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Original Research Article

Frequency of Anemia in Patients With Preterm Labour at Tertiary Care Hospital Quetta

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Abstract: *Preterm labour is a major cause of neonatal morbidity and mortality, particularly in low-resource settings. Anemia, especially iron deficiency anemia, has been suggested as a modifiable risk factor contributing to preterm birth.* ***Objective:*** *To assess the frequency of anemia and its association with demographic and clinical variables in pregnant women with preterm labour.* ***Methods:*** *This descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynecology, Sandeman Provincial Hospital, Quetta, over a period of six months following ethical approval. A total of 146 pregnant women aged 18–40 years with preterm labour were enrolled using non-probability consecutive sampling. Data were collected using a structured proforma, including demographics, clinical findings, and hemoglobin levels. Anemia was defined as hemoglobin <11 g/dL.* ***Results:*** *Out of 146 participants, 90 women (61.6%) were found to be anemic. Severe anemia was noted in 6 cases (4.1%). Anemia was significantly more common in women aged <25 years (p = 0.03), those from rural areas (p = 0.04), those with lower socioeconomic status (p = 0.01), and those with limited education (p = 0.02). No significant association was found with parity (p = 0.16) or BMI (p = 0.09).* ***Conclusion:*** *It is concluded that anemia is a common finding in patients presenting with preterm labour, especially among socially and economically disadvantaged groups. Early detection and management of anemia during pregnancy can play a vital role in reducing the risk of preterm birth. Strengthening antenatal care services with a focus on nutritional support and community education is essential.*

Keywords: Anemia, Preterm labour, Pregnancy, Hemoglobin, Maternal health, Socioeconomic factors, Risk factors

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Introduction

Preterm labour, defined as the onset of labour before 37 completed weeks of gestation, remains a leading cause of neonatal morbidity and mortality worldwide. It contributes significantly to complications such as respiratory distress syndrome, intraventricular hemorrhage, and long-term neurodevelopmental impairment (1). Despite advancements in obstetric care, the global burden of preterm birth continues to rise, particularly in low- and middle-income countries where access to quality antenatal care is limited (2). Anemia during pregnancy across the world involves around 32 million individuals, approximately 38% of the world population (3). According to recent research, 2/3rd of the pregnant population is affected by anemia. During pregnancy, anemia in mothers could lead to detrimental effects on the newborn (4). Anemia is not the only risk to mothers but low hemoglobin levels may lead to unfortunate consequences including low Apgar score, compromised birth weight, small for gestational age (SGA) babies, preterm labor, intrauterine growth retardation or intrauterine death (5). Preterm labor remains one of the greatest causes of perinatal mortality and morbidity worldwide. The association between maternal anemia and preterm birth remains equivocal, with some, but not other, studies documenting increased risk (6). The findings from Chinese studies on the relationship between anemia and preterm birth are also inconsistent (7). Studies have suggested that the association between anemia and preterm birth may vary based on the timing of anemia during gestation. Despite the considerable etiological heterogeneity in preterm birth clinical subtypes, namely, preterm premature rupture of membranes (PROM), spontaneous preterm labor, and medically indicated preterm birth, very few studies have attempted to evaluate if associations between anemia and preterm birth are largely driven by associations with one particular subtype (8). If maternal anemia is indeed associated with one preterm birth subtype, and not others, the association with preterm birth as an entity may be attenuated. Preterm birth may occur through multiple pathways, with maternal infection, hypoxia, and oxidative stress being the three major postulated biological mechanisms (9). A study conducted by Aasia Fozia et al demonstrated that the frequency of anemia in patients with preterm labor was 41.5% (8).

Anemia during pregnancy is a public health issue all over the world. Preterm labor poses significant risks to maternal and neonatal health, and anemia is a common nutritional deficiency with potential adverse outcomes for both mother and baby. Investigating the prevalence of anemia in women experiencing preterm labor provides crucial insights into the co-occurrence of these conditions, helping to identify potential exacerbating factors and inform targeted interventions (10). Understanding the frequency of anemia in this specific population is vital for guiding healthcare professionals in optimizing maternal care, enhancing pregnancy outcomes, and ultimately improving outcomes for both mothers and their preterm infants. This study addresses a pertinent research gap and contributes valuable knowledge to enhance clinical management and public health strategies related to preterm births and anemia in pregnancy.

The objective of the study was to determine the frequency of anemia in patients with preterm labor at the tertiary care hospital Quetta.

Methodology

This was a descriptive cross-sectional study conducted in the Department of Obstetrics & Gynecology, Sandeman Provincial Hospital, Quetta, Balochistan from December 2024 till May 2025. The sample size was calculated using the WHO sample size calculator. A confidence level of 95% was used, with a margin of error (d) set at 8% and an estimated anemia frequency of 41.5% based on a prior parent study. Applying these values into the formula $n=Z^2 \cdot P(1-P)/d^2$, the calculated sample size came out to be 146 patients. This number was deemed sufficient to detect meaningful patterns within the study population. The sampling technique used was non-probability consecutive sampling.

Pregnant women aged 18–40 years presenting with preterm labour (gestational age <37 weeks). Any gravida.

History of cervical insufficiency or vaginal infections in the last one year. Recent history of urinary tract infection (UTI). Known blood disorders in pregnancy (e.g., idiopathic thrombocytopenic purpura or von Willebrand disease).

Following ethical approval, all eligible women admitted with preterm labour to Sandeman Provincial Hospital were invited to participate. Written informed consent was obtained in both English and Urdu (Annexure A). A structured proforma was used to collect demographic and clinical information, including age, weight, height, body mass index (BMI), parity, place of residence, socioeconomic status, and gestational age (determined by last menstrual period). Clinical examination was performed to record vital signs, and symptoms such as pallor, palpitations, and vaginal bleeding. Labour-related data such as cervical dilation, uterine contractions, and premature rupture of membranes were noted. Venous blood samples (3 mL) were drawn for hemoglobin estimation using standard laboratory procedures. Patients requiring blood transfusion due to low hemoglobin levels were managed accordingly. All collected data were recorded on a pre-designed proforma. Strict adherence to exclusion criteria was ensured.

Data entry and analysis were performed using SPSS for Windows, version 26.0. For continuous variables such as age, gestational age, height, weight, gravida, and hemoglobin levels, means and standard deviations were calculated. The Shapiro-Wilk test was applied to check the normality of data distributions. Categorical variables, including place of residence (urban/rural), BMI category (normal/overweight/obese), parity (nulliparous/multiparous), educational level, socioeconomic status, and presence or absence of anemia were expressed as frequencies and percentages. Stratification was done for age, gestational age, BMI, educational status, and socioeconomic status to assess their effects on the outcome variable. After stratification, chi-square tests were applied to determine statistical significance. If any cell had a frequency ≤5, Fisher's exact test was used instead. A p-value ≤0.05 was considered statistically significant throughout the analysis.

Results

Data were collected from 146 patients. The mean age was 27.8 ± 5.1 years, and the mean gestational age at presentation was 33.4 ± 2.1 weeks. Among them, 39.7% were primigravida and 60.3% were multigravida. The average weight and height were 62.3 ± 9.7 kg and 158.2 ± 6.5 cm, respectively. Based on BMI, 32.9% were in the normal range, 44.5% were overweight, and 22.6% were obese. (Table 1)

Table 1: Demographic and Clinical Characteristics (n = 146)

Variable	Value
Total Patients	146
Mean Age (years)	27.8 ± 5.1
Mean Gestational Age (weeks)	33.4 ± 2.1
Primigravida	58 (39.7%)
Multigravida	88 (60.3%)
Mean Weight (kg)	62.3 ± 9.7
Mean Height (cm)	158.2 ± 6.5
BMI Category – Normal	48 (32.9%)
BMI Category – Overweight	65 (44.5%)
BMI Category – Obese	33 (22.6%)

Among the 146 patients, 64.4% resided in urban areas while 35.6% were from rural backgrounds. Regarding education, 25.3% were illiterate, 30.1% had primary education, 27.4% completed secondary education, and 17.2% had intermediate or higher qualifications. Socioeconomically, 40.4% of women belonged to the lower class, 48.6% to the middle class, and only 11% to the upper class. Anemia was observed in 61.6% of the participants, with 4.1% suffering from severe anemia, while 38.4% were non-anemic. (Table 2)

Table 2: Distribution by Residence, Education, and Socioeconomic Status

Variable	Number of Patients	(%)
Urban Residence	94	64.4%
Rural Residence	52	35.6%
Illiterate	37	25.3%
Primary Education	44	30.1%
Secondary Education	40	27.4%
Intermediate or Higher	25	17.2%
Lower Socioeconomic Status	59	40.4%
Middle Socioeconomic Status	71	48.6%
Upper Socioeconomic Status	16	11.0%
Anemia Status		
Anemic	90	61.6%
Non-Anemic	56	38.4%
Severe Anemia Cases	6	4.1%

Statistical analysis showed a significant association between anemia and several demographic factors. Women under 25 years of age ($\chi^2 = 4.78$, $p = 0.03$), those from rural areas ($\chi^2 = 4.14$, $p = 0.04$), with low socioeconomic status ($\chi^2 = 6.58$, $p = 0.01$), and lower education levels ($\chi^2 = 5.32$, $p = 0.02$) were significantly more likely to be anemic. No statistically significant association was found between anemia and parity ($\chi^2 = 1.98$, $p = 0.16$) or BMI ($\chi^2 = 2.88$, $p = 0.09$). (Table 3, Figure 1)

Table 3: Association of Anemia with Demographic Variables

Factor	Test Statistic	p-value
Age < 25 years	$\chi^2 = 4.78$	0.03
Rural Residence	$\chi^2 = 4.14$	0.04
Low Socioeconomic Status	$\chi^2 = 6.58$	0.01
Low Education	$\chi^2 = 5.32$	0.02
Parity	$\chi^2 = 1.98$	0.16
Body Mass Index (BMI)	$\chi^2 = 2.88$	0.09

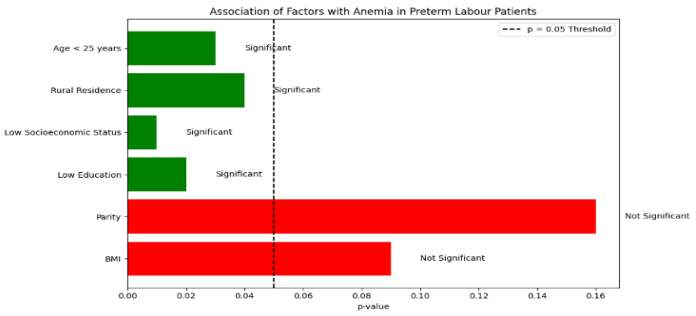

Figure 1: Association of Anemia in preterm labour

Discussion

This study aimed to assess the frequency of anemia among women presenting with preterm labour at a tertiary care hospital in Balochistan. The findings revealed that 61.6% of the women were anemic at the time of presentation, highlighting anemia as a highly prevalent and significant maternal health issue in this obstetric subgroup. These results are consistent with previous studies conducted in similar low-resource settings, where maternal anemia has been repeatedly linked with adverse pregnancy outcomes, including preterm delivery, low birth weight, and perinatal mortality (11). The high frequency of anemia observed in this study could be attributed to multiple interrelated factors such as poor nutritional intake, lack of prenatal care, and delayed identification of hematologic deficiencies. This is particularly relevant in regions like Balochistan, where health infrastructure is challenged by socioeconomic disparities, limited access to supplements, and cultural barriers affecting

healthcare-seeking behavior. Moreover, the average gestational age at presentation was 33.4 weeks, underscoring the clinical importance of screening for anemia early in antenatal care to allow timely interventions (12).

Stratified analysis showed that anemia was more prevalent in women under the age of 25, those from rural areas, and those belonging to low socioeconomic backgrounds. These findings are in line with global literature, which identifies young maternal age and poverty as key determinants of poor maternal nutrition and health (13). Rural residence likely reflects reduced access to iron-rich foods and antenatal services. The significant association between anemia and lower education levels further emphasizes the role of maternal awareness and literacy in pregnancy outcomes. Women with minimal education may be less informed about the importance of iron supplementation, dietary practices, or signs of anemia, making them particularly vulnerable (14). Although parity and BMI were not significantly associated with anemia in this study, the majority of patients were either overweight or obese, which might mask clinical signs of anemia and delay diagnosis. Furthermore, it is noteworthy that a small proportion of patients (4.1%) had severe anemia, a condition associated with increased risk of maternal morbidity, need for transfusion, and maternal near-miss events (15). This highlights the need for strengthened screening protocols and proactive management during antenatal visits. These findings are consistent with studies conducted in other parts of Pakistan and South Asia. For example, studies in Punjab and Sindh report anemia prevalence in preterm labour patients ranging from 40% to 65%, depending on setting and diagnostic thresholds (16). This supports the view that anemia is not only common but also a modifiable risk factor that should be integrated into preterm labour prevention strategies (17). The study's strength lies in its strict inclusion/exclusion criteria, single-center focused design, and structured data collection using standardized tools. However, it has some limitations. Being a cross-sectional study, it cannot establish causal relationships. Laboratory parameters beyond hemoglobin, such as ferritin or serum iron, were not assessed due to resource constraints, which could have allowed differentiation between iron deficiency and other types of anemia. Additionally, patient-reported variables such as diet and adherence to supplements were not analyzed, which might have offered a broader perspective on contributing factors.

Conclusion

It is concluded that anemia is highly prevalent among women presenting with preterm labour, with more than half of the study population found to be anemic. This highlights anemia as a significant and potentially modifiable contributor to adverse obstetric outcomes in this setting. The frequency was notably higher among women of younger age, those residing in rural areas, and those from lower socioeconomic and educational backgrounds, indicating the influence of social determinants on maternal health. These findings emphasize the importance of early screening, nutritional counseling, and iron supplementation as routine components of antenatal care, especially in resource-limited regions. Strengthening community awareness and improving access to maternal healthcare services could play a pivotal role in reducing both maternal anemia and the risk of preterm birth. Further longitudinal studies are recommended to explore causal relationships and assess the impact of anemia correction on gestational outcomes.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-24)

Consent for publication

Approved

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Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

HY (Resident), ZK (Resident), RA (Internship)
Review of Literature, Data entry, Data analysis, and drafting article.
Manuscript drafting, Study Design,
IR (Resident), HAH (House Officer), RNK (Resident)
Study Design, manuscript review, critical input.
Conception of Study, Development of Research Methodology Design

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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