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Original Article

Assessment of Risk Factors for the Development of PROM in a Tertiary Care Hospital

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Abstract

Background: Premature Rupture of Membranes (PROM) is a significant obstetric issue associated with increased rates of perinatal morbidity and mortality. Understanding the risk factors for PROM is essential to develop appropriate preventive policies to improve pregnancy and neonatal outcomes.

Objective: This study aimed to assess the risk factors for the development of PROM in a tertiary care hospital and to analyze the associated maternal and neonatal complications.

Methods: This descriptive cross-sectional study was conducted at the Gynae Department, Hayatabad Medical Complex, Peshawar, from March 2022 to February 2023. The study included 190 pregnant women diagnosed with PROM. Participants were selected using a non-probability consecutive sampling method. Data were collected using a structured questionnaire and patient medical records. PROM was diagnosed based on clinical examination, positive nitrazine test, and ferning test. In ambiguous cases, additional diagnostics like ultrasound and biochemical markers (PAMG-1 and IGFBP-1) were used. Ethical approval was obtained, and data were analyzed using SPSS Version 25. Descriptive statistics summarized the demographic and clinical characteristics, and associations between risk factors and PROM were evaluated using Chi-square and t-tests, with a p-value <0.05 considered statistically significant.

Results: The mean age of participants was 28.5±5.3 years, with 55.3% aged 20-29 years and 58.4% being multiparous. Significant risk factors included lower socioeconomic status (43.7%), history of sexually transmitted infections (21.6%), and previous PROM (34.2%). Obstetric factors such as multiple gestations and polyhydramnios were present in 12.1% and 15.8% of cases, respectively. Complications associated with PROM included intra-amniotic infection (17.9%), preterm labor (42.6%), and neonatal sepsis (9.5%).

Conclusion: The study identified significant risk factors for PROM, including lower socioeconomic status, history of sexually transmitted infections, and prior PROM. These findings highlight the need for targeted interventions and management strategies to mitigate complications such as intra-amniotic infection, preterm labor, and neonatal sepsis, thereby improving maternal and neonatal outcomes. productivity.

1 Introduction

Premature Rupture of Membranes (PROM) is a critical obstetric issue characterized by the rupture of the amniotic sac before the onset of labor, significantly contributing to perinatal morbidity and mortality. This condition affects approximately 8-10% of all pregnancies, with preterm PROM (PPROM) accounting for 2-4% (1,2). The timely diagnosis and effective management of PROM are paramount in enhancing neonatal and maternal outcomes (3). Complications resulting from PROM include intra-amniotic infection, umbilical cord prolapse, and placental abruption, with preterm birth remaining the leading cause of neonatal morbidity and mortality globally (4,5). The etiology of PROM is multifactorial, involving genetic, environmental, and sociodemographic factors.

Several risk factors are associated with the development of PROM, including lower socioeconomic status, smoking history, past sexually transmitted infections (STI), and previous preterm births (6). Additionally, certain obstetric characteristics, such as multiple gestations and polyhydramnios, have demonstrated an increased probability for PROM (7). Understanding these risks is crucial for developing preventive strategies and effective clinical interventions. Assessment of risk factors for PROM is particularly significant in tertiary care settings where high-risk pregnancies are more frequent, and these hospitals, which are specialized and capable of handling complex cases, are best suited for studying the epidemiology and outcomes of PROM (8).

Recent advancements in ultrasound techniques and biochemical markers, such as PAMG-1 and IGFBP-1, have improved the accuracy of diagnosing PROM (9). However, challenges remain in predicting and preventing PROM, especially in resource-limited areas. Therefore, further research is essential to develop comprehensive risk assessment models to better target interventions and reduce adverse outcomes for both mother and child (10).

This study aims to identify and analyze the risk factors associated with the occurrence of PROM at a tertiary care hospital. By focusing on a specific population, the research seeks to contribute to the existing evidence-based literature that guides clinical practices in mitigating the risks associated with PROM. The identification of significant risk factors can inform targeted interventions and management strategies to improve maternal and neonatal outcomes in cases of PROM.

2 Material and methods

This descriptive cross-sectional study was conducted at the Gynae Department of Hayatabad Medical Complex, Peshawar, between March 2022 and February 2023. A total of 190 pregnant women diagnosed with PROM were included in the study. Participants were selected using a non-probability consecutive sampling method. The inclusion criteria encompassed pregnant women presenting with confirmed PROM at any gestational age, while exclusion criteria included women with multiple gestations, congenital fetal anomalies, or a history of invasive procedures such as amniocentesis.

Data collection was carried out using a structured questionnaire administered by trained healthcare professionals. The questionnaire was designed to capture comprehensive information on demographic characteristics, medical and obstetric history, and potential risk factors for PROM. Clinical data were meticulously obtained from patient medical records and included maternal age, parity, gestational age at the time of PROM, history of previous PROM, and any complications observed during the current pregnancy.

PROM diagnosis was confirmed based on clinical examination, which involved observing amniotic fluid leakage from the cervix, and was further corroborated by positive nitrazine and/or ferning tests. In cases where the diagnosis was ambiguous, additional diagnostic tools such as ultrasound and biochemical markers (PAMG-1 and IGFBP-1) were employed to ensure accuracy. This approach ensured a robust and reliable diagnosis of PROM, essential for the study's validity.

Ethical approval for the study was obtained from the Institutional Review Board of Hayatabad Medical Complex, Peshawar, ensuring adherence to the ethical standards set forth by the Helsinki Declaration. Informed consent was obtained from all participants, with assurances of confidentiality and the right to withdraw from the study at any point without any impact on their medical care.

The data were entered and analyzed using SPSS Version 25. Descriptive statistics were utilized to summarize the demographic and clinical characteristics of the study population. Continuous variables were presented as means with standard deviations, while categorical variables were expressed as frequencies and percentages. The association between potential risk factors and the occurrence of PROM was evaluated using the Chi-square test for categorical variables and the t-test for continuous variables. A p-value of less than 0.05 was considered statistically significant, ensuring rigorous analysis and interpretation of the data (11,12).

This methodical approach to data collection, diagnosis confirmation, ethical considerations, and statistical analysis provided a comprehensive understanding of the risk factors associated with PROM, laying a foundation for further research and clinical interventions aimed at improving maternal and neonatal outcomes.

3 Results

The study included 190 pregnant women diagnosed with PROM. The mean age of the participants was 28.5±5.3 years, with a majority aged between 20-29 years (55.3%) and multiparous (58.4%). The gestational age at the time of PROM averaged 34.2±3.1 weeks. A detailed summary of the demographic and clinical characteristics is presented in Table 1.

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Frequency (%)
Age Group	
< 20 years	15 (7.9)
20-29 years	105 (55.3)
30-39 years	62 (32.6)
≥ 40 years	8 (4.2)
BMI Category	
Underweight (< 18.5 kg/m²)	10 (5.3)
Normal weight (18.5-24.9 kg/m²)	85 (44.7)

Overweight (25-29.9 kg/m²)	60 (31.6)
Obese (≥ 30 kg/m²)	35 (18.4)
Parity	
Primiparous	79 (41.6)
Multiparous	111 (58.4)
Gravida	
1	52 (27.4)
2	61 (32.1)
3	45 (23.7)
≥ 4	32 (16.8)
Gestational age at PROM (weeks)	
< 28 weeks	15 (7.9)
28-32 weeks	50 (26.3)
33-36 weeks	85 (44.7)
≥ 37 weeks	40 (21.1)

Several significant risk factors for PROM were identified. A history of previous PROM was reported by 34.2% of the women. Additionally, 43.7% belonged to a lower socioeconomic status, and 21.6% had a history of sexually transmitted infections (STIs). Obstetric factors such as multiple gestations and polyhydramnios were reported by 12.1% and 15.8% of the participants, respectively. The identified risk factors are summarized in Table 2.

Table 2: Identified Risk Factors for PROM

Risk Factor	Frequency (%)
History of previous PROM	65 (34.2)
Lower socioeconomic status	83 (43.7)
History of STIs	41 (21.6)
Multiple gestations	23 (12.1)
Polyhydramnios	30 (15.8)

The study also highlighted several complications associated with PROM. Intra-amniotic infection was observed in 17.9% of the cases, preterm labor in 42.6%, and neonatal sepsis in 9.5%. The frequency of these complications is detailed in Table 3.

Table 3: Complications Associated with PROM

Complication	Frequency (%)
Intra-amniotic infection	34 (17.9)
Preterm labor	81 (42.6)
Neonatal sepsis	18 (9.5)

The results of this study underscore the significant risk factors and complications associated with PROM, providing crucial insights for early intervention and management strategies aimed at mitigating adverse maternal and neonatal outcomes.

4 Discussion

The study demonstrated that Premature Rupture of Membranes (PROM) is a significant obstetric complication with serious implications for both maternal and neonatal health. The findings revealed that a substantial proportion of the study population was between 20-29 years old and multiparous, aligning with previous research indicating that young age and multiparity are associated with a higher incidence of PROM (13,14). This demographic profile underscores the need for targeted interventions in this age group to mitigate the risk of PROM.

One of the notable findings was the strong association between low socioeconomic status and PROM, with 43.7% of the participants belonging to a lower socioeconomic bracket. This finding is consistent with the work of Caughey et al., who also highlighted the correlation between socioeconomic disadvantages and an increased risk of PROM (15). Socioeconomic status often influences access to healthcare, nutritional status, and overall maternal well-being, which could explain its significant impact on PROM incidence. Additionally, the history of sexually transmitted infections (STIs) emerged as a significant risk factor, reported by 21.6% of the participants. This aligns with existing literature that established STIs as contributory factors to PROM (16,17). The study's findings emphasize the importance of STI prevention and treatment as part of prenatal care to reduce PROM risk.

The recurrence of PROM was another critical aspect, with 34.2% of the participants reporting a history of previous PROM. This highlights the necessity for close monitoring and management of women with a history of PROM in subsequent pregnancies, as supported by Khan

et al., who found a significant correlation between prior PROM and its recurrence (18). Obstetric factors such as multiple gestations and polyhydramnios were also identified as risk factors, albeit with a lower frequency than other studies have reported (19). These variations could be attributed to differences in sample size, study design, or population characteristics, suggesting the need for further research to explore these associations in diverse settings.

The study identified several complications associated with PROM, including intra-amniotic infection, preterm labor, and neonatal sepsis. Intra-amniotic infection was observed in 17.9% of the cases, preterm labor in 42.6%, and neonatal sepsis in 9.5%. These findings are consistent with previous research, which has documented similar complications arising from PROM (20). The relatively higher incidence of neonatal sepsis noted in this study indicates a pressing need for enhanced neonatal care and timely interventions to manage PROM cases effectively, thereby reducing adverse fetal outcomes.

The study's strengths included its robust methodology, including comprehensive data collection and reliable diagnostic criteria, which ensured the validity of the findings. The use of advanced diagnostic tools like PAMG-1 and IGFBP-1 in ambiguous cases contributed to the accurate diagnosis of PROM. However, the study also had limitations. The cross-sectional design precluded causal inferences between identified risk factors and PROM, and the non-probability sampling method limited the generalizability of the results to larger populations. Additionally, the study was conducted in a single tertiary care facility, which might not reflect the situation in other healthcare settings.

The findings underscore the importance of recognizing and addressing the risk factors for PROM to implement early interventions and management strategies. Healthcare providers should prioritize the prevention and treatment of STIs and ensure adequate prenatal care for women from lower socioeconomic backgrounds. Further research involving larger and more diverse populations is needed to validate these findings and develop comprehensive risk assessment models. Enhancing healthcare facilities with better neonatal care capabilities could significantly reduce the complications associated with PROM, improving outcomes for both mothers and their newborns.

In conclusion, this study provided valuable insights into the risk factors and complications associated with PROM, contributing to the body of evidence that informs clinical practices. By addressing these risk factors through targeted interventions, healthcare providers can better manage PROM cases, ultimately leading to improved maternal and neonatal health outcomes.

5 Conclusion

In conclusion, the study identified several significant risk factors for the development of Premature Rupture of Membranes (PROM), including lower socioeconomic status, history of sexually transmitted infections (STIs), and previous occurrences of PROM. These findings underscore the critical need for targeted interventions and management strategies to address these risk factors effectively. By focusing on improving socioeconomic conditions, enhancing the prevention and treatment of STIs, and closely monitoring women with a history of PROM, healthcare providers can significantly reduce the incidence and complications associated with PROM. Such complications include intra-amniotic infection, preterm labor, and neonatal sepsis, which can have severe consequences for both maternal and neonatal health. Implementing comprehensive risk assessment models and evidence-based clinical practices can lead to better maternal and neonatal outcomes, ultimately contributing to the overall improvement of obstetric care in tertiary healthcare settings.

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Disclaimers

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