THE USE OF DIFFERENT COMPLETE BLOOD COUNT PARAMETERS IN PREDICTION OF PRETERM DELIVERY IN WOMEN WITH THREATENED PRETERM LABOR; A PROSPECTIVE STUDY FROM NOVEMBER 2022 TO NOVEMBER 2023

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INTRODUCTION

Preterm labor (PTL) is defined by WHO as the onset of labor after the age of viability which is from 20 to 28 weeks of gestation and before 37 completed weeks.

True labor refers to regular uterine contractions (at least one every 10 minutes), which are gradually increasing in intensity, frequency, and duration associated with either cervical dilatation or rupture of fetal amniotic membranes. If cervical change or rupture of the membranes does not occur, a diagnosis of threatened PTL (TPTL) can be made. Fortunately, about 50% and up to 70% of TPTL women do not deliver preterm and the contractions subside.

Preterm delivery is associated with a significant increase in fetal mortality and morbidity, respiratory problems, high risk of infection, feeding difficulties, visual and hearing weakness, and neurodevelopmental delay. This makes the screening for women at the highest risk of preterm birth and prevention of preterm crucially important.

AIM OF THE WORK

The aim of this work was to assess the use of different blood parameters and ratios {lymphocytes, monocytes, neutrophils, and platelets count, and platelets lymphocytes ratio (PLR), neutrophils lymphocytes ratio (NLR), and lymphocytes monocytes ratio (MLR)} in prediction of preterm delivery in women with threatened preterm labor.

PATIENTS AND METHODS

This prospective study was conducted on 118 women who were recruited from Elshatby Maternity Hospital from November 2022 to November 2023. Group A: 71 patients suffering from PTLP recruited from the emergency department. Group B: 47 patients not suffering from PTLP recruited from the antenatal care clinic.

Patients in both groups were subjected to detailed history taking, General and abdominal examination, Ultrasound assessment, Cardiotocography (CTG) and Complete and differential blood count including hemoglobin, hematocrit, platelets, WBC, neutrophils, lymphocytes, and monocytes count at the time of admission as well as calculation of PLR, NLR and MLR was obtained.

Patients in both groups were followed up to collect the data regarding the gestational age at time of delivery and the fetal weight.

RESULTS

Table 1: Comparison between the two studied groups according to CBC parameters

CBC	Cases (n = 71)	Control (n = 47)	Test of sig.	P
Hemoglobin				
Min. – Max.	11.0 –16.60	11.0 –15.10	t= 1.319	0.190
Mean ± SD.	12.06 ±0.97	11.84 ±0.69		
Median (IQR)	11.80 (11.50 –12.30)	11.70 (11.45 –12.15)		
HCT				
Min. – Max.	36.0 – 43.70	37.0 – 47.0	U= 1322.0	0.056
Mean ± SD.	38.34 ± 1.80	39.65 ± 3.32		
Median (IQR)	38.0 (37.0 – 39.5)	38.40 (37.25 – 39.7)		
Platelet				
Min. – Max.	152.0 – 491.0	150.0 – 421.0	U = 1489.0	0.324
Mean ± SD.	248.9 ± 68.80	237.8 ± 68.88		
Median (IQR)	243.0 (203.5 – 276.5)	222.0 (179.0 – 269.5)		
WBCs				
Min. – Max.	5.67 –37.80	3.80 –15.50	U= 720.500*	<0.001*
Mean ± SD.	13.93 ±5.51	9.37 ±2.56		
Median (IQR)	13.39 (10.25 –15.60)	9.69 (7.55 –11.20)		
Monocyte				
Min. – Max.	0.09 – 21.6	2.0 –14.0	U = 1448.0	0.225
Mean ± SD.	6.20 ± 3.50	6.79 ±2.69		
Median (IQR)	6.0 (4.30 – 7.55)	6.70 (4.95 –8.30)		
Lymphocyte				
Min. – Max.	3.27 –34.70	7.50 –48.0	t= 6.665*	<0.001*
Mean ± SD.	15.06 ±7.51	24.47 ±7.51		
Median (IQR)	14.20 (8.90 –20.30)	24.20 (19.60 –29.40)		
Neutrophils				
Min. – Max.	18.70 –96.50	44.0 –89.0	U = 766.500*	<0.001*
Mean ± SD.	77.20 ±11.56	68.28 ±8.29		
Median (IQR)	78.70 (71.70 –85.75)	68.90 (64.25 –73.75)		
PLR				
Min. – Max.	4.64 – 116.0	3.13 – 32.93	U = 723.5*	<0.001*
Mean ± SD.	24.73 ± 22.15	11.14 ± 6.0		
Median (IQR)	17.30 (11.9 – 29.1)	9.17 (6.99 – 14.0)		
NLR				
Min. – Max.	1.50 –29.51	0.92 – 11.87	U = 650.0*	<0.001*
Mean ± SD.	7.23 ±5.24	3.24 ± 1.78		
Median (IQR)	5.44 (3.55 –9.33)	2.80 (2.2 – 3.80)		
MLR				
Min. – Max.	0.11 –2.48	0.07 – 0.55	U = 1010.5*	<0.001*
Mean ± SD.	0.51 ±0.38	0.30 ± 0.13		
Median (IQR)	0.41 (0.28 –0.56)	0.31 (0.20 – 0.40)		

U: Mann Whitney test p: p value for comparing between the two studied groups.
*: Statistically significant at p ≤ 0.05   IQR: **Inter quartile range**   SD: **Standard deviation.**

Table 2: Diagnostic performance of the most important CBC parameters and ratios as regards their sensitivity, specificity, PPV and NPV to predict women with TPTL

	AUC	P	95% C.I	Cut off#	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
WBCs (×10³)	0.784*	<0.001*	0.704 –0.865	>12.7#	56.34	93.62	93.0	58.7
NLR	0.805*	<0.001*	0.727 –0.884	>3.26#	83.1	65.96	78.7	72.1
MLR	0.697*	<0.001*	0.604 –0.791	>0.37#	60.56	74.47	78.2	55.6
Lymphocyte (%)	0.812*	<0.001*	0.735 –0.890	≤21.3#	81.69	70.21	80.6	71.7
PLR	0.783*	<0.001*	0.700 –0.866	>12.68#	73.24	72.34	80.0	64.2

AUC: Area Under a Curve.   p value: Probability value.
CI: Confidence Intervals.   NPV: Negative predictive value.
PPV: Positive predictive value.   *: Statistically significant at p ≤ 0.05.
#Cut off was choose according to Youden index.

CONCLUSION

Regarding to our results we concluded that; as regards the CBC parameters, the increase in WBC, neutrophils, MLR, PLR and NLR, and the decrease in lymphocytes are expected to be found in women with TPTL.

CBC parameters as: (WBC, lymphocytes and MLR) and determining their cut off values (≥12.7×10³/mm³, ≤21.3%, and >.37 respectively), are of great importance in expecting those at risk of PTL and therefore initiate appropriate management, while Hb, Hct, platelets, neutrophils, monocytes, PLR and NLR cannot predict those at risk of PTL according to this study.