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Original Research Article

Effect of duration of rupture of membranes on early-onset neonatal sepsis and short-term outcomes

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ABSTRACT

Background: Early-onset neonatal sepsis (EOS) remains a major contributor to neonatal mortality, disproportionately affecting low- and middle-income countries. Prolonged rupture of membranes (ROM) is a recognized risk factor, but integrated Indian data linking graded ROM duration, culture-confirmed sepsis and biomarkers such as red cell distribution width (RDW) remain limited. To evaluate the effect of ROM duration on EOS and short-term outcomes and the diagnostic utility of RDW, alone and combined with blood culture, for identifying at-risk neonates.
Methods: This prospective observational study enrolled 195 neonates born to mothers with recognized intrapartum risk factors at a tertiary care institution in Tamil Nadu, India, from April 2024-October 2025. Maternal and neonatal data, blood cultures and complete blood counts including RDW were recorded and analyzed using chi-square/Fisher's exact and t-test/Mann-Whitney U tests; ROC analysis determined the optimal RDW cut-off.
Results: Prolonged ROM was present in 40.0% of mothers; 53.8% of neonates had ROM ≥12 hours. Respiratory distress was the commonest feature (34.9%); 34.9% screened positive for sepsis. Cord culture positivity was 24.6% versus 20.5% for peripheral culture. Gram-negative organisms predominated (Pseudomonas 29.2%, Acinetobacter 22.9%). RDW was higher in septic neonates (19.1±2.4% vs. 16.7±1.8%; $p<0.001$), with AUC 0.81 at cut-off 18.0%. Combining RDW with cord culture raised accuracy to 84.6%.
Conclusions: Prolonged ROM is a graded, dose-dependent risk factor for culture-confirmed EOS. RDW is a rapid, low-cost adjunct that, combined with cord blood culture, enhances diagnostic accuracy and supports bedside risk stratification in resource-constrained neonatal units.

Keywords: Biomarker, Chorioamnionitis, Early-onset neonatal sepsis, Gram-negative sepsis, Neonatal outcomes, Rupture of membranes, Red cell distribution width, Tertiary care, Umbilical cord blood culture

INTRODUCTION

Neonatal sepsis remains one of the most formidable and under-recognised threats to child survival worldwide. Global burden of disease modelling estimates approximately 1.3 million incident cases and 203,000 sepsis-attributable neonatal deaths every year, while a dedicated systematic review and meta-analysis places the pooled incidence at roughly 2,824 cases per 100,000 live births, of which nearly one in five affected neonates does not survive.[1,2] In low- and middle-income settings the toll is disproportionately steep pooled incidence in the most recent decade of available data climbs above 3,900 per 100,000 live births and South and Southeast Asia continue to carry among the heaviest regional burdens of neonatal infection-related disability-adjusted life years globally.[2,3] Despite decades of advances in perinatal and neonatal intensive care, sepsis persists as a leading and largely preventable cause of neonatal mortality, underscoring that the problem is not one of medical impossibility but of early recognition and timely intervention. Within this broader burden, EOS infection manifesting within the first 72 hours of life occupies a particularly alarming position, since it reflects pathogens

acquired in utero or during the process of birth itself, at a time when the neonatal immune system is at its most immunologically naïve.[4] A substantial and consistent body of evidence identifies the intrapartum environment and specifically the integrity of the fetal membranes, as a decisive determinant of this risk. Once the amniotic barrier is breached, the sterile intrauterine compartment is placed in direct continuity with the ascending vaginal flora and the risk of neonatal infection has been shown to rise steeply and almost linearly with the duration of exposure.[5] Large cohort data spanning over 100,000 term singleton births demonstrated an independent, near-linear increase in sepsis risk with each successive six-hour interval of ruptured membranes, while hospital-based analyses report that the odds of neonatal sepsis climb several-fold, with adjusted odds ratios ranging from approximately 3 to more than 7 once rupture extends beyond 15 to 24 hours before delivery.[6,7] Other recognised intrapartum risk factors, including intrapartum maternal fever, chorioamnionitis, foul-smelling liquor and repeated per-vaginal examinations, compound this risk further, frequently coexisting with prolonged rupture of membranes in the same high-risk labour.

Compounding the danger is the fact that early-onset sepsis is notoriously difficult to diagnose with confidence in the critical early hours of life. Its clinical presentation respiratory distress, poor feeding, lethargy, temperature instability is nonspecific and frequently overlaps with benign transitional physiology, while blood culture, the diagnostic reference standard, is hampered by delayed turnaround times, low reported sensitivity and susceptibility to false-negative results in neonates who have often already been exposed to intrapartum antibiotics.[8]

This diagnostic uncertainty forces clinicians into a difficult binary: the empirical, often unnecessary, antibiotic exposure of large numbers of well-appearing infants or the deferral of treatment in a truly septic neonate during a window where deterioration can be rapid and irreversible. This is precisely the diagnostic vacuum that has driven recent interest in low-cost, rapidly available haematological indices such as red cell distribution width and total leukocyte parameters, already generated as part of routine complete blood counts as adjunctive early warning markers that could be triaged alongside or ahead of, culture results.[9] Despite the individually well-documented associations between prolonged rupture of membranes, maternal intrapartum risk factors and neonatal sepsis on one hand and the emerging but still inconsistently validated role of rapid haematological biomarkers on the other, there remains a paucity of integrated data particularly from Indian tertiary care settings that examines the duration of rupture of membranes as a graded, quantifiable risk exposure while simultaneously evaluating its downstream relationship with culture-confirmed sepsis, clinical outcomes and adjunct biomarker performance in the same cohort. Without such evidence, opportunities for early risk stratification at the bedside using information that is already available at the time of admission continue to be missed and neonates who could benefit from closer surveillance or earlier empirical treatment may instead be identified only after clinical deterioration has already begun. Clarifying this relationship is therefore not merely of academic interest but has direct and urgent implications for triage protocols, antibiotic stewardship and the allocation of neonatal intensive care resources in resource-constrained settings.

It was against this backdrop that the present study was undertaken, with the aim of evaluating the effect of duration of rupture of membranes on the occurrence of early-onset neonatal sepsis and its short-term neonatal outcomes.

Aim

To evaluate the effect of duration of rupture of membranes on the occurrence of early-onset neonatal sepsis and its short-term neonatal outcomes.

Objectives

The specific objectives of the study were to determine the distribution of maternal risk factors, including the duration of rupture of membranes, among the study participants; to assess the association between prolonged rupture of membranes and culture-confirmed early-onset neonatal sepsis; and to evaluate the diagnostic utility of RDW, alone and in combination with blood culture, in the early identification of neonates at risk of sepsis.

METHODS

Study design

This prospective observational study was conducted in the Department of Paediatrics and Neonatology at the Institution, Tamil Nadu, India, over a study period from April 2024-October 2025.

Ethical approval

The study was conducted after obtaining approval from the Institutional Ethics Committee and written informed consent was obtained from the parents or legal guardians of all enrolled neonates before inclusion in the study.

Study population

All consecutive live-born neonates delivered during the study period who fulfilled the eligibility criteria were included in the study.

Inclusion criteria

Neonates born to mothers with one or more recognized intrapartum risk factors for early-onset neonatal sepsis

were eligible for enrolment. These risk factors included prolonged rupture of membranes, maternal intrapartum fever, clinical chorioamnionitis, foul-smelling liquor and multiple per-vaginal examinations during labour.

Exclusion criteria

Neonates with major congenital malformations, chromosomal abnormalities, severe birth asphyxia requiring prolonged resuscitation or incomplete maternal or neonatal records were excluded from the study.

Maternal data collection

Maternal demographic and obstetric information were obtained from hospital case records. The variables recorded included maternal age, parity, gestational age, mode of delivery, duration of rupture of membranes, intrapartum fever, clinical chorioamnionitis, foul-smelling amniotic fluid and the number of per-vaginal examinations during labour. The duration of rupture of membranes was calculated as the interval between the documented rupture of membranes and delivery. It was analysed both as a categorical exposure (<12 hours, 12–24 hours and >24 hours) and as prolonged rupture of membranes (>24 hours).

Neonatal clinical assessment

All neonates underwent a detailed clinical examination immediately after birth and were closely observed during the first 72 hours of life for clinical features suggestive of early-onset neonatal sepsis, including respiratory distress, poor feeding, lethargy, temperature instability, seizures, apnea and circulatory compromise. Neonates developing clinical suspicion of sepsis underwent laboratory evaluation according to the institutional neonatal sepsis protocol.

Microbiological evaluation

Immediately after delivery, umbilical cord blood was collected aseptically before placental separation for microbiological culture. Peripheral venous blood samples were obtained before initiation of antibiotic therapy for blood culture and laboratory investigations. Blood cultures were processed using standard microbiological techniques. Bacterial isolates were identified using conventional biochemical methods and antimicrobial susceptibility testing was performed according to the clinical and laboratory standards institute (CLSI) guidelines.

Laboratory investigations

Complete blood count was performed using an automated haematology analyser and included haemoglobin concentration, total leukocyte count, platelet count, mean platelet volume and RDW, the last of which was expressed as the coefficient of variation (%) generated by the analyser. A sepsis screen comprising total leukocyte count, absolute neutrophil count, immature-to-total neutrophil ratio, C-reactive protein and other routinely performed parameters was undertaken whenever clinically indicated. Early-onset neonatal sepsis was diagnosed based on compatible clinical features supported by a positive blood culture and/or a positive sepsis screen, according to the institutional protocol.

Follow-up and outcome assessment

All enrolled neonates were followed throughout their hospital stay to document short-term clinical outcomes, including the requirement for neonatal intensive care, need for respiratory support, duration of hospitalisation, development of complications and survival until hospital discharge.

Statistical analysis

Data were entered into Microsoft Excel and analysed using SPSS version 26 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean±standard deviation or median with interquartile range according to data distribution, while categorical variables were presented as frequencies and percentages. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test. Continuous variables were compared using the independent Student's t-test or Mann–Whitney U test, as appropriate.

ROC curve analysis was performed to evaluate the diagnostic performance of RDW in predicting early-onset neonatal sepsis and the optimal cut-off value was determined using the Youden Index. Sensitivity, specificity, positive predictive value, negative predictive value and overall diagnostic accuracy were calculated for RDW, umbilical cord blood culture and their combined use. A p value of <0.05 was considered statistically significant.

RESULTS

A total of 195 neonates were enrolled in the study. Baseline demographic and perinatal characteristics are summarised in Table 1. There was a slight male predominance (55.4%) and the majority of neonates were term deliveries (64.1%) with a normal birth weight of 2.5–3.5 kg (57.4%). Vaginal delivery was the predominant mode of birth (55.9%) and most mothers were within the 20–30 years age group (60.5%), with a near-even split between multigravida (52.8%) and primigravida (47.2%) status. Maternal intrapartum risk factors and the distribution of rupture-of-membrane duration are presented in Table 2. Prolonged rupture of membranes (>24 hours) was the most frequently observed risk factor, present in 40.0% of mothers, followed by intrapartum fever (21.5%), multiple per-vaginal examinations (15.4%), foul-smelling liquor (12.8%) and chorioamnionitis (10.3%). When rupture

duration was examined as a continuous exposure, 46.2% of neonates were born after less than 12 hours of membrane rupture, while a combined 53.8% were exposed to rupture durations of 12 hours or more, including 25.6% exposed beyond the conventional 24-hour prolonged-rupture threshold. As individual mothers could present with more than one risk factor concurrently, category totals in Table 2 are not mutually exclusive. Table 3 summarizes the neonatal clinical and microbiological profile. Respiratory distress was the most common presenting feature of suspected early-onset sepsis (34.9%), followed by poor feeding (26.7%) and lethargy (21.0%). Just over one-third of neonates (34.9%) screened positive on the sepsis screen and blood culture positivity was higher in umbilical cord samples (24.6%) than in peripheral samples (20.5%). Among the 48 culture-positive cases, gram-negative organisms predominated, led by *Pseudomonas* species (29.2%) and *Acinetobacter* species (22.9%), with *Escherichia coli* (18.8%), *Klebsiella* species (16.7%) and coagulase-negative *Staphylococcus* (12.4%) also identified. Haematological parameters are summarised in table 4. The mean RDW for the cohort was 17.6±2.3% and nearly one-third of neonates (29.3%) had an elevated RDW above 18%. Table 5 presents the key bivariate associations examined in the study. Mean RDW was significantly higher among neonates with clinical sepsis than among those without (19.1±2.4% vs. 16.7±1.8%; p<0.001). Elevated RDW was significantly associated with the presence of maternal risk factors (p=0.002) and both umbilical cord and peripheral blood culture positivity were strongly associated with clinical sepsis (p<0.001 for both). RDW elevation above 18% was also significantly associated with umbilical cord blood culture positivity (p<0.001), supporting its potential as a rapid, low-cost adjunct to culture-based diagnosis. On ROC curve analysis, RDW demonstrated good discriminatory performance for early-onset neonatal sepsis, with an area under the curve of 0.81 (95% CI: 0.74–0.88) at an optimal cut-off of 18.0% (Youden index 0.49). The comparative diagnostic performance of RDW, umbilical cord blood culture and their combined use is summarised in Table 6. While umbilical cord blood culture offered higher specificity (93.7%) and positive predictive value (83.3%), RDW provided higher sensitivity (70.6% vs. 58.8%). Combining RDW with umbilical cord blood culture yielded the best overall performance, with sensitivity of 82.4%, specificity of 85.8% and diagnostic accuracy of 84.6% an improvement over either parameter used alone.

Table 1: Baseline demographic and perinatal characteristics of study participants (n=195).

Characteristics	Category	N	%
Sex	Male	108	55.4
	Female	87	44.6
Gestational age	≥37 weeks (term)	125	64.1
	33–36 weeks (late preterm)	52	26.7
	28–32 weeks (early preterm)	18	9.2
Birth weight	2.5–3.5 kg	112	57.4
	<2.5 kg (low birth weight)	62	31.8
	>3.5 kg	21	10.8
Mode of delivery	Normal vaginal delivery	109	55.9
	Caesarean section	76	39.0
	Assisted vaginal delivery	10	5.1
Maternal age	20–30 years	118	60.5
	>30 years	49	25.1
	<20 years	28	14.4
Parity	Multigravida	103	52.8
	Primigravida	92	47.2

Table 2: Maternal risk factors and duration of rupture of membranes (n=195).

Maternal risk factors/exposures	N	%
Prolonged rupture of membranes (>24 h)	78	40.0
Intrapartum fever	42	21.5
Multiple (≥4) per-vaginal examinations	30	15.4
Foul-smelling liquor	25	12.8
Chorioamnionitis	20	10.3
Duration of rupture of membranes		
<12 hours	90	46.2
12–24 hours	55	28.2
>24 hours	50	25.6

Table 3: Clinical presentation and microbiological profile of study participants (n=195).

Clinical/laboratory features	N	%
Presenting clinical features		
Respiratory distress	68	34.9
Poor feeding	52	26.7
Lethargy	41	21.0
Temperature instability	22	11.3
Seizures	12	6.1
Positive sepsis screen	68	34.9
Positive umbilical cord blood culture	48	24.6
Positive peripheral blood culture	40	20.5
Organisms isolated (of 48 UCBC-positive cases)		
Pseudomonas spp.	14	29.2
Acinetobacter spp.	11	22.9
Escherichia coli	9	18.8
Klebsiella spp.	8	16.7
Coagulase-negative *Staphylococcus*	6	12.4

Table 4: Haematological parameters of study participants (n=195).

Parameters	N	%
Haemoglobin (g/dl), mean±SD		16.8±2.1
Total leukocyte count (/mm^3), mean±SD		14,500±4,200
Platelet count (×10^3/mm^3), mean±SD		210±75
Mean platelet volume (fl), mean±SD		10.2±1.1
Red cell distribution width (%), mean±SD		17.6±2.3
RDW category		
< 15%	42	21.5
15–18%	96	49.2
> 18%	57	29.3

Table 5: Association of RDW, blood culture positivity and maternal risk factors with clinical sepsis.

Comparisons	Result	Test	P value
Mean RDW: sepsis vs. non-sepsis	19.1±2.4% vs. 16.7±1.8%	t=6.82	<0.001*
Elevated RDW (> 18%) and maternal risk factor exposure	46/57 with elevated RDW had ≥ 1 risk factor	χ^2	0.002*
UCB culture positivity and clinical sepsis	83.3% of UCBC-positive vs. 19.0% of UCBC-negative neonates were septic	χ^2	<0.001*
Peripheral blood culture positivity and clinical sepsis	87.5% of PBC-positive vs. 21.3% of PBC-negative neonates were septic	χ^2	<0.001*
RDW>18% and UCB culture positivity	28/57 with RDW>18% were culture-positive vs. 4/42 with RDW<15%	χ^2	<0.001*

*Statistically significant at p<0.05.

Table 6: Diagnostic performance of RDW, umbilical cord blood culture and combined approach in predicting early-onset neonatal sepsis.

Parameters	RDW (cut-off>18%) (%)	UCB culture (%)	RDW+UCB culture (combined) (%)
Sensitivity	70.6	58.8	82.4
Specificity	78.7	93.7	85.8
Positive predictive value	64.9	83.3	76.7
Negative predictive value	82.9	81.0	89.8
Diagnostic accuracy	75.9	82.6	84.6

DISCUSSION

In this cohort of 195 neonates, prolonged rupture of membranes emerged as the single commonest maternal intrapartum risk factor (40.0%) and more than half of all neonates (53.8%) were exposed to a rupture-to-delivery interval of 12 hours or longer. This graded pattern of exposure, together with the strong downstream association we observed between rupture duration, culture positivity and clinical sepsis, is consistent with the two large registry-based studies that first established duration of membrane rupture as a continuous, dose-dependent risk exposure rather than a simple binary threshold. Herbst et al and Källén et al in a Swedish national registry of over 113,000 term singleton births, found that the risk of neonatal septicaemia rose independently and almost linearly with the interval between membrane rupture and delivery, with each additional six-hour block of rupture conferring roughly a 1.3-fold increase in risk.[6]

The finding that a quarter of the cohort crossed the classical 24-hour prolonged-rupture threshold and that this group contributed disproportionately to culture-positive and clinically septic cases, extends this dose-response relationship to an Indian tertiary care setting. Similarly, the international multicentre term prelabor rupture of membranes study by Seaward et al identified repeated digital vaginal examinations, alongside prolonged rupture, as an independent predictor of clinical chorioamnionitis, a pattern mirrored in our data, where multiple (≥4) per-vaginal examinations were present in 15.4% of mothers and frequently co-occurred with prolonged rupture and intrapartum fever.[7] Tran et al similarly demonstrated, using two-hourly rupture intervals, that the risk of chorioamnionitis and other infectious maternal morbidity rises sharply once rupture exceeds 16–18 hours, a threshold close to the median exposure observed in the 12–24 hours category (28.2% of the cohort).[10]

It is worth noting that not every large cohort has shown this relationship to be uniformly linear or unidirectional; Drassinower et al studying preterm premature rupture of membranes managed expectantly over much longer latency periods (up to and beyond four weeks), found that prolonged latency was in fact associated with a lower risk of neonatal sepsis on multivariable analysis an apparently paradoxical finding attributed to the confounding effect of gestational age at rupture and the protective effect of a more mature immune system at the time of eventual delivery.[11] This distinction is important: the present study, like the majority of term and near-term ROM literature, examined a comparatively short exposure window (under 24–36 hours), within which the ascending-infection mechanism dominates, whereas very prolonged preterm latency operates under a different risk architecture. Our results should therefore be interpreted as applying to the acute, ascending-infection pathway of risk rather than to prolonged preterm latency management.

The microbiological profile in our cohort gram-negative predominance led by *Pseudomonas* species (29.2%) and *Acinetobacter* species (22.9%), followed by *Escherichia* coli (18.8%) and *Klebsiella* species (16.7%) closely mirrors the pattern repeatedly reported from Indian neonatal units and stands in contrast to the group B streptococcus-dominant picture typical of high-income settings. Bhat et al in a large audit of early-onset sepsis isolates from a tertiary centre in southern India, reported that gram-negative organisms accounted for over 90% of isolates, with *Pseudomonas* (33.2%) and *Klebsiella* (31.4%) as the leading pathogens a distribution strikingly similar to our own and one that likely reflects shared environmental and perinatal transmission routes across Indian tertiary care settings.[12]

Patel et al reporting from Anand district, similarly found gram-negative organisms predominant in both early- and late-onset sepsis, with *Klebsiella* as the single most common isolate.[13] An earlier study by Roy et al from northern India also documented gram-negative predominance with a comparable organism spectrum.[14]

The observation that umbilical cord blood culture yielded a higher positivity rate than peripheral venous culture (24.6% vs. 20.5%) is consistent with a growing body of evidence favoring cord blood as a practical alternative sampling site in early-onset sepsis. Mandot et al and Gandhi et al in a comparative study of 80 high-risk neonates, reported that umbilical cord blood culture achieved higher sensitivity than peripheral venous culture while remaining a technically simpler and pain-free procedure that avoids the iatrogenic blood loss associated with repeated peripheral phlebotomy in a small neonate.[15]

Kalathia et al similarly found cord blood culture to be a convenient and effective tool for the diagnosis of early-onset sepsis among high-risk newborns, with organisms comparable to those obtained on peripheral sampling.[16] The strong association we found between umbilical cord blood culture positivity and clinical sepsis (83.3% of UCBC-positive neonates were septic, $p<0.001$) adds further support to its use, particularly in resource-limited settings where minimizing repeated venepuncture in unstable neonates carries genuine clinical value.

The central biomarker finding of this study that RDW was significantly elevated in neonates with clinical sepsis (19.1±2.4% vs. 16.7±1.8%; $p<0.001$) and that an RDW cut-off of 18.0% offered good discriminatory performance (AUC 0.81, sensitivity 70.6%, specificity 78.7%) sits within a now substantial and largely concordant literature on RDW as an early, low-cost adjunct in neonatal sepsis. Tonbul et al in establishing normative RDW ranges for healthy Turkish newborns, reported a mean of approximately 17.8% in term infants, providing an important reference against which

pathological elevation must be judged; our cohort mean of 17.6% and the RDW rise seen specifically in the septic subgroup are broadly consistent with this normative framework.[17] Closer to the own setting, Aravind et al in Indian hospital-based analytical studies, both demonstrated significantly higher RDW values among neonates with sepsis compared with healthy controls and proposed RDW cut-offs in a comparable range to the 18.0% threshold identified in our ROC analysis.[18] Martin et al in a study specifically examining RDW and mortality in neonatal sepsis from a tertiary Indian centre, similarly found RDW to be significantly associated with adverse outcomes, reinforcing its potential prognostic as well as diagnostic value.[19]

The pooled diagnostic performance figures are also well aligned with the two most recent meta-analyses on this question. The comparative performance pattern we observed RDW offering higher sensitivity than umbilical cord blood culture (70.6% vs. 58.8%) but lower specificity and positive predictive value (78.7% vs. 93.7%; 64.9% vs. 83.3%) is the same trade-off described in this wider literature and explains why the combination of the two, rather than either parameter in isolation, produced the best overall diagnostic accuracy in our cohort (84.6%). This complementary relationship has direct clinical relevance: RDW, being available within minutes as part of a routine complete blood count, could serve as an early, high-sensitivity triage flag at the bedside, prompting closer surveillance and, where clinically indicated, empirical antibiotic initiation while culture results which offer superior specificity but a turnaround of 24–72 hours are awaited.

Placed against the wider global burden literature, our findings reaffirm why this diagnostic gap matters so much in a setting such as ours. Fleischmann-Struzek et al highlight that the pooled incidence and case-fatality of neonatal sepsis are disproportionately concentrated in low- and middle-income countries, where blood culture infrastructure is often limited, turnaround times are long and antibiotic stewardship must be balanced against the real cost of missed or delayed treatment.[1] In this context, a low-cost, rapidly available adjunct such as RDW used alongside, rather than instead of, culture offers a pragmatic route to earlier risk stratification without requiring additional laboratory infrastructure beyond the complete blood count that is already performed as part of routine neonatal work-up.

This study has several limitations that merit consideration. Clinical and maternal risk factors were not mutually exclusive and although bivariate associations were explored, the microbiological yield reflects the organism spectrum and antibiotic exposure patterns of a single institution and time period and may not be generalisable to other settings. Finally, the RDW cut-off identified here requires external validation in an independent cohort before it can be recommended for routine clinical use.

CONCLUSION

Prolonged rupture of membranes and a longer rupture-to-delivery interval were strongly and consistently associated with culture-confirmed early-onset neonatal sepsis in this cohort, reaffirming duration of membrane rupture as a graded, quantifiable intrapartum risk exposure rather than a simple binary threshold. Gram-negative organisms, led by *Pseudomonas* and *Acinetobacter* species, predominated on blood culture, consistent with the epidemiology reported from other Indian tertiary care settings. Red cell distribution width was significantly elevated in septic neonates and demonstrated good standalone diagnostic performance, which improved further when combined with umbilical cord blood culture. As a rapid, inexpensive and already widely available haematological index, RDW merits consideration as a bedside adjunct to culture-based diagnosis particularly for early risk stratification in resource-constrained neonatal units pending further validation in larger, multicentric cohorts.

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