

Maternal Risk Factors Associated with Early-Onset Neonatal Sepsis: An Observational Study from a Tertiary Care Centre in Central India

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Abstract

Background: Early-onset neonatal sepsis (EONS) remains a major cause of neonatal morbidity and mortality in developing countries. Maternal infections and intrapartum complications play a pivotal role in the occurrence of EONS. This study aimed to identify maternal risk factors associated with early-onset neonatal sepsis in a tertiary care setting in Central India.

Methods: This observational study was conducted over 18 months in the Department of Obstetrics and Gynaecology, Gandhi Medical College, Bhopal. Mothers whose neonates were diagnosed with early-onset sepsis were included. Maternal demographic, obstetric, and clinical parameters were analyzed. Key maternal risk factors were identified using descriptive analysis.

Results: A total of 170 mother–neonate pairs were included. The majority of mothers were aged 20–30 years, and most were multigravida. Prolonged rupture of

membranes (≥ 18 hours) was observed in 32.9% of cases, pre-term birth in 47.1%, cesarean section associated in 47.6% and meconium-stained amniotic fluid in 17.6%. Male gender (61.8%) and low birth weight (< 2500 g; 70%) were common neonatal findings. Blood culture positivity was 20.6%, with *Staphylococcus aureus* being the predominant organism. Significant associations were found between EONS and maternal factors such as PROM, prolonged labor, and reduced ANC visits.

Conclusion: Prolonged rupture of membranes, pre-term birth and inadequate antenatal care were key maternal determinants of early-onset neonatal sepsis. Improved antenatal care and timely intrapartum interventions can reduce neonatal morbidity and mortality associated with EONS.

Keywords: Early-onset neonatal sepsis, maternal risk factors, PROM, antenatal care, India

Introduction

Neonatal sepsis remains a leading cause of neonatal morbidity and mortality, especially in low- and middle-income countries like India. Early-onset neonatal sepsis (EONS), defined as sepsis occurring within the first 72 hours of life, is primarily due to vertical transmission of pathogens from mother to neonate. Identifying maternal risk factors such as chorioamnionitis, premature rupture of membranes (PROM), prolonged labor and intrapartum fever is crucial to developing preventive strategies. This study aims to assess maternal risk factors associated with EONS in a tertiary care center in Central India.

Materials and Methods

This was an observational study conducted over 18 months at the Department of Obstetrics and Gynaecology, Gandhi Medical College, Bhopal. Mothers whose neonates were diagnosed with EONS were included after obtaining informed consent. Data were collected on maternal sociodemographic characteristics, antenatal visits, presence of infections, PROM, intrapartum fever, and mode of delivery. Neonatal data including birth weight, gestational age, Apgar score, and blood culture results were also recorded. Data were analyzed using descriptive statistics.

Results

A total of 170 mother–neonate pairs were analyzed. The mean maternal age was 25 years, with 81.2% between 20–30 years. Multigravida constituted 52.9% of participants. Only 55.3% had ≥ 4 antenatal visits. PROM ≥ 18 hours occurred in 32.9% of cases, and meconium-stained liquor in 17.6%. The most frequent duration of labor was between 12 and 18 hours, accounting for 40.0% of the cases. Cesarean delivery was performed in 47.6% of cases. Among neonates, 70% were low birth weight, and 47.1% were preterm. Blood culture positivity was found in 20.6%, with coagulase-negative

Staphylococcus aureus, methicillin-resistant Staphylococcus aureus, and methicillin-sensitive Staphylococcus aureus were each isolated as predominant isolates. Significant associations were noted between EONS and PROM ($p < 0.01$), cesarean delivery ($p < 0.05$), pre-term birth ($p < 0.05$), low birth weight ($p < 0.05$) and < 4 ANC visits ($p < 0.05$). The following figures describe the findings.

Figure 1: Distribution of patients according to ANC visits

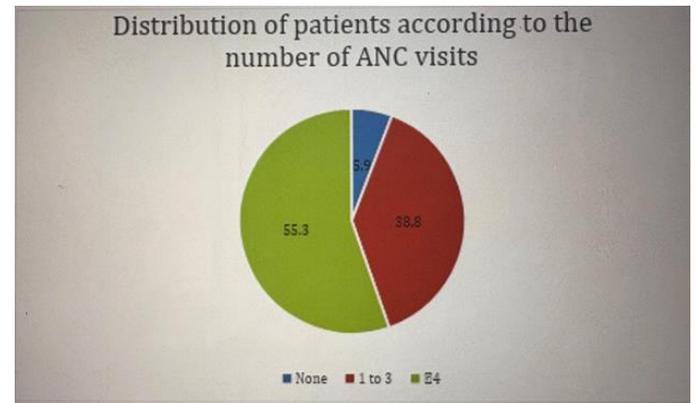


Figure 2: Distribution according to gestational age at delivery

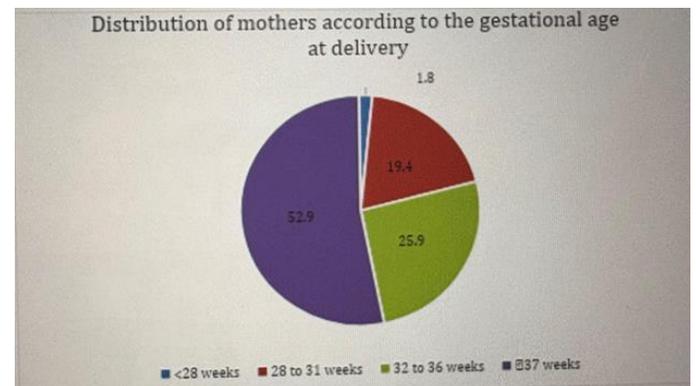


Figure 3: Distribution according to mode of delivery

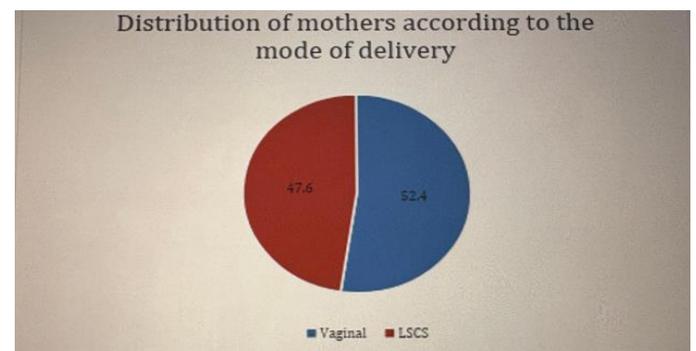


Figure 4: Distribution according to presence of PROM

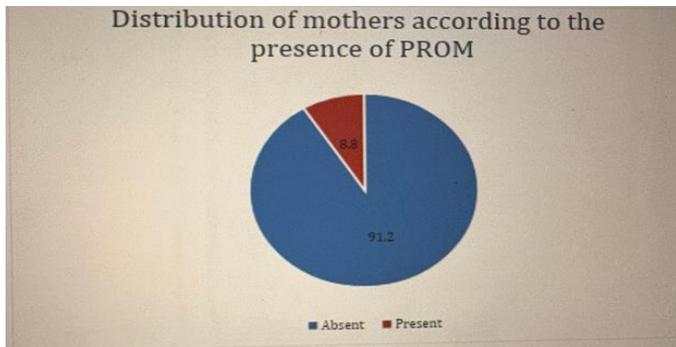


Figure 5: Distribution according to presence of PPRM

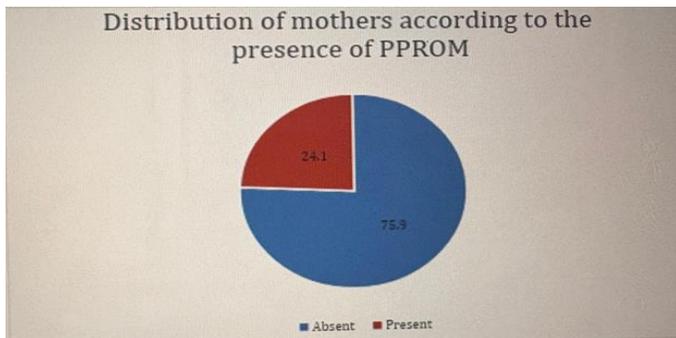


Figure 6: Distribution according to condition of amniotic fluid

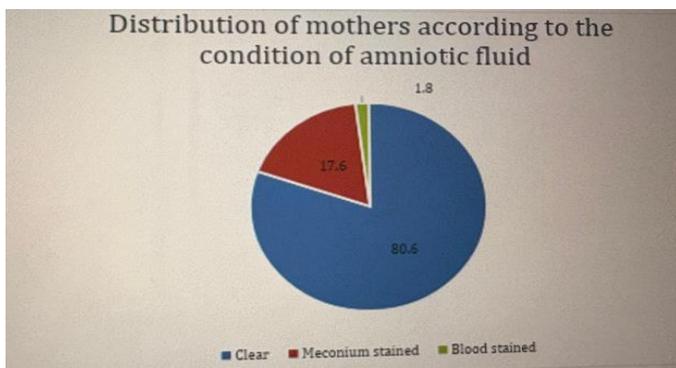


Figure 7: Distribution according to birth weight of neonate

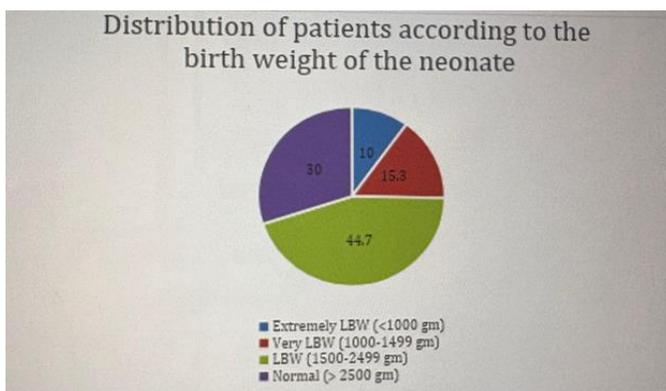
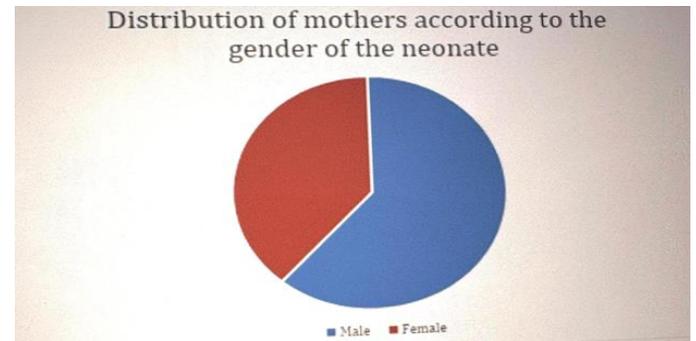


Figure 8: Distribution according to gender of neonate



Discussion

The present study highlights key maternal determinants of EONS, consistent with global and Indian literature. Prolonged rupture of membranes, pre-term birth and cesarean delivery emerged as major contributors, aligning with findings by Guo et al. (2023), Noah et al. (2022) and Ahmed et al. (2019). Reduced antenatal visits were also significantly associated with higher incidence of EONS, emphasizing the importance of comprehensive antenatal care. Among neonatal factors, low birth weight (LBW) neonates and male neonates contributed a significant proportion, as also seen in studies by Chauhan et al. (2023) and Salama et al. (2023). Culture positivity was also seen, similar to other Indian studies. This underscores the need for improved infection control and rational antibiotic use to combat antimicrobial resistance. The strengths of the study include its large sample size and comprehensive focus on maternal, intrapartum and neonatal determinants. Limitations include its single-center nature. Larger multicentric studies are warranted to validate these findings.

Conclusion

Prolonged rupture of membranes, cesarean delivery, pre-term birth and inadequate antenatal care were significant maternal risk factors for early-onset neonatal sepsis. Good antenatal care and timely obstetric interventions can substantially reduce neonatal morbidity and mortality.

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