



ORIGINAL RESEARCH PAPER

Neonatology

BACTERIAL PROFILE OF SEPSIS AT A RURAL NEONATAL UNIT IN SOUTH KASHMIR

KEY WORDS: neonatal sepsis, antibiotic sensitivity, blood culture, klebsiella, staphylococcus aureus.

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ABSTRACT

INTRODUCTION: Neonatal sepsis contributes to a quarter of neonatal mortality in developing nations worldwide. There has been a paradigm shift in the bacterial isolates since the last decade which needs modification of antibiotic protocols.
AIM: Currently there is a paucity of data from rural India in this regard, which was the reason to conduct this study.
MATERIAL AND METHODS: All the neonates with risk factors of sepsis where enrolled in the study and a blood culture was sent on first contact. A standard form was filled for collecting the demographic and clinical details. A total of 500 babies with probable sepsis were cultured.
RESULTS: 100 samples had a definite growth. 80% organisms grown were gram negative rods; among them Klebsiella, Ecoli and Acinetobacter were predominant in that order. Staphylococcus aureus was grown in 5% isolates. There was a widespread resistance against cefotaxime in Klebsiella and Ecoli. However some sensitivity was retained for amikacin.
CONCLUSION: We recommend a rational antibiotic policy and strict implementation of hand washing and barrier nursing while dealing with neonates.

INTRODUCTION

Neonatal septicemia is responsible for a quarter of the neonatal deaths in the whole world. Microorganisms most commonly associated with EOS(early onset sepsis) include Group B Streptococcus (GBS), Escherichia coli, coagulase negative Staphylococcus species (CONS), Haemophilus influenzae and Listeria monocytogenes whereas LOS(late onset sepsis) is caused by CONS, S.aureus, E. coli, Klebsiella spp., Pseudomonas spp., Enterobacter spp., Candida spp, Group B streptococcus, Serratia spp., Acinetobacter spp. and anaerobes. The recent trends show an increase in infections due to CONS.(Hornik et al., 2012)

The pattern of causative organisms in neonatal septicemia has been constantly changing. (Daoud, Abuekteish, Obeidat, el-Nassir, & al-Rimawi, 1995). Very few studies in neonatal sepsis have been done in rural north India and almost none in Kashmir province. Present study was done in a sick newborn care unit associated with a district hospital in south Kashmir to get an idea of predominant microbes causing neonatal sepsis and also to establish the local antibiotic sensitivity

MATERIALS AND METHODS

The study was carried out from August 2017 to July 2018 at a 20-bed level II sick newborn care unit (SNCU), at district hospital Anantnag an associated hospital of G.M.C Anantnag, roughly 60 km from capital city Srinagar.. The unit provides level II care, including oxygen by hood, resuscitation with bag and mask ventilation, phototherapy, intravenous therapy, and naso/oro-gastric feeding. Neonates with probable sepsis and clinical indications like lethargy, apnea, tachypnea, tachycardia, hypotension, instability of temperature, poor feeding, poor perfusion, and abdominal distension or with following perinatal risk factors—maternal fever, prolonged rupture of the membranes for more than 24 hours, foul-smelling or meconium-stained liquor, or frequent (>3) unclean vaginal examinations, and/or having severe prematurity, or birth asphyxia necessitating active resuscitation were subjected to blood culture. ("National Neonatal-Perinatal Database," 2005)

After taking a proper informed consent, 2 mL of blood for culture was drawn with aseptic precautions from a peripheral vein. Blood culture was performed using the BACTEC 9050 system. Bacterial isolates were identified and antimicrobial susceptibility test was performed using Kirby Bauer disc diffusion method. Clinical and Laboratory Standards Institute were used as a guideline to determine the level of sensitivity or resistance.(MA, 2006).The study was conducted after obtaining approval of Institutional Ethics Committee.

RESULTS

A total of 1550 babies were admitted during the study period from August 2017 to July 2018. A total of 500 babies with clinically

probable sepsis i.e having various risk factors were subjected to blood culture. Around 100 neonates had a culture positive for the causative organism. In the group of culture proven sepsis there were a total of 61 males (61%) and 39 females (39%). Mean age of the group was 4±3.5 days. There were 40 preterm neonates and 60 full term neonates in the culture positive group. 20 babies were small for gestational age. The demographic characteristics of the culture positive and culture negative neonates are compared in Table 1. Gestational age was the only variable which showed a p-value <0.001.

Table 1

DEMOGRAPHIC VARIABLES	CULTURE POSITIVE	CULTURE NEGATIVE	P VALUE
MALE	61	240	
FEMALE	39	160	
TERM	60	360	<0.0001
PRETERM	40	40	
VAGINAL DELIVERY	72	300	
CAESAREAN SECTION	28	100	
AGA	80	305	
SGA	20	95	
MEAN AGE(Days)	4 ± 3.5	3 ± 2.5	
INBORN	80	340	
OUTBORN	20	60	

Obstetric risk factors and their frequency are as in Table 2

TABLE 2

OBSTETRIC RISK FACTORS IN CULTURE	POSITIVE NEONATES
MSAF	7%
PROM	8%
CHORIOAMNIONITIS	5%

Meconium stained Amniotic fluid(MSAF), Premature rupture of membranes(PROM)

Gram negative bacilli were more predominant 80%. Staphylococcus aureus was present in 10% of isolates. CONS(coagulase negative staphylococci) were present in 5% cases. They were however, regarded pathogenic when they were recovered in serial cultures and when taken from different venepuncture sites. Table 3

TABLE 3 BACTERIAL PROFILE

Klebsiella	40
E. Coli	20
Acintobacter	15
S Aureus	10

Pseudomonas	5
CONS	5
Yeast	5

Klebsiella and Acinetobacter species were more susceptible to amikacin and moderately to other aminoglycosides, third generation cephalosporins and ciprofloxacin. Pseudomonas species were mostly susceptible to amikacin, moderately to gentamicin, netilmicin and ciprofloxacin, and less susceptible to ceftazidime and piperacillin. E.coli were susceptible to amikacin and netilmicin but remarkably less sensitive to ampicillin and third generation cephalosporins. S.aureus was better susceptible to ciprofloxacin, vancomycin and amikacin when compared to ampicillin and cefotaxime. Methicillin resistance was seen in 60% patients. However they were susceptible to vancomycin. In general gram negative organisms showed resistance to the first and second line antibiotics prescribed by WHO.

DISCUSSION

Around 25% cases of probable sepsis had a positive culture. R.Vishwanathan et al. Kayange et al in Tanzania reported a higher culture positivity in probable sepsis of around 46.3% and 47% respectively.(Viswanathan et al., 2012)(Kayange, Kamugisha, Mwizamholya, Jeremiah, & Mshana, 2010) Male sex vulnerability to culture positive sepsis was documented in our study. Similar results were reported by other studies. (Stoll et al., 1996b)(Ahmed, Chowdhury, Hoque, & Darmstadt, 2002)(Joshi, Ghole, & Nipadkar, 2000) Preterm neonates are more predisposed to early and late onset sepsis. This was clearly documented in our study. There was extremely significant association (p-value <0.0001) between gestational age and probability of culture positive sepsis in our study. Similar results were shown in studies by Sigel J et al, Collins A et al. (Siegel & McCracken, 1981)(Collins, Weitkamp, & Wynn, 2018)

Klebsiella followed by other gram negative bacilli predominated in our study. Klebsiella has been the most common causative organism till recent times in many centers in urban India. (Viswanathan et al., 2011) Predominance of gram negative isolates (67.2%-92.5%) has similarly been reported by developing countries.(Ganatra, Stoll, & Zaidi, 2010)(Baltimore, Huie, Meek, Schuchat, & O'Brien, 2001) In industrialized world group B streptococcus was the commonest cause of EOS. E. coli was 2nd most common.(Stoll et al., 1996a)(Cordero, Sananes, & Ayers, 1999)(Ganatra et al., 2010) Although for many years Gram-negative bacteria were isolated from the majority of bacteremic patients with severe sepsis, the proportion of cases associated with Gram-positive bacteria has steadily increased over the last 2 decades, and now S. aureus, CONS, and Enterococci account for approximately 30 to 50% of the cases in most clinical series. NFGN(Non fermenting gram negative organisms) are a recent addition to the bacteria encountered in NICU. Our study was characterized by a decreased frequency of Gram-positive infection, including Group B Streptococcus and coagulase negative Staphylococcus (CONS). One reason for this could be that our unit is of level II, and interventions, such as insertion of central vascular catheters and mechanical ventilation, are not performed in this unit.

Klebsiella and Acinetobacter species of present study were more susceptible to amikacin and moderately to other aminoglycosides, third generation cephalosporins and ciprofloxacin. Higher sensitivity to aminoglycosides was reported by Agarwal et al (Agrawal, Chaturvedi, Dey, & Narang, 1990) and Kuruvilla et al(Kuruvilla, Pillai, Jesudason, & Jana, 1998). E.coli and other gram negative bacilli were susceptible to amikacin and netilmicin but remarkably less sensitive to ampicillin and third generation cephalosporins. This susceptibility of Ecoli to amikacin has been documented in several studies too.(Tallur, Kasturi, Nadgir, & Krishna, 2000) Given the fact that third generation cephalosporins are rampantly used as an empiric treatment in NICU's, there is alarmingly high resistance to these drugs. The infection prevention guidelines need to be implemented at all levels of healthcare. Overcrowding and poor staffing patterns are practical problems in hospitals, such as the one where the present study was carried out.

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