

# A Study of the Bacteriological Profile and Antibiotic Sensitivity in Neonatal Septicemia

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## ABSTRACT

**Introduction:** Neonatal septicaemia is one of the leading causes of neonatal mortality in developing countries like India. The bacteriological profile of neonatal sepsis varies from place to place and from time to time. In this study we analyzed the bacteriological profile in neonatal septicemia and their antibiotic sensitivity pattern.

**Material and Methods:** This was a retrospective study conducted in a Level III Neonatal Intensive Care Unit in South India. The data was obtained from the blood culture and antibiotic sensitivity reports of neonates admitted with septicemia from January'15 to December'15.

**Results:** There were 144 culture positive isolates. 88% were gram negative isolates. Of the gram negative isolates, Klebsiella was the commonest isolate, accounting for about 70% of neonatal septicaemia. The second commonest isolate was E.coli, which was seen in 13% of cases of neonatal septicaemia. Of the Gram Positive isolates, *S.aureus* isolate was seen 2% of cases and Coagulase Negative Staphylococcus was seen in 4% of cases. There was no isolate of Group B Streptococci in the study period.

**Conclusion:** Periodic antibiotic sensitivity studies will help pediatricians to choose an appropriate antibiotic for empirical therapy of neonatal septicemia. Paediatricians should also be aware of the rising antibiotic resistances to all commonly used antibiotics.

**Keywords:** neonatal septicemia, bacteriological profile, antibiogram, resistance

## INTRODUCTION

Neonatal Septicemia refers to the presence of microbes or their toxins in blood of neonates. It is diagnosed by a positive blood culture in the first 4 weeks of life. It is one of the leading causes of neonatal mortality in developing countries like India.<sup>1</sup> Neonates are particularly prone for developing sepsis due to factors like immature immune system, prematurity, low birth weight, and maternal infections. The bacteriological profile of neonatal sepsis varies from place to place and from time to time.<sup>2,3</sup> In the developed countries, group B Streptococcus and E-coli contribute to 70%-75% of cases of neonatal septicemia. Whereas in developing countries like India, Gram negative organisms like Klebsiella remain the major cause of neonatal sepsis.<sup>4,5</sup> It is necessary to treat neonatal infections empirically by antimicrobial drugs immediately to reduce the mortality of neonates by knowing the epidemiology of bacteria and antimicrobial sensitivity in that particular centre.<sup>6</sup> Hence an effective surveillance program is needed to formulate an appropriate empirical antibiotic therapy.<sup>7</sup> The aim of the study is to analyze the bacteriological profile in neonatal septicemia and their antibiotic sensitivity pattern.

## MATERIAL AND METHODS

This is a retrospective study conducted in a Level III Neonatal Intensive Care Unit in South India. The data was obtained from the blood culture and antibiotic sensitivity reports of neonates admitted with septicemia from January'15 to December'15. The processing of blood samples for culture and the isolate identification was done by standard methods. All the 144 Isolates were identified by their characteristic appearance, Gram staining and confirmed by standard biochemical tests. The antibiotic sensitivity was also determined according to the guidelines of Clinical and Laboratory Standards Institute.<sup>8</sup> Institutional ethical committee approval was obtained.

## STATISTICAL ANALYSIS

The data were recorded and analyzed using Microsoft Office Excel software and the results were explained in frequency and percentage.

## RESULTS

Table-1 shows the pattern isolates. There were 144 culture positive isolates. 88% were gram negative isolates. Of the gram negative isolates, Klebsiella was the commonest isolate, accounting for about 70% of neonatal septicaemia. The second commonest isolate was E.coli, which was seen in 13% of cases of neonatal septicaemia. The Pseudomonas and Proteus isolates were also seen in about 3% and 2% of cases respectively. Of the Gram Positive isolates, *S.aureus* isolate was seen in 2% of cases and Coagulase Negative Staphylococcus was seen in 4% of cases. There was no isolate of Group B Streptococci in the study period.

Table-2 Shows the antibiotic resistance pattern of the

Organism	Number	Percentage
Klebsiella	101	70
E.coli	18	13
Pseudomonas	5	3
Proteus species	3	2
<i>Staphylococcus aureus</i>	3	2
CONS	6	4
Miscellaneous	8	6
Total	144	100

**Table-1: Pattern of Isolates**

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	Ampicillin	Gentamicin	Amikacin	Ceftriaxone	Ciprofloxacin	Cefotaxime	Ofloxacin	Cefoperazone/ sulbactam	Piperacillin/ tazobactam	Vancomycin
Klebsiella	100	50	29	93	44	86	27	43	40	NT
E.coli	100	28	28	100	28	67	39	50	NT	NT
Pseudomonas	100	80	80	80	60	100	60	80	20	NT
Proteus	NT	100	66	NT	0	100	0	NT	NT	NT
S.aureus	100	66	33	66	66	100	66	33	NT	0
CONS	100	66	33	100	100	100	100	66	33	0

Table-2: Antibiogram of organisms (% resistance)

organisms isolated. All the organisms isolated during the study period showed resistance to Ampicillin. Klebsiella species were more sensitive to Amikacin and Ofloxacin. E.coli was sensitive equally to Gentamicin, Amikacin and Ciprofloxacin. Pseudomonas species was highly sensitive to Piperacillin and Tazobactam combination. *S.aureus* was sensitive to Amikacin and Vancomycin, while CONS was sensitive to Amikacin, Vancomycin and Piperacillin and Tazobactam combination.

## DISCUSSION

Septicemia is one of the leading causes of neonatal mortality in developing countries like India. In this present study, Gram negative and Gram positive isolates accounted for 88% and 12% of the cases respectively. Other studies reported in India have reported similar pattern of isolations.<sup>1,9-11</sup> Among the isolates, Klebsiella was the most common organism followed by Escherichia and Pseudomonas (Table: 1). Many other studies have also reported Klebsiella as the most common isolate.<sup>12</sup> The National Neonatal-Perinatal database also states Klebsiella as the most common (29%) pathogen in neonatal septicaemia.<sup>13</sup> In case of gram positive isolates Coagulase Negative Staphylococci were the most common, which is comparable with a study by Fler A et al.<sup>14</sup> The gram negative isolates were resistant to most commonly used antibiotics like Ampicillin, and Cephalosporins. Resistance was least with Amikacin and Piperacillin and Tazobactam (Table 2) which is similar to other studies.<sup>10,15</sup> Similarly Gram positive isolates were resistant to Ampicillin and Cephalosporins. But the gram positive isolates were very highly sensitive to Vancomycin similar to a study by Sudarshan Raj.<sup>15</sup> Contrary to studies from western countries which report many cases of neonatal septicaemia with Group B Streptococci, there was no case of Group B Streptococci isolate in our study.

## CONCLUSION

Neonatal septicaemia is a life threatening emergency where appropriate empirical antibiotic therapy will save the neonate. For this the treating paediatrician should be aware of the organisms prevalent in their place and its antibiotic susceptibility. Paediatricians should also be aware of the rising antibiotic resistances to all commonly used antibiotics. Periodic antibiotic sensitivity studies will help paediatricians to choose an appropriate antibiotic for empirical therapy of neonatal septicemia.

## REFERENCES

1. Agnihotri N, Kaistha N, and Gupta V. Antimicrobial Susceptibility of Isolates

- from Neonatal Septicemia. Jpn. J. Infect. Dis. 2004;57:273-275.
2. Gomaa HHA, Udo EE, Rajaram U. Neonatal septicemia in Al-Jahra hospital, Kuwait: Etiologic agents and antibiotic sensitivity patterns. Med Princ Pract. 2001;10:145-50.
3. Shrestha P, Das BK, Bhatta NK, et al. Clinical and bacteriological profiles of blood culture positive sepsis in newborns. J Nepal Paediatr Soc. 2008;27:64-7.
4. Dramstadt GL, Black RE, Santosham M. Research priorities and postpartum care strategies for the prevention and treatment of neonatal infection in less developed countries. Pediatr Infect Dis J. 2000;19:739-50.
5. WHO Young infants Study Group. Bacterial etiology of serious infections in young infants in developing countries: results of a multicentre study. Pediatr Infect Dis J. 1999; 18:S17-S22.
6. Yu L, Wu SX, Jia HQ. Study on antimicrobial susceptibility of bacteria causing neonatal infections: A 12 year study (1987-1998). Singapore Med J. 2001;42:107-10.
7. Bhatt Sima K. Bacteriological profile and antibiogram of neonatal septicemia: National Journal of Community Medicine. 2012;3:238.
8. Clinical Laboratories Standards Institute (CLSI). Performance of standards for antimicrobial disk susceptibility tests; approved standards. 10th ed. Wayne, PA: CLSI. 2009;29:M02-A10.
9. Vinodkumar CS, Neelagund YF, Kalsurmah S, Banapurmath S, Kalappannavar NK, Basavarajappa KG. Perinatal risk factors and microbial profile of neonatal septicemia: A multicentred study. J Obstet Gynecol India. 2008;58:32-4.
10. Shah AJ, Mulla SA, Revdiwala SB. Neonatal sepsis: High antibiotic resistance of the bacterial pathogens in a neonatal intensive care unit of a tertiary Care hospital. J Clin Neonatol. 2012;1:72-5.
11. Kaistha N, Mehta M, Singla N, Garg R, Chander J. Neonatal septicemia isolates and resistance patterns in a tertiary care hospital of North India. J Infect Dev Ctries. 2009;4:55-7.
12. Mathur M, Shah H, Dixit K, Khambadkone S, Chakrapani A, Irani S. Bacteriological profile of neonatal septicemia cases. J Postgrad Med. 1994;40:18-20.
13. Neonatal morbidity and mortality; report of the National Neonatal-Perinatal Database. Indian Pediatr. 1997;34:1039-42.
14. In: Behrman RE, Kliegman RM, Jenson HB, eds. Nelson Text Book of Pediatrics. 16th ed. W.B.Saunders Company Publisher. 2000;1:544-552.
15. Sudharshan Raj, Bacteriological profile of neonatal sepsis in a tertiary care hospital, World Journal of Pharmacy and Pharmaceutical Sciences. Volume 2, Issue 6, 5709-5717.

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