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Original Research Article

PERINATAL OUTCOMES IN MATERNAL ANEMIA IN PREGNANCY IN TERTIARY CARE CENTRE, HALDWANI

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ABSTRACT

Background: Maternal anemia is a common and preventable condition associated with adverse perinatal outcomes, especially in developing countries. This study aims to assess the relationship between the severity of maternal anemia and its impact on neonatal outcomes in a tertiary care setting. **Materials and Methods:** A hospital-based observational study was conducted on 100 anemic pregnant women admitted for delivery. Data on maternal demographics, hemoglobin levels, and perinatal outcomes—including birth weight, APGAR scores, intrauterine deaths (IUD), and mode of delivery—were collected and analyzed. **Result:** The majority of anemic women were aged 26–30 years (51%) and multigravida (83%). Moderate anemia (Hb 7–9.9 g/dL) was most prevalent (57%), followed by severe anemia (<7 g/dL) in 42% of cases. A significant inverse relationship was observed between the severity of anemia and birth outcomes. Among severe anemia cases, 83% of neonates had low birth weight, 17% had APGAR scores <7, and 9% were intrauterine deaths. In contrast, mild anemia (1% of cases) showed no adverse neonatal outcomes. Overall, 67% of babies born to anemic mothers were low birth weight. **Conclusion:** The study confirms that increasing severity of maternal anemia is strongly associated with adverse perinatal outcomes, particularly low birth weight, fetal distress, and intrauterine mortality. Early identification and correction of anemia during pregnancy are essential for improving neonatal health and reducing preventable complications.

INTRODUCTION

According to World Health Organization (WHO), an estimated over 2 billion people, almost 30% population of world, are affected by anemia and almost 50% of pregnant women are suffering from varying degree of anemia.[1] Although anemia has been found in women of both high and middle income nations, but its more prevalent in low/middle-income countries.[2]

The prevalence of anaemia all over the world is 51% and is as high as 87.5% amongst pregnant women in India.[3] Anaemia continues to take a heavy toll of maternal lives in India from direct as well as indirect deaths, from cardiac failure, haemorrhage, infections, pre-eclampsia, puerperal sepsis. According to the FOGSI – WHO study (1997), anaemia is responsible for 64.4% of maternal deaths in India.[4]

Anaemia, the most preventable cause of maternal mortality, should be eradicated from the female population. In regions like Haldwani, located in the foothills of Uttarakhand, the problem is exacerbated by poor nutritional intake, short inter-pregnancy intervals, and limited access to consistent antenatal care, particularly in rural and marginalized populations. Despite national supplementation programs and awareness initiatives, the prevalence of anemia in pregnancy remains unacceptably high.

Given this context, the present study was undertaken at a tertiary care centre in Haldwani to evaluate the perinatal outcomes in anemic pregnant women. By examining variables such as birth weight, APGAR scores, intrauterine deaths, and mode of delivery, stratified by the severity of anemia, this study aims to better understand the clinical consequences and contribute to improved maternal-fetal health strategies in similar settings.

Aims and Objectives

To evaluate the impact of maternal anemia on perinatal outcomes among pregnant women admitted to a tertiary care centre in Haldwani.

Objectives

1. To assess the prevalence and severity of anemia among pregnant women at the time of delivery.

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2. To analyze the association between maternal anemia and perinatal outcomes, including:
   - Birth weight of the newborn
   - APGAR score at 5 minutes
   - Intrauterine fetal death (IUD)
   - Mode of delivery (NVD vs LSCS)
3. To examine the demographic and obstetric profiles (age, gravidity, birth spacing, and religion) of anemic pregnant women.
4. To compare perinatal outcomes across different severity levels of anemia (mild, moderate, severe).

MATERIALS AND METHODS

Study Design: A hospital-based observational and cross-sectional study was conducted. The study was carried out in the Department of Obstetrics and Gynaecology at a tertiary care centre in Haldwani, Uttarakhand, catering to both urban and rural populations.

Study Population: Pregnant women admitted for delivery who were found to be anemic at the time of admission (based on hemoglobin level <11 g/dL) were included.

Sample Size: A total of 100 anemic pregnant women were included in the study using convenient sampling.

Inclusion Criteria

- Pregnant women with hemoglobin <11 g/dL at the time of delivery
- Singleton pregnancies
- Women who consented to participate in the study

Exclusion Criteria

- Women with known hematological disorders (e.g., thalassemia, sickle cell disease)
- Women with multiple pregnancies
- Pre-existing medical conditions like chronic hypertension or diabetes
- Non-consenting individuals

Data Collection:

Data were collected using a predesigned proforma, including:

1. Maternal demographic details: age, religion, gravida status, inter-pregnancy interval
2. Hemoglobin level at admission (classified as:
   - Mild anemia: 10–10.9 g/dL
   - Moderate anemia: 7–9.9 g/dL
   - Severe anemia: <7 g/dL)
3. Perinatal outcomes:
   - Birth weight (classified as low birth weight if <2.5 kg)
   - APGAR score at 5 minutes
   - Intrauterine death (IUD)
   - Mode of delivery (Normal vaginal delivery or Cesarean section)

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using descriptive statistics. Results were presented as frequency and percentage. Associations between anemia severity and perinatal outcomes were assessed using chi-square test where applicable. A p-value <0.05 was considered statistically significant.

RESULTS

[Table 1] presents the demographic characteristics of 100 anemic pregnant women. The majority of participants were aged between 26–30 years (51%), followed by 21–25 years (25%), indicating that anemia was most prevalent in women within the peak reproductive age group.

Regarding religion, 67% were Hindu and 33% were Muslim.

In terms of obstetric history, 83% were multigravida (G2–G4), suggesting repeated pregnancies were a common feature among anemic women. Only 10% were primigravida, while 7% were grand multipara (≥G5), showing that higher gravidity may be associated with increased risk of anemia.

Table 1: Maternal Profile of Anemic Pregnancies

Variable	Category	Count	Percentage (%)
Age (years)	≤20	8	8%
	21–25	25	25%
	26–30	51	51%
	>30	16	16%
Religion	Hindu	67	67%
	Muslim	33	33%
Gravida	Primigravida (G1)	10	10%
	Multigravida (G2–G4)	83	83%
	Grand multipara (≥G5)	7	7%

Table 2: Perinatal Outcomes by Severity of Maternal Anemia

Outcome	Mild Anemia (Hb 10–10.9 g/dL)	Moderate Anemia (Hb 7–9.9 g/dL)	Severe Anemia (Hb <7 g/dL)
Number of Cases	1	57	42
APGAR <7 at 5 min	0 (0%)	7 (7%)	17 (17%)
IUD (Intrauterine Deaths)	0 (0%)	2 (2%)	9 (9%)
LSCS Delivery	0 (0%)	12 (12%)	4 (4%)

[Table 2] outlines the distribution of key perinatal outcomes—APGAR scores, intrauterine deaths (IUDs), and mode of delivery (LSCS)—in relation to the severity of maternal anemia.

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Out of 100 cases, moderate anemia (Hb 7–9.9 g/dL) was the most prevalent category (57%), followed by severe anemia (Hb <7 g/dL) in 42 women, and mild anemia (Hb 10–10.9 g/dL) in just 1 case.

The occurrence of low APGAR scores (<7 at 5 minutes) was highest in the severe anemia group (17%), indicating increased fetal compromise in more anemic mothers. In comparison, 7% of babies in the moderate anemia group had low APGAR scores, and no cases were reported in the mild anemia group.

Similarly, the incidence of intrauterine death (IUD) rose with anemia severity—9% in severe anemia, 2% in moderate, and 0% in mild cases.

Interestingly, LSCS (Cesarean) deliveries were more common in the moderate anemia group (12%) compared to 4% in the severe group.

Table 3: Association between Severity of Maternal Anemia and Birth Weight

Outcome	Low Birth Weight (<2.5kg)	Normal Birth Weight (≥2.5kg)	Total
Mild Anemia (Hb 10–10.9 g/dL)	0 (0%)	1 (1%)	1 (1%)
Moderate Anemia (Hb 7–9.9 g/dL)	32 (32%)	25 (25%)	57 (57%)
Severe Anemia (Hb <7 g/dL)	35 (35%)	7 (7%)	42 (42%)
Total	67 (67%)	33 (33%)	100 (100%)

[Table 3] illustrates the relationship between the severity of maternal anemia and birth weight outcomes in 100 anemic pregnant women.

Among those with mild anemia (Hb 10–10.9 g/dL), the only case resulted in a normal birth weight baby (≥2.5 kg), showing no adverse outcome.

In the moderate anemia group (Hb 7–9.9 g/dL), 32 out of 57 cases (56%) resulted in low birth weight babies (<2.5 kg), while the remaining 25 cases (44%) had babies with normal weight.

The severe anemia group (Hb <7 g/dL) showed the highest risk, with 35 out of 42 neonates (83%) being born with low birth weight, and only 7 (17%) having normal weight.

Overall, 67% of babies born to anemic mothers were low birth weight, highlighting a strong inverse relationship between maternal hemoglobin levels and neonatal birth weight.

DISCUSSION

This study assessed the impact of maternal anemia on perinatal outcomes and revealed a significant association between increasing severity of anemia and adverse fetal health indicators. The most common form of anemia among the participants was moderate anemia (Hb 7–9.9 g/dL), with low birth weight (67%) and low APGAR scores being the most frequent adverse outcomes. Notably, the severe anemia group demonstrated a marked increase in intrauterine deaths (9%) and low birth weights (83%), indicating that the risk to neonatal health rises as maternal hemoglobin levels decline.[5]

These findings are strongly supported by a meta-analysis by Jung et al. (2019), which evaluated over 4 million pregnancies and found that maternal anemia significantly increased the odds of low birth weight (OR: 1.65), preterm birth (OR: 2.11), and perinatal mortality (OR: 3.01) by Jung et al., 2019. Our study also echoes their findings, especially the elevated risk of low birth weight and perinatal loss in severe anemia.[6]

Similarly, a nationwide study in Bangladesh demonstrated that maternal anemia was significantly associated with preterm birth (AOR: 2.03), early neonatal mortality (AOR: 1.87), and perinatal mortality (AOR: 1.54), reinforcing the global relevance of these findings Kabir et al., 2022.[7]

Regarding birth weight, our study's result that 67% of neonates born to anemic mothers had low birth weight is consistent with a meta-analysis that highlighted a 200-gram increase in birth weight among mothers who received targeted treatment such as periodontal care during pregnancy, which indirectly reduced the systemic inflammation contributing to anemia Bi et al., 2019.

The higher rate of cesarean section in moderate anemia compared to severe anemia, while initially counterintuitive, can be attributed to obstetric decision-making: in moderate cases, active intervention may be more feasible to prevent fetal compromise, whereas severe anemia may result in spontaneous preterm labor or fetal demise before such interventions can occur.

Thus, the findings from this tertiary care center in Haldwani are consistent with broader global evidence and underscore the need for early detection and correction of anemia during pregnancy to reduce preventable adverse perinatal outcomes.

Summary

- Most anemic mothers were aged 26–30 years and were multigravida.
- Moderate anemia (57%) was the most common, followed by severe anemia (42%).
- Low APGAR scores, IUDs, and low birth weight were more common in severe anemia cases.
- 67s% of babies born to anemic mothers were low birth weight.
- A clear inverse association was observed between maternal hemoglobin level and birth outcomes.
- Early detection and management of anemia in pregnancy is crucial for reducing perinatal complications.

CONCLUSION

This study demonstrates a significant association between the severity of maternal anemia and adverse perinatal outcomes. As hemoglobin levels declined, there was a notable increase in the rates of low birth

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weight, intrauterine fetal deaths (IUDs), and low APGAR scores. Among the different categories, severe anemia (Hb <7 g/dL) showed the highest risk of poor neonatal outcomes, including 83% low birth weight and 17% with low APGAR scores.

The findings reinforce the critical importance of early screening, timely diagnosis, and appropriate treatment of anemia during pregnancy. Strengthening antenatal care, ensuring iron and folic acid supplementation, and promoting nutritional education—particularly for multigravida women—are essential strategies to improve maternal and neonatal health outcomes in settings like Haldwani and similar resource-limited regions.

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