

PREVALENCE OF ANEMIA AND ITS ASSOCIATION WITH PREGNANCY OUTCOMES AMONG ANTENATAL WOMEN: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Anemia in pregnancy is a significant public health concern in developing countries and is associated with adverse maternal and fetal outcomes. To assess the prevalence and severity of anemia among pregnant women and to evaluate its association with socio-demographic factors and pregnancy outcomes. **Material and Methods:** A hospital-based cross-sectional study was conducted among 350 pregnant women attending antenatal care. Hemoglobin levels were measured and participants were categorized into normal and anemic groups. Data on age, gestational age, and birth interval were collected. Pregnancy outcomes such as low birth weight, preeclampsia, abortions, stillbirths, prolonged labor, birth asphyxia, and preterm delivery were recorded. Statistical analysis was performed using the chi-square test. **Results:** The prevalence of anemia was 71.4%, while 28.6% had normal hemoglobin levels. Mild anemia was most common (46.6%), followed by moderate (21.4%) and severe anemia (3.4%). A higher prevalence of anemia was observed among women aged 21–30 years (75.8%) and those in ≥ 25 weeks of gestation (76.2%), though these associations were not statistically significant ($p > 0.05$). Adverse outcomes such as low birth weight (60%), abortions and stillbirths (75%), preeclampsia (60%), prolonged labor (75%), birth asphyxia (66.6%), and preterm delivery (100%) were more common among anemic women. **Conclusion:** Anemia is highly prevalent among pregnant women and is associated with adverse pregnancy outcomes. Early detection and appropriate management through strengthened antenatal care are essential to improve maternal and fetal health.

INTRODUCTION

Anemia during pregnancy is one of the most common nutritional disorders affecting women worldwide and remains a major public health challenge, particularly in developing countries¹. According to the World Health Organization, anemia in pregnancy is defined as a hemoglobin level of less than 11 g/dL and affects nearly 40% of pregnant women globally². The burden is disproportionately higher in low- and middle-income countries, including India, due to poor nutritional status, frequent pregnancies, and limited access to quality antenatal care³.

In India, anemia continues to be a significant public health issue despite multiple national programs such as iron and folic acid supplementation and antenatal care services. Data from the National Family Health Survey (NFHS-5) show that more than half of pregnant women are anemic, indicating persistent

gaps in nutrition, awareness, and healthcare utilization⁴. Iron deficiency remains the most common cause, although other factors such as folate deficiency, parasitic infections, and socio-economic determinants also contribute significantly⁵.

The burden of anemia is particularly pronounced in states like Jharkhand, where a large proportion of the population resides in rural and tribal areas. Limited access to healthcare services, low literacy levels, poverty, and dietary insufficiencies contribute to the high prevalence of anemia in this region. Studies conducted in Jharkhand have reported a high prevalence of anemia among pregnant women, reflecting inadequate antenatal care coverage and poor nutritional practices. Cultural practices, early marriage, and closely spaced pregnancies further exacerbate the problem⁶. Anemia during pregnancy has serious implications for both maternal and fetal health. It is associated with increased risk of maternal morbidity,

preeclampsia, and mortality, as well as adverse perinatal outcomes such as low birth weight, preterm delivery, birth asphyxia, and stillbirth⁷. The severity of anemia further influences the degree of risk, with moderate to severe anemia leading to worse outcomes.

Several socio-demographic and obstetric factors, including maternal age, gestational age, and birth interval, have been identified as determinants of anemia in pregnancy⁸. However, findings across studies have been inconsistent, highlighting the need for region-specific data to guide targeted interventions.

Given the high burden of anemia and its serious consequences, especially in resource-limited settings like Jharkhand, the present study was undertaken to assess the prevalence of anemia among pregnant women and its association with pregnancy outcomes.

MATERIALS AND METHODS

A hospital-based cross-sectional study was conducted among pregnant women at a tertiary care hospital in Jharkhand, spanning from January 2024 to December 2025. The study involved 350 participants who attended antenatal care (ANC) services during this period. Pregnant women were selected through convenience sampling, based on their availability and willingness to participate. The research aimed to gather insights into the health and experiences of pregnant women receiving ANC at the hospital during the specified timeframe.

The study included all pregnant women attending antenatal care (ANC) during the specified period who consented to participate. Exclusions were made for those with known hematological disorders, chronic systemic illnesses, or who did not consent. Data collection utilized a pre-tested structured questionnaire covering socio-demographic variables, obstetric factors, and clinical history. Hemoglobin levels were measured using standard laboratory methods, with classifications based on World Health Organization criteria: normal (≥ 11 g/dL), mild anemia (10–10.9 g/dL), moderate anemia (7–9.9 g/dL), and severe anemia (< 7 g/dL). Pregnancy outcomes evaluated included low birth weight, preeclampsia, abortions, stillbirths, prolonged labor, birth asphyxia, preterm delivery, and mode of delivery (LSCS).

Statistical analysis was conducted using software Epi-Info software, employing descriptive statistics to summarize data. Categorical variables were reported as frequencies and percentages. The chi-square test evaluated the relationship between anemia, socio-demographic factors, and pregnancy outcomes, with a p-value of < 0.05 deemed statistically significant.

RESULTS

The study investigates the socio-demographic characteristics associated with anemia, highlighting variations in prevalence across various age groups and pregnancy stages. The highest prevalence of anemia was noted in women aged 21–30 years (75.8%), followed by those aged 31–40 years (66.7%) and under 20 years (64.7%), though these differences were not statistically significant ($\chi^2 = 5.04$, $df = 2$, $p = 0.08$). In terms of gestational age, the prevalence of anemia increased with advancing weeks of pregnancy: 65.5% for < 12 weeks, 69.0% for 13–24 weeks, and 76.2% for ≥ 25 weeks, with no statistically significant difference observed ($\chi^2 = 3.06$, $df = 2$, $p = 0.21$). Additionally, a longer birth interval (≥ 3 years) correlated with a higher prevalence of anemia (80.0%) compared to shorter intervals of 1–2 years (70.0%) and < 1 year (66.7%), approaching, but not reaching, statistical significance ($\chi^2 = 5.37$, $df = 2$, $p = 0.06$). [Table-1 & Figure 1]

The majority of participants exhibited mild anemia, with hemoglobin levels between 10–10.9 g/dL (46.6%). Moderate anemia (7.1–9.9 g/dL) was present in 21.4% of participants, and 3.4% had severe anemia (< 7 g/dL). Only 28.6% had normal hemoglobin levels (> 11 g/dL). [Table-2 & Figure-2] Anemia is significantly associated with various pregnancy-related complications. Among anemic women, the following statistics were noted: 60% of low birth weight (LBW) cases, 75% of abortions and stillbirths, 60% of preeclampsia occurrences, 75% of prolonged labor instances, and 66.6% of birth asphyxia cases. Notably, 100% of premature delivery cases were in anemic women. However, for lower segment cesarean sections (LSCS), an equal proportion (50%) was observed in both anemic and non-anemic groups. Overall, the data indicates that complications during pregnancy are more prevalent in women with anemia compared to those with normal hemoglobin levels. [Table-3 & Figure 3]

Table 1: Prevalence of Anemia According to Socio-Demographic Status

Variables	Normal n (%)	Anaemia n (%)	Total	χ^2	df	p
Age						
<20	48 (35.3%)	88 (64.7%)	136	5.04	2	0.08
21–30	51 (24.2%)	160 (75.8%)	211			
31–40	1 (33.3%)	2 (66.7%)	3			
Duration of Pregnancy						
<12 weeks	20 (34.5%)	38 (65.5%)	58	3.06	2	0.21
13–24 weeks	45 (31.0%)	100 (69.0%)	145			
≥ 25 weeks	35 (23.8%)	112 (76.2%)	147			
Birth Interval (years)						

<1	50 (33.3%)	100 (66.7%)	150	5.37	2	0.06
1-2	30 (30.0%)	70 (70.0%)	100			
≥3	20 (20.0%)	80 (80.0%)	100			
Total	100 (28.6%)	250 (71.4%)	350			

Table 2: Distribution of Hemoglobin Level in study Participants

Hemoglobin Level	n(%)
<7	12(3.4%)
7.1-9.9	75(21.4%)
10-10.9	163(46.6%)
>11	100(28.6%)
Total	350(100%)

Table 3: Anemia and Complications of pregnant women

Variables	Normal	Anemic	Total
Anemia status	100 (28.6%)	250 (71.4%)	350
LBW	40 (40%)	60 (60%)	100
LSCS	5 (50%)	5 (50%)	10
Abortions and still births	3 (25%)	9 (75%)	12
Preeclampsia	2 (40%)	3 (60%)	5
Prolonged labor	1(25%)	03 (75%)	4
Birth asphyxia	2 (33.3%)	04 (66.6%)	6
Premature delivery	0 (0.0%)	2 (100%)	2

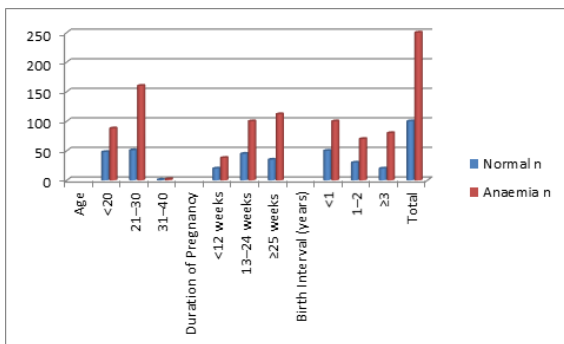


Figure 1: Prevalence of Anemia According to Socio-Demographic Status

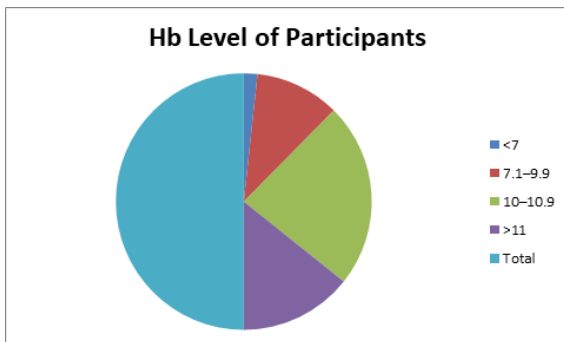


Figure 2: Distribution of Hemoglobin Level in study Participants

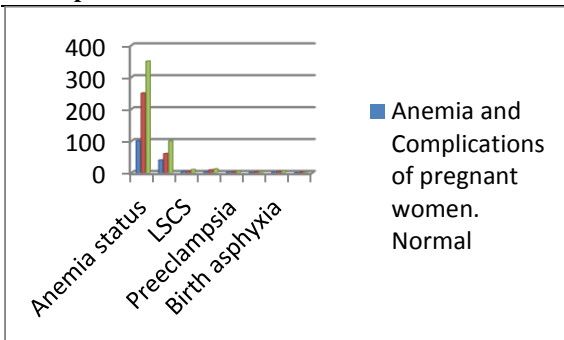


Figure 3: Anemia and Complications of pregnant women

DISCUSSION

The present study demonstrated a high prevalence of anemia (71.4%) among pregnant women, indicating that anemia continues to be a major public health concern. This finding is consistent with reports from the World Health Organization, which estimates that approximately 40% of pregnant women worldwide are anemic, with a significantly higher burden in developing countries like India.^[9] Similar high prevalence rates have been reported in studies conducted in different parts of India, reflecting persistent nutritional deficiencies and inadequate antenatal care.^[10]

In the present study, the highest prevalence of anemia was observed among women aged 21-30 years. Although this association was not statistically significant, it aligns with findings from other Indian studies where the majority of pregnant women fall within this reproductive age group, thus contributing to a higher absolute burden of anemia.^[11] The lack of statistical significance suggests that anemia is widespread across all age groups rather than confined to a specific category.

An increasing trend in anemia prevalence was observed with advancing gestational age, with the highest prevalence in women ≥25 weeks of pregnancy. This could be attributed to increased iron and folic acid requirements during the second and third trimesters, along with hemodilution effects (physiological anemia of pregnancy). Similar trends have been documented in previous studies,^[12] emphasizing the importance of early screening and timely supplementation.

Birth interval also showed a rising trend in anemia prevalence with longer intervals (≥3 years), although the association was not statistically significant. This finding contrasts with some studies that report shorter birth intervals as a risk factor due to inadequate replenishment of maternal iron

stores.^[13] The variation may be due to differences in socio-cultural practices, nutritional intake, and healthcare access.

The distribution of hemoglobin levels in this study revealed that most women had mild anemia (46.6%), followed by moderate (21.4%) and severe anemia (3.4%). This pattern is comparable to national data, where mild anemia constitutes the largest proportion among pregnant women.^[14] Although mild anemia may appear less severe, it still has important implications for maternal and fetal health if left untreated.

The association between anemia and adverse pregnancy outcomes was evident in this study. A higher proportion of complications such as low birth weight, abortions, stillbirths, preeclampsia, prolonged labor, birth asphyxia, and premature delivery were observed among anemic women. These findings are in agreement with earlier studies which have established anemia as a significant risk factor for poor maternal and perinatal outcomes.^[15]

The observation that 100% of premature deliveries occurred among anemic women further underscores the severity of its impact.

Interestingly, no difference was observed in LSCS rates between anemic and non-anemic women. This suggests that cesarean delivery may be influenced more by obstetric indications rather than anemia status alone.^[16]

Overall, the findings of this study highlight the persistent burden of anemia and its association with adverse pregnancy outcomes. Strengthening antenatal care services, ensuring early diagnosis, promoting iron and folic acid supplementation, and improving nutritional awareness are essential to reduce the burden of anemia among pregnant women.

CONCLUSION

The present study reveals a high prevalence of anemia (71.4%) among pregnant women, highlighting its continued significance as a major public health problem. Although socio-demographic factors such as age, gestational age, and birth interval showed variations in anemia prevalence, none demonstrated a statistically significant association, indicating that anemia is widely prevalent across all groups.

Most participants had mild to moderate anemia, suggesting a substantial burden that may often go unnoticed yet carries important clinical implications. The study also demonstrates a clear association between anemia and adverse pregnancy outcomes, including low birth weight, abortions, stillbirths, preeclampsia, prolonged labor, birth asphyxia, and premature delivery.

These findings emphasize the need for early detection and effective management of anemia during pregnancy. Strengthening antenatal care services, ensuring universal iron and folic acid

supplementation, improving maternal nutrition, and increasing awareness are essential strategies to reduce the burden of anemia and improve maternal and fetal outcomes.

Further large-scale and longitudinal studies are recommended to better understand causal relationships and evaluate the effectiveness of intervention programs.

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