

Original Research Article

Prevalence of neonatal septicemia at a tertiary care level district hospital

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ABSTRACT

Introduction: Neonatal sepsis is a major cause of neonatal mortality, the clinical outcome of which depends on early diagnosis and initiation of appropriate antibiotics. The emergence of multi-drug resistant strains has limited the choice of available antibiotics. Thus, antibiotic resistance pattern of pathogens is critical for both therapy and infection control.

Materials and Methods: This observational study was conducted in the Microbiology department of Tertiary care level hospital affiliated with medical college. Venous blood collected aseptically before initiation of antibiotic therapy. For neonates 2 ml of blood & for older children 5 ml of blood was collected from peripheral vein with aseptic precaution. The blood culture bottles were sent to laboratory, where they incubated in BACTEC (FX40) if bottle was positive then it sub-culture were made on MacConkey & Blood agar & incubated in appropriate temperature & further identification was done according to standard guidelines. Antimicrobial susceptibility testing was done by Kirby-Bauer disc diffusion method and interpretation was done according to CLSI guidelines.

Results: Among 100 blood samples processed from clinically suspected neonatal septicemia cases, 28 (28 %) samples showed growth. Among 28 isolates, 15 were from early onset septicemia (EOS) and 13 were from Late Onset Septicemia (LOS). Among 28 culture positives, 20 (71.4%) were from males and 8(28.6%) were from females, thus showing a male preponderance. Gram-positive bacteria were responsible for most cases of neonatal sepsis. Coagulase negative staphylococci (CoNS) were the most frequent isolated pathogens in EOS and LOS, followed by Klebsiella pneumoniae, Staphylococcus aureus, Enterococcus spp and Escherichia coli. The antibiotic sensitivity showed that most of the Gram negative bacteria were highly resistant to the commonly used antibiotics like Ampicillin and Gentamicin.

Conclusion: Neonatal sepsis is a medical emergency and empirically treatment is started without microbiology report. If local microbiological databases are available with information regarding the commonly isolated organisms and their drug resistance patterns, it can help the clinicians in planning of therapy which in turn reduces neonatal mortality and morbidity.

Keywords: Neonatal septicemia, Blood culture, Antibiotic resistance

INTRODUCTION

Neonatal sepsis is defined as a clinical syndrome in an infant 28 days of life or younger, manifested by systemic

signs of infection and isolation of a bacterial pathogen from the bloodstream.¹

Sepsis occurring in the first 72 hours of life is defined as early-onset sepsis (EOS) and that occurring beyond 72 hours as late-onset sepsis (LOS).² Neonatal sepsis is caused

by Gram-positive and Gram-negative bacteria and Candida.³

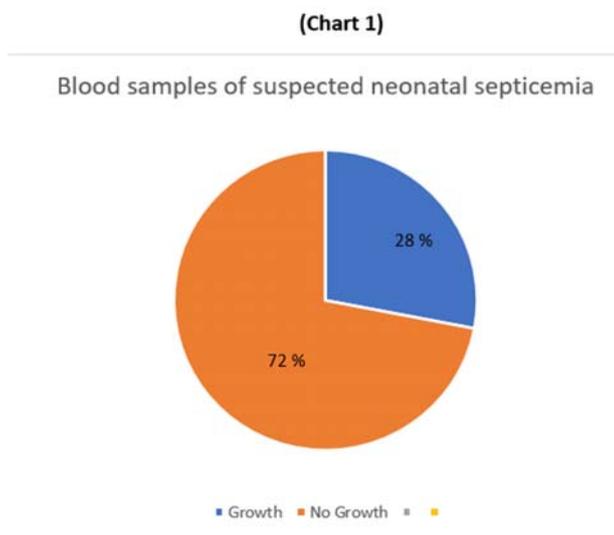
In most developing countries, gram negative bacteria remain the major source of infection.⁴ The spectrum of organisms that causes neonatal sepsis changes over times and varies from region to region. This is due to the changing pattern of antibiotic use and changes in lifestyle.⁵ Globally, sepsis is still one of the major causes of morbidity and mortality in neonates, in spite of recent advances in health care units.⁶ It is an important cause of morbidity and mortality among neonates in India with an estimated incidence of approximately 4%.⁷

Prompt recognition and appropriate antimicrobial therapy are the key determinants of positive outcome in this serious pediatric emergency.⁸ Microbial invasion of the bloodstream can have serious consequences such as shock, multi-organ failure, disseminated intravascular coagulation (DIC) and death.⁹

identification was done according to standard guidelines. Antimicrobial susceptibility testing was done by Kirby-Bauer disc diffusion method and interpretation was done according to CLSI guidelines.¹⁰

RESULTS

Among 100 blood samples processed from clinically suspected neonatal septicemia cases, 28 (28 %) samples showed growth. (Chart 1)



Among 28 isolates, 15 were from early onset septicemia (EOS) and 13 were from Late Onset Septicemia (LOS). (Chart 2)

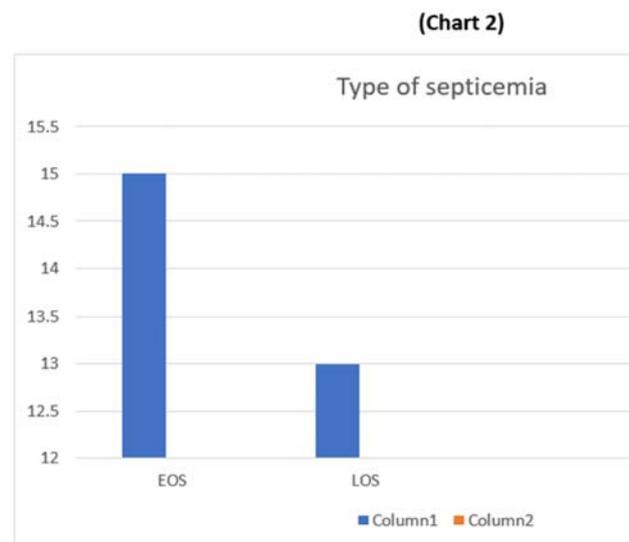
This study was conducted to know the prevalence of neonatal septicemia and the antibiotic susceptibility patterns of the bacteria.

MATERIAL AND METHODS

This observational study was conducted in the Microbiology department of Tertiary care level hospital affiliated with medical college.

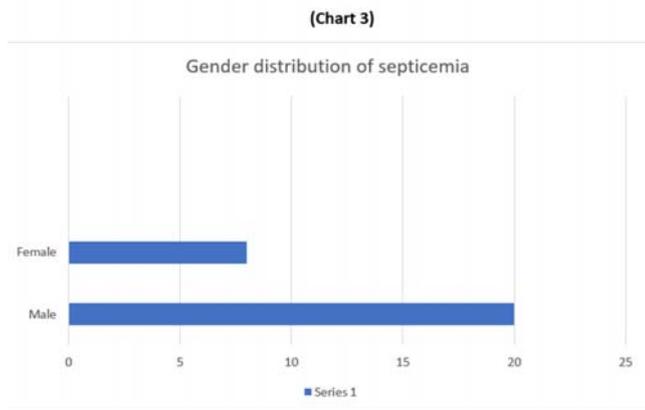
Venous blood collected aseptically before initiation of antibiotic therapy. For neonates 2 ml of blood & for older children 5 ml of blood was collected from peripheral vein with aseptic precaution.

The blood culture bottles were sent to laboratory, where they incubated in BACTEC (FX40) if bottle was positive then it sub-culture were made on MacConkey & Blood agar & incubated in appropriate temperature & further



Among 28 culture positives, 20 (71.4%) were from males and 8(28.6%) were from females, thus showing a male preponderance.(Chart 3)

The type and frequency of isolated pathogen in relation to the type of sepsis were shown in Table 1 and chart 4. Gram-positive bacteria were responsible for most cases of neonatal sepsis. Coagulase negative staphylococci (CoNS) were the most frequent isolated pathogens in EOS and LOS, followed by Klebsiella pneumoniae, Staphylococcus aureus, Enterococcus spp and Escherichia coli.

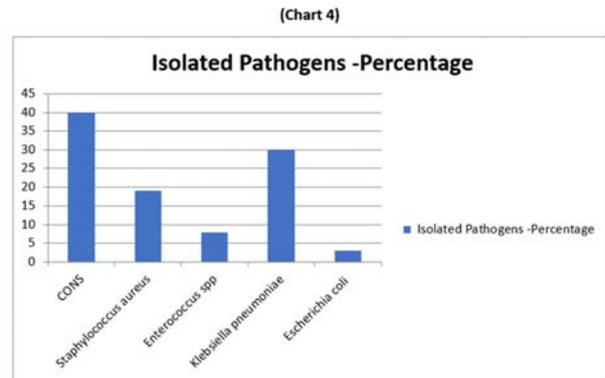


The antibiotic sensitivity showed that most of the Gram negative bacteria were highly resistant to the commonly used antibiotics like Ampicillin and Gentamicin. Gram positive bacteria showed 100% sensitivity to linezolid. The predisposing factors noted in this study were perinatal asphyxia, hypoglycemia, preterm and pneumonia.

DISCUSSION

Bloodstream infections are one of the most common health-care-associated infections worldwide. The disease can

range from self-limiting infections to life-threatening sepsis which requires rapid as well as aggressive antibiotic therapy. A wide variety of organisms have been known to cause sepsis. Increased incidence of antimicrobial resistance is also a worldwide concern.¹¹



In this study, which was conducted in 100 neonates, 28 babies (28%) were culture positive. According to a study conducted by Khan SM et al in Kochi, in 2012, culture positivity was 38%.¹² The incidence of neonatal septicaemia is variable and differs from place to place because it depends on various factors such as gestational age, foetal birthweight, maternal nutrition, perinatal care and hygienic conditions and child health-care facilities.¹

		Isolated microorganism	Total (%) (N-28)
Gram-positive bacteria		Coagulase negative staphylococci	11 (40 %)
		<i>Staphylococcus aureus</i>	5 (19 %)
		<i>Enterococcus spp</i>	2 (8 %)
Gram-negative bacteria		<i>Klebsiella pneumoniae</i>	9 (30 %)
		<i>Escherichia coli</i>	1 (3 %)
		<i>Total</i>	28 (100 %)

Table 1. Microbiological profile found in positive blood cultures from neonates with early- and late-onset sepsis

Clinical presentation	No of neonates	Percentage
Respiratory distress	13	47%
Poor feeding	6	22%
Cyanosis	4	14%
Fever	2	7%
Jaundice	2	7%
Apnoea	1	3%

Table 2. Clinical presentation in culture positive neonate

In the present study, the male babies outnumbered the female babies, both total cases and in culture positivity. This is comparable with studies conducted in India and other countries.^{13,14} The reason for male preponderance is unknown, but this could be due to sex-dependent factors. The synthesis of gamma globulins is probably regulated by X-linked immunoregulatory genes, and as males have only one X chromosome, they are more prone for neonatal septicemia than females.¹⁵

Shim et al. who conducted a 26-year longitudinal analysis regarding the trends in epidemiology of neonatal sepsis in a tertiary care centre in Korea reported that Gram-positive bacteria accounted for 43.6%, Gram-negative bacteria for 37.6% and fungus for 18.8% cases. The common microorganisms found were *S. aureus* (25.5%), *Candida* species (16.8%), *K. pneumoniae* (13.4%), *E. coli* (8.7%) and CONS (8.1%).¹⁴ In a study in the neonatal intensive care unit of a tertiary care hospital in Gujarat by Shah et al. in 2012, Gram-negative organisms were isolated in 52% cases, Gram-positive in 45% cases and *Candida* species in 3% cases.¹⁶ The increased incidence of sepsis by Gram-negative bacteria may be attributed to the fact that there is colonisation of Gram-negative bacteria in the skin of the neonate and the personnel of the neonatal wards

In the present study, 62 of the total cases were of low birthweight. In a study conducted by Nithin et al. in SreeAvittomThirunal Hospital, Thiruvananthapuram, in 2008, 44% of the neonates had low birthweight as a risk factor.¹⁷ Immature host defence mechanisms make the low birthweight neonate, particularly susceptible to overwhelming infection. In this study, the culture positive neonates had respiratory distress as the main clinical presentation (13 neonates) followed by poor feeding (6 neonates), cyanosis (4neonates), fever (3 neonates), jaundice (2 neonates), apnoea (1 neonate).

CONCLUSION

Neonatal sepsis is a medical emergency and empirically treatment is started without microbiology report.

If local microbiological databases are available with information regarding the commonly isolated organisms

and their drug resistance patterns, it can help the clinicians in planning of therapy which in turn reduces neonatal mortality and morbidity.

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