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Original Research Article

Sepsis in the newborn: urgency and uncertainty in neonatal sepsis

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ABSTRACT

Background: Neonatal sepsis is a syndrome characterized by systemic signs and symptoms of infection along with bacteremia in the first month of life. It remains a leading cause of neonatal morbidity and mortality worldwide, particularly in low- and middle-income countries. Early diagnosis is challenging because of non-specific clinical manifestations.
Methods: A cross-sectional study was conducted from February 2026 to April 2026 at Rapti Academy of Health Sciences, Nepal. Medical records of 125 neonates aged 0-28 days who underwent sepsis screening were analyzed. Clinical, demographic, and laboratory parameters were evaluated to identify predictors of culture-confirmed neonatal sepsis.
Results: Among 125 neonates, 62 (50%) had culture-confirmed sepsis. Gestational age below 30 weeks, CRP ≥12 mg/L, increased monocyte percentage, and low Apgar score (<7 at 5 minutes) were significant predictors of neonatal sepsis. Hypoglycemia, elevated micro-ESR, and abnormal gastric aspirate smear findings were commonly associated with sepsis.
Conclusions: Neonatal sepsis remains a major cause of morbidity and mortality. Early recognition of clinical and laboratory predictors may facilitate prompt diagnosis and timely management, thereby improving neonatal outcomes.

Keywords: Neonatal sepsis, Newborn, C-reactive protein, Blood culture, Prematurity, Neonatal infection

INTRODUCTION

Neonatal sepsis continues to be a major public health problem globally, accounting for a significant proportion of neonatal deaths, especially in developing countries.[1]

According to global estimates, infections contribute to nearly one-third of neonatal mortality.[2,3]

Despite advances in neonatal intensive care, early diagnosis remains a challenge because of subtle and non-specific clinical presentations.[2,8]

Timely identification of risk factors and early initiation of appropriate therapy are crucial in reducing morbidity and mortality associated with neonatal sepsis.[5]

Several clinical and laboratory parameters have been evaluated for their usefulness in the early diagnosis and prediction of neonatal sepsis, but their reliability remains variable across different populations and healthcare settings.[6,7]

The objective of this study was to determine the incidence of culture-confirmed sepsis among clinically suspected neonates and to identify significant clinical and laboratory predictors of neonatal sepsis.

METHODS

A cross-sectional study was conducted from February 2026 to April 2026 at the Department of Pediatrics, Rapti Academy of Health Sciences, Dang, Nepal. Medical

records of 125 neonates aged 0-28 days who underwent sepsis screening were analyzed.

Inclusion criteria

Neonates aged 0-28 days who were clinically suspected of having sepsis and underwent sepsis screening during the study period were included in the study. Neonates with complete clinical and laboratory records available in the hospital database were eligible for analysis.

Exclusion criteria

Neonates older than 28 days and those with incomplete clinical or laboratory records were excluded from the study. Cases with insufficient information required for analysis were also excluded.

Sepsis screening and diagnostic criteria

Neonates were evaluated for sepsis using clinical and laboratory parameters. The sepsis screening protocol included total leukocyte count, absolute neutrophil count, immature neutrophil ratio, micro-ESR, C-reactive protein (CRP), blood culture, cerebrospinal fluid analysis, urine examination and culture, stool examination and culture, gastric aspirate smear, and chest radiography. Immature neutrophils greater than 20% were considered suggestive of neonatal sepsis.

Biochemical parameters

Biochemical investigations included blood sugar, serum bilirubin, blood urea, serum creatinine, and serum electrolyte levels. These parameters were assessed as part of the routine evaluation of suspected neonatal sepsis.

Grouping of study population

The study population was categorized into two groups. The sepsis group included culture-positive neonates with clinical evidence of infection, whereas the non-sepsis group included neonates who did not fulfill the diagnostic criteria for culture-confirmed sepsis. Demographic, maternal, clinical, and laboratory variables were compared between the two groups.

Risk factors for neonatal sepsis

Risk factors for neonatal sepsis were classified as major and minor risk factors. Major risk factors included premature rupture of membranes for more than 24 hours, intrapartum maternal fever, chorioamnionitis, fetal tachycardia (heart rate >160 beats/min), and foul-smelling amniotic fluid. Minor risk factors included rupture of membranes for more than 12 hours, low birth weight, twin gestation, peripartum maternal fever, preterm birth, Apgar score below 6 at one-minute, maternal leukocytosis, maternal colonization with Group B Streptococcus, prolonged labor, birth asphyxia, and the need for resuscitation at birth.

Sampling technique and sample size

A consecutive sampling technique was employed in this study. All neonates aged 0-28 days admitted to Rapti Academy of Health Sciences, Dang, Nepal, who underwent sepsis screening during the study period and fulfilled the inclusion criteria were considered eligible for enrolment. A total of 125 neonates were included in the final analysis.

Statistical analysis

Data were entered into Microsoft excel and analyzed using SPSS version 25.0. Continuous variables were expressed as mean±standard deviation, while categorical variables were presented as frequencies and percentages. A p value of less than 0.05 was considered statistically significant.

Ethical considerations

Permission to conduct the study and access hospital records for research purposes was obtained from Rapti Academy of Health Sciences, Dang, Nepal. Patient confidentiality and anonymity were maintained throughout the study, and no identifying information was included in the analysis.

RESULTS

A total of 125 neonates were included in the study. Among them, 68 (54.4%) were male and 57 (45.6%) were female. Preterm neonates constituted 64.0% of the study population, while 45 (36.0%) were term neonates. Low birth weight (<2500 g) was observed in 71 (56.8%) neonates, whereas 54 (43.2%) had normal birth weight.

Table 1: demographic characteristics of the study population, (n=125).

Variables	N
Male	68 (54.4%)
Female	57 (45.6%)
Preterm neonates	80 (64.0%)
Term neonates	45 (36.0%)
Low birth weight (<2500 g)	71 (56.8%)
Normal birth weight (≥2500 g)	54 (43.2%)

Among the 125 neonates included in the study, 62 (50%) had culture-confirmed sepsis, while 63 (50%) did not have sepsis.

Gestational age <30 weeks, C-reactive protein (CRP) ≥12 mg/L, and higher monocyte percentage were identified as independent predictors of sepsis.

A low Apgar score (<7 at 5 minutes) was also associated with an increased risk of neonatal sepsis.

Serum bilirubin levels (total and direct) were evaluated, and a majority of cases showed unconjugated hyperbilirubinemia. Additionally, hypoglycemia was commonly observed among neonates with sepsis.

Micro-ESR >15 mm and gastric aspirate smear showing >8 neutrophils per high-power field (HPF) were useful indicators for early diagnosis of sepsis.

Leukopenia or absolute neutropenia was observed in approximately 20% of cases, suggesting septicemia

Table 2: Incidence of sepsis, (n=125).

Category	N	Percentage
Sepsis	62	50%
Non-sepsis	63	50%

Table 3: Predictors of neonatal sepsis.

Variables	Finding
Gestational age	<30 weeks
CRP	≥12 mg/l
Monocyte percentage	Increased
Apgar score	<7 at 5 min

Table 4: Laboratory findings.

Parameters	Observation
Serum bilirubin	Unconjugated hyperbilirubinemia
Blood glucose	Hypoglycemia
Micro-ESR	>15 mm
Gastric aspirate	>8 neutrophils/HPF
WBC	Leukopenia/neutropenia (20%)

DISCUSSION

The present study highlights that neonatal sepsis remains a major health concern, particularly in resource-limited settings. The predominance of early-onset sepsis observed in this study is consistent with findings reported in previous studies conducted in South Asia and other developing countries, where early-onset infections continue to contribute substantially to neonatal morbidity and mortality.[2,4,9]

Low birth weight and prematurity were identified as the most common risk factors for neonatal sepsis in the present study. Similar findings have been reported by several investigators who demonstrated that preterm and low birth weight neonates are more susceptible to infection because of the immaturity of the immune system, reduced skin barrier function, and increased exposure to invasive procedures.[3,5,9,11] These findings emphasize the need for careful monitoring and early intervention in high-risk neonates.

Neonatal sepsis continues to be associated with significant morbidity in resource-limited settings. Early diagnosis and prompt treatment remain essential for improving outcomes. Previous studies have emphasized the importance of infection prevention and timely antimicrobial therapy in reducing burden of neonatal sepsis.[6,7,14]

The findings of this study are consistent with previous studies in which prematurity and low birth weight were identified as significant contributors to neonatal sepsis.[3,5,9,11] Furthermore, elevated CRP levels observed in the present study support the findings of earlier investigations that identified CRP as a useful biomarker for the early diagnosis and monitoring of neonatal sepsis.[8,10,14] Low Apgar scores and abnormal laboratory parameters were also associated with an increased risk of neonatal sepsis, which is in agreement with previous reports.[12,15]

Gestational age below 30 weeks was identified as an independent predictor of neonatal sepsis in the present study. Similar findings have been reported in previous studies, which demonstrated that extremely preterm neonates are at a higher risk of infection because of immunological immaturity and prolonged hospitalization.[3,9,11] Furthermore, an increased monocyte percentage was associated with neonatal sepsis in the present study, suggesting an active inflammatory response. Previous studies have also highlighted the role of hematological parameters as useful adjuncts in the diagnosis of neonatal sepsis.[10,14]

Early recognition of clinical and laboratory indicators such as micro-ESR, gastric aspirate smear findings, leukopenia, and neutropenia plays a crucial role in guiding prompt treatment decisions. Similar observations have been reported in previous studies, which highlighted the usefulness of these simple and cost-effective laboratory markers in the early detection of neonatal infections, particularly in resource-limited settings.[8,10,14]

Overall, the findings of the present study support existing evidence that prematurity, low birth weight, elevated CRP levels, abnormal laboratory parameters, and gram-negative bacterial infections remain important determinants of neonatal sepsis. Early diagnosis, prompt initiation of appropriate antimicrobial therapy, and strict infection control measures are essential to improve neonatal outcomes and reduce mortality associated with neonatal sepsis.

CONCLUSION

Neonatal sepsis remains a significant cause of morbidity and mortality, especially in resource-limited settings. Early identification of risk factors such as prematurity,

low birth weight, and elevated inflammatory markers is crucial for timely diagnosis and management. Strengthening neonatal care services and infection control measures can help reduce the burden of neonatal sepsis.

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