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Original Research Article.

Evaluation of Microbiological Profile of Neonatal Sepsis: An Institutional Based Study

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ABSTRACT

Background: Neonatal sepsis is defined as a disseminated disease with positive blood culture during the first month of life, and encompasses various systemic infections of the newborn such as septicemia, osteomyelitis, pneumonia, meningitis and urinary tract infection. Hence; present study was undertaken for assessing microbial profile of neonatal sepsis.

Materials and Methods: A total of 100 neonates were analyzed. Blood culture was done in all the neonates who were suspected to have septicemia. Collection of the blood sample was done from the peripheral vein. The blood culture was done in a brain heart infusion broth and was incubated at 37-degree C. Standard method was used to identify the gram staining of the bacterial growth. The cultures which did not show any growth for seven days were reported as negative culture.

Results: Among these 100 patients, positive blood cultures were found to be present in 19 patients. Out of these 19 patients with positive blood cultures, 11 were males while the remaining 8 were females. Klebsiella spp. and coagulase negative staphylococci were the most common gram negative and gram-positive organism obtained in the present study.

Conclusion: Neonatal sepsis is a frequent occurring phenomenon with Klebsiella and coagulase negative staphylococci being the most commonly encountered microorganism.

Keywords: Sepsis, Blood Culture, Neonatal Infections.

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INTRODUCTION

Neonatal sepsis is defined as a disseminated disease with positive blood culture during the first month of life, and encompasses various systemic infections of the newborn such as septicemia, meningitis, pneumonia, arthritis, osteomyelitis and urinary tract infection. It is more common in developing countries compared with developed countries. Neonatal sepsis is the most common cause of neonatal mortality. Studies have recorded an incidence of neonatal sepsis, varying between 11 and 24.5 per 1000 live births in some Asian countries. It is responsible for about 30-50% of the neonatal deaths.[1-4] Epidemiological data on very low birth weight infants shows that the predominant pathogens of neonatal late onset sepsis (LOS) are coagulase-negative staphylococci, followed by Gram-negative bacilli and fungi. Due to the difficulties in a prompt diagnosis of LOS and LOS-associated high risk of mortality and long-term neurodevelopmental sequelae, empirical antibiotic treatment is initiated on suspicion of LOS.[5, 6] Hence; the present study was undertaken for assessing the microbial profile of neonatal sepsis.

MATERIALS AND METHODS

The study was conducted in the Department of Microbiology, Chandulal Chandrakar Memorial Medical College, Kachandur, Durg, Chhattisgarh (India) and it included assessment of microbiological profile of neonatal sepsis. Ethical approval was obtained from institutional ethical committee. All the hematological and biochemical reports of all the patients were obtained from newborns admitted to the Department of Pediatrics and the Neonatal Intensive Care Unit (NICU) of the medical college for the study period. Blood culture was done in all the neonates who were suspected to have septicemia. Collection of the blood sample was done from the peripheral vein. The blood culture was done in a brain heart infusion broth and was incubated at 37-degree C. The subcultures were done on sheep blood agar and MacConkey agar if the indications of growth were noticed at days 1, 4, and 7. Standard method was used to identify the gram staining of the bacterial growth. The cultures which did not show any growth for seven days were reported as negative culture.

All the results were summarized in Microsoft excel sheet and were analyzed by SPSS software. Univariate regression curve was used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, analysis of a total of 100 newborns who were admitted with clinical symptoms of neonatal sepsis was done. Among these 100 patients, positive blood cultures were found to be present in 19 patients. Out of these 19 patients with positive blood cultures, 11 were males while the remaining 8 were females. Among these 19 cases, early onset sepsis comprised of 12 cases while late onset sepsis comprised of 7 cases. Gram negative bacilli on culture growth was found to be present in 10 cases, while gram positive cocci on culture growth were found to be present in 9 cases. Klebsiella spp. and coagulase negative staphylococci were the most common gram negative and gram-positive organism obtained in the present study.

Table 1: Demographic data

Demographic variables	Number of cases
Total number of cases	100
Number of cases with positive blood culture	19
Males with positive blood culture	11
Females with positive blood culture	8
Early onset sepsis	12
Late onset sepsis	7

Table 2: Microbiological profile of the cases with positive blood culture

Organisms	Number of cases with positive culture
Staphylococcus aureus	2
Acinetobacter	2
Coagulase negative staphylococci	6
Klebsiella	7
Others	2
Total	19

DISCUSSION

Neonatal sepsis is defined as a clinical syndrome of bacteremia with systemic signs and symptoms of infection in the first 4 weeks of life. Septicemia occurs in 2.3% of intramural live births. Over 40% of the under-5 deaths globally occur in the neonatal period. The World Health Organization estimates that >1 million neonatal deaths worldwide annually are caused by severe infections, and ~1 million deaths are due to neonatal sepsis or pneumonia alone.[6- 8]

Neonatal septicemia is broadly divided into early-onset sepsis (< 72 hrs) and late-onset sepsis (≥ 72 hrs-28 days). This distinction based on age is of value in presumptive identification of predominant organism. Early-onset sepsis is acquired during fetal life, delivery, or at the nursery. Group B Streptococcus, Escherichia coli, or Listeria monocytogenes happen to be the most common organism. Late-onset sepsis is most commonly caused by coagulase negative Staphylococci (CONS), Staphylococcus aureus, Escherichia coli, Klebsiella spp, and Pseudomonas aeruginosa and is usually acquired in the neonatal intensive care unit (NICU) or the community.[9]

In the present study, analysis of a total of 100 newborns who were admitted with clinical symptoms of neonatal sepsis was done. Among these 100 patients, positive blood cultures were found to be present in 19 patients. Out of these 19 patients with positive blood cultures, 11 were males while the remaining 8 were females. Among these 19 cases, early onset sepsis comprised of 12 cases while late onset sepsis comprised of 7 cases.

Nayak S et al identified the organisms causing septicemia in neonates and to determine the antimicrobial susceptibility pattern of the isolates. This prospective study was conducted by analyzing the blood cultures and the sensitivity reports of 195 newborns who were admitted to the NICU between June 2011 and May 2012 with sepsis. A total number of 75 patients (38.46%) had positive blood cultures. Klebsiella pneumoniae (30.66%) was the most common organism isolated. Majority of organisms isolated were resistant to commonly used antibiotics. Maximum sensitivity was seen for Carbapenems in gram-negative bacilli, Vancomycin for gram-positive cocci. Multi-drug-resistant organisms were isolated from neonatal septicemia. Therefore, great caution is required in selection of antibiotics.[10]

In the present study, Gram negative bacilli on culture growth was found to be present in 10 cases, while gram positive cocci on culture growth were found to be present in 9 cases. Klebsiella spp. and coagulase negative staphylococci were the most common gram negative and gram-positive organism obtained in the present study. Galhotra et al. determined the etiology, clinical characteristics and outcome of neonatal septicemia cases. 257 clinically suspected cases of neonatal sepsis were enrolled and classified as early onset septicemia (EOS) and late onset septicemia (LOS) based on appearance of signs and symptoms, i.e. within or after 72 h, respectively. Blood culture was performed using BACTEC 9240, isolates were identified by standard techniques and antibiotic susceptibility was performed as per the

CLSI guidelines. Risk factors associated with neonatal sepsis were recorded and analyzed with respect to culture-proven sepsis. In both suspected and culture-proven sepsis cases, majority of the neonates were male, pre-term and low birth weight babies. The prevalence of EOS and LOS was 82.4% and 17.5%, respectively. Culture positivity was seen in 7.8% of the cases. In culture-proven septicemia, 55% neonates presented with EOS and 45% presented with LOS. Gram positive isolates were more as compared with Gram negative isolates. The most common isolates were S. aureus, S. epidermidis and E. coli. All Gram-positive isolates were sensitive to vancomycin and linezolid, while carbapenems and polymyxin B were the most effective drugs in the Gram-negative isolates. Mortality was higher in LOS as compared with EOS cases, and the difference was statistically significant. Gram positive pathogens were predominant in septicemia. Vancomycin and linezolid were the most effective antibiotics for Gram positive isolates and carbapenems for most effective Gram-negative organisms.[11]

CONCLUSION

Under the light of above obtained results, it can be concluded that neonatal sepsis is a frequent occurring phenomenon with Klebsiella and coagulase negative staphylococci being the most commonly encountered microorganism.

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