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RESEARCH ARTICLE

Early-Onset Neonatal Sepsis And Its Association With Maternal Vaginal Infection

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ABSTRACT

Background: Early-onset neonatal sepsis (EONS) is a major contributor to neonatal morbidity and mortality. Maternal vaginal infection is an important source of vertical transmission.

Methods: This prospective observational study was conducted on 80 term neonates born to mothers with risk factors for vaginal infection. High vaginal swab (HVS) cultures were obtained from mothers, and neonates were evaluated using sepsis screen and blood culture.

Results: The incidence of EONS was 37.5% (30/80). Among neonates with EONS, 96.4% had positive sepsis screen, and 40% (12/30) had positive blood cultures. Gram-negative organisms such as Klebsiella (66.6%), E. coli (25%), and Acinetobacter (8.3%) predominated. Significant association was observed between maternal risk factors (UTI, PROM) and EONS.

Conclusion: Maternal vaginal infection is strongly associated with early-onset neonatal sepsis. Early screening using HVS and neonatal sepsis screening can help reduce morbidity and mortality.

Keywords: Early Onset Neonatal sepsis (EONS), Maternal vaginal infections, Chorioamnionitis, Premature rupture of membranes (PROM), Urinary tract Infection (UTI), C- Reactive Protein (CRP), Blood Culture and Sensitivity

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INTRODUCTION

Neonatal sepsis, defined as infection occurring within the first 28 days of life, remains a major cause of neonatal morbidity and mortality. Approximately 20% of neonates develop sepsis in the early neonatal period, with around 1% mortality attributable to sepsis-related causes. Early-onset neonatal sepsis (EONS), occurring within the first 72 hours of life, contributes significantly to neonatal deaths.

Globally, neonatal sepsis accounts for nearly 1.3 million cases annually, with an estimated incidence of 937 per 100,000 live births. In India, the incidence of EONS is approximately 18 per 1000 live births, with regional studies from Telangana reporting rates around 18.3%.

EONS is primarily acquired through vertical transmission of microorganisms from the maternal genital tract before or during delivery. Neonates may be exposed in utero or during passage through the birth canal. Maternal vaginal colonization is a well-established risk factor, with 30–45% of neonates born to colonized mothers developing surface colonization, indicating a high rate of transmission.

Maternal conditions such as chorioamnionitis, premature rupture of membranes (PROM), and urinary tract infection (UTI) significantly increase the risk of neonatal sepsis and adverse pregnancy outcomes. These risks are particularly pronounced in the third trimester.

Early identification of neonates at risk is essential, as clinical signs of sepsis may be subtle and easily missed. Close monitoring and timely intervention are critical to

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Table 1 : Association Between Risk Factors And Incidence Of Eos

Risk Factors	*Incidenceof Eos*					
	No		*Yes*		*Total*	
	Freq	*%*	*Freq*	*%*	*Freq*	*%*
Culture/Sensitivity	1	10.0	9	90.0	10	100.0
Fever	48	88.9	6	11.1	54	100.0
LPV>18	1	6.3	15	93.8	16	100.0
Total	50	62.5	30	37.5	80	100.0

Chi-Square=49.40,df=2,P=0.00

Table 2: Association Between Prom And Incidence Of Eos

Sepsis Screen	*Incidenceof Eos*					
	No		*Yes*		*Total*	
	Freq	*%*	*Freq*	*%*	*Freq*	*%*
Negative	49	94.2	3	5.8	52	100.0
Positive	1	3.6	27	96.4	28	100.0
Total	50	62.5	30	37.5	80	100.0

P=13.44,df=1,Chi-Square=0.00

Table 3 : Association Between Sepsis Screen And Incidence Of Eos

Prom	*Incidenceof Eos*					
	No		*Yes*		*Total*	
	Freq	*%*	*Freq*	*%*	*Freq*	*%*
No	49	70.0	15	30.0	64	100.0
Yes	1	10.0	15	90.0	16	100.0
Total	50	62.5	30	37.5	80	100.0

P=63.8,df=1,Chi-Square=0.00

Table 4: Association Between Clinical Symptoms And Eos

Clinical Symptoms	*Eos(Incidencecalc)*					
	No		*Yes*		*Total*	
	Freq	*%*	*Freq*	*%*	*Freq*	*%*
Dullact	36	70.6	15	29.4	51	100.0
Feed Dec	2	33.3	4	66.7	6	100.0
Fever+	75	45.5	6	54.5	11	100.0
Well Babyt	7	58.3	5	41.7	12	100.0
Total	50	62.5	30	37.5	80	100.0

Chi-Square=5.05,df=3,P=0.16Chi-Square=5.05,df=3,P=0.16

Table 6 : Incidence of EOS in neonates based on sepsis screen parameters in comparison with blood culture

Variables	*Frequency*	*percentage*
Crp>6mg/dl	9	75%
Anc<1800	5	41.6%
It Ratio>0.2	2	16.6%

Table 5 : Asociation Between Blood Culture And Incidence Of Eos

Blood Culture	*Incidenceof Eos*					
	No		*Yes*		*Total*	
	Freq	*%*	*Freq*	*%*	*Freq*	*%*
Negative	50	73.5	18	26.5	68	100.0
Positive	0	0.0	12	100.0	12	100.0
Total	50	62.5	30	37.5	80	100.0

P=23.5,df=1,Chi-Square=0.00

reducing neonatal morbidity and mortality.

OBJECTIVES

- To determine the incidence of early-onset neonatal sepsis
- To evaluate the association between maternal vaginal infection and EONS
- To identify causative organisms
- To assess the utility of sepsis screening

METHODS

Study Design

Prospective observational study

Setting

Princess Esra Hospital, Hyderabad

Duration

Feb 2024 – Oct 2024

Sample Size

80 neonates

Inclusion Criteria

- Term neonates (≥37 weeks)
- Mothers with UTI, PROM >18 hrs, fever, vaginal discharge

Exclusion Criteria

- Preterm neonates
- No consent
- Investigations:
- Maternal HVS culture
- Neonatal sepsis screen (CRP, ANC, I/T ratio)
- Blood culture

RESULTS

Above table shows association between mother risk factors and incidence of EOS.UTI and LPV cases were more in EOS compare to fever cases. This association was statistically significant. (P>0.05)

Above table shows association between mother risk factor –PROM and incidence of EOS.90% of PROM cases were found with EOS. This association was statistically significant. (P>0.05)

Sepsis screen was positive for 96.4% of neonates with EOS. This was statistically significant

i.e. Sepsis screen positive neonates are more likely to have sepsis.

Among clinical symptoms dull activity was seen in 63.7% of neonates followed by fever in 13.8% neonates. Association between clinical symptoms and incidence of EOS was not statistically significant.

Above table shows the association between blood culture and incidence of EOS.All the blood culture positive cases were found with EOS. This association was statistically significant. (P<0.05)

Out of 12 culture positive cases,9 cases had CRP greater than 6mg/dl i.e.75% cases. Therefore, CRP has highest sensitivity amongst sepsis screen factors.

DISCUSSION

- This study demonstrates a strong association between maternal vaginal infection and early-onset neonatal sepsis.

- The incidence of EONS (37.5%) is consistent with other Indian studies. Gram-negative organisms, especially *Klebsiella*, were predominant, aligning with regional microbiological trends.
- The high sensitivity of CRP (75%) supports its utility as an early screening tool. Blood culture remains the gold standard, but limited positivity highlights the importance of clinical diagnosis.
- Maternal risk factors such as UTI and PROM showed significant correlation with EONS, reinforcing the importance of antenatal screening.

CONCLUSION

This study demonstrates a significant association between early-onset neonatal sepsis (EONS) in term neonates and maternal vaginal infection with identifiable risk factors.

Sepsis screening serves as a simple, cost-effective tool for early identification, while blood culture remains the gold standard for diagnosis. Early recognition and timely management of EONS are crucial in reducing neonatal morbidity and mortality.

Screening mothers with risk factors enables early identification and close monitoring of at-risk neonates. Appropriate intrapartum antibiotic administration may further reduce the risk of transmission.

However, the findings of this study are limited by a small sample size and should be validated by larger studies for broader generalization.

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