

**SPECTRUM OF BACTERIA IN NEONATAL SEPSIS AT THE DISTRICT HOSPITAL NICU ATTACHED TO MANDYA INSTITUTE OF MEDICAL SCIENCES, KARNATAKA**Keerthi A. M<sup>1</sup>, Keerthi B. J<sup>2</sup>, Mamatha P. S<sup>3</sup>, Anitha G<sup>4</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: INTRODUCTION:** Neonatal sepsis is a clinical syndrome characterized by the systemic signs of infection and accompanied by bacteremia in the first month of life. In spite of great advances in antimicrobial therapy, neonatal life support measures and the early detection of risk factors, septicemia continues to be a major cause of mortality and morbidity among neonates around the world. **Objective:** To Review the bacterial pathogens of neonatal septicemia and their antibiotic sensitivity pattern. **MATERIAL AND METHODS:** The bacterial pathogens and their antimicrobial susceptibility test reports from 160 neonates clinically suspected of sepsis, admitted to Neonatal Intensive care Unit (NICU) of Mandya Institute of Medical Sciences (MIMS), over one year period (Jan 2010 to Dec 2010) was studied from the records of Microbiology Laboratory, MIMS. **RESULTS:** Out of 160 cases, 54(33.75%) were positive in blood culture. Among the positive cases, Klebsiella species 20(37%) was the most frequent isolate followed by Staphylococcus aureus 11(20.3%), E. Coli 6 (11.1%), Coagulase Negative Staphylococcus 5(9.2%), Pseudomonas aeruginosa 3(5.5%), Acinetobacter species 2(3.7%), Citrobacter 2(3.7%) and Proteus mirabilis 2(3.7%). Klebsiella species showed 100% resistance to ampicillin and 45% resistance to Amikacin. About 90% of Staphylococcus aureus showed resistance to penicillin and 100% of them were susceptible to Vancomycin. All Gram negative isolates were 100% susceptible to Imipenem and more than 77% were sensitive to Amikacin. **CONCLUSION:** Gram negative septicaemia was predominantly encountered with high resistance to first line drugs like Gentamicin and Ampicillin. Thus the initial therapy in our hospital may be aimed at Gram negative bacteria and Amikacin may be used as first drug of choice, while Imipenem is still the best for infection with multidrug resistant gram negative bacteria.

**KEYWORDS:** Neonatal septicaemia, Klebsiella species, Staphylococcus aureus, Antimicrobial resistance.

**INTRODUCTION:** Neonatal sepsis is a clinical syndrome characterized by systemic signs of infections and accompanied by bacteremia in the 1<sup>st</sup> month of life. According to National Neonatal Perinatal Data (NNPF2002-03), incidence of neonatal sepsis is 30/1000 live births.<sup>1</sup> Neonatal sepsis is an important cause of morbidity and mortality among neonates in India with an estimated incidence of approximately 4% in intramural live births.<sup>2</sup>

The microbial etiology of neonatal sepsis is variable and often changes temporarily. Groups B Streptococci is a common cause of neonatal sepsis in West but infrequent in India and other tropical countries. S aureus, Klebsiella, E. Coli along with CONS and Pseudomonas are the main organisms responsible for neonatal septicemia in India.<sup>3</sup>

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Neonates are particularly vulnerable to infections because of weak immune barrier. Several risk factors have been identified both in neonates and mother who make them susceptible to infections. Also, the organisms isolated are often resistant to multiple antimicrobials which make the treatment difficult and grave sequel ensue.<sup>4</sup>

In view of the fulminating course of neonatal septicemia, every attempt should be made for early diagnosis and management.<sup>5</sup> For effective management of neonatal septicemia with appropriate antibiotics to minimize risk of severe morbidity and mortality, besides reducing emergence of multidrug resistant organisms by rational antibiotic use, study of bacteriological profile and antibiotic sensitivity pattern play a significant role.<sup>6,7</sup>

The present study was carried out to review the spectrum of bacteria and their antibiotic sensitivity pattern in neonatal septicemia of our NICU to help the neonatologist for better empirical treatment of neonatal septicemia.

**MATERIAL AND METHODS:** Bacterial pathogens isolated from blood samples of 160 clinically suspected septicemia neonates admitted to District Hospital NICU, MIMS from Jan-Dec 2010, and their antimicrobial susceptibility test reports were reviewed from the Records of Microbiology Laboratory, MIMS.

**RESULTS:** Out of 160 clinically suspected cases studied, growth of bacteria was obtained in 54 (33.75%) blood samples. Of these, Klebsiella species was the most frequent isolate (37%) followed by S.aureus (20.3%), E.coli (11.1%), CONS (9.2%) and other less frequent isolates (Table 1).

In Early onset sepsis (age<1wk), the most frequent isolate was Klebsiella species (42.8%) followed by Staphylococcus aureus (21.4%), E.coli (11.9%) and others. In Late onset sepsis (LOS), CONS (33.3%) was isolated most frequently followed by Klebsiella species (16.7%) and Staphylococcus aureus (16.7%) (Table.1).

Bacteria isolates	Number (%)	EOS (%)	LOS (%)
Klebsiella species	20 (37.0)	18 (42.8)	2(16.7)
S.aureus	11 (20.3)	09 (21.4)	2 (16.7)
E. Coli	06 (11.1)	05 (11.9)	1 (08.3)
CONS	05 (09.2)	01 (02.3)	4 (33.3)
Pseudomonas aeruginosa	03 (05.5)	02 (04.7)	1 (08.3)
Acinetobacter species	02 (03.7)	02 (04.7)	0 (0)
Citrobacter species	02 (03.7)	02 (04.7)	0 (0)
Proteus mirabilis	02 (03.7)	01 (02.3)	1 (08.3)
Proteus vulgaris	01 (01.8)	01 (02.3)	0 (0)
Enterobacter species	01 (01.8)	01 (02.3)	0 (0)
Enterococcus species	01 (01.8)	00 (0)	1 (08.3)
<b>Total</b>	<b>54</b>	<b>42</b>	<b>12</b>

Table 1: Distribution of bacterial isolates from blood culture

EOS-Early onset septicemia

LOS-Late onset septicemia

CONS-Coagulase Negative Staphylococcus aureus.

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Antibacterial resistance pattern of Gram positive and Gram negative blood stream isolated are shown in Table 2 and Table 3, respectively.

Organisms	P	E	CO	V	Cp	G	T	Lz	Ox
S. aureus n=11	10 (80.9)	6 (54.5)	6 (54.5)	0 (0)	5 (45.4)	4 (36.3)	5 (45.4)	0 (0)	9 (81.8)
CONS n=5	3 (60)	2 (40)	1 (20)	0 (0)	1 (20)	1 (20)	2 (40)	0 (0)	2 (40)
Enterococcus n=1	1 (100)	-	-	0 (0)	-	0	1 (100)	-	-

**Table 2: Antibacterial resistance pattern of Gram positive bacteria**

Figures shown in table are number of resistant isolates.

Figures shown in parenthesis indicate percentage of resistant isolates.

P=Penicillin, E=Erythromycin, Co=Cotrimoxazole, V=Vancomycin, Cp=Ciprofloxacin, G=Gentamicin, T=Tetracycline, Lz= Linezolid, Ox=Oxacillin.

Organisms	Ap	Co	T	G	Ak	Cf	Cz	Cp	I
Klebsiellaspn=20	20 (100)	12 (60)	13 (65)	15 (75)	9 (45)	14 (70)	11 (55)	13 (65)	0 (0)
E.colin=6	5 (83.5)	3 (50)	4 (66.6)	4 (66.6)	2 (33.3)	3 (50)	3 (50)	4 (66.6)	0 (0)
Pseudomonas aeruginosa n=3	-	-	-	2 (66.6)	1 (33.3)	2 (66.6)	1 (33.3)	2 (66.6)	0 (0)
Acinetobacter n=2	-	1 (50)	-	2 (100)	1 (50)	1 (50)	1 (50)	1 (50)	0 (0)
Citrobacter n=2	2 (100)	1 (50)	2 (100)	1 (50)	0 (0)	1 (50)	1 (50)	1 (50)	0 (0)
Proteus mirabills n=2	2 (100)	2 (100)	1 (50)	1 (50)	1 (50)	1 (50)	1 (50)	1 (50)	0 (0)
Proteus. Vulgaris n=1	1 (100)	1 (100)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)
Enterobacterspp n=1	1 (100)	1 (100)	1 (100)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

**Table 3: Antibacterial resistance pattern of Gram negative bacteria**

Figures shown in table are number of resistant isolates.

Figures shown in parenthesis indicate percentage of resistant isolates.

Ap= Ampicilin, Co= Cotrimoxazole, T=Tetracycline, G=Gentamicin.

Ak= Amikacin, Cf=Cefotaxime, Cz= Ceftazidime, Cp=Ciprofloxacin, I=Imipenem.

**DISCUSSION:** In the present study, it was observed that culture positive neonatal septicemia was seen in 33.75% cases. This incidence closely matches with some Indian studies, 40%<sup>3</sup>, 24%<sup>8</sup>, and 27%,<sup>5</sup> and as well studies abroad 30%.<sup>9</sup>

The weaker immune system in neonates and children explains this higher rate of isolation. In our study, out of 54 bacterial isolates, majority were Gram negative bacilli 37 (68.5%). *Klebsiella* species was isolated most frequently in 20(47%) cases followed by *S. aureus* 11(20.3%), *E. coli* 6 (11.1%), CONS 5 (9.2%), *Pseudomonas aeruginosa* 3(5.5%), *Acinetobacter* species 2 (3.7%), *Citrobacter* species 2 (3.7%), *Proteus mirabilis* 2 (3.7%), *Proteus vulgaris*, *Enterobacter* species and *Enterococcus* 1 each (1.8% each).

*Klebsiella* species was a predominant isolate in other Indian studies.<sup>9,10,4</sup> *Staphylococcus aureus* was the predominant isolate in some studies abroad.<sup>11,12</sup> Area based knowledge of bacteriological spectrum is essential for empirical therapy. An incidence of 9.2% for CONS was seen in our study.

CONS is usually regarded as a skin contaminant, but Leon et.al<sup>13</sup> opined that his bacterium in the blood could no longer be taken as contaminant especially in patients in critical care units.

In Early onset sepsis (EOS), *Klebsiella* species was the most frequent offender in 18 (42.8%) cases, followed by *S. aureus* 9 (21.4%) and others. CONS 4 (33.3%) was the most frequently isolated

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pathogen from Late onset sepsis (LOS). This is in accordance with other Indian studies<sup>14, 15</sup>. Incidence of *Acinetobacter septicaem* in our study was 3.7% which is slightly lower than that reported by Vinod Kumar and Neelagund (8.3%).<sup>16</sup> However, *Acinetobacter* species are fast emerging as important nosocomial pathogens as evidenced by other Indian studies.<sup>16,17</sup>

*Klebsiella* species which was the most frequent isolate showed 100% resistance to ampicillin, 75% to gentamicin and least resistance to amikacin (45%). All other isolates were sensitive to imipenem. *Klebsiella* is a major agent of neonatal nosocomial infections. It continues to be a nightmare for neonatologists, microbiologists and hospital administrators.

Multidrug resistant *Klebsiella pneumoniae* species was the commonest organism isolated by A Malik et al.<sup>18</sup> *Acinetobacter* species isolated in our study also showed multidrug resistance with 100% resistance to Gentamicin. About 90% of *S. aureus* and 60% of CONS were found resistant of penicillin. All were sensitive to Vancomycin and Linezolid. MSRA was noted in 81.8% of *S. aureus* isolates.

**CONCLUSION:** The high frequency of resistance to Beta lactum antibiotics may be due to their indiscriminate use as first line drugs. Amikacin is a good alternative to which most Gram negative isolates were found susceptible in our study, and while Imipenem is still the best, for infections with multidrug resistant gram negative bacteria.

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