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Demographic Profile and Outcomes of Pregnant Women with PPROM: A Comparative Study

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Abstract

Background: *Preterm premature rupture of membranes (PPROM) is a significant obstetric complication that is associated with adverse maternal and neonatal outcomes. Identifying risk factors and predictive markers is essential to improve clinical management. This study aimed to evaluate the demographic characteristics and pregnancy outcomes of women with PPROM.*

Methods: *This prospective cohort study was conducted at Department of Fetomaternal Medicine and Obstetrics and Gynaecology of Bangabandhu Sheikh Mujib Medical University (BSMMU) from September 2022 to August 2023. A total of 73 pregnant women at 11–13 weeks of gestation were enrolled in the study. The platelets counts (PC) and mean platelet volume (MPV) were measured and participants were monitored for PPROM development till delivery. Statistical analysis was performed using SPSS (version 22), with a p-value <0.05 considered significant.*

Results: *Among participants, nine (12.3%) developed PPROM. Mean maternal age was similar between groups (26.96 ± 5.12 vs. 27.34 ± 5.14 years, p=0.098), but underweight status (BMI <18.5) was significantly higher in the PPROM group (22.22% vs. 0.0%, p=0.001). A strong association was observed between altered platelet indices and PPROM, with 44.6% of PPROM cases in the exposed group compared to 4.7% in the non-PPROM group (p=0.003). Early preterm PPROM (≤30 weeks) accounted for 44.4% of cases, while 44.4% occurred at 32–36 weeks.*

Conclusion: *This study highlights BMI and platelet indices as potential predictive markers of PPROM. Early identification and monitoring of high-risk pregnancies may aid in timely intervention to reduce adverse outcomes.*

Keywords: *PPROM, platelet indices, maternal BMI, pregnancy outcomes*

1. INTRODUCTION

The premature rupture of fetal membranes before 37 weeks gestational period defines PPROM which continues to generate substantial perinatal complications worldwide [1]. About 2–3 percent of pregnancies develop PPROM resulting in preterm birth occurrences in one-third of all cases [2]. Various combined biochemical and mechanical factors contribute to membrane

weakening that eventually leads to rupture in cases of PPROM [3]. The fetal membrane extracellular matrix serves as a critical component for sustaining structural stability and any degradation of this matrix due to inflammatory processes or infections or physical forces is regarded as a main cause of PPROM [4].

Several risk factors including maternal infections alongside previous preterm birth and cigarette smoking and nutritional deficiencies have been identified as PPROM initiators [5]. The condition of intra-amniotic inflammation represents a strong association with PPROM while producing adverse effects that harm newborns [6]. Research shows that sterile and microbial-associated intra-amniotic inflammation cause fetal membrane weakness which results in membrane rupture [7]. Two blood markers known as mean platelet volume (MPV) and platelet-to-lymphocyte ratio have been studied to determine their predictive ability in cases of PPROM since they display signs of underlying inflammatory responses [8,9]. Currently the clinical assessment of these markers as predictive tools produces ambiguous results.

Extensive research about PPROM and its effects concludes that significant holes exist in the understanding of how population characteristics affect maternity and newborn healthcare following premature rupture of membranes. Research focusing on how maternal age together with parity and socioeconomic status affect PPROM risk exists but researchers have not conducted extensive comparative assessments of demographic profiles and their associations with clinical results [10]. Advanced clinical care necessitates localized research concerning health management procedures across healthcare facilities because these discrepancies need guidance in medical decision processes [11].

The purpose of this research was to study the essential demographic elements alongside pregnancy results between patients with PPROM and patients without PPROM in order to better understand risk preparation and patient wellness. The research investigates demographic indicators such as maternal age and number of pregnancies along with rupture timing during pregnancy to determine essential factors that will guide intervention planning and prenatal care enhancement. Knowledge regarding PPROM's demographic factors and clinical effects permits improved maternal and baby healthcare through optimized management strategies for decreasing adverse outcomes.

2. Objective

The objective of this study was to evaluate the demographic characteristics and pregnancy outcomes of women with preterm premature rupture of membranes (PPROM).

3. Methodology & Materials

This prospective cohort study was conducted at Department of Fetomaternal Medicine and Obstetrics and Gynaecology of Bangabandhu Sheikh Mujib Medical University (BSMMU) from September 2022 to August 2023. A total of 73 pregnant women at 11-13 weeks of gestation attending the outpatient department of Fetomaternal Medicine and Obstetrics and Gynecology who fulfill the inclusion criteria are included in this study.

Inclusion Criteria

- Pregnant women with gestational age 11-13 weeks.
- Pregnant women without any diagnosed Platelet disorder.

Exclusion Criteria

- Fetal anomalies.
- Women with chronic Hypertension, cardiac, renal, liver disease, epilepsy.
- History of PPROM, Cervical incompetence.
- Diagnose cases of uterine anomalies, e.g., Bicornuate uterus.
- Threatened abortion.
- Known case of Platelet disorders.

Data Collection Technique

Subjects were selected purposively according to the availability of the patients. Detailed Obstructive and medical history and clinical information were obtained by preformed structured questionnaire.

Study Procedure

This prospective cohort study was conducted in the Outpatient Department of Fetomaternal Medicine and Obstetrics and Gynaecology of BSMMU. After approval from Institutional Review Board, pregnant women with gestation 11 – 13 weeks without known Platelet disorders were selected as study subjects from September 2022 to August 2023. The study's purpose and procedure were explained, and informed written consent was obtained. Information from interviews, observations, clinical examinations, and investigations was recorded in a pre-

designed data collection sheet. Subjects were followed up by regular ANC to delivery. A 3 ml blood sample was taken from the antecubital vein for Platelet Count (PC) and Mean Platelet Volume (MPV). Patients were monitored for PPROM until delivery. The range for PC was 150,000-450,000/cu mm and MPV was 7.2 -9.2 Fl. Normal PC and MPV were considered unexposed, while high PC and low MPV were ranked as exposed.

Ethical Consideration

There were minimal physical, psychological, social and legal risks during examination and delivery, with proper consent obtained. Privacy was maintained during history taking, examination and procedures, ensuring confidentiality. The study objectives, benefits and potential risks were explained to participants, who were informed of their right to withdraw. Informed written consent was obtained from each subject.

Statistical Analysis of Data

Statistical analysis was performed using the Statistical Package for Social Science (SPSS, version 22). Results were presented in tables, figures, frequency, percentage, mean with SD and diagrams as required for qualitative and quantitative variables. Chi-square test and Fisher's exact test were done to determine significant relationships between categorical variables when applicable. A p-value <0.05 was considered statistically significant.

4. Results

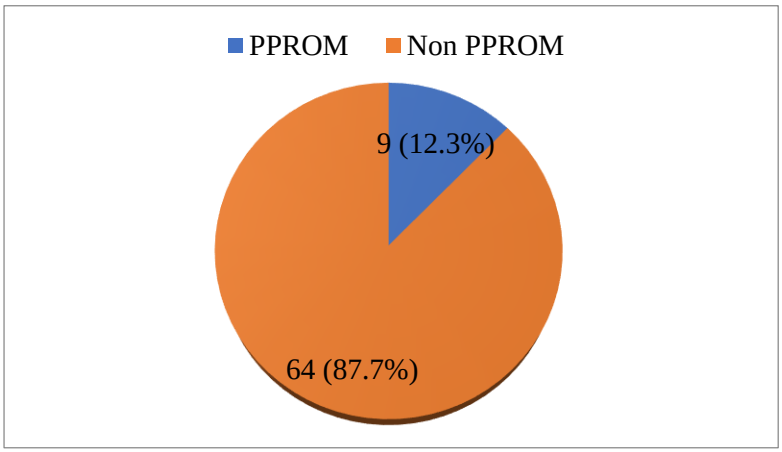

Figure: *Distribution of the patients based on PPROM*

The figure illustrates the distribution of patients based on PPROM status, visually depicting the proportion of PPROM and non-PPROM cases within the study population.

Table 1. *Patients demographic characteristics (n=73)*

Variable		PPROM (n=9)	Non-PPROM (n=64)	p-value
Age (years)	≤20	0 (0.0)	4 (6.25)	0.098
	21 - 25	0 (0.0)	25 (39.06)	
	26 - 30	7 (77.78)	20 (31.25)	
	>30	2 (22.22)	15 (23.44)	
Mean ± SD		26.96 ± 5.12	27.34±5.14	
Occupation	Housewife	4 (44.44)	47 (73.44)	0.122
	Student	0 (0.0)	2 (3.13)	
	Service	5 (55.56)	15 (23.44)	
BMI (kg/m^2)	<18.5	2 (22.22)	0 (0.0)	[a]0.001
	18.5-24.9	7 (77.78)	62 (96.88)	
	>24.9	0 (0.0)	2 (3.13)	
Parity	Primi	5 (55.56)	24 (37.50)	[b]0.469
	Multipara	4 (44.44)	40 (62.50)	
Mode of delivery	Vaginal Delivery	5 (55.56)	37 (57.81)	[b]1.000
	Caesarean Section	4 (44.44)	27 (42.19)	

Table 1 presents the demographic characteristics of 73 pregnant women, including 9 (12.3%) with PPROM. The mean age was similar between groups (26.96 ± 5.12 vs. 27.34 ± 5.14 years,

p=0.098), with most PPROM cases (77.78%) occurring in women aged 26–30 years. PPROM was more frequent among working women (55.56%), while the non-PPROM group comprised mostly housewives (73.44%). Underweight status was significantly higher in the PPROM group (22.22% vs. 0.0%, p=0.001). Parity distribution and mode of delivery showed no significant differences between groups, with vaginal delivery being the most common mode in both (p=1.000).

Table 2. *Outcome of the study subjects groups (Exposed and Non-exposed) regarding development of subsequent PPROM*

Group	PPROM (n=9)	Non-PPROM (n=64)	Total	P value
Non-exposed group (Normal platelet count and normal mean platelet volume)	5 (55.6%)	61 (95.3%)	66	0.003
Exposed group (High platelet count and low mean platelet volume)	4 (44.6%)	3 (4.7%)	7	

Table 2 evaluates the relationship between platelet indices and the occurrence of PPROM. Among women in the non-exposed group, 5 (55.6%) developed PPROM compared to 61 (95.3%) who did not, indicating a significant association between platelet parameters and PPROM risk (p=0.003). Conversely, 44.6% of PPROM cases were found in the exposed group, while only 4.7% of non-PPROM cases belonged to this category. These findings suggest a potential role of altered platelet indices in the pathogenesis of PPROM.

Table 3. *Gestational age at development of PPROM (n=9)*

Gestational age (weeks)	Number of subjects	Types of PPROM
24+1	1	Early Preterm PPROM (23-31 weeks)
25+2	1	Early PPROM (23-31weeks)
29+1	1	Early PPROM (23-31 weeks)
30+1	1	Early PPROM (23-31 weeks)
32+2	1	Pre-term PROM (32-36 weeks)
33+2	1	Pre-term PROM (32-36 weeks)
34+2	1	Pre-term PROM (32-36 weeks)
35+2	1	Pre-term PROM (32-36 weeks)
37+0	1	Term PROM (37 weeks)

Table 3 categorizes the gestational age at which PPROM occurred. Among the 9 cases, 4 (44.4%) were classified as early preterm PPROM (≤30 weeks), while 4 (44.4%) occurred between 32 and 36 weeks (preterm PROM). One case (11.1%) was recorded at term (≥37 weeks). The highest number of cases (n=4) occurred at gestational ages ranging from 24+1 to 30+1 weeks, highlighting the prevalence of early preterm PPROM in the study cohort.

5. Discussion

The research investigated the demographic background information and pregnancy results between women who experienced preterm premature rupture of membranes (PPROM) and those who did not develop PPROM. The statistical results showed that maternal age together with body mass index (BMI) played fundamental roles in developing PPROM. The combination of elevated platelet count and decreased mean platelet volume (MPV) levels allowed healthcare providers to identify women who faced higher possibilities of premature membrane rupture. The preterm membranes ruptured at various stages during pregnancy though the majority of instances happened during early preterm development. This study confirms previous research findings while offering new insights into this subject matter.

A demographic assessment revealed that both groups of patients had a comparable maternal age distribution which aligns with previous research findings published by Mercer [12]. Research shows that women who experienced premature rupture of membranes had lower BMI readings when compared to those without PPROM because underweight women face higher risks for PPROM due to membrane structural weaknesses (Bryant-Greenwood and G.D.,)[4]. The composition of fetal membrane extracellular

matrix and its tensile strength serve to keep membranes intact and underweight mothers may face heightened risks of membrane injury due to weakened membrane structure (Moore et al.,) [13].

This study revealed a substantial relationship between teenage motherhood and both elevated platelet count and decreased MPV that resulted in PPROM. Results from Ekin et al. [5] support the findings by showing that platelet index variations work as predictive signs for PPROM. Platelets contribute to inflammatory activities while activated platelet quantities associate with negative pregnancy outcomes such as PPROM per Gasparyan et al. [14]. An elevated platelet count together with reduced MPV indicates more rapid platelet turnover and results in a state that is potentially hypercoagulable and pro-inflammatory which weakens fetal membranes (Juan et al.,) [15].

Developmental stage when membranes rupture acts as a critical factor that influences the outcome of newborns. Our study confirmed that PPROM mainly occurred within the early preterm period extending from 23 to 31 weeks gestational age. This observation matches previously published research by Goldenberg et al. [2]. The early advancement of membrane rupture matter medically because it raises the probability of infant health complications and death. Scientists have thoroughly investigated intra-amniotic infection together with sterile inflammation because research demonstrates infectious inflammatory responses help weaken the membranes (Romero et al.,) [6]. Our research findings support the need for early intervention by demonstrating that subclinical infections might trigger the premature membrane ruptures among the study group.

The groups with PPROM and those without showed no substantial difference in delivery methods since both experienced comparable numbers of vaginal delivery and cesarean section. Research carried out by Kayiga et al. [10] demonstrated that obstetric indications play a more significant role than premature membrane rupture in determining delivery methods for PPROM patients. Medical practitioners tend to select cesarean delivery in situations that show fetal distress or when PPROM affects premature gestational periods (Creasy & Resnik,) [16].

These results create important implications which should influence clinical practice together with public health policy decisions. Monitoring programs with early preventive methods should be implemented for women identified at risk through BMI and platelet index assessments. Healthcare providers should implement nutritional support programs for underweight pregnant women while monitoring their platelet indices closely for potential abnormalities. Further investigation should examine the effectiveness of protective treatments including vaginal probiotics since they demonstrate potential in preventing PPROM according to Ibrahim et al. [11].

This research investigation demonstrates the connections between maternal BMI values and platelet indices measurements with PPROM while extending previous study findings. The research demonstrates why pregnant women need personalized prenatal care services which focus on tracking pregnancies with risk factors to discover problems early so appropriate interventions can take place. More research needs to confirm these observations thus enabling the creation of specific preventative measures to reduce the risks of PPROM.

6. Conclusion

This study highlights maternal BMI and platelet indices as significant predictors of PPROM in underweight women at a higher risk. Early preterm PPROM (≤30 weeks) was the most prevalent, emphasizing the need for targeted intervention. Integrating platelet indices into prenatal screening can enhance risk stratification and obstetric management. Nutritional support and surveillance programs may aid in prevention. Larger studies are needed to validate these findings and to explore the underlying pathophysiological mechanisms. Standardized clinical guidelines incorporating hematological parameters can improve maternal-fetal outcomes.

7. Limitations and Recommendations

The small sample size, particularly in the PPROM group, may have limited the generalizability of the findings. The study did not assess inflammatory markers, such as C-reactive protein (CRP) or interleukin levels, which could provide further insights into the pathophysiology of PPROM. Future studies should include a larger cohort and explore the mechanistic pathways linking hematological parameters with membrane rupture.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

REFERENCES

[1] American College of Obstetricians and Gynecologists. Practice bulletin no. 172: premature rupture of membranes. Obstetrics and gynecology. 2016 Oct; 128(4):e165-77.

[2] Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. The lancet. 2008 Jan 5;371 (9606):75-84.

[3] Calvin SE, Oyen ML. Microstructure and mechanics of the chorioamnion membrane with an emphasis on fracture properties. Annals of the New York Academy of Sciences. 2007 Apr; 1101(1):166-85.

[4] Bryant-Greenwood GD. The extracellular matrix of the human fetal membranes: structure and function. Placenta. 1998 Jan 1; 19(1):1-1.

[5] Ekin A, Gezer C, Kulhan G, Avcı ME, Taner CE. Can platelet count and mean platelet volume during the first trimester of pregnancy predict preterm premature rupture of membranes?. Journal of Obstetrics and Gynaecology Research. 2015 Jan; 41(1):23-8.

[6] Romero R, Espinoza J, Gonçalves LF, Kusanovic JP, Friel L, Hassan S. The role of inflammation and infection in preterm birth. InSeminars in reproductive medicine 2007 Jan (Vol. 25, No. 01, pp. 021-039). Copyright© 2007 by Thieme Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA..

[7] Romero R, Miranda J, Chaemsaithong P, Chaiworapongsa T, Kusanovic JP, Dong Z, Ahmed AI, Shaman M, Lannaman K, Yoon BH, Hassan SS. Sterile and microbial-associated intra-amniotic inflammation in preterm prelabor rupture of membranes. The journal of maternal-fetal & neonatal medicine. 2015 Aug 13; 28(12):1394-409.

[8] Isık H, Aynıoglu O, Sahbaz A, Arıkan I, Karçaaltıncaba D, Sahin H, Köroglu M. Can plateletcrit, an underestimated platelet parameter, be related with preterm labour?. Journal of Obstetrics and Gynaecology. 2015 Oct 3; 35(7):676-80.

[9] Toprak E, Bozkurt M, Çakmak BD, Özçimen EE, Silahlı M, Yumru AE, Çalışkan E. Platelet-to-lymphocyte ratio: A new inflammatory marker for the diagnosis of preterm premature rupture of membranes. Journal of the Turkish German Gynecological Association. 2017 Sep 1;18(3):122.

[10] Kayiga H, Lester F, Amuge PM, Byamugisha J, Autry AM. Impact of mode of delivery on pregnancy outcomes in women with premature rupture of membranes after 28 weeks of gestation in a low-resource setting: A prospective cohort study. PloS one. 2018 Jan 10; 13(1):e0190388.

[11] Ibrahim FA, Mostafa MK, Farahat MM. Vaginal probiotic administration in the management of preterm premature rupture of membranes. The Egyptian Journal of Hospital Medicine. 2018 Oct 1; 73(10):7672-82.

[12] Mercer BM. Preterm premature rupture of the membranes. Obstetrics & Gynecology. 2003 Jan 1; 101(1):178-93.

[13] Moore RM, Mansour J, Redline R, Mercer B, Moore JJ. The physiology of fetal membrane rupture: insight gained from the determination of physical properties. Placenta. 2006 Nov 1; 27(11-12):1037-51.

[14] Yuri Gasparyan A, Ayvazyan L, P Mikhailidis D, D Kitas G. Mean platelet volume: a link between thrombosis and inflammation?. Current pharmaceutical design. 2011 Jan 1; 17(1):47-58.

[15] Juan P, Stefano G, Antonella S, Albana C. Platelets in pregnancy. Journal of prenatal medicine. 2011 Oct; 5(4):90.

[16] Resnik R, editor. Maternal-fetal medicine: principles and practice. Saunders; 2004.

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