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The Diagnostic Value of Platelet/Lymphocyte Ratio and Neutrophil/Lymphocyte Ratio in Preterm Premature Rupture of Membranes

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ABSTRACT

Background: Preterm Premature rupture of membranes (PPROM) is the rupture of the membranes that encapsulate the amniotic fluid and the fetus before delivery, resulting in the amniotic fluid draining through the vagina. PPROM affects between 20% and 36% of all pregnancies. **Objective:** The aim of the current study was to assess the significance of the platelet/lymphocyte ratio (PLR) and the neutrophil/lymphocyte ratio (NLR) in PPROM.

Patients and methods: A case control study was conducted on 70 women between 2020 and 2022 at the Obstetrics and Gynecology Department of Menufia University in Shebin Elkom, Egypt, and the Ministry of Health Hospital in Ashmoun, Egypt. **Results:** According to our findings, the optimal cutoff value for detecting PPROM for NLR was 4.658, with a sensitivity of 97% and a specificity of 29% at an AUC of 0.955. PLR's cutoff value was 133.415, with a sensitivity of 95% and a specificity of 98% at an AUC of 0.663.

Conclusion: NLR and PLR values in the PPROM group are considerably greater than in healthy controls.

Keywords: Chorioamnionitis, Neonatal hypoxia, Neutrophil/Lymphocyte Ratio, Platelet/Lymphocyte Ratio.

INTRODUCTION

Preterm Premature rupture of membranes (PPROM), or spontaneous rupture of the fetal membranes before 37 weeks of gestation, affects 3% of all pregnancies. It is linked to severe maternal and fetal morbidity and mortality. One of the most frequent causes of premature birth, PPROM is linked to both maternal and newborn infections. The risk of chorioamnionitis is roughly 6–10%, and if it persists for more than 24 hours, it rises to 40% [1].

Furthermore, a neonatal infection is also twice as likely to affect those who do not have chorioamnionitis. During PPROM, the risk of infection rises, and jaundice and newborn hypoxia are also more prevalent. Because of these critical problems, to ensure the health of both the mother and the fetus, early diagnosis is essential [2].

A substantial correlation between several inflammatory indicators and PPROM has been documented, and inflammation is a key factor in membrane rupture. Although many etiological factors may be taken into consideration with Prior preterm birth, sexually transmitted infections, cervical surgery (past or present), low socioeconomic level, low maternal body mass index, amniocentesis, etc. are all forms of PPROM, and membrane rupture is heavily influenced by inflammation [3].Megakaryocytic series multiply more often and lymphocyte numbers typically decline because exhibiting extreme apoptosis in settings of ongoing inflammation. As a result, severe chronic inflammatory illnesses might impact markers determined from total blood counts such as the platelet-to-lymphocyte ratio (PLR) [4]. PLR is a popular, trustworthy, and simple marker. It has been associated to preeclampsia, acute appendicitis, recurrent miscarriages, gestational diabetes mellitus, and premature labor in pregnant women [5]. Increased neutrophil/lymphocyte ratio (NLR) has been shown to have prognostic and predictive significance in a number of cancers such as lung cancer, colorectal cancer, and hepatocellular carcinoma. Moreover, preeclampsia has elevated NLR levels [6].

Several pregnancy-related disorders were identified to affect NLR. Similar conditions include gestational diabetes, intrahepatic cholestasis, hyperemesis gravidarum, and pregnancy-related acute appendicitis. The authors came to the conclusion that NLR was a helpful marker for PPROM prediction. In the literature, there are few details about the relationship between PLR, NLR, and the presence of PPROM. The present study evaluated how PLR and NLR can be used to predict PPROM [4]. The aim of the study was to evaluate the diagnostic value of PLR and NLR in PPROM. Early diagnosis of these cases will improve the pregnancy outcome and limit the morbidity and mortality rates significantly.

PATIENTS AND METHODS

A case control study was conducted on 70 women between 2020 and 2022 at the Obstetrics and Gynecology Department of Menufia University in Shebin Elkom, Egypt, and the Ministry of Health Hospital in Ashmoun, Egypt.

Study population: Group A included 35 women who were carrying singletons between 24+0 and 36+6 weeks who had PPROM and **Group B** included 35 women who were carrying singletons between 24+0 and 36+6 weeks without PPROM.

Inclusion criteria:

Women who are 24+0 to 36+6 weeks along in a singleton pregnancy. The gestational age was determined by the previous menstrual period and, if necessary, corrected by ultrasound. We included both women with and without PPROM symptoms and signs.

Exclusion criteria: Preeclampsia or eclampsia in the past, pregnancy with twins or triplets, >30 mm of cervical dilatation, significant vaginal hemorrhage previa placenta, diseases of the blood, hepatic disease, history of autoimmune disease, calatori any acute or chronic viral or inflammatory disorders, such as

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gestational diabetes mellitus, that impact expectant mothers Pregnancies with reduced intrauterine development, fetal chromosomal disorders, female patients who undergone invasive procedures like amniocentesis and any fetal infections.

Sample size calculation: According to **Toprak *et al.*** [1] they reported that, with a power of 90%, a marginal error of 0.05, and a case-control ratio of 1:1, the levels of NLR were 5.38±3.3 and 3.85±2.4 for the PPROM group and control groups, respectively. The estimated sample size is 35 cases for each group.

All research patients underwent the following procedures:

Full history including Age and gestational age are both indicated by the beginning day of the most recent menstrual cycle. Pregnancy symptoms included extreme headaches, blurred vision, vomiting, epigastric pain, decreased fetal activity, lower limb edema, vaginal bleeding, and vaginal fluid leaking. Amount of pregnancies and any complications were recorded.

General Examination: Body's temperature, pulse, blood pressure, respiration rate, and vital signs, together with weight were recorded. Thereafter, examination of the face and neck, the chest and heart, checking the breasts for pregnancy symptoms, any lumps, and nipple discharge were done. Finally lower body (leg abnormalities, varicose veins, and edema) was examined.

Abdominal Examination:

A. **Inspection:** Respiratory movements, fetal movement, the shape and contour of the belly, the skin for any pigmentation, the epigastric pulse, the umbilicus (site, discharge, or hernia), the hernial orifices, the distribution of the hair, and the back for abnormalities are all things to look out for.
B. **Palpation: Superficial Palpation** to identify superficial lumps, stiffness, or tenderness, and **Special obstetric palpation to gravid uterus:** First pelvic grip, second pelvic grip, umbilical grip, fundal level, and detection of uterine contraction.
C. **Auscultation:** Pinard stethoscopes and acoustic aids can be used to detect fetal heart sounds.

Local examination:

Observation during dorsilithotomy Position with a sterile speculum to check for active amniotic fluid flow from the cervix or amniotic fluid accumulating in the fornices. Once the patient complains of fluid leaking before 37 weeks of pregnancy, this examination is performed. Excluding labor was done, because digital examination is linked to a shortened latent period and the possibility of negative sequela, speculum examination is used to detect cervical dilatation. As a result of digital inspection, vaginal microbes are immediately introduced into the cervical canal. Nonetheless, to rule out labor, a digital cervical examination is crucial.

Ultrasonographic scanning was done to determine gestational age, fetal anomalies, multiple gestations, and liquid volume.

Laboratory investigations: Fasting blood sugar was measured using an automated chemical analyzer that uses random access samples **(Beckman Counter)**. Also, blood group, Rh factor, and kidneys and liver function tests were measured using automated chemical analyzer tests, sample-oriented random access **(Backman Counter).** Finally, complete blood count, urine analysis, and tests for sensitivity, microscopy, culture, and albumin levels were estimated.

Ethical Consideration: This study was ethically approved by the Institutional Review Board [IRB] of the Faculty of Medicine, Mansoura University. Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Statistical Analysis: The collected data were introduced and statistically analyzed by utilizing Microsoft Excel 2019 and Statistical Package for Social Sciences (SPSS) version 25 for windows. Qualitative data were defined as numbers and percentages. Chi-Square test and Fisher's exact test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Normal distribution of variables was described as mean and standard deviation (SD), and Student's t-test was used for comparison between groups. The ROC (receiver operating characteristic) curves were estimated: Cutoff values, sensitivity, specificity, positive predictive value, and negative predictive value. P value ≤0.05 was considered to be statistically significant.

RESULTS

In the current investigation, there was no discernible difference between the mean ages of the patients and controls. The mean body mass index for the sick and control groups showed no significant difference (P=0.552) **(Table 1).**

Table (1): Demographic data among case and control groups (N=70).

Variables		Case (N=35)	Control (N=35)	T test	*P value*
Age/year	Mean ± SD Range	27.20 ± 4.13 21-34	28.37 ± 5.17 23-35	1.047	0.299
BMI (kg/m^2)	Mean ± SD Range	29.63 ± 3.32 22-34	29.23 ± 2.16 19-31	0.598	0.552

BMI: Body mass index

Regarding gravidity, parity, previous caesarean sections, history of abortions, history of cervical evacuation after abortion, history of preterm labor, history of cervical procedures, previous UTI, prior vaginal bleeding, and prior chorioamnionitis, there were no significant differences between the studied groups (P>0.05) **(Table 2).**

Table (2): Clinico-Pathological data among case and control groups (N=70).

Variables	Case (N=35)		Control (N=35)		Total (N=70)		X^2	*P value*
	No.	%	No.	%	No.	%		
Gravidity (Mean ± SD)	2.14 ± 1.59		2.29 ± 1.38		2.22 ± 1.49		t= 0.4	0.690
Gravidity								
Primigravida	9	25.71	7	25	16	22.86	0.831	0.934
Twice	10	28.57	11	31.43	21	30		
Three times	9	25.71	11	31.43	20	28.57		
Four times	5	14.29	5	14.29	10	14.29		
Five times	2	5.71	1	2.86	3	4.29		
Parity (Mean ±SD)	1.46 ± 1.2		1.49 ± 1.07		1.48 ± 1.14		t= 0.105	0.916
Parity								
No	9	25.71	7	25	16	22.86	0.831	0.934
Once	10	28.57	11	31.43	21	30		
Twice	9	25.71	11	31.43	20	28.57		
Three times	5	14.29	5	14.29	10	14.29		
Four times	2	5.71	1	2.86	3	4.29		
Previous CS								
No	16	45.71	20	57.14	36	51.43	2.694	0.441
Once	8	22.86	8	22.86	16	22.86		
Twice	9	25.71	7	25.	16	22.86		
Three times	2	5.71	0	0.0	2	2.86		
Previous abortions								
No	26	74.29	21	60	47	67.14	2.006	0.367
Once	8	22.86	11	31.43	19	27.14		
Twice	1	2.86	3	8.57	4	5.71		
Cervical evacuation after abortion								
No	26	74.29	30	85.71	56	80	1.978	0.372
Once	8	22.86	5	14.29	13	18.57		
Twice	1	2.86	0	0.0	1	1.43		
History of preterm labor								
No	25	71.43	23	65.71	48	68.57	0.306	0.858
Once	8	22.86	10	28.57	18	25.71		
Twice	2	5.71	2	5.71	4	5.71		
History of cervical procedures or cercelage								
No	30	85.7	25	71.4	55	78.6	2.121	0.145
Once	5	14.3	10	28.6	15	21.4		
Previous PPROM								
No	23	65.71	35	100	58	82.86	14.483	**0.001***
Once	11	31.43	0	0.0	11	15.71		
Twice	1	2.86	0	0.0	1	1.43		
Previous UTI								
Yes	21	60	15	42.86	36	51.43	2.059	0.151
Once	0	0.0	13	37.14	0	0.0		
Twice	0	0.0	2	5.71	0	0.0		
No	14	40	20	57.14	34	48.57		
Previous vaginal bleeding								
No	33	94.29	35	100	68	97.14	2.059	0.151
Present (threatened abortion)	2	5.71	0	0.0	2	2.86		
Previous chorioamnionitis No	35	100	35	100	70	100	---	---

CS: Cesarean Section. **PPROM:** Preterm premature rupture of membranes. **UTI:** Urinary tract infection.

Moreover, the ESR during the first and second hours was substantially higher in the case group compared to the control group (P<0.05). However, there were no significant changes in CRP between the groups studied (P>0.05) **(Table 3).**

Table (3): ESR results and CRP among case and control groups (N=70).

Variables	Case (N=35)		Control (N=35)		Total (N=70)		T test	*P value*	95% CI	
									Lower	Upper
ESR (mm/hr)										
1st hr (Mean±SD)	52.17±11.53		45.14±11.10		48.66±11.72		2.508	**0.015***	1.44	12.62
2nd hr (Mean±SD)	92.74±20.87		81.11±20.13		86.93±21		2.317	**0.024***	1.61	21.64
Positive CRP (Mean±SD	19.40±4.56		12.38±3.06		15.89±3.71		1.954	0.057	-0.23	14.28
Negative CRP (Less than 6	**No.**	**%**	**No.**	**%**	**No.**	**%**	**X^2**	***P value***	---	---
	5	14.29	19	54.29	24	34.29	1.19	0.78		

ESR: Erythrocyte sedimentation rate. **CRP:** C-reactive protein.

Also, the case group's total leucocyte count, neutrophils, NLR, and PLR all showed a substantial rise than control's group with P<0.001 and p=0.006, respectively. When compared to the control group, the lymphocyte count in the case group was considerably lower (P<0.001). Hemoglobin and platelets, however, did not significantly differ between the groups studied (P>0.05) **(Table 4).**

Table (4): Lab investigations, NLR and PLR among case and control groups (N=70).

Variables	Case (N=35)	Control (N=35)	T	*P value*	95% CI	
	Mean±SD	Mean±SD			**Lower**	**Upper**
HB (g/dl)	11.66±0.44	11.71±0.55	0.384	0.702	-0.28	0.19
Platelets (K/µL)	274.26±68.35	296.2±72.92	1.189	0.239	-58.77	14.88
TLC (cells/µl)	11.08±2.62	6.73±1.53	6.996	**P<0.001***	3.11	5.59
Neutrophils (K/µL)	9.62±1.78	5.57±1.28	9.822	**P<0.001***	3.23	4.87
Lymphocyte (K/µL)	2.24±0.55	3.01±0.71	4.276	**P<0.001***	-1.13	-0.41
NLR	4.67±1.14	1.98±0.45	8.463	**P<0.001***	2.06	3.33
PLR	133.1±31.57	103.21±24.99	2.827	**P=0.006***	8.79	50.98

Also, the case group's ultrasonography amniotic fluid index was substantially lower than the control groups, which is significant (P<0.001). However, there was a substantial temperature increase in the case group compared to the control group (P<0.001). In the control group as opposed to the case group, uterine soreness and foul discharge were most frequently reported, with a significant difference (P<0.05). Also fluid pooling occurred more frequently in the case group than the control group, with a significant difference (P<0.001) between the two groups. There were no appreciable variations in the study groups' systolic, diastolic, and pulse pressures as well as ultrasound gestational age or ultrasound presentation (P>0.05) **(Table 5)**.

Table (5): Ultrasound and clinical examinations among case and control groups (N=70).

Variables	Case (N=35)		Control (N=35)		Total (N=70)		T test	P value
Ultrasound gestational age/ wks (Mean±SD)	32.00±3.29		31.51±3.39		31.76±3.34		0.608	0.545
Ultrasound amniotic fluid index (AFI), Mean±SD	5.32±2.67		14.77±2.37		10.05±2.52		15.675	**<0.001***
Ultrasound presentation	**No.**	**%**	**No.**	**%**	**No.**	**%**		
Cephalic	33	94.29	32	91.43	65	92.86	**X^2=**	0.643
Breech	2	5.71	3	8.57	5	7.14	0.215	
General Examination								
SBP (Mean±SD)	109.43±10.83		109.14±10.4		109.29±10.62		0.113	0.911
DBP (Mean±SD)	69.71±7.85		69.71±7.85		69.71±7.85		0.000	1.000
Pulse (Mean±SD)	77.6±6.31		78.4±6.68		78±6.5		0.515	0.608
Temperature (Mean±SD)	37.41±0.42		36.87±0.2		37.14±0.31		6.928	**<0.001***
Abdominal Examination								
Fundal level (Equal period of	**No.**	**%**	**No.**	**%**	**No.**	**%**	---	---
amenorrhea)	35	100	35	100	70	100		
Uterine tenderness No	35	100	31	88.57	66	94.29	= 4.242	**0.039***
Yes	0	0.0	4	11.43	4	5.71		
Local Examination								
Fluid pooling Present	35	100	0	0.0	35	50		
Absent	0	0.0	35	100	35	50	**X^2**=70	**<0.001***
Offensive discharge Absent	35	100	34	97.14	69	98.57	**X^2**=70	**<0.001***
Present	0	0.00	1	2.86	1	1.43		

Moreover, there were significant negative connections with pus cells, lymphocyte, ultrasonography AFI, fluid pooling, and unpleasant discharge (P>0.05) and positive correlations with NLR and PLR, previous PPROM, ESR1st Hour, ESR 2nd Hour, positive CRP, TLC, neutrophils, and temperature (P<0.05). Moreover, PLR had significant positive associations with NLR, RBCS, ESR 1st and 2nd hours, positive CRP, platelets, TLC, neutrophils, ultrasound gestational age, systolic blood pressure, diastolic blood pressure and temperature (P<0.05) as well as significant negative correlations with pus cells, lymphocytes, fluid pooling, and unpleasant discharge (P<0.05) **(Table 6).**

Table (6): Correlation between NLR, PLR with the studied parameters.

Variable	NLR		PLR	
	r	P-value	r	P-value
NLR	---	---	0.774**	**<0.001***
PLR	0.774**	**<0.001***	---	---
Age	-0.063	0.607	-0.024	0.846
BMI	-0.072	0.554	-0.218	0.070
Gravidity	-0.036	0.769	-0.028	0.816
Parity	-0.013	0.917	-0.006	0.958
Previous CS	0.151	0.211	0.087	0.472
Cervical evacuation after abortion	0.142	0.240	0.108	0.373
Preterm labor	-0.135	0.265	-0.181	0.133
Previous PPROM	0.341**	**0.004***	0.114	0.346
Previous UTI	-0.074	0.545	0.053	0.663
Positive previous UTI	0.499	0.058	0.454	0.089
Vaginal bleeding	0.187	0.122	0.178	0.140
Pus Cells	-0.568**	**<0.001***	-0.247*	**0.039***
RBCS	-0.005	0.967	0.312**	**0.009***
ESR 1st Hour	0.685**	**<0.001***	0.754**	**<0.001***
ESR 2nd Hour	0.664**	**<0.001***	0.771**	**<0.001***
Positive CRP	0.511**	**<0.001***	0.435**	**0.003***
HB	0.022	0.860	0.041	0.734
Platelets	0.156	0.196	0.504**	**<0.001***
TLC	0.912**	**<0.001***	0.765**	**<0.001***
Neutrophils	0.872**	**<0.001***	0.568**	**<0.001***
Lymphocyte	-0.731**	**<0.001***	-0.680**	**<0.001***
Ultrasound gestational age/wks.	0.174	0.150	0.247*	**0.039***
Ultrasound presentation	0.007	0.955	0.025	0.839
Ultrasound AFI	-0.561**	**<0.001***	-0.047	0.702
Systolic blood pressure	0.151	0.213	0.248*	**0.038***
Diastolic blood pressure	0.134	0.268	0.241*	**0.045***
Pulse	0.056	0.644	0.084	0.488
Temperature	0.642**	**<0.001***	0.390**	**0.001***
Uterine tenderness	-0.073	0.548	0.055	0.652
Fluid pooling	-0.788**	**<0.001***	-0.282*	**0.018***
Offensive discharge	-0.794**	**<0.001***	-0.289*	**0.015***

The optimal cutoff point for PROM detection for NLR, according to our study's ROC curve analysis, was 4.658, with sensitivity of 97% and specificity of 29% at an AUC of 0.955. While PLR's cutoff point was 133.415 and had an AUC of 0.663, it had a sensitivity of 95% and a specificity of 98% **(Table 7).**

Table (7): ROC curve analysis for NLR and PLR as markers for detection of preterm premature rupture of membranes.

Variables	Area	Cut off point	Std. Error	Asymptotic Sig.	Sensitivity	Specificity	95%CI	
							Lower	Upper
NLR	0.955	4.658	0.022	<0.001*	97%	29%	0.912	0.998
PLR	0.663	133.415	0.066	0.019*	95%	98%	0.533	0.793

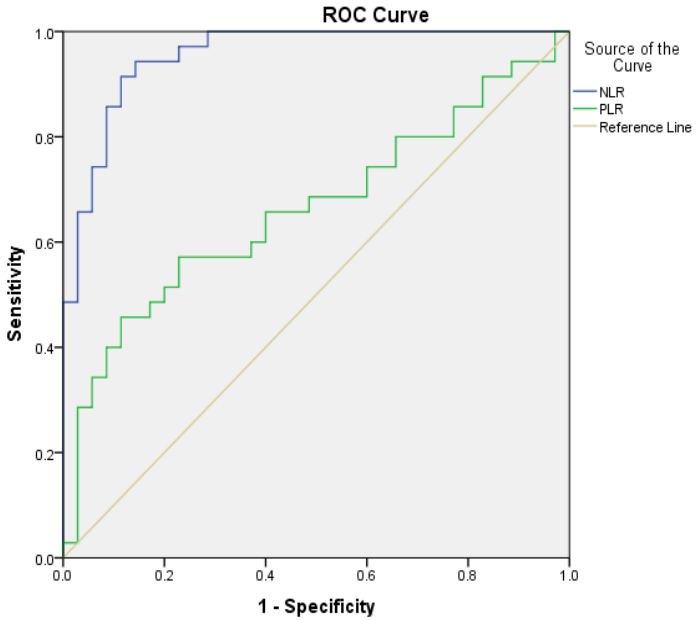

Figure (1): ROC curve analysis of NLR and PLR for detection of PPROM.

DISCUSSION

PROM is defined as an early fetal membrane significant risk factor for prenatal death and morbidity. Moreover, PROM, the primary factor in preterm birth, has previously been linked to various negative consequences on both the mother and the fetus [7].

Recently, the propensity of numerous inflammatory markers to detect membrane rupture at an early stage was examined. In recent years, peripheral blood cells have been used to obtain diagnostic values for the inflammatory markers PLR and NLR. PLR and NLR can be employed as early diagnostic markers and prognosis predictors for a number of acute and chronic inflammatory illnesses, according to studies. NLR predicts the severity of sepsis by combining neutrophil and lymphocyte counts. PLR, on the other hand, integrates lymphocyte and platelet counts and is a crucial measure for determining the severity of a disease [8].

This study found that the case group had higher ESR in the first and second hours than the control group (P<0.05). However, there were no significant changes in CRP between the groups studied (P>0.05). In a previous study by **Loukovaara *et al.*** [9] reported that whereas the control participants' pregnancies were full-term, their patients with PPROM delivered their babies early. Between PPROM patients with normal immunoturbidimetric CRP readings and controls, we did not find any difference in the very sensitive CRP values.

In contrast, there was an increase in the very sensitive CRP throughout follow-up in PPROM patients with consistently normal immunoturbidimetric CRP, suggesting the emergence of low-grade inflammation. This would be consistent with the hypothesis that the majority of preterm labor cases involve intrauterine rupture and labor induction, occurs in 3% of all pregnancies and is a
infection, even in the absence of overt symptoms of infection [10]. As an alternative, corticosteroids and/or antibiotics may have temporarily suppressed CRP production after PPROM, as evidenced by our observation. In this concern, in a study by **Shaaban *et al.*** [11] discovered that among the patients under study, there was a significant correlation between maternal CRP with ESR at the second hour and TLC. Among the patients in the study, the relationship between maternal CRP and ESR within the first hour was not significant.

The current study found that, as compared to the control group, the total leucocyte count, neutrophils, and platelet-to-lymphocyte ratio were all considerably higher in the case group (P<0.05). Lymphocyte levels in the case group were considerably lower (2.24±0.58) than in the control group (3.01±0.89), (P<0.05).

Our findings corroborate those of **Sharami *et al.*** [12], who found that PLR was significantly associated with an elevated risk of PROM, or prenatal rupture of the membranes, which occurs prior to the onset of labor. Their study's PLR results showed a positive correlation between neonate weight and PLR in the PROM group, with PLR being considerably greater in the PROM group. A negative correlation between gestational weeks and PLR, on the other hand, was only found in the group of patients with spontaneous preterm labor. These results are consistent with those of **Toprak *et al.*** [1]. However, **Ozel *et al.*** [13] reported no significant difference in PLR readings between the PPROM and Control groups.

It is important to note that ongoing inflammation encourages the expansion of the megakaryocytic series, which in turn leads to relative thrombocytosis. Moreover, the occurrence of apoptosis causes the lymphocyte count to decrease in chronic inflammation.

Until to this point, PLR readings have not been confined to find early PROM [12]. Data shows that PLR has a negative predictive role on cancer and coronary artery disease, however, and that these values have been investigated with promising results in a range of different illnesses. For example, in the study of **Bharadwaj *et al.*** [14] PLR has been shown to be a speedy, straightforward, and readily available biomarker for the early detection of neonatal sepsis, allowing doctors to handle these cases correctly. Similarly, **Koh *et al.*** [15] PLR was discovered to be an independent indication for higher mortality risk in breast cancer.

The current investigation found that the neutrophil-to-lymphocyte ratio was substantially higher in the case group than in the control group (P<0.05). In the same line in the study of **Ozel *et al.*** [13] NLR readings in the PPROM group were significantly higher than in healthy controls. Moreover, in a prospective case-control research that comprised 121 pregnant women with PPROM and 96 pregnant women experiencing spontaneous preterm labor, **Toprak *et al.*** [1] discovered that the PPROM group had higher NLR levels.

Moreover, **Jung *et al.*** [16] According to their retrospective cohort study, which included patients at 18–24 weeks of pregnancy who underwent amniocentesis before receiving emergency cerclage for cervical insufficiency, a high NLR and high amniotic fluid IL-8 levels showed a significant correlation with the occurrence of spontaneous preterm labor at less than 32 weeks of pregnancy. As a consequence, they suggested that preoperative NLR and amniotic fluid IL-8 levels might be useful in predicting the effectiveness of emergency cerclage in women with cervical insufficiency. In a separate investigation, the associations between maternal blood 25-hydroxyvitamin D, paraoxonase 1, and NLR were investigated in women who gave delivery early spontaneously preterm without clinical chorioamnionitis. Preterm deliveries had a much larger NLR value than term deliveries it was discovered [17].

The current study found that the ultrasonography amniotic fluid index was lower in the case group (5.32±2.67) than in the control group (14.77±2.37), (P<0.001). There were no significant variations in ultrasound gestational age or ultrasound presentation between the tested groups (P>0.05). In the same line **Eltayeb *et al.*** [18] shown that there is a statistically significant difference in AFI between the examined groups. Moreover, **Weissmann-Brenner *et al.*** [19] found that the presence of low AFI aids in the confirmation of the diagnosis of PPROM when there is a suspicion of the condition. Patients with PPROM have considerably lower AFIs as compared to pregnancies with intact membranes.

PLR was found to have significant positive correlations with NLR, RBCS, ESR 1st Hour, ESR 2nd Hour, positive CRP, platelets, TLC, neutrophils, ultrasound gestational age, systolic blood pressure, diastolic blood pressure, temperature (P<0.05) and negative correlations with pus cells, lymphocyte, fluid pooling, and offensive discharge (P<0.05) in the current study. Similar results were seen in a research conducted by **Lakshmi and Sravani** [20]. It should be emphasized that pregnant women above the age of 18 were included in this study, and the majority of the women in both the PROM and control groups were between the ages of 21 and 25. When laboratory measurements were compared to healthy gestational age-matched controls, it was shown that the mean values of total counts, neutrophil counts, platelet lymphocyte ratios, and neutrophil lymphocyte ratios were greater in the cases (pregnant women with PROM). It was statistically significant that the mean values obtained between groups varied.

Their research has shed light on the role of inflammation in PPROM, indicating that increases in inflammatory markers such as NLR and PLR are important predictors of PPROM. Also, in a study by **Toprak *et al.*** [1]**,** women with PPROM had higher NLR and PLR ratios than normal controls.

The NLR cutoff point in the current investigation was found to be 4.658, with an AUC of 0.955, a sensitivity of 97%, and a specificity of 29%. With a sensitivity of 95% and a specificity of 98% at an AUC of 0.663, PLR has a cutoff value of 133.415. However, in a study by **Sharami *et al.*** [12]**,** based on the ROC diagram used to identify PPROM, the best cut-off point for the PLR index was 142.2, with a sensitivity value of 62.7% and a specificity value of 63.3%. This is a reliable threshold and demonstrates an association between PLR values and PROM.

Also, in the study of **Ozel *et al.*** [13] NLR successfully predicted the occurrence of newborn sepsis AUC=0.717 (95% confidence interval 0.610-0.824), P<0.001) with sensitivity and specificity rates of 69.7% and 72.0%, respectively, at a cut-off level of 5.14. Additionally, in a study by **Lakshmi and Sravani** [20] they discovered that PLR had lower sensitivity and specificity (57.8% and 73.7%, respectively) than NLR (69.7% and 72%). As a result, whereas both NLR and PLR are raised in PPROM, the prognostic accuracy of NLR is higher than that of PLR. Although the specific pathophysiology underlying NLR and PLR's prognostic involvement in PPROM is unknown.

Limitation of the study: We omitted various obstetric and medical conditions that could have an impact on the examined parameters, reducing the sample size.

CONCLUSION

When compared to healthy controls, NLR and PLR values in the PPROM group were considerably higher. Consequently, NLR and PLR can be employed as more cost-effective techniques for the management of

patients, especially those with PPROM. In general, PLR ratio and NLR ratio are available cheap markers for detection of PPROM. Also, PLR ratio had higher Specificity than NLR.

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