



To Study Prevalence of Organisms Causing Neonatal Septicemia in NICU in A Tertiary Care Hospital of Jhalawar

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Abstract

Neonatal septicaemia is one of the leading causes of mortality and morbidity in developing countries like India. Incidence varies from country to country but it is much higher in developing countries than in developed nations. Reasons are not only related to good prenatal, perinatal and post natal care and the efficient antibiotic policies in developed countries, but also to the high rate of home deliveries, often overseen by unskilled attendants, in developing countries. Appropriate intervention requires an early aetiological diagnosis. Microbial aetiology of neonatal septicaemia is diverse. Several studies on neonatal sepsis have documented the diversity of bacteria. The present study reiterates the earlier findings and emphasizes the importance of periodic surveys of microbial flora encountered in particular neonatal settings to recognize the trend. The present study was conducted in Department of Microbiology and Immunology, Jhalawar Medical College, Jhalawar from March 2016 to March 2017. Clinically suspected 298 samples were included in this study.

Introduction

Neonatal mortality rate is one of the indicators for measuring the health status of a nation. There could be various reasons for neonatal mortality but septicemia continues to be a major cause of neonatal mortality and morbidity worldwide⁽¹⁰⁾. As high as 47.5% -64% incidence of bacteremia has been reported in neonates

previously with Gram-negative organisms such as *Klebsiella* being the main isolate^(2,3).

Neonatal Septicemia is one of the commonest causes of Neonatal mortality and morbidity. It is estimated that 20% of all neonates develop sepsis, and it is responsible for 30-50% of total neonatal death in developing countries⁽⁴⁻⁶⁾. Unfortunately, Sepsis is still one of the major causes of morbidity

and mortality in neonates globally, inspite of recent advances in health care system including vaccines⁽⁷⁾. Nearly 40% of under-five deaths globally occur in the neonatal period, resulting in 3.1 million newborn deaths each year⁽⁸⁾. The majority of these deaths usually occur in countries with low-income and almost 1 million of these deaths are attributed to infectious causes including neonatal sepsis, meningitis, and pneumonia⁽⁹⁾. On the other hand, the survivors of neonatal sepsis are vulnerable to short- and long-term neuro developmental morbidity⁽¹⁰⁻¹²⁾.

Neonatal sepsis is defined as a clinical syndrome in an infant of upto 28 days of life, manifested by systemic signs of infection and isolation of a bacterial pathogen from the bloodstream⁽¹³⁾. Sepsis is also defined as SIRS (systemic inflammatory response syndrome) resulting from a suspected or proven infection. The clinical spectrum of sepsis begins when a systemic infection (e.g.: bacteraemia, fungemia, viremia) or localized infection (e.g.: meningitis, pneumonia, pyelonephritis) progresses from sepsis to severe sepsis (the presence of sepsis combined with organ dysfunction), septic shock (severe sepsis plus the persistence of hypo perfusion or hypotension for > 1 hr despite adequate fluid resuscitation or a requirement for inotropic agents or vasopressors), multiple organ dysfunction syndrome (MODS), and ultimately death.⁽¹⁴⁾

According to the data from National Neonatal Perinatal Database (NNPD, 2002-03) the incidence of neonatal sepsis is 30 per 1000 live births. The database comprising 18 tertiary care neonatal units across India found sepsis to be one of the commonest causes of neonatal mortality contributing to 19% of all neonatal deaths.⁽¹⁵⁾

Prior to 1937 mortality from neonatal septicaemia was 90 per cent. After beginning of antibiotic era, the figure has fallen to 13-45%.⁽¹⁶⁾ Mortality was significantly higher in babies with positive blood culture.⁽¹⁷⁾

Diagnosis and management of sepsis are a great challenge facing neonatologists in NICUs. Clinical diagnosis of presentation is difficult due

to nonspecific signs and symptoms. In addition, laboratory diagnosis is time consuming. This matter necessitates the initiation of empirical antibiotic therapy till the suspected sepsis is ruled out. At the same time, increased multidrug resistant organisms make the treatment options fewer and the effective treatment is delayed⁽¹⁸⁾

Aims and Objectives

1. To study the prevalence of organisms causing neonatal septicaemia in tertiary care hospital.
2. To study positivity rate of blood culture of neonates.
3. To study antimicrobial susceptibility pattern

Materials and Methods

The present study was conducted in Department of Microbiology and Immunology, Jhalawar Medical College, Jhalawar from March 2016 to March 2017.

Blood samples were collected from patients admitted in the NICU in Hira Kunwar Ba Hospital, Jhalawar. Total numbers of cases included in this study were 298 out of which 110 were culture positive.

Selection criteria for Subjects

Inclusion criteria

- 1) Neonates of both sexes were included in this study.
- 2) Neonates presenting with signs and symptoms such as refusal to feed, lethargy, fever, hypothermia, vomiting, diarrhoea, abdominal distension, jaundice, respiratory distress, seizures etc., or any external evidence of sepsis like umbilical cord infection, skin infection etc. were taken up for study.
- 3) A sample showing the growth of organisms of low pathogenicity, a repeat blood sample was taken and on isolation of the organism on repeat culture, it was included in this study.

Exclusion criteria

- 1) Neonates with absence of signs of sepsis were excluded from this study.
- 2) Low pathogenic organisms like CoNS, Candida spp. unless grown on repeat culture were excluded.
- 3) Processing in laboratory

For each neonate, one blood samples per patient were drawn under sterile conditions. All blood cultures were processed by the Microbiology Laboratory, Jhalawar medical college. Blood culture bottles, especially for neonates, were incubated for 72 hours at 37°C and sub cultured every other day to blood agar, Mac Conkey agar, and incubated at 37°C for 24–48 hours. Isolates of bacteria were identified by standard Microbiological techniques described in Mackie and McCartney, Practical Medical Microbiology; Diagnostic microbiology.^(19,20)

Antibiotic sensitivity was done on Mueller Hinton agar (M173) by using commercially available discs from HiMedia (Table 3A & 3B). Kirby Bauer’s disc diffusion method was followed as per CLSI guidelines.⁽²⁰⁾ Discs were stored as per manufacturer’s instructions and used within expiry period.

Results and Conclusion

1. Blood culture results (N=298)

Culture report	Number of cases
Culture negative	188 (63.08)
Culture positive	110 (36.91)
Total	298

Figures in parentheses are percentages. Table 1. shows the results of blood cultures of the clinically suspected cases of neonatal septicaemia. 188/298(63.08%) blood cultures were sterile while 110/298(36.91%) were positive.

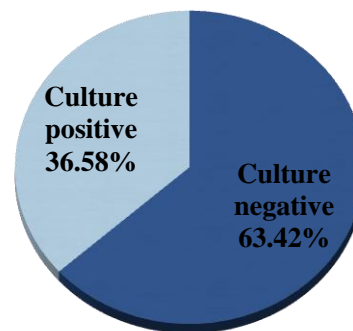


Figure 1: Blood culture results (N=298)

2. Organism-wise distribution (N=110)

Isolates	Numbers	Percentage
Bacterial	76	69.09
Fungal	34	30.90

Culture positive cases when analysed showed growth of bacteria in 76/110(69.09%) and fungi in 34/110(30.90%).

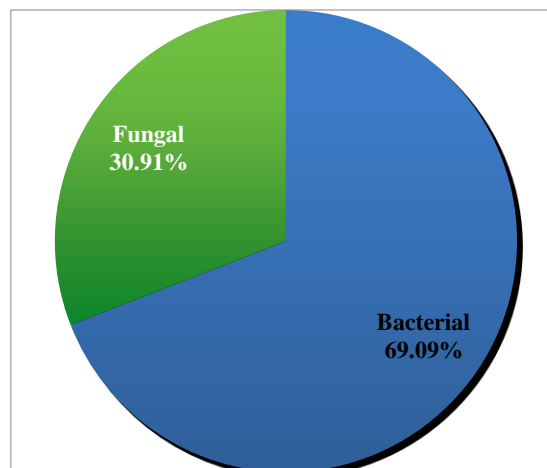


Figure 2: Organism-wise distribution (N=109)

3. Distribution of Gram positive isolates

Bacteria	Numbers	Percentage
<i>Staphylococcus aureus</i>	18	47.36
CoNS	9	23.68
<i>Streptococcus pyogenes</i>	1	2.63
<i>Enterococcus species</i>	10	26.31
Total	38	100

Table 3. shows the distribution of various Gram positive bacteria isolated in this study. *Staphylococcus aureus* were 18/38 (47.36%). Coagulase negative *Staphylococcus* were 9/38(23.68%) . 10/38 (26.31%) isolates were *Enterococcus* and *Streptococcus pyogenes* was isolated in 1/38 (2.63%) cultures. All the Gram positive isolates were cocci and *Staphylococcus aureus* was found to be the dominant Gram positive organism isolated in this study.

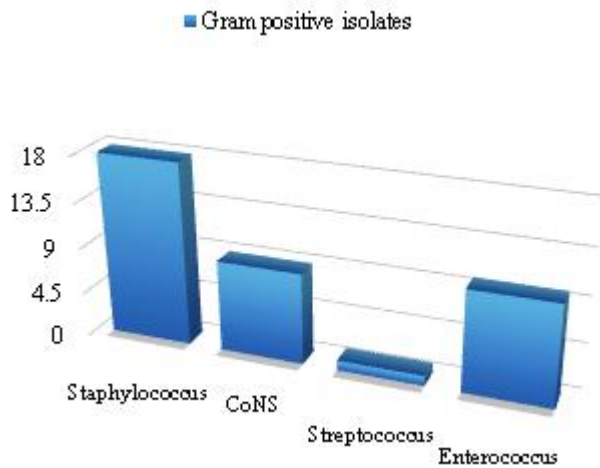


Figure 3: Distribution of Gram positive isolates

4. Distribution of Gram negative isolates

Bacterial isolates	Numbers	Percentage
<i>Escherichia coli</i>	11	28.94
<i>Klebsiella</i>	15	39.47
<i>Pseudomonas species</i>	4	10.52
<i>Enterobacter species</i>	3	7.89
<i>Citrobacter freundii</i>	5	13.15
Total	38	100

Table 4. shows the distribution of various Gram negative bacteria isolated in this study. *Klebsiella species* accounted for 15/38 (39.47%) of the isolates, 11/38 (28.94%) isolates were *Escherichia coli*. *Pseudomonas species* accounted for 4/38 (10.52%) isolates. *Enterobacter species* were 3/38 (7.89%) while *Citrobacter freundii* accounted for 5/38(13.15%). All the isolates in this category were bacilli, overall *Klebsiella species* was the predominant Gram negative isolate observed.

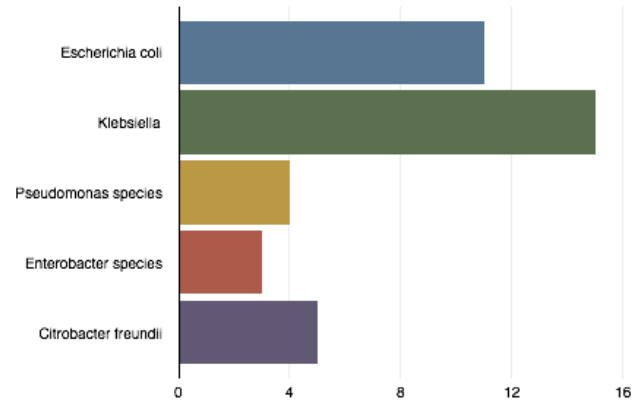


Figure 4: Distribution of Gram negative isolates

5. Distribution of fungal isolates

Fungi	Numbers	Percentage
<i>Candida albicans</i>	8	23.52
Non <i>albicans Candida species</i>	26	76.47
Total	34	100

Table 5. shows the distribution of various fungal isolates in this study. *Candida albicans* was isolated in 8/34 (23.52%) and Non *albicans Candida species* were 26/34 (76.47%). All the fungal isolates were yeast-like only.

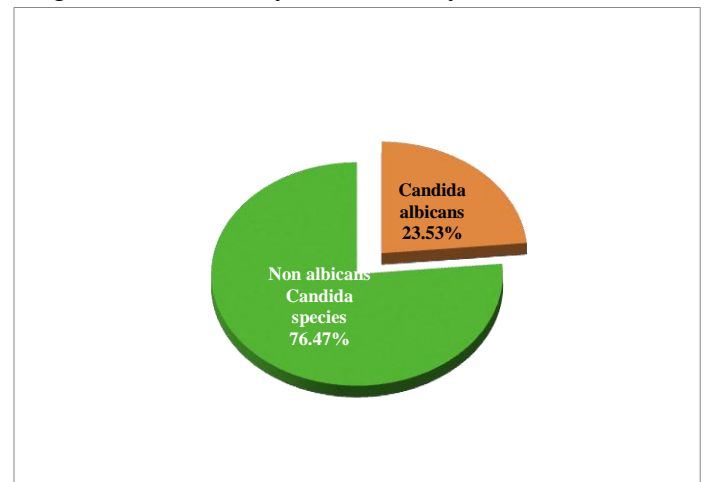


Figure 5: Distribution of fungal isolates

Staphylococcal isolates were predominantly resistant to cotrimoxazole, erythromycin, clindamycin and cefuroxime. Of all the CoNS isolated 5/9 were found resistant to erythromycin and 3/9 were resistant to ampicillin and clindamycin. *Streptococcus pyogenes* was 100% resistant to cotrimoxazole. Isolates belonging to

Enterococcus spp. were 100% resistant to ampicillin, levofloxacin and erythromycin.

All the strains of *Escherichia coli* were found to be 100% resistant to cefotaxime, aztreonam, gentamicin, amikacin and levofloxacin. Of the *Klebsiella spp* 14/15 (92%) isolates were resistant to amoxy-clav, cefotaxime, ceftazidime and gentamicin. *Enterobacter spp.* were found which showed comparable resistance pattern as that of *Klebsiella spp.* Almost all isolate of *Citrobacter freundii* was found to be resistance to all the antibiotics tested except meropenem, polymyxin B, levofloxacin and cotrimoxazole. Among the nonfermenters, *Pseudomonas spp.* were found to be resistant to almost all the antibiotics except polymyxin B.

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