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Original Research Article

Diagnostic performance of platelet-lymphocyte ratio in preterm premature rupture of membranes

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ABSTRACT

Background: Preterm premature rupture of membranes (PPROM) is a significant contributor to preterm birth and is associated with considerable maternal and neonatal morbidity, with diagnosis often challenging due to nonspecific clinical presentation and limited reliable markers. Therefore, the present study aimed to evaluate the diagnostic performance of platelet-to-lymphocyte ratio (PLR) in PPROM.
Methods: This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital, Bangladesh (June 2022-May 2023). Sixty pregnant women (30 PPROM, 30 controls) at 28–36^{+6} weeks' gestation were enrolled to evaluate PLR in PPROM. Exclusions included multiple gestations, systemic disorders, malignancy, fetal anomalies, and pregnancy complications (GDM, preeclampsia). Data were analyzed using SPSS v26, with $p<0.05$ considered significant.
Results: A total of 60 participants (30 per group) were included with comparable baseline characteristics (mean age: 27.57±5.14 vs. 28.33±5.02 years; p=0.561). No significant differences were observed in parity or ANC status. Platelet count (269.63±63.40 vs. 207.43±46.50×10³/mm³; p<0.001) and PLR (123.15±27.73 vs. 104.48±26.09; p=0.009) were significantly higher in Group A, while lymphocyte count was not significant. ROC analysis showed AUC 0.697 with cut-off ≥117.7, sensitivity 53.3%, specificity 76.7%, and accuracy 65%.
Conclusions: PLR shows moderate diagnostic utility as a supportive biomarker in PPROM.

Keywords: Preterm premature rupture of membranes, Platelet-to-lymphocyte ratio, Diagnostic performance, Preterm birth, Inflammatory markers

INTRODUCTION

Pregnancy and childbirth represent highly important physiological stages that are closely linked with significant maternal and fetal outcomes. Preterm birth continues to be a major public health concern globally and is a leading cause of neonatal morbidity and mortality across the world. PPROM plays a substantial role in the overall burden of preterm birth and is recognized as an important obstetric complication that affects a significant proportion of pregnancies. On a global scale, the preterm birth rate is approximately 11%, and it remains the leading cause of death among children under five years of age.[1,2] PPROM contributes to about 1-4% of all pregnancies and is responsible for nearly 30-40% of preterm births, thereby playing a major role in perinatal morbidity and mortality.[3]

PPROM is characterized by spontaneous rupture of the fetal membranes before 37 completed weeks of gestation and prior to the onset of labor. It is a serious obstetric condition that is associated with considerable maternal and fetal complications. It is among the most frequent causes of preterm delivery and has a strong association with maternal and neonatal infectious morbidity.[4] The incidence of chorioamnionitis is estimated to be around 6-10%, and this risk may rise to as high as 40% when membrane rupture persists for more than 24 hours,

highlighting the severity and clinical implications of the condition.[5-7]

Even though PPROM is clinically significant, its diagnosis is not always straightforward in practice. While it is largely based on clinical assessment, variations in clinical presentation along with limitations in available diagnostic approaches make early recognition difficult. Furthermore, limited access to appropriate diagnostic facilities and delays in laboratory turnaround time may further hinder timely identification and management.[8,9] In addition, there remains a lack of dependable early predictive markers for PPROM, emphasizing the need for simple, accessible, and reliable screening tools.[10]

The underlying pathophysiology of PPROM is complex and involves multiple contributing factors, with inflammation playing a central and decisive role in membrane weakening and rupture. Regardless of the initiating factors, inflammatory processes are considered the primary pathological mechanism associated with both preterm labor and PPROM.[11] Subclinical intrauterine infection together with systemic inflammatory activation leads to progressive weakening of the fetal membranes.[12] Pro-inflammatory mediators such as interleukin (IL)-6, IL-8, IL-1, and tumor necrosis factor (TNF) are released into maternal circulation, which subsequently stimulate matrix metalloproteinases (MMPs).[13] These enzymes degrade collagen within the fetal membranes, thereby reducing structural integrity and increasing susceptibility to rupture.[14]

In recent years, the PLR has gained attention as a simple, inexpensive inflammatory marker derived from routine complete blood count parameters.[15,16] It reflects the dynamic balance between inflammatory and thrombotic activity and has been suggested as a useful predictive and prognostic indicator in various systemic and inflammatory conditions. Additionally, it has been linked with multiple obstetric complications, suggesting its potential relevance in pregnancy-related inflammatory processes.[17,18] Due to its widespread availability, low cost, and ease of calculation, PLR has emerged as a promising candidate biomarker in obstetric research.

However, despite increasing interest, current evidence regarding the association between PLR and PPROM remains limited and inconsistent. While some studies have demonstrated elevated PLR levels in PPROM, the findings are not uniform, and optimal diagnostic cut-off values have not been clearly established across different populations.[19] Moreover, robust evidence evaluating its diagnostic accuracy in diverse clinical settings is still lacking. This gap in the literature underscores the necessity for further well-designed studies to better clarify the diagnostic value of PLR in PPROM.[20]

PPROM is a major contributor to preterm birth and is associated with significant maternal and neonatal morbidity, yet its early diagnosis remains difficult due to nonspecific clinical presentation and limited reliability of conventional diagnostic methods. Inflammatory markers derived from routine hematological parameters, particularly PLR, have emerged as simple and cost-effective indicators of systemic inflammation. However, existing evidence regarding the diagnostic accuracy of PLR in PPROM is still limited and inconsistent. Therefore, the present study was undertaken to evaluate the diagnostic performance of PLR in PPROM.

Objectives

Objectives were to evaluate the diagnostic performance of PLR in PPROM.

METHODS

This was a cross-sectional analytical study conducted in the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh, from June 2022 to May 2023. A total of 60 pregnant women were included in the study, selected based on specific inclusion and exclusion criteria to evaluate the diagnostic performance of PLR in PPROM, with 30 participants in the PPROM group and 30 in the control group.

Inclusion criteria

Pregnant women with gestational age between 28 and 36^{+6} weeks and willingness to participate in the study were included in the study.

Exclusion criteria

Unwillingness to participate, multiple gestations, hematological disorders, malignancies, hepatic disease, history of autoimmune disease, pregnancy-related inflammatory conditions such as gestational diabetes mellitus and preeclampsia, any acute or chronic infectious or inflammatory diseases and fetal chromosomal anomalies were excluded from the study.

Study variables

Dependent variable

PPROM was a dependent variable in this study.

Independent variables

Age, educational status, income status, gravidity, parity, gestational age, and PLR were independent variables in this study.

Data collection procedure

Ethical approval was obtained from the Ethical Review Committee (ERC) of Dhaka Medical College Hospital prior to data collection. Eligible participants were

identified based on inclusion and exclusion criteria. After explaining the aim and procedures of the study, written informed consent was obtained from each participant or their legal guardian.

A total of 30 PPROM cases were enrolled in Group A and 30 full-term healthy pregnant women were included in Group B. Data were collected through face-to-face interviews using a semi-structured questionnaire, along with clinical history, physical examination findings, and relevant laboratory investigations. Data were recorded in a structured case record form by the researcher.

Data collection tools

Structured checklist for each participant, semi-structured questionnaire prepared in Bengali and informed written consent form (Bangla and English versions)

Statistical analysis

Data were analyzed using statistical package for social sciences (SPSS) version 26.0. Continuous variables were expressed as mean±standard deviation, while categorical variables were presented as frequency and percentage. Chi-square test was used for categorical variables, and independent sample t-test was used for continuous variables. A $p<0.05$ was considered statistically significant, with a 95% confidence interval.

Ethical considerations

Ethical approval was obtained from the Ethical Review Committee and Research Review Committee of Dhaka Medical College Hospital, followed by approval from the BCPS. Participants were informed about the study purpose, procedures, risks, and benefits in their local language before enrollment. Written informed consent was obtained from all participants. Confidentiality was strictly maintained, and participation was voluntary. No invasive procedures were involved, and refusal to participate did not affect treatment or care in any way.

RESULTS

The age distribution was comparable between the two groups, with the majority of participants aged 25–30 years (43.3% in both groups), followed by 31–35 years (26.7% in Group A vs. 33.3% in Group B) and 18–24 years (30.0% vs. 23.3%), with no statistically significant difference (p=0.790). The mean age was 27.57±5.14 years in Group A and 28.33±5.02 years in Group B (p=0.561). Regarding parity, most participants were primiparous (50.0% in Group A and 43.3% in Group B), followed by parity 2 (26.7% vs. 16.7%) and nulliparous women (20.0% vs. 26.7%), with no significant difference between the groups (p=0.435). In terms of antenatal care (ANC) visits, the majority of participants had irregular visits (76.7% in Group A and 63.3% in Group B), while regular visits were reported in 23.3% and 36.7% of participants, respectively, with no statistically significant difference (p=0.399).

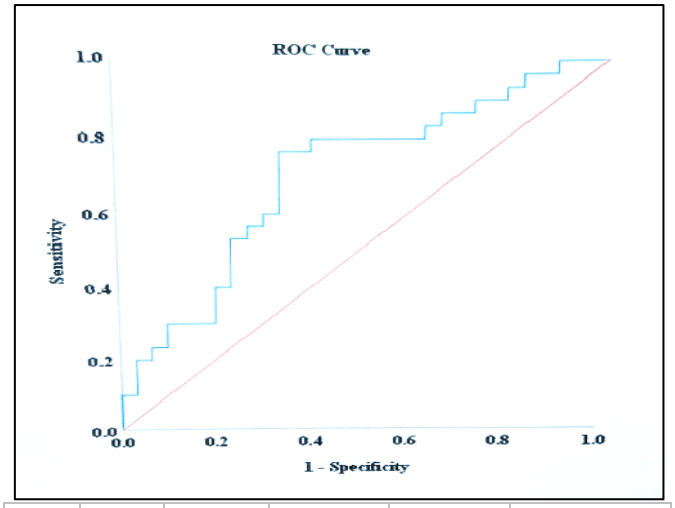
The mean platelet count was significantly higher in Group A compared to Group B (269.63±63.40×10³/mm³ vs. 207.43±46.50×10³/mm³; $p<0.001$), whereas the mean lymphocyte count, although higher in Group A (2253.98±588.02/mm³) than in Group B (2022.70±326.42/mm³), did not show a statistically significant difference (p=0.065). Consequently, the platelet-to-lymphocyte ratio (PLR) was significantly elevated in Group A compared to Group B (123.15±27.73 vs. 104.48±26.09; p=0.009).

Table 1: Baseline demographic and obstetric characteristics of the study participants, (n=60).

Variables		Group A (n=30), N (%)	Group B (n=30), N (%)	P value
Age (in years)	18-24	9 (30.0)	7 (23.3)	0.790
	25-30	13 (43.3)	13 (43.3)	
	31-35	8 (26.7)	10 (33.3)	
	Mean±SD	27.57 ± 5.14	28.33 ± 5.02	0.561
Parity	0	6 (20.0)	8 (26.7)	0.435
	1	15 (50.0)	13 (43.3)	
	2	8 (26.7)	5 (16.7)	
	3	1 (3.3)	4 (13.3)	
ANC Visit	Irregular	23 (76.7)	19 (63.3)	0.399
	Regular	7 (23.3)	11 (36.7)	

Table 2: Comparison of hematological investigations between study groups, (n=60).

Variables	Group A (n=30), Mean±SD	Group B (n=30), Mean±SD	P value
Platelet count (×10³/mm³)	269.63±63.40	207.43±46.50	<0.001
Lymphocyte count (/mm³)	2253.98±588.02	2022.70±326.42	0.065
PLR	123.15±27.73	104.48±26.09	0.009



AUC	P value	Cut off value	Sensitivity	Specificity	95% CI (Lower, upper)
0.697	0.009	117.7	53.30%	76.70%	0.562- 0.831

Figure 1: ROC Curve of PLR for diagnosis of PPROM.

ROC curve analysis demonstrated that PLR had an area under the curve (AUC) of 0.697 (95% CI: 0.562-0.831), indicating moderate diagnostic performance. This finding was statistically significant (p=0.009). A cut-off value of ≥117.7 yielded a sensitivity of 53.3% and specificity of 76.7% for the diagnosis of PPROM.

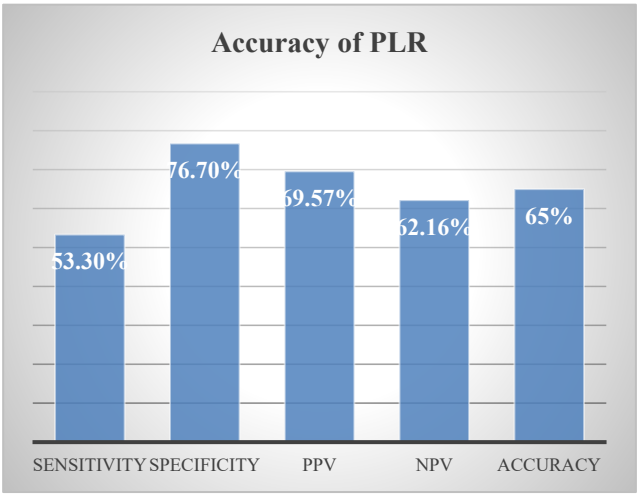


Figure 2: Diagnostic performance metrics of PLR in predicting PPROM.

At the selected cut-off value of ≥117.7, the sensitivity of PLR was 53.3% and specificity was 76.7%. The positive predictive value (PPV) was 69.57%, and the negative predictive value (NPV) was 62.16%. The overall diagnostic accuracy of PLR in predicting PPROM was 65%.

DISCUSSION

In this cross-sectional analytical study conducted at the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital, PLR was found to be significantly elevated in women with PPROM compared to controls, while baseline characteristics remained comparable between groups. The ROC analysis demonstrated moderate diagnostic performance with acceptable sensitivity, specificity, and overall accuracy, indicating that PLR may serve as a useful adjunctive marker for the diagnosis of PPROM.

In the present study, the baseline demographic and obstetric characteristics were comparable between the two groups, with no statistically significant differences observed. The majority of participants were aged between 25-30 years, and the mean ages were 27.57±5.14 and 28.33±5.02 years in Group A and Group B, respectively. This finding is consistent with Abebe et al who reported that approximately 62% of PPROM cases occurred within the 25-34 years age group, with a mean age of 26.7±4.6 years, suggesting that PPROM is predominantly seen in the reproductive age group with similar age distribution patterns across different populations.[21] Similarly, Naher et al observed that the highest proportion of PPROM cases occurred in the 25-29-year age group, which closely aligns with the findings of the present study.[22]

In terms of parity, primiparous women constituted the largest proportion in both groups in the present study. This is in agreement with Noor et al who reported a higher occurrence of PPROM among first pregnancies (42.2%), suggesting that nulliparity or early parity may be associated with increased susceptibility to membrane rupture. Furthermore, the majority of participants in both groups had irregular antenatal care visits, although the difference was not statistically significant. This pattern is consistent with the findings of Ağaoğlu et al who identified inadequate antenatal care utilization and lower socioeconomic status as important risk factors associated with PPROM.[23] The absence of statistically significant

differences in baseline demographic and obstetric characteristics between the groups in the present study confirms that the study groups were well matched, thereby strengthening the validity of subsequent comparisons involving hematological and diagnostic parameters.

In the present study, hematological analysis revealed that the mean platelet count was significantly higher in the PPROM group compared to the control group. This finding is in agreement with Toprak et al who also reported significantly elevated platelet counts in PPROM patients compared to controls (244.5±60 vs. 210.6±64.8 $\times 10^3/mm^3$; $p<0.001$), indicating activation of systemic inflammatory pathways associated with membrane rupture.[24] Although lymphocyte counts were higher in the PPROM group, the difference did not reach statistical significance, suggesting that isolated lymphocyte values may not independently reflect the inflammatory status in PPROM. In contrast, the PLR was significantly elevated in the PPROM group, which is consistent with findings from Egiz et al who demonstrated markedly higher PLR values in PPROM patients compared to controls.[25]

Similarly, Esercan et al reported elevated PLR levels in PPROM cases, further supporting its association with inflammatory activation and its potential role as a composite hematological marker in this condition.[26] Collectively, these findings suggest that while individual hematological parameters may show variability, PLR provides a more stable and integrated indicator of systemic inflammation in PPROM.

In ROC curve analysis, the PLR demonstrated an AUC of 0.697 (95% CI: 0.562-0.831), indicating a moderate level of diagnostic accuracy for PPROM. This finding is in close agreement with Toprak et al who reported an AUC of approximately 0.62 for PLR, along with a sensitivity of 57.8% and specificity of 73.7% at a cut-off value of around 117.14. Notably, the present study identified a very similar cut-off value of 117.7, yielding a sensitivity of 53.3% and specificity of 76.7%, thereby reinforcing the consistency and reproducibility of PLR-based diagnostic thresholds across different populations. Although the sensitivity observed in the present study was slightly lower than that reported by Toprak et al the higher specificity suggests improved accuracy in correctly identifying non-PPROM cases.[24] Overall, the similarity in AUC values and cut-off points across studies supports the moderate but consistent diagnostic performance of PLR in PPROM, highlighting its potential role as a supportive biomarker rather than a definitive standalone diagnostic tool.

Furthermore, in the present study, the overall diagnostic performance of PLR demonstrated a sensitivity of 53.3%, specificity of 76.7%, positive predictive value of 69.57%, negative predictive value of 62.16%, and an accuracy of 65%. These findings are broadly consistent with those reported by Toprak et al who observed similar diagnostic parameters with sensitivity of 57.8% and specificity of 73.7%, further supporting the moderate diagnostic utility of PLR. In addition, Esercan et al demonstrated significantly elevated PLR values in PPROM patients with an AUC of approximately 0.671, reinforcing the moderate discriminatory capacity of PLR observed in the present study.[24,26] However, Egiz et al reported comparatively higher diagnostic performance, with sensitivity reaching 95% and specificity 98%, and AUC values ranging from 0.663 to 0.955 depending on the index evaluated, suggesting that PLR and related inflammatory markers may demonstrate variability in diagnostic accuracy depending on population characteristics and study design.[25] Despite such variability, the present findings align more closely with studies reporting moderate diagnostic performance, thereby supporting the conclusion that PLR is a reproducible but adjunctive biomarker in the diagnosis of PPROM rather than a standalone diagnostic test.

Limitations

The study had a few limitations: The study was conducted at a single center, which may limit generalizability of the findings. The sample size was relatively small, which may affect the statistical power of the results. Randomization was not performed, which may introduce potential selection bias

CONCLUSION

PPROM is an important obstetric condition associated with significant maternal and neonatal morbidity, where early and reliable diagnostic markers are clinically valuable. In this study, the PLR was significantly higher in the PPROM group compared to controls, while platelet count was also elevated and lymphocyte count showed no significant difference. ROC analysis demonstrated moderate diagnostic performance with acceptable specificity and overall accuracy, suggesting that PLR may serve as a useful adjunctive inflammatory marker in the assessment of PPROM rather than a standalone diagnostic test.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Walani SR. Global burden of preterm birth. Int J Gynecol Obstet. 2020;150(1):31-3.
2. Guduru R, Manjareeka M, Panda J, Pattanayak S. Hematologic Ratios as Early Biomarkers for Preterm Premature Rupture of Membranes: A Prospective Cohort Study. Cureus. 2026;18:3.
3. Jena BH, Biks GA, Gete YK, Gelaye KA. Incidence of preterm premature rupture of membranes and its association with inter-pregnancy interval: a prospective cohort study. Scientific Rep. 2022;12(1):5714.

4. Kabir A, Akter L, Ripon A. Association of maternal platelet-to-lymphocyte ratio with preterm prelabour rupture of membranes. Int J Clin Obstet Gynaecol. 2025;9(1):185-91.
5. Ozel A, Alici Davutoglu E, Yurtkal A, Madazli R. How do platelet-to-lymphocyte ratio and neutrophil-to-lymphocyte ratio change in women with preterm premature rupture of membranes, and threaten preterm labour? J Obstet Gynaecol. 2020;40(2):195-9.
6. Goya M, Bernabeu A, García N, Plata J, Gonzalez F, Merced C, et al. Premature rupture of membranes before 34 weeks managed expectantly: maternal and perinatal outcomes in singletons. J Maternal-Fetal Neonatal Med. 2013;26(3):290-3.
7. Simhan HN, Canavan TP. Preterm premature rupture of membranes: diagnosis, evaluation and management strategies. BJOG. 2005;112:32-7.
8. Celik IH, Hanna M, Canpolat FE, Pammi M. Diagnosis of neonatal sepsis: the past, present and future. Pediatric Res. 2022;91(2):337-50.
9. Li T, Dong G, Zhang M, Xu Z, Hu Y, Xie B, et al. Association of neutrophil-lymphocyte ratio and the presence of neonatal sepsis. J Immunol Res. 2020;2020(1):7650713.
10. Ghafoor S. Current and emerging strategies for prediction and diagnosis of prelabour rupture of the membranes: a narrative review. Malaysian J Med Sci. 2021;28(3):5.
11. Ekin A, Gezer C, Taner CE, Ozeren M, Uyar I, Gulhan I. Risk factors and perinatal outcomes associated with latency in preterm premature rupture of membranes between 24 and 34 weeks of gestation. Arch Gynecol Obstet. 2014;290(3):449-55.
12. Menon R, Richardson LS, Lappas M. Fetal membrane architecture, aging and inflammation in pregnancy and parturition. Placenta. 2019;79:40-5.
13. Kenyon S, Boulvain M, Neilson JP, Cochrane Pregnancy and Childbirth Group. Antibiotics for preterm rupture of membranes. Cochrane Database System Rev. 1996;2013:12.
14. Karampitsakos T, Mavrogianni D, Machairiotis N, Potiris A, Panagopoulos P, Stavros S, et al. The impact of amniotic fluid interleukin-6, interleukin-8, and metalloproteinase-9 on preterm Labor: A narrative review. Biomedicines. 2025;13(1):118.
15. Balta S, Ozturk C. The platelet-lymphocyte ratio: A simple, inexpensive and rapid prognostic marker for cardiovascular events. Platelets. 2015;26(7):680-1.
16. Nording HM, Seizer P, Langer HF. Platelets in inflammation and atherogenesis. Front Immunol. 2015;6:98.
17. Qin B, Ma N, Tang Q, Wei T, Yang M, Fu H, et al. Neutrophil to lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR) were useful markers in assessment of inflammatory response and disease activity in SLE patients. Modern Rheumatol. 2016;26(3):372-6.
18. Stojkovic Lalosevic M, Pavlovic Markovic A, Stankovic S, Stojkovic M, Dimitrijevic I, Radoman Vujacic I, et al. Combined diagnostic efficacy of neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), and mean platelet volume (MPV) as biomarkers of systemic inflammation in the diagnosis of colorectal cancer. Dis Markers. 2019;2019(1):6036979.
19. Özer PT, Özer M, Oğlak SC, Budak A, İnan AH, Tosun G, et al. Evaluating the predictive potential of neutrophil-to-lymphocyte and platelet-to-lymphocyte ratios in the second-trimester preterm premature rupture of membranes (PPROM): a retrospective case-control study. Clin Expe Obstet Gynecol. 2024;51(2):28.
20. Abebe TA, Nima DD, Mariye YF, Leminie AA. Determinants for perinatal adverse outcomes among pregnant women with preterm premature rupture of membrane: A prospective cohort study. Front Reprod Health. 2022;4:1052827.
21. Naher N, Faria FT. Maternal and Fetal Outcome in Women Presenting with Preterm Premature Rupture of Membranes (PPROM): A Case Series from a Tertiary Care Hospital in Bangladesh. TAJ. 2025;38(4):206-11.
22. Noor S, Nazar AF, Bashir R, Sultana R. Prevalance of PPROM and its outcome. J Ayub Med Coll Abbottabad. 2007;19(4):14-7.
23. Ağaoğlu RT, Öztürk Ö, Ulusoy CO, Günday F, Sarikaya Kurt D, Aksu M, et al. Perinatal outcomes and predictors of neonatal mortality in preterm premature rupture of membranes: a tertiary center experience. BMC pregnancy and childbirth. 2025;25(1):585.
24. Toprak E, Bozkurt M, Dinçgez Çakmak B, Özçimen EE, Silahlı M, Ender Yumru A, et al. Platelet-to-lymphocyte ratio: A new inflammatory marker for the diagnosis of preterm premature rupture of membranes. J Turk Ger Gynecol Assoc. 2017;18(3):122-6.
25. Egiz MN, Mahmoud SA, Abdel-Samea SR, Dawood RM. The Diagnostic Value of Platelet/Lymphocyte Ratio and Neutrophil/Lymphocyte Ratio in Preterm Premature Rupture of Membranes. Egypt J Hospital Med. 2023;91(1):4251-8.
26. Esercan A, Demir I. Neutrophil/Lymphocyte and Platelet/Lymphocyte Ratio in Preterm Premature Rupture of Membranes. Cureus. 2023;15(5):e38664.

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