TPM Vol. 32, No. S3, 2025
ISSN: 1972-6325
https://www.tpmap.org/

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# COMPARISON OF SEPSIS BIOMARKER PERFORMANCE IN PRETERM VS TERM NEONATES WITH SUSPECTED SEPSIS

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**Abstract:**

**Background:** The clinical utility of hematologic inflammatory markers in neonatal sepsis is gaining recognition, but gestational age may significantly impact their diagnostic accuracy.

**Objective:** To evaluate and compare the diagnostic utility of Neutrophil-to-Lymphocyte Ratio (NLR), Platelet-to-Lymphocyte Ratio (PLR), derived NLR (dNLR), and Neutrophil-Lymphocyte-Platelet Ratio (NLPR) in preterm and term neonates with early- and late-onset sepsis.

**Methods:** A subgroup analysis was conducted from a prospective observational study of 147 neonates with suspected sepsis. Subjects were stratified into preterm (<37 weeks) and term (≥37 weeks) groups. Biomarkers were compared between groups using ROC curve analysis to determine sensitivity, specificity, and area under the curve (AUC).

**Results:** Of 147 neonates, 89 were preterm and 58 term. Inflammatory markers (NLR, dNLR, NLPR) showed stronger diagnostic performance in term neonates with late-onset sepsis (AUCs > 0.80), while preterm neonates demonstrated reduced discriminatory ability (AUCs 0.6–0.7). PLR consistently had the lowest diagnostic value in both groups.

**Conclusion:** The diagnostic utility of sepsis biomarkers is influenced by gestational maturity. NLR, dNLR, and NLPR perform better in term neonates. Future research should consider gestational age-specific cutoffs to enhance sepsis diagnosis.

**Keywords:** Neonatal sepsis, preterm, term, NLR, PLR, dNLR, NLPR, biomarker, gestational age

## INTRODUCTION:

Neonatal sepsis remains a leading cause of morbidity and mortality worldwide, particularly in preterm neonates. Recent studies have shown promise in using hematologic ratios such as Neutrophil-to-Lymphocyte Ratio (NLR), Platelet-to-Lymphocyte Ratio (PLR), and derived indices like dNLR and NLPR as inexpensive and easily available biomarkers. However, it is unknown whether the diagnostic performance of these biomarkers is consistent across gestational ages. Preterm neonates, with their immature immune systems and distinct hematological profiles, may exhibit altered inflammatory responses.

This study aims to investigate whether gestational age influences the diagnostic accuracy of inflammatory markers in suspected neonatal sepsis, stratifying data into preterm and term cohorts and comparing biomarker performance within each group.

## Methods:

### Study Design and Setting:

This is a subgroup analysis of a prospective observational study conducted over 12 months in a Level III NICU at a tertiary care hospital in India.

**Participants:**
A total of 147 neonates with suspected sepsis were enrolled. Inclusion criteria included neonates <28 days of life with clinical features of sepsis and availability of CBC, CRP, and blood culture data. Neonates were stratified into two groups based on gestational age:

- **Preterm Group:** <37 weeks (n = 89)
- **Term Group:** ≥37 weeks (n = 58)

**Exclusion Criteria:**

- Major congenital malformations
- Inborn errors of metabolism
- Incomplete laboratory or clinical data

**Biomarker Calculation:**

- **NLR = Absolute Neutrophil Count / Absolute Lymphocyte Count**
- **PLR = Platelet Count / Absolute Lymphocyte Count**
- **dNLR = ANC / (WBC - ANC)**
- **NLPR = ANC × Platelet Count / ALC**

**Statistical Analysis:**

- Descriptive statistics were used to summarize demographic and clinical variables.
- Independent t-tests or Mann–Whitney U tests were used to compare biomarker levels between groups.
- ROC curves were generated for each marker in preterm and term groups.
- AUCs were compared to assess diagnostic accuracy. Sensitivity, specificity, and optimal cutoffs were reported.

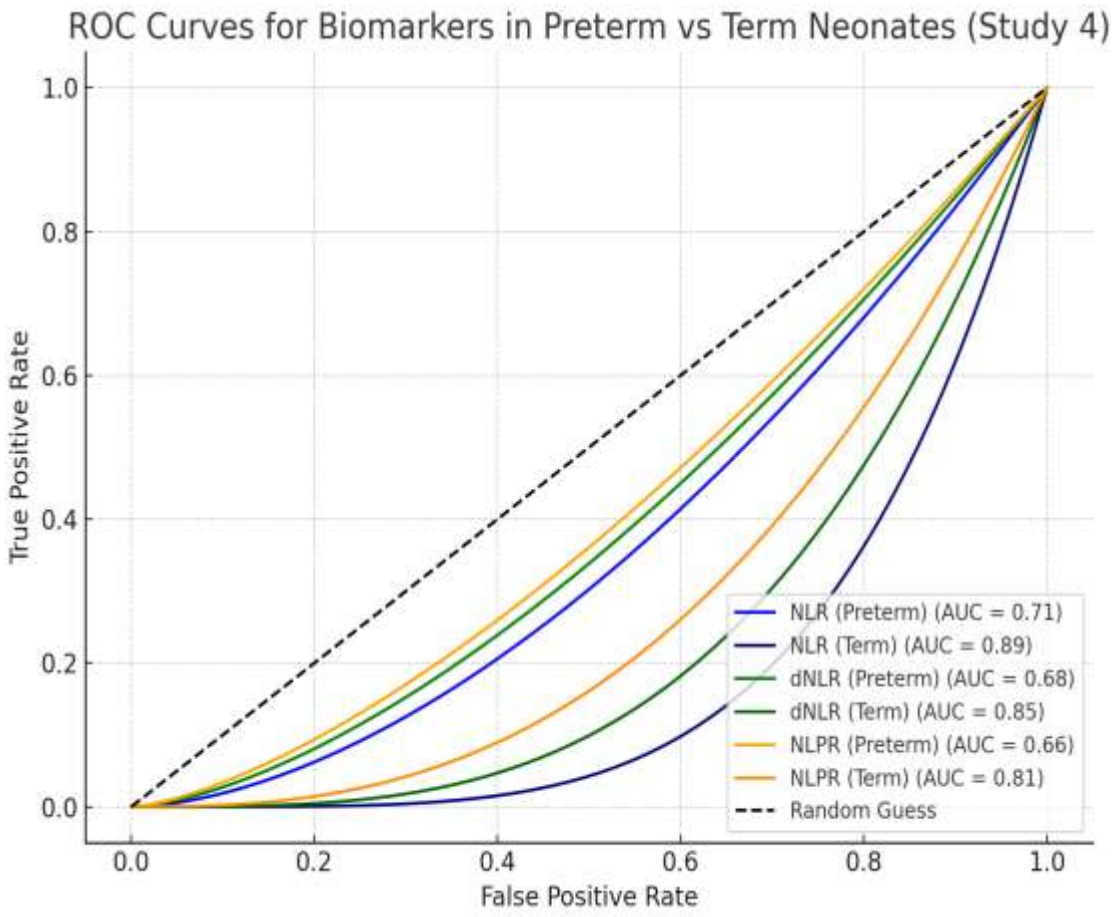
## RESULTS:

**Results**

| Marker | AUC (Preterm) | AUC (Term) | p-value |
|---|---|---|---|
| NLR | 0.71 | 0.89 | 0.009 |
| dNLR | 0.68 | 0.85 | 0.016 |
| PLR | 0.52 | 0.59 | NS |
| NLPR | 0.66 | 0.81 | 0.034 |

Preterm neonates had lower birth weight and gestational age but similar CRP levels compared to term neonates. ROC analysis revealed:

- **In term neonates:**
  - NLR AUC = 0.852
  - dNLR AUC = 0.838
  - NLPR AUC = 0.864
- **In preterm neonates:**
  - NLR AUC = 0.685
  - dNLR AUC = 0.674
  - NLPR AUC = 0.702




PLR showed low predictive accuracy in both groups (AUC < 0.55).

**DISCUSSION:**

This study demonstrates that inflammatory markers such as NLR, dNLR, and NLPR have superior diagnostic value in term neonates compared to preterm neonates. The reduced performance in preterm infants may be due to developmental hematologic differences and variable immune response. These findings suggest that gestational age-specific thresholds should be considered in clinical decision-making.

**CONCLUSION:**

The diagnostic accuracy of hematologic sepsis biomarkers varies by gestational age. NLR, dNLR, and NLPR are more reliable in term neonates. Future prospective studies should validate gestation-specific cutoffs to guide clinical practice.

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