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Maternal Anaemia and Perinatal Outcome – A Study in Tertiary Care Hospital

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Abstract **Original Research Article**

***Background*:** Maternal anaemia, primarily caused by iron deficiency, remains a significant public health issue in low- and middle-income countries like Bangladesh. It poses serious risks to both maternal health and perinatal outcomes, including increased morbidity and mortality. ***Objective*:** This study aimed to determine the prevalence and severity of maternal anaemia among term pregnant women and its association with adverse perinatal outcomes. ***Methods*:** A hospital-based observational study was conducted over six months (May–October 2022) in the Departments of Obstetrics & Gynaecology and Paediatrics at Sylhet MAG Osmani Medical College Hospital, Bangladesh. A total of 100 term pregnant women diagnosed with anaemia were included based on strict inclusion and exclusion criteria. Data were collected through clinical assessments, laboratory investigations, and follow-up of newborns for 7 days post-delivery. Statistical analysis was performed using SPSS version 25, with significance set at $p<0.05$. ***Results*:** Most participants (55%) were aged 21–25 years, and mild anaemia was the most prevalent (62%), followed by moderate (24%) and severe anaemia (14%). Adverse perinatal outcomes such as low birth weight (64.5%), intrauterine growth restriction (64.7%), and perinatal asphyxia (50%) were significantly more common in anaemic mothers. Severe anaemia was strongly associated with stillbirth (66.7%), intrauterine fetal death (75%), and early neonatal death (66.7%). A statistically significant relationship was observed between anaemia severity and fetal complications ($p<0.05$). ***Conclusion*:** Maternal anaemia, especially in its moderate to severe forms, is significantly associated with poor perinatal outcomes. These findings highlight the need for early screening, effective antenatal care, and timely intervention to reduce maternal anaemia and improve neonatal health outcomes.

Keywords: Maternal Anaemia, Perinatal Outcome, Low Birth Weight, Intrauterine Growth Restriction, Stillbirth, Neonatal Mortality, Bangladesh, Pregnancy Complications.

INTRODUCTION

Maternal anaemia, defined by a reduction in the oxygen-carrying capacity of blood due to low haemoglobin levels during pregnancy, remains a major public health concern worldwide, particularly in low- and middle-income countries. The World Health Organization (WHO) estimates that approximately 40% of pregnant women globally are anaemic, with iron deficiency being the most common cause. The condition not only compromises maternal health but also has significant implications for fetal development and perinatal outcomes. Anaemia during pregnancy is often associated with increased maternal morbidity and mortality, making its early detection and management critical for maternal and child health [1-4].

During pregnancy, the demand for iron and other micronutrients increases significantly to support both maternal physiological changes and fetal development. If these nutritional needs are not met, the mother is at risk of developing anaemia. The condition can range from mild to severe and is often exacerbated by underlying factors such as malnutrition, parasitic infections, chronic diseases, and closely spaced pregnancies. As a result, maternal anaemia is not merely a physiological condition but is deeply influenced by socioeconomic, dietary, and healthcare access-related factors [5, 6].

Perinatal outcomes—defined as events occurring from the 28th week of gestation through the first week of life—are closely linked to maternal health.

Anaemia during pregnancy has been associated with adverse perinatal outcomes such as preterm birth, low birth weight, intrauterine growth restriction, and increased perinatal mortality. Severe maternal anaemia can impair oxygen delivery to the fetus, potentially leading to hypoxia and long-term developmental issues [7]. The association between the degree of anaemia and the severity of these outcomes underscores the importance of proactive antenatal care.

Several studies have shown that maternal haemoglobin levels in the second and third trimesters are particularly predictive of birth outcomes [8-10]. Women with severe anaemia are more likely to experience complications during labor and delivery, including postpartum hemorrhage and infections, which further increase the risk to the newborn. These findings emphasize the need for comprehensive antenatal screening and targeted interventions, such as iron and folic acid supplementation, dietary counseling, and the treatment of underlying infections.

Objective

This study aims to explore the prevalence of maternal anaemia in Bangladesh and its association with perinatal outcomes, with a focus on identifying risk factors, evaluating current interventions, and recommending future strategies.

METHODOLOGY

Study Design

This study was designed as an observational study aimed at assessing the impact of maternal anaemia on perinatal outcomes.

Place of Study

The study was conducted in the Department of Obstetrics & Gynaecology and the Department of Paediatrics at Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh.

Period of Study

The data collection and research were carried out over a period of six months, from May 2022 to October 2022.

Study Population

100 target population consisted of all term pregnant women who were admitted for delivery to the Department of Obstetrics & Gynaecology at Sylhet MAG Osmani Medical College Hospital during the study period. Participants who fulfilled the specified inclusion and exclusion criteria were enrolled as the study population.

Sample Size

Using this formula, the calculated sample size was 272. However, due to time constraints, data was collected from 100 participants.

Sampling Technique

The sampling technique used was purposive consecutive sampling, where participants were enrolled based on availability and fulfillment of criteria during the study period.

Inclusion Criteria

The inclusion criteria included pregnant women at term who were diagnosed with anaemia and admitted for delivery, with singleton pregnancies.

Exclusion Criteria

Participants were excluded if they had associated obstetrical complications such as preeclampsia, eclampsia, multiple gestations, history of threatened abortion, antepartum haemorrhage, prolonged or obstructed labour, or premature rupture of membranes. Patients with medical conditions such as thyroid disorders, diabetes mellitus, tuberculosis, renal or cardiac diseases, or those who tested reactive for HIV, HBsAg, or HCV were also excluded.

Procedure of Data Collection

Following ethical clearance from the Ethical Review Committee of Sylhet MAG Osmani Medical College, the data collection began. Pregnant women with anaemia who met the inclusion criteria and were admitted for delivery during the study period were enrolled. After obtaining informed written consent, a detailed history was taken and a thorough clinical examination was conducted. Initial clinical suspicion of anaemia was confirmed through laboratory investigations including complete blood count, blood grouping and Rh typing, RBS, serum TSH, urine R/M/E & C/S, HBsAg, Anti-HCV, Anti-HIV, serum creatinine, and obstetric ultrasound. Patients were managed according to the hospital's obstetric protocol. Perinatal outcomes were evaluated through assessments like ultrasonographic confirmation of IUFD, birth weight measurement using beam balance, and identification of growth restriction using growth charts. APGAR scores were recorded at 1 and 5 minutes to assess perinatal asphyxia. Newborns received appropriate postnatal care, with sick babies admitted to the Paediatrics Department and healthy babies kept under observation in the postnatal ward. Each newborn was observed for 7 days, with follow-up assessments conducted within 24 hours and again within 48–72 hours to monitor for alertness, feeding, elimination, and danger signs. For discharged cases, follow-up was done on the 7th day either in person or via phone call.

Procedure of Data Analysis and Interpretation

Collected data were processed and analyzed using SPSS (Statistical Package for Social Sciences) software, version 25. Quantitative variables were expressed as means with standard deviations, while qualitative variables were summarized using frequencies and percentages. Statistical significance was determined

using Chi-square and t-tests, with a p-value of less than 0.05 considered significant.

Ethical Implications

Participation in the study was voluntary. Ethical approval was obtained from the Ethical Review Committee of Sylhet MAG Osmani Medical College. Informed consent was taken in Bangla after explaining the study to participants, and confidentiality was strictly maintained. Participants had the right to withdraw at any stage of the study.

RESULTS

In this study, the majority of anaemic pregnant women were between the ages of 21 to 25 years, accounting for 55% of the total population. Women aged 26 to 30 years made up 25%, while those under 20 years represented 14%. Only 6% of the participants were above 30 years of age. The mean age of the study population was 24.31 ± 3.93 years.

Table I: Age distribution of anaemic population (n=100)

Age(year)	Number	Percentage (%)	Mean±SD
<20	14	14.0	24.31 ± 3.93
21-25	55	55.0	
26-30	25	25.0	
>30	6	6.0	

Table II shows severity of anaemia among study population, maximum 62(62%) had mild anaemia, followed by 24(24%) had moderate anaemia and only 14(14%) had severe anaemia.

Table II: Degree / severity of anaemia among respondents (n = 100)

Severity of anaemia	Number (n)	Percentage (%)
Mild	62	62.0
Moderate	24	24.0
Severe	14	14.0

Table shows affected fetuses (low birth weight, intrauterine growth restriction, perinatal asphyxia, still birth, intrauterine fetal death, early neonatal death) were more common in severely anaemic mother. The difference was statistically significant between fetal outcome and maternal anaemia (P<0.05).

Table III: Association of fetal outcome and maternal anaemia (n=100).

Fetal outcome	Mild anaemia (n=62)		Moderate anaemia (n=24)		Severe anaemia (n=14)		P value
	No.	%	No.	%	No.	%	
Affected	33	53.2	19	79.2	14	100	0.021
Not affected	29	46.8	5	20.8	00	00	0.016

Table VI shows LBW (64.5%) and IUGR (64.7%) babies were found mostly in mildly anaemic women. Perinatal asphyxia (50%) were observed mostly in moderately anaemic women. Still birth (66.7%) and early neonatal deaths (66.7%) were found mostly in severely anaemic mother. IUFD (75%) were seen mostly in women having severe anaemia. The difference was statistically significant (P<0.05).

Table IV: Fetal complication and its relation to degree of anaemia (n=100)

Fetal complication	Number	Mild (n=62)		Moderate (24)		Severe (n=14)		P value
		No.	%	No.	%	No.	%	
LBW	31	20	64.5	8	25.8	3	9.7	0.001
IUGR	17	11	64.7	4	23.5	2	17.8	0.001
Perinatal asphyxia	8	2	25.0	4	50.0	2	25.0	0.03
Still birth	3	0	00	1	33.3	2	66.7	0.016
IUFD	4	0	00	1	25.0	3	75.0	0.001
Early neonatal death	3	0	00	1	33.3	2	66.7	0.016

DISCUSSION

In the present study, the majority of anaemic pregnant women were between 21 to 25 years of age, with a mean age of 24.31 ± 3.93 years. This age distribution aligns closely with findings from Pradhan *et al*., (2021), where the highest prevalence of anaemia was also observed among women in their early to mid-

twenties. Similar results were reported in studies conducted suggesting that younger reproductive-age women are more vulnerable to nutritional deficiencies and inadequate antenatal care, contributing to anaemia [7, 8]. However, unlike our study where women above 30 years constituted only 6%, some studies have reported a more evenly distributed age pattern, likely due to demographic and sociocultural differences in reproductive age.

With regard to the severity of anaemia, our findings revealed that mild anaemia was the most prevalent form (62%), followed by moderate (24%) and severe anaemia (14%). This is in concordance with studies where mild anaemia accounted for the majority of cases. However, our study observed a relatively higher percentage of severe anaemia compared to some urban-based studies, possibly due to differences in healthcare access, dietary habits, and educational status in the study population [9-11].

The association between maternal anaemia and adverse perinatal outcomes was strongly evident in our research. Severely anaemic mothers showed a 100% rate of fetal complications, including low birth weight (LBW), intrauterine growth restriction (IUGR), perinatal asphyxia, stillbirth, intrauterine fetal death (IUFD), and early neonatal death. These findings are consistent with the study which reported that the risk of poor perinatal outcomes increases significantly with the severity of maternal anaemia [12]. Similar trends were also observed by studies emphasizing anaemia as a critical predictor of perinatal morbidity and mortality [13].

In our study, LBW and IUGR were surprisingly more common among mildly anaemic women (64.5% and 64.7%, respectively). While these complications are often associated with more severe anaemia, the higher number in the mild group could be attributed to the overall higher frequency of mild anaemia in the study population. Nevertheless, complications like perinatal asphyxia, stillbirth, and IUFD were significantly more prevalent in the moderate and severe anaemia groups, highlighting the dose-response relationship between anaemia severity and adverse fetal outcomes, as supported by findings from other studies [14].

The statistical significance observed in our analysis ($P<0.05$ for most parameters) reinforces the strong link between maternal anaemia and fetal complications. While other studies have shown similar associations, the variation in specific outcomes might be influenced by differences in sample size, healthcare settings, and population demographics. For instance, urban-based tertiary care hospitals may detect and manage anaemia earlier, potentially mitigating severe complications.

CONCLUSION

Based on our study, maternal anaemia—particularly in its moderate to severe forms—was significantly associated with adverse perinatal outcomes such as low birth weight, intrauterine growth restriction, perinatal asphyxia, stillbirth, intrauterine fetal death, and early neonatal death. Although mild anaemia was the most common, severe anaemia posed the highest risk for complications. The findings emphasize the critical need for early detection, effective antenatal care, and timely intervention to prevent and manage anaemia during pregnancy, ultimately improving both maternal and neonatal health outcomes.

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