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Original Research Article

Study on the effect of maternal anemia on birth weight of term neonates among rural population India

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ABSTRACT

Background: Maternal anemia in pregnancy is common and has several deleterious effects on the health of the mother and the fetus. Maternal anemia is an important risk factor for LBW babies and preterm babies. There exists an insufficient information regarding the adverse effect of anemia during pregnancy especially among rural population. The aim of the study was to determine whether maternal anemia would affect the birth weight of the baby.
Methods: The study was conducted in post-natal ward in Sri Venkateshwara Medical College Hospital and Research centre, Ariyur, Puducherry, India a tertiary care hospital in a rural area.
Results: About 85% of low birth weight babies were born to mothers with severe maternal anemia with a p value of <0.001 which is statistically significant. None of the mothers who didn't have maternal anemia had low birth weight babies.
Conclusions: Maternal anemia is directly proportional to fetal growth. Maternal anemia being an important risk factor for low birth weight should be prevented as early as possible thus helpful in de-creasing the incidence, mortality and morbidity of LBW babies.

Keywords: Birth weight, Maternal anemia, Term neonates

INTRODUCTION

Anaemia in pregnancy constitutes a significant public health problem in developing countries. Among the various causes of anaemia in women, iron deficiency is the most common cause, primarily due to their recurrent menstrual loss and secondary due to poor supply of iron in the diet.

Maternal anemia in pregnancy is common and has several deleterious effects on the health of the mother and the fetus. Maternal anemia is an important risk factor for LBW babies and preterm babies. There exists an insufficient information regarding the adverse effect of anemia during pregnancy especially among rural population.[1]

During pregnancy anemia is common due to increased demand of iron for the growing fetus and placenta and increased red blood cell mass, which is further aggravated with other factors such as childbearing at an early age, repeated pregnancies, short intervals between pregnancies and poor access to antenatal care and supplementation. The consequences of iron deficiency anemia during gestation include increased risks of preterm delivery, lower birth weight and perinatal mortality.[2] Reduced level of hemoglobin favor changes in placental angiogenic. Thereby causing decreased

availability of oxygen to the fetus which results in intrauterine growth restriction and low birth weight.

Globally, about 18 million infants are born with low birth weight of <2500 g every year.[3] Though these low birth weight (LBW) infants constitute only about 14% of the total live births, they account for 60-80% of total neonatal deaths.[4] In general, risk factors in the mother that may contribute to low birth weight include young ages, multiple pregnancies, previous LBW infants, poor nutrition, heart disease or hypertension, un-treated coeliac disease, drug addiction, alcohol abuse, and insufficient prenatal care. Environ-mental risk factors include smoking, lead exposure, and other types of air pollutions.

METHODS

The study was conducted in postnatal ward in Sri Venkateshwara Medical College Hospital and Research centre, Ariyur, Puducherry, India a tertiary care hospital in a rural area from December 2016 to July 2017. About 486 deliveries during the study period were included in the study.

Inclusion criteria

All term babies (completed >37 weeks of gestational age) and babies born to woman of age 18-35 years were included.

Exclusion criteria

Babies born to woman having gestational diabetes mellitus, pregnancy induced hypertension, fever with rash, short stature, babies born with congenital anomalies, preterm, sick neonates (neonates with RDS, MAS, TTNB, sepsis, hypoglycemia, seizures).

All the mothers and babies who satisfied the inclusion criteria were included in the study. All information about maternal factors, baby resuscitation details was collected as per pro forma. Anemic mothers were classified into 3 groups - no anemia, mild, moderate and severe based on the hemoglobin level classified as no anemia- >10 gm%, mild anemia- 8-10 gm%, moderate- 8-7 gm%, severe- <7 gm%.[5]

All babies were personally examined by the investigator to asses gestational age, sex, perinatal complications and full systemic examination and birth weight was recorded. All data collected were entered in Microsoft Excel and Statistics 16.0 software was used for statistical analysis. The data was analyzed using appropriate test of significance.

RESULTS

A total 486 mothers and their babies were included in the study. Among them about 249 (51.23%) mothers didn't have anemia and 237 (48.75%) mothers had anemia as shown in Table 1.

The distribution of birth weight of the 486 babies born is given in Table 2. Among 486 babies, that were born to their mothers. Maximum (85%) babies having birth weight between 2000 to 2499 grams were born to mother who have severe maternal anemia.

Maximum (53.04%) babies with birth weight between 2500 to 3000 grams were born to mothers who didn't have maternal anemia.

Maximum (44.85%) babies with birth weight between 3001 to 3499 grams were born to mothers who had moderate maternal anemic.

Maximum (69.09%) babies with birth weight between 3500 to 4000 grams were born to mothers who didn't have maternal anemia.

Maximum (85.18%) babies with birth weight between 4001 to 4499 grams were born to mothers who didn't have maternal anemia as shown in Table 3.

Table 1: Distribution of mothers with anemia among study population.

Anemic mothers	Frequency	Percent (%)
No anemia	249	51.23
Mild	42	8.64
Moderate	161	33.12
Severe	34	6.99
Total	486	100

Table 2: Distribution of birth weight of neonates among study population.

Birth weight (gms)	Frequency	Percent (%)
2000-2499	40	8.23
2500-3000	230	47.32
3001-3499	107	22.01
3500-4000	55	11.31
4001-4499	54	11.11
Total	486	100

This study gives us the prevalence of maternal anemia in a rural population (Ariyur, Puducherry, India) which is 48.75%. About 85% of low birth weight babies were born to mothers with severe maternal anemia with a p value of <0.001 which is statistically significant. There were babies with LBW which belonged to mothers with mild (5%) and moderate (10%) anemia too, but of lesser percentages, yet statistically significant. None of the mothers who didn't have maternal anemia had low birth weight babies.

Thus, proving maternal anemia has direct effect on birth weight of the babies.

Table 3: The relation of maternal anemia with birth weight of newborns.

Birth weight (gms)	Anemic mothers					Chi square	P value
	No	Mild	Moderate	Severe	Total		
2000-2499	0 (0.0%)	2 (5.00%)	4 (10.00%)	34 (85.00%)	40 (100%)	455.4	<0.001
2500-3000	122 (53.04%)	16 (6.95%)	92 (40.00%)	0 (0.0%)	230 (100%)		
3001-3499	43 (40.18%)	16 (14.95%)	48 (44.85%)	0 (0.0%)	107 (100%)		
3500-4000	38 (69.09%)	8 (14.54%)	9 (16.38%)	0 (0.0%)	55 (100%)		
4001-4499	46 (85.18%)	0 (0.0%)	8 (14.81%)	0 (0.0%)	54 (100%)		
Total	249 (51.23%)	42 (8.64%)	161 (33.12%)	34 (6.99%)	486 (100%)		

DISCUSSION

The main findings of this systematic review showed that maternal anemia is a risk factor for low birth weight. In the present systematic review, the positive association between maternal anemia and low birth weight was verified using subgroup analyses that included both the presence of anemia and its severity level due to the need for more accurate anemia diagnosis.

Present study tells us the prevalence of maternal anemia is 48.75% in a rural population. In 2008, Milman N described that in tropical countries, the incidence of anemia in pregnancy is about 40-80%.[6]

Maximum babies having birth weight between 2000 to 2499 grams (LBW) were born to mother who have severe maternal anemia with a p value <0.001 thus being statistically significant. Singla PN et al, stated that the birth weight was significantly reduced in the very severely anemic mothers and had direct relationship with the maternal haemoglobin levels.[7]

In the study, fetal growth in maternal anaemia by Singla PN et al, concluded that all indices of fetal growth showed linear relationships with maternal haemoglobin. The growth retarding effect of maternal anaemia was more on fetal birth weight and mid-arm circumference than on other anthropometric indices of the newborn.[8]

Rusia US et al, found that maternal Hb concentration showed a significant correlation with birth weight (p <0.01), Apgar score (p <0.001) and birth asphyxia.[9]

Nair M et al, concluded that 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.[10]

CONCLUSION

Maternal anemia is directly proportional to fetal growth. Maternal anemia being an important risk factor for low birth weight should be prevented as early as possible. Thereby, decreasing the incidence, mortality and morbidity of LBW babies.

Government has introduced multiple programmes/ schemes for the control and prevention of maternal anemia. But still the prevalence is high among rural population. This clearly shows the reach of the government initiatives have not extended to the rural areas. Therefore, it is important to establish the government program for prevention and control of anemia in rural areas in a more effective way.

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