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Bacteriological Profile of Blood Culture Positive Sepsis in Newborn at BPKIHS, Dharan Nepal

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ABSTRACT

Background & Objectives: Neonatal infections currently cause about 1.6 million deaths annually in developing countries. Sepsis and meningitis is responsible for most of these deaths. This study was undertaken to determine the bacteriological profiles and antibiotic sensitivity patterns of isolates from blood cultures of neonates admitted in a tertiary care hospital in Eastern Nepal. **Materials & Methods:** A retrospective study was conducted at pediatric department from January, 2014 to December 2014. Total 1009 newborns blood sample with suspected and clinical sepsis were cultured by using standard microbiological technique and antibiotic sensitivity patterns were studied. **Results:** The positive blood culture was 32.4% (327/1009). Gram positive bacteria were more common 231(71%) than gram negative bacteria 96(29%). Staphylococcus aureus 174 (53.2%) and acinetobacter 46(14.1%) were the commonest isolates in blood culture. Most of the organisms showed sensitivity with aminoglycosides (gentamicin and amikacin) and third generation cephalosporins. **Conclusion:** Staphylococcus aureus, Acinetobacter and Klebsiella species remain the principal organisms causing neonatal sepsis and antibiotics like amino glycosides should be first choice of drugs.

Key words: Blood culture; Neonatal sepsis; organism

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INTRODUCTION

Neonatal sepsis is a significant cause of neonatal morbidity and mortality in the newborn, particularly in preterm, low birth weight infants.[1, 2] According to World Health Organization (WHO) estimates; neonatal sepsis remains the major cause out of five million neonatal deaths per year.[3] 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 life style. Neonatal sepsis caused by Gram-negative organisms has been reported in recent years from Nepal[4-6] and responsible for Neonatal sepsis caused by responsible for 18 to 78% of all neonatal sepsis.[7-11] In the developing world, Escherichia coli (E. coli), Klebsiella species, and Staphylococcus aureus (S. aureus) are the most common pathogens of EOS, whereas S. aureus, Streptococcus pneumoniae, and Streptococcus pyogenes are the most commonly reported organisms in LOS.[12, 13] But Group B streptococcal disease is the most important cause of neonatal sepsis in Europe and North America.[6] Thus, the knowledge of both the common pathogens causing septicemia in neonates and their antimicrobial susceptibility is essential in order to select appropriate antimicrobial treatment. Hence, the present study was conducted to document the bacteriological profile of neonatal septicemia and their antibiotic susceptibility profile for planning strategy for the management of neonatal septicemia of neonates admitted in a tertiary care hospital in eastern region of Nepal.

MATERIALS AND METHODS

This A retrospective study was conducted at neonatology division of BPKIHS from January, 2014 to December 2014. Total 1009 newborns blood sample with suspected and clinical sepsis were cultured by using standard microbiological

technique and antibiotic sensitivity patterns were studied. One ml of blood collected under aseptic conditions was inoculated in blood culture bottle containing 9 ml of Brain Heart Infusion broth and incubated at 37°C. Total 1009 newborns blood samples were deposited in microbiology lab to know causative organism and antibiotic sensitivity pattern by using standard microbiology technique. Subcultures were made into sheep blood agar, chocolate agar, and MacConkey agar after overnight of aerobic incubation. Blood agar and MacConkey agar plates were incubated overnight at 37°C in aerobic atmosphere while chocolate agar plates were incubated overnight at 37°C in 5% CO2 atmosphere. Thereafter, culture bottles were observed for turbidity for up to 10 days. Final blind subcultures were done before reporting the sample negative.[14] Antimicrobial susceptibility of the bacterial isolates to antibiotics namely amikacin, ampicillin, cefotaxime, ciprofloxacin, methicillin and gentamicin was determined by Kirby Bauer's disc diffusion method.

RESULTS

PATIENTS: Out of 1009 newborns blood cultures, 327 (32.4%) were positive for bacterial pathogens.

ORGANISMS: Gram-positive organism were isolated in 231 (71%) and gram-negative organism in 96 (29.0%). Staphylococcus aureus in 174 (53.2%), Enterococcus in 12(3.6%), coagulase negative Staphylococcus in 8(2.4%), Streptococcus 11(3.4%) and MRSA 26 (7.9%) were the gram-positive organisms isolated. Among the Gram-negative organisms Klebsiella pneumoniae in 8 (2.4%), Enterobacter Sp in 10 (3.1%) and Acinetobacter in 46(14.1%) were the most common. Citrobacter (0.91%), Pseudomonas (5.5%) and E.coli (3.4%) were the other isolates. (TABLE 1).

ANTIBIOTIC RESISTANCE: Resistance to ampicillin (>50%) was observed in both gram positive and negative bacteria. Methicillin resistance was seen in 16% of Staph aureus isolates. Resistance to aminoglycosides, gentamicin (20t o 40%) and amikacin (0 to 12%) was low. Resistance to 3rd generation cephalosporins and ciprofloxacin ranged from 0-30% (Table 2).

DISCUSSION

In this study, blood culture positivity rate is 32.4% and in 67.6% cases there was no growth. This finding is comparable with other reports.[15, 16] A negative blood culture does not exclude sepsis and could be due to anaerobes.[17] In this study the predominant isolates was S. aureus which is in agreement with other reports.[17, 18] In this study, Klebsiella species (2.4%), Enterobacter species (3.1%) and Acinetobacter (14.1%) are the leading cause of neonatal sepsis among gram negative organisms. The report of the National Neonatal Perinatal database showed Klebsiella as the predominant (29%) pathogen.[19, 20] The clinical significance of relatively low virulence isolates, such as CONS and Enterococcus is difficult to ascertain. These organisms can cause true bacteremia or their isolation may represent simple contamination. It would be unfair to ignore such isolates as contaminants.

In contrast to many other studies that reported Klebsiella and other gram-negative organism and Staph. aureus as the common isolates.[15, 21, 22] In the present study, majority of patients showing predominantly Staph aureus. Being a tertiary care hospital, complicated pregnancies in labour are referred to BPKIHS. Premature rupture of membrane and repeated vaginal examinations by the midwives were the common factors observed on admissions. Staph aureus is not a common organism in the genital tract. Hence it was presumed that possibly due to poor knowledge of

Table 1: Organisms isolated from blood culture

TOTAL NUMBER OF ORGANISM ISOLATED	TOTAL n =327(32.4%)	
GRAM POSITIVE BACTERIA	**231**	**71%**
Staphylococcus aureus	174	53.2%
Enterococcus Fecalis	12	3.6%
Coagulase negative Staphylococcus	8	2.4%
Streptococcus	11	3.4%
MRSA	26	7.9%
GRAM NEGATIVE BACTERIA	**96**	**29%**
Klebsiella pneumoniae	8	2.4%
Enterobacter	10	3.1%
Acinetobacter	46	14.1%
E.Coli	11	3.4%
Pseudomonas	18	5.5%
Citrobacter	3	0.91%

Table 2: Percentage resistance to antibiotics in bacterial isolates (N = 327)

ORGANISM	TOTAL NO (%)	AMIKACIN	AMPICILLIN	CEFOTAXIME	CEFTAZIDIME	CIPROFLOXACIN	GENTAMICIN	METHICILLIN
GRAM POSITIVE BACTERIA	**231(71%)**							
Staphylococcus aureus	174(53.2%)	3	59	8	3	28	19	16
Enterococcus Fecalis	12(3.6%)	13	12	17	3	17	20	-
Coagulase negative Staphylococcus	8(2.4%)	8	33	8	0	17	25	-
Streptococcus	11(3.4%)	0	25	50	0	0	0	-
MRSA	26(7.9%)	7	20	15	3	2	18	3
GRAM POSITIVE BACTERIA	**96(29%)**							
Klebsiella pneumoniae	8(2.4%)	11	58	14	6	14	42	-
Enterobacter	10(3.1%)	3	63	13	13	14	42	-
Acinetobacter	46(14.1%)	12	68	28	12	24	40	-
E.Coli	11(3.4%)	5	58	11	16	11	42	-
Pseudomonas	18(5.5%)	5	-	16	16	26	21	-
Citrobacter	3(0.91%)	0	58	0	0	17	25	-

disinfection and sterilization in domiciliary practice, or a higher rate of survival of highly susceptible low-birth weight infants, admitted to neonatal intensive care units, acquire this infection from several sources.

Resistance to ampicillin was seen to the tune of 59% in GPC and 68% in GNB, which is in agreement with many other studies. Staph aureus showed resistance (16%) to methicillin an observation also made in other studies.[18, 23, 24] Most of the organisms are sensitive to aminoglycosides (Amikacin and gentamicin) and third generation cephalosporins. A combination of ampicillin and amikacin is the treatment of choice for Neonatal sepsis at BPKIHS. In general, the sensitivity of the gram negative isolates to amikacin supports continued use of this agent in the initial, empiric treatment of neonatal sepsis in our hospital.

CONCLUSION

Thus, it is concluded that S aureus, CONS, and gram negative organisms (Klebsiella, Enterobacter and E. coli) are the leading cause of neonatal sepsis in Nepal and most of them are sensitive to aminoglycosides and third generation cephalosporins. Continuous surveillance is needed to understand changing bacterial ecology and the resistance pattern of the antimicrobial agents in a neonatal unit so that an empirical treatment of critically ill or very low birth weight infants could be initiated pending a report of blood culture and sensitivity. Moreover, a decline in infection rate is a great motivation for health care workers for following the infection control practices in the neonatal units.

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