common medical problem in pregnancy.

The amount of iron transferred to the fetus is unaffected even if the mother is suffering from iron deficiency anaemia. So, the neonate does not suffer from anaemia at birth.

The effect of maternal anaemia includes, increased incidence of low birth weight babies with its incidental hazard, increased chance of intrauterine death.^{7,8} The sum effect is increased perinatal loss. Maternal anaemia is commonly considered as a risk factor for low birth weight babies. Some studies demonstrated a strong association between low hemoglobin before delivery and low birth weight. However, some others have not found a significant association.

METHODS

The study was conducted in post-natal ward in Institute of Maternal and Child Health, Government Medical College, Kozhikode from November 2014 to October 2016. Study population included 200 babies divided into 2 groups.

- Group A (case): term babies having birth weight less than 2500 g
- Group B (control): term babies having birth weight more than 2500 g.

Babies born to woman of age 18-35 years were included. Babies born to woman having gestational diabetes mellitus, pregnancy induced hypertension, fever with rash, short stature, babies born to woman having medical complications except anaemia, babies born with congenital anomalies were excluded. All information about maternal factors was collected as per proforma from mothers' record. Information about labour was taken from doctors' labour room records.

All babies were personally examined by the investigator to assess gestational age, sex, perinatal complications and full systemic examination including birth weight. All data collected were entered in Microsoft Excel and PASW Statistics 18 software. The data was analyzed using appropriate test of significance.

RESULTS

Mean hemoglobin value in 1st trimester was found to be lower in cases (10.68) compared to controls (11.46) and this was found to be statistically significant (p value <0.001). Similar findings were observed in 2nd trimester (mean hemoglobin in cases 10.36 and controls 11.47, p value <0.001) and 3rd trimester (mean hemoglobin in cases 10.42 and controls 11.32, p value <0.001). Anemia in all three trimesters were found to be more in cases compared to controls and this was found to be statistically significant (p value <0.001) (odds ratio 0.173, CI 0.068-0.44 for 1st trimester, odds ratio 0.074, CI 0.025-0.218 for 2nd trimester, odds ratio 0.380, CI 0.196-0.739) (Figure 1).

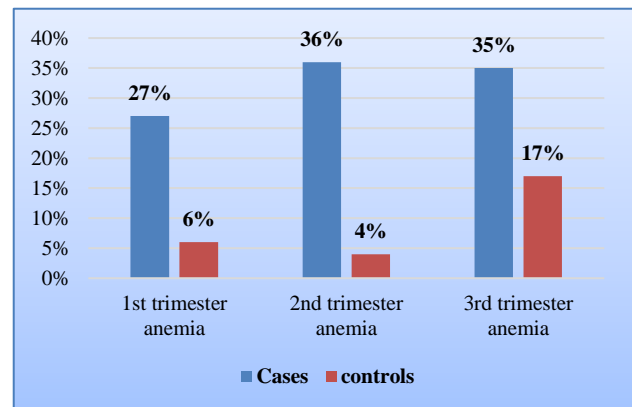


Figure 1: Distribution of anaemia in mothers of cases/controls.

SGA babies were found to be more common in cases (89%) compared to controls (18%) (p value <0.001). The difference in head circumference between the two groups was not found to be statistically significant (p value 0.317).

Mean length of babies were found to be higher in controls (47.53) compared to cases (45.79) and this was found to be statistically significant (p value <0.001).

Table 1. Comparison of cases and controls.

	Cases	Control	
	Mean (sd)	Mean (SD)	P value
1 st trimester hemoglobin (g/dl)	10.68 (0.93)	11.46 (0.93)	< 0.001
2 nd trimester hemoglobin (g/dl)	10.36 (1.23)	11.47 (0.91)	<0.001
3 rd trimester hemoglobin (g/dl)	10.42 (1.09)	11.32 (1.12)	<0.001
Head circumference (cm)	32.97 (1.13)	33.15 (1.39)	0.317
Length (cm)	45.79 (1.266)	47.53 (2.120)	<0.001

On analysis using logistic regression model it was found that mothers with anemia at any time during pregnancy have 4.3 times higher risk of giving birth to low birth weight babies (odds ratio 4.31) compared to non-anaemic mothers. The p value obtained was 0.001 which is statistically significant. Results are summarized in Table 1.

DISCUSSION

The study showed that mean hemoglobin value of mothers who give birth to low birth weight babies are significantly lower than that of mothers who give birth to normal birth weight babies. This was found to hold true in all three trimesters. The same result was found in a study conducted previously by Levy A et al which showed that there was higher rate of preterm deliveries and low birth weight among babies born to mothers with anemia during pregnancy as compared to the babies born to non-anemic mothers.⁹

In the present study it is found that mothers with hemoglobin below 10 g/dl at any time during pregnancy has 4.3 times higher risk of giving birth to low birth weight babies compared to mothers with hemoglobin more than 10g/dl. The association was found to be significant with a p value of 0.001. This is consistent with the study conducted by Chumnijarakij T et al where they found that maternal hematocrit value below 30% has increased risk of giving birth to low birth weight babies.¹⁰ Bakhtiar UJ et al conducted a study about relationship between maternal hemoglobin and perinatal outcome in 2007.¹¹ Here the risk of giving birth to low birth weight babies among anemic women was 1.8 times more than non anemic women

Even though in the present study it was seen that maternal anaemia during pregnancy, irrespective of the trimester increases the risk of low birth weight in babies, the incidence of anemia in mothers who gave birth to low

birth weight babies was maximum (36%) in 2nd trimester. Bondevik GT et al in his study found out that severe maternal anemia, particularly in the first trimester, is significantly associated with adverse pregnancy outcomes like low birth weight, IUGR and decreased head circumference.¹²

When the lengths of babies were compared in the present study, it was found that mean length of babies was lower in cases compared to controls, with a mean of 45.8 cms in cases and 47.5 cms in controls. This was also similar to the study, conducted by Dalal et al in this study the mean length of babies born to anemic mothers were 43 cms, 45 cm and 46 cm for severe, moderate and mild anemia compared to 47 in non anemic mothers.¹³ Singla PN et al conducted a study where they found that the birth weight, head circumference, chest circumference, mid-arm circumference, and crown heel length are significantly lower in infants born to women with moderate (haemoglobin 6.1±8.5g/dl) and severe anaemia (haemoglobin <6.0 g/dl), in comparison to infants born to non-anaemic women.¹⁴

But the present study could not find a significant difference in head circumference of the two groups (p value 0.317). This is also different from that of the findings in study conducted by Kaur et al in which the head circumference of babies born to anemic mothers was significantly lower compared to babies born to non anemic mothers.¹⁵ The lack of association between maternal anaemia and head circumference may be because mothers with anemia in 1st trimester were lower in the present study compared to previous studies and it is anemia in 1st trimester that has been found to result in lower head circumference in babies in most of the studies.

CONCLUSION

Anemia during pregnancy is a risk factor for low birth weight and SGA, independent of the trimester. Length of babies born to anaemic mothers is also low. But it does not have a significant effect on head circumference of babies.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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