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Original Research Article

A Hospital-Based Assessment of the Impact of Corrected Maternal Anemia on Perinatal Outcome its Comparison with Babies Born to Anemic Mothers

Snigdha Prasad[1], Nayan Rukhaiyar[2]

[1]Senior Resident, Department of Obstetrics and Gynecology, Lord Buddha Koshi Medical College & Hospital, Saharsa, Bihar, India
[2]Assistant Professor, Department of Pediatrics, Lord Buddha Koshi Medical College & Hospital, Saharsa, Bihar, India

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Corresponding author: Dr. Nayan Rukhaiyar
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Abstract

Aim: The aim of the present study was to assess impact of corrected maternal anemia on perinatal outcome in terms of birth weight and gestational maturity and its comparison with babies born to anemic mothers and burden and severity of anemia in pregnant women.

Methods: Total 120 pregnant women of 20 ±4 weeks of gestation with singleton pregnancy attending OPD of Department of Obstetrics & Gynaecology at Lord buddha koshi medical college & hospital for one year and were enrolled after taking informed consent. A brief medical history and examination was done before enrolling the patient.

Results: A total of 120 women with pregnancy around 20+4 week's gestation were included in this study. As per hemoglobin levels and WHO definition of anemia, 6 (5%) antenatal mothers had severe anemia, 78 (65%) had moderate anemia and 36 (30%) had Hb levels >10gm/dl. 78 women with moderate anemia i.e. hemoglobin level between 7-10gm% constituted our study group. Out of 78 women 4 were lost to follow up, one who developed PIH, one with bleeding and 12 who did not show improvement in hemoglobin level due to irregular intake or intolerance were excluded from this study.

Conclusion: From the present study we concluded that; anemic mothers had higher chance of delivering preterm and low birth weight baby, which again is an important determinant of survival and quality of life a child.

Keywords: Maternal Anemia, Perinatal Outcome, Premature And Low Birth Weight Babies.

Introduction

Despite being a major public health issue, anemia in pregnancy (AIP) is surprisingly still not well understood in terms of its definition, prevalence, incidence and the effectiveness of iron supplements in improving pregnancy outcomes. [1] There is ambiguity in systems of measurement criteria for the onset of anemia during pregnancy. Some authors considered "anemia at first antenatal care visit "as a measure of occurrence of AIP, while others considered any antenatal low hemoglobin (Hb) measurement throughout the course of pregnancy. [2,3]

There is no universal standard for the exact timing of measurement for the onset of anemia that would clearly differentiate between incident and prevalent cases.

Another factor that adds to the complexity in measuring anemia in pregnancy is the variation among researchers in specifying the cut-off point of Hb level; while some investigators defined it as Hb <11.0 g/dl as per the recommendation of the WHO, others adopted different cut-off points such as <10.0 and <10.5 g/dl as recommended by other agencies in the USA. [4-7]

The role of anemia in pregnancy and iron on the growing fetus has been studied in the last few decades. The outcome of these studies is either inconclusive or at the most supportive of the popular notions held so far regarding pregnancy outcome and anemia. Low birth weight is a major public health problem in India and influenced by several factors including maternal anemia. Some studies revealed that maternal anemia during 3rd trimester of pregnancy is associated with LBW baby; some other studies indicated that maternal anemia onset in any trimester leads to LBW baby. [8-12]

There is significant variation in the incidence of LBW across regions. In 2013, nearly 22 million newborns an estimated 16% of all babies born globally had low birth weight. South Asia has the highest incidence, with one in four newborns weighing less than 2500 gms, while East Asia/Pacific has the lowest, at 7%. Nearly 40% of all LBW babies in the developing world are born in India. [13] Among the various factors affecting the birth weight, anemia during pregnancy has been found to have significant effect on weight as well as on maturity of baby. WHO estimates that prevalence of anemia is 14% in developed countries, 42.7 -57.3% in developing countries like India. [14]

Multiple factors lead to anaemia in pregnancy, nutritional iron deficiency anaemia (IDA) being the commonest. Physiological haemodilution and several factors affecting Hb and iron status in pregnancy lead to difficulties in establishing a definitive diagnosis. Fetal programming occurs when the normal pattern of fetal development is disrupted by an abnormal stimulus or 'insult' applied at a critical point in in-utero development. [15] Correction of anaemia with haematinics provides adequate proof of a nutritional deficiency in its pathogenesis.

The aim of the present study was to assess impact of corrected maternal anemia on perinatal outcome in terms of birth weight and gestational maturity and its comparison with babies born to anemic mothers and burden and severity of anemia in pregnant women.

Methods

The present study was conducted after obtaining institutional ethical clearance. Total 120 pregnant women of 20±4 weeks of gestation with singleton pregnancy attending OPD of Department of Obstetrics & Gynaecology At Lord Buddha Koshi Medical College & Hospital for one year and were enrolled after taking informed consent. A brief medical history and examination was done before enrolling the patient.

Exclusion Criteria:

Antenatal mothers having associated conditions that may affect the fetal growth were excluded.

1. Women with systemic disease like primary cardiac, renal, hepatic disorder and hypothyroidism.
2. History of pathologic blood loss at any stage during study period.
3. Antenatal mother who developed PIH even after enrollment.
4. Those that did not show improvement of anemia after supplementation.
5. Mothers who had anemia other than nutritional.

Laboratory Investigation: To know the severity of anemia complete haemogram was done, and as per WHO criteria, on the basis of hemoglobin level11 they were divided into 3 groups

Group A (Hb < 7) severe anemia

Group B (Hb 7- 10) moderate anemia

Group C (Hb > 10) mild/ no anemia

Women of Group B with hemoglobin levels of 7- 10 gm% became our study group. These were supplemented with oral hematinics as per protocol of management of anemia during pregnancy and these were followed till delivery for assessment of perinatal outcome. Oral haematinic was given in form of tablets with following composition Ferrous Ascorbate equivalent to elemental iron 100 mg, Folic acid 1.1 mg. These tablets were given one tablet twice daily after meals as per standard protocol of management of anemia during pregnancy. These patients were regularly followed till the time of delivery and improvement of anemia was assessed by hemoglobin levels done at regular intervals and at the time of delivery. Perinatal outcome in terms of prematurity and low birth weight babies was assessed in babies of mother who showed improvement of their anemia during follow up. Gestational age was assessed by modified Ballard scoring system (Ballard et al, 1991). Birth weight of babies of mothers enrolled for the study was taken by same digital weighing machine used in labor room. Low birth weight baby was defined as per standard definition of birth weight of less than 2500 gms.

Babies of this group were compared with babies of 60 mothers who had anemia at the time of delivery. Their records were checked retrospectively to assess their anemia status during pregnancy. Only those mothers were included in comparison group, whose hemoglobin levels were between 7-10 gm% at the time of delivery and who had previous lab records suggestive of moderate anemia. Those mothers who were anemic but had any other risk factor which was likely to affect the growth of the baby were excluded.

Results

Table 1: Distribution of antenatal mothers according to their hemoglobin level

Groups	Range of Hb (gm/dl)	Study group n = 120	Mean Hb. (gm/dl)	HCT
A	< 7	6 (5%)	6.4	19.2
B	7- 10	78 (65%)	8.6	25.8
C	>10	36 (30%)	11.6	34.8

A total of 120 women with pregnancy around 20+4 week's gestation were included in this study. As per hemoglobin levels and WHO definition of anemia, 6 (5%) antenatal mothers had severe anemia, 78 (65%) had moderate anemia and 36 (30%) had Hb levels >10gm/dl. 78 women with moderate anemia i.e. hemoglobin level between 7-10gm% constituted our study group. Out of 78 women 4 were lost to follow up, one who developed PIH, one with bleeding and 12 who did not show improvement in hemoglobin level due to irregular intake or intolerance were excluded from this study.

Table 2: Anemia status of antenatal mothers at the time of delivery

Groups	Supplemented Group (60)	Comparison Group (60)
Mean Hb Level (gm/dl) Before supplementation	~ 8.4	
Mean Hb level (gm/dl) After supplementation	~ 11.4	~ 8.2
HCT	34.2	24.6

In remaining 60 women improvement in mean hemoglobin was reported to be from 8.4 gm% to 11.4 gm%. Perinatal outcome in terms of birth weight and gestational age was assessed in these 60 women and was compared with 60 babies delivered to anemic mothers.

Table 3: Distribution of babies of anemic and non-anemic mothers as per their birth weight

Groups	Antenatal mothers (n) Birth Weight (>2500 gms)	Normal weight babies Birth Weight <2500 gms	Low birth weight babies
Non-Anemic mothers	60	55 (91.66%)	5 (8.34%)
Anemic mothers	60	42 (70%)	18 (30%)

Improvement of maternal anemia was found to have significant positive effect on birth weight of baby in our study. 5 (8.34%) babies had low birth weight in supplemental group as compared to 30% in anemic group.

Table 4: Mean birth weight in two groups

Groups	Mean Birth wt (gms)
Non anemic group	2746
Anemic group	1876

Mean birth weight was 2746 gms in non-anemic group (supplemental group) as compared to 1876 gms in anemic group. Babies of non-anemic group showed improvement in birth weight of about 870 gms with maternal supplementation.

Table 5: Distribution of babies according to their gestation in anemic and non-anemic group

Groups	Preterm	Term	Post term	Total
Non anemic group	3 (5%)	56	1	60
Anemic Group	6 (10%)	54	0	60

Effect of improvement of maternal anemia on maturity of baby is depicted in the above table. No significant effect of maternal anemia on gestational age could be demonstrated in our study.

Discussion

Anaemia is hematological abnormality and has a significant public health problem globally. World Health Organization (WHO) reports that more than 1.62 billion people are affected globally. Of these, 56 million pregnant women (41.8%) were suffering from varying degrees of anaemia. [16] Despite anaemia being found worldwide, it's more prevalent in developing countries. [17]

In India, of all infants who died before they completed 29 days post-birth, 48.1% suffered from LBW and premature birth. [20,21] Maternal anemia is reported to be one of the important factors of low birth weight of babies. The effect of maternal anemia on birth weight have been reported by many studies, but the level of hemoglobin at which this association is seen is reported to be, different in various studies. Most of the studies reported that hemoglobin level of less than 10 gm% had significant effect on birth weight of baby [18,20-22] but Manisha et al [19] found positive association only with severe anemia with hemoglobin level < 7gm%. Similar inverse relation with maternal hemoglobin level between 6-8 gm% and low birth weight was reported by Ganesh et al. [23] In contrast K. Jagdish et al in their study observed no association between maternal anemia and birth weight of babies. [24]

In our study percentage of low birth weight babies was 27.8% in anemic mothers which was high as compared to 8.9% in non-anemic mothers. The overall prevalence of LBW as reported by various studies from India ranged from 28% to 40%. [21,23,24] Risk of having low birth weight baby increases when mother is anemic. [25,26] It was 1.9 to 4.8 times more as reported by Lone FW and Deshmukh.et al in their study. [27,28]

Maternal anemia has long been a known risk factor for preterm delivery along with its effect on birth weight. In our study 6.4% babies were born prematurely to non-anemic mothers as compared to 11.3% babies of anemic mothers. Incidence of preterm delivery was reported to be as high as 45% in moderate anemia group as compared to 50% in severely anemic mothers. [29] In our study intrauterine growth retardation was more responsible for low birth weight than prematurity. On the contrary Sharma S reported prematurity to be more associated with low birth weight. [30]

This study also reveals no significant association with initial Hb level, initial maternal weight on 1st visit and weight gain through 4 visits. But, study by Hosen et al conclude that maternal weight at 1st visit (<45 kg) and weight gain (<7 kg) during pregnancy have been found to be consistently associated with LBW. [31,32]

Conclusion

From the present study we concluded that; anemic mothers had higher chance of delivering preterm and low birth weight baby, which again is an important determinant of survival and quality of life a child. This reiterates importance of preventing and controlling maternal anemia not only for mothers but also for the health of a baby.

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