Original Article

Incidence, Bacteriological Profile and Antibiotic Sensitivity Pattern of Neonatal Sepsis at SSPM Medical College & Lifetime Hospital, Padve, Sindhudurg, Maharashtra

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ABSTRACT

Neonatal sepsis remains a leading cause of neonatal morbidity and mortality in India, with evolving microbial trends and rising antimicrobial resistance complicating empirical management strategies. This retrospective observational study was conducted from January 2023 to August 2025 at a tertiary care teaching hospital in coastal Maharashtra to determine the incidence, bacteriological profile, and antibiotic susceptibility pattern of neonatal sepsis and to compare findings with national datasets. Among 205 live births, 198 neonates with clinical suspicion of sepsis were screened, and 44 culture-positive cases were identified, yielding an incidence of 21.46%. Early-onset sepsis (85%) predominated over late-onset sepsis (15%). *Staphylococcus aureus* (47.3%) was the most common isolate, with a methicillin-resistant *S. aureus* (MRSA) prevalence of 50%. Among Gram-negative organisms, *Klebsiella pneumoniae* (14.9%) and *Acinetobacter* spp. (14.9%) were predominant. Vancomycin and Linezolid showed 100% sensitivity against *S. aureus*, while *Klebsiella pneumoniae* demonstrated 100% sensitivity to Imipenem. However, *Acinetobacter* spp. exhibited 66.7% resistance to Imipenem. The findings indicate a shift toward Gram-positive predominance with significant MRSA burden and emerging carbapenem resistance among non-fermenters, underscoring the importance of periodic institutional antibiogram surveillance and strengthened antimicrobial stewardship.

Keywords: Neonatal sepsis; MRSA; Antibiogram; Antimicrobial resistance; Maharashtra.

INTRODUCTION

Neonatal sepsis, defined as a systemic infection occurring within the first 28 days of life, continues to be a major contributor to neonatal mortality in India. National reports estimate that infections account for nearly one-third of neonatal deaths [1]. The epidemiological pattern of neonatal sepsis varies geographically and temporally. Earlier Indian studies such as the National Neonatal-Perinatal Database (NNPD) and the Delhi Neonatal Infection Study (DeNIS) reported predominance of Gram-negative organisms, particularly *Klebsiella* and *Acinetobacter* species [1,2]. However, recent institutional data from various tertiary centers indicate a rising prevalence of Gram-positive infections, especially MRSA. Continuous regional surveillance is therefore critical for updating empirical antibiotic policies. The present study aims to determine the incidence, bacteriological spectrum, and antimicrobial susceptibility pattern of neonatal sepsis in a tertiary care hospital in coastal Maharashtra and compare the findings with national datasets.

MATERIALS AND METHODS
Study Design and Setting

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Retrospective observational study conducted in the Department of Microbiology and NICU, SSPM Medical College & Lifetime Hospital, Maharashtra.

Study Period
January 2023 – August 2025.

Inclusion Criteria
Neonates (0–28 days) with clinical suspicion of sepsis and positive blood culture.

Exclusion Criteria
Contaminated samples and incomplete records.

Microbiological Processing
Blood cultures were processed under aseptic precautions using Bact/ALERT 3D 60 (Biomerieux, France) techniques. Organisms were identified and Antimicrobial susceptibility testing was performed using the Fully automated Vitek-2 (Biomerieux, France) and interpreted according to CLSI guidelines.

Statistical Analysis
Data were analysed using descriptive statistics and expressed as percentages and proportions. Comparative analysis was performed with published national datasets.

RESULTS AND DISCUSSION
Among 205 live births, 44 neonates had culture-proven sepsis, yielding an incidence of 21.46%, comparable to Indian tertiary care reports ranging from 20–30% [1–5].

A total of 44 culture-positive cases were identified, yielding an incidence of 21.46%. Early-onset sepsis predominated (85%). Staphylococcus aureus was the most common isolate. MRSA prevalence was 50%. Emerging carbapenem resistance was noted among Acinetobacter spp.

Table 1: Distribution of Early-Onset and Late-Onset Neonatal Sepsis

Type of Sepsis	Number (n)	Percentage (%)
Early-Onset Sepsis	38	85
Late-Onset Sepsis	6	15
Total	**44**	**100**

Table 2: Bacteriological Profile of Culture-Positive Neonatal Sepsis (n = 44)

Organism	Number (n)	Percentage (%)
Staphylococcus aureus	21	47.3
Klebsiella pneumoniae	7	14.9
Acinetobacter spp.	7	14.9
Other organisms	9	22.9
Total	**44**	**100**

Note: Percentages are calculated out of total culture-positive cases.

Table 3: Antibiotic Sensitivity Pattern of Major Isolates

Organism	Most Sensitive Antibiotics	Sensitivity (%)	Major Resistance Concern
Staphylococcus aureus	Vancomycin	100	50% MRSA
	Linezolid	100	
Klebsiella pneumoniae	Imipenem	100	ESBL production risk
Acinetobacter spp.	Imipenem	33.3	66.7% Carbapenem resistance

Table 4: Comparison of Incidence with National Studies

Study	Location	Incidence (%)
Present Study	Maharashtra	21.46
NNPD Report [1]	India	~30
DeNIS Study [2]	Delhi	14–25
Tallur et al. [3]	Karnataka	24

Table 5: Comparison of Gram-Positive and Gram-Negative Distribution

Study	Gram-Positive (%)	Gram-Negative (%)	Predominant Organism

Present Study	~55	~45	*S. aureus*
DeNIS [2]	35	65	*Klebsiella*
NNPD [1]	40	60	*Klebsiella*
Sharma et al. [6]	42	58	*Acinetobacter*

The MRSA prevalence of 50% falls within the national range of 30–60% [4–6]. Carbapenem resistance in *Acinetobacter* spp. (66.7%) aligns with alarming national trends reported in tertiary centers [6,7]. However, preserved Imipenem sensitivity in *Klebsiella pneumoniae* suggests effective carbapenem stewardship locally.

Clinical Implications
1. Consider MRSA coverage in high-risk early-onset sepsis.
2. Restrict carbapenem use to culture-proven indications.
3. Strengthen NICU infection control measures.
4. Implement annual institutional antibiogram surveillance.

CONCLUSIONS
The study demonstrates a significant burden of early-onset neonatal sepsis with a notable shift toward Gram-positive predominance and substantial MRSA prevalence. Emerging carbapenem resistance in non-fermenting Gram-negative bacilli, particularly *Acinetobacter* spp., highlights the urgent need for robust antimicrobial stewardship and stringent infection control practices. Periodic surveillance remains essential to guide evidence-based NICU antibiotic policies.

Ethics approval and consent to participate
Institutional Ethics Committee approval was obtained prior to study initiation. Confidentiality of patient data was maintained.

List of Abbreviations
MRSA – Methicillin-Resistant *Staphylococcus aureus*
NNPD – National Neonatal-Perinatal Database
DeNIS – Delhi Neonatal Infection Study
CLSI – Clinical and Laboratory Standards Institute
NICU – Neonatal Intensive Care Unit

Data Availability
The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest
The authors declare that there is no conflict of interest regarding the publication of this paper.

Authors' Contributions
SST conceptualized the study, analysed microbiological data, and drafted the manuscript. VV supervised the study, interpreted findings, and critically revised the manuscript. Both authors read and approved the final manuscript.

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