A PILOT STUDY ON BACTERIAL PROFILE OF NEONATAL SEPSIS IN A TERTIARY CARE HOSPITAL SERVING RURAL POPULATION

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ABSTRACT: BACKGROUND: One of the major causes of neonatal morbidity and mortality in India is bacterial sepsis. **AIM:** To evaluate the bacterial profile of neonatal sepsis cases of the hospital. **STUDY DESIGN:** A prospective pilot study was conducted. **MATERIALS AND METHODS:** Blood cultures were done from all neonates admitted with signs of sepsis over a period of two months in a tertiary care hospital serving a rural population. Bacti Alert system (Bio-Merieux) was used in this study and bacterial identification was done by biochemical tests. **RESULTS:** 72 neonates were included in the study out of which 23 (33%) had positive blood cultures. 12 out of 23 (52%) grew *S. aureus*, followed by 4 out of 23 (17%) enterococcus species. The other species identified were *Klebsiella*, *Escherichia coli*, *Listeria*, Coagulase negative staphylococcus and *Candida* species. The staphylococci and enterococci were 100% sensitive to Vancomycin. The gram negative bacilli were found susceptible to Piperacillin-tazobactam and to Imipenem. Drug sensitivity was not done for the *Candida*. Babies with late onset sepsis were culture positive in greater numbers. **CONCLUSION:** Changing trends in organisms causing neonatal sepsis should be followed up in further prospective studies.

KEYWORDS: Neonatal sepsis, automated blood culture, *S. aureus*.

INTRODUCTION: Neonatal sepsis remains the major cause out of five million neonatal deaths per year according to World Health Organization (WHO) estimates.⁽¹⁾ The spectrum of organisms that causes neonatal sepsis changes over times and varies from region to region. The epidemiological data from developing countries however, shows important differences in the microbial pattern and antimicrobial sensitivities of pathogens from that of developed countries.⁽²⁾ This study was conducted to determine bacteriological profiles and antibiotic sensitivity patterns of isolates from blood cultures of neonates admitted in a tertiary care hospital in rural location of eastern India.

MATERIALS AND METHODS: A total of 72 neonates with clinical features of sepsis who were admitted at the hospital, from June 2013 to August 2013 were included in this study. This hospital has more than twenty thousand deliveries annually and is a 1200 bed tertiary teaching hospital with a 20 bed neonatal unit.

Blood cultures were performed routinely on all neonates with clinical signs suggestive of sepsis (poor feeding, respiratory distress, fever and hypothermia) or whose mothers had a history of prolonged rupture of membranes (≥ 24 h), maternal fever and premature labor. Bact/ALERT® PF culture bottles were used with the BacT/ALERT Microbial Detection System for enhanced recovery and detection of aerobic and facultative anaerobic microorganisms (bacteria and fungi) from blood.

The isolates were identified by standard biochemical tests. Antibacterial resistance pattern of the isolates was studied by Kirby- Bauer disc diffusion technique.

ORIGINAL ARTICLE

Susceptibility of the isolates were done and interpreted according to National Committee for Clinical Laboratory Standards (NCCLS) recommendations. The antibiotic disks were manufactured by Hi Media Labs.

RESULTS: 72 neonates were admitted during the study period with features of sepsis, of whom 23 (33 per cent) had proven sepsis confirmed by positive blood culture. Late onset sepsis that is sepsis after the age of seven days, was significantly more common. (Table 1).

Staphylococcus aureus was significantly higher as a causative organism followed by enterococcus species. *Candida albicans* was the only fungal organism. (Table 2).

The staphylococci were all sensitive to vancomycin. Enterococci were all sensitive to vancomycin. *Listeria* isolated was only resistant to cephalosporins. (Table 3).

The gram negative bacilli isolated were all sensitive to piperacillin tazobactam combination. Imipenem resistance was not detected. Enterobacteriaceae were all sensitive to netilmycin but 50% of *klebsiella* were resistant to Amikacin. (Table 4).

DISCUSSION: Database regarding bacteriological profile and antibiotic resistance pattern in neonatal sepsis in rural West Bengal hospitals is not available to help in better management of these patients.

This study was started when automated blood culture facilities were made available in the microbiology department of this hospital situated in rural area of Eastern India. The initial data has been documented and analyzed to understand the trends of bacterial infection and antibiotic resistance pattern.

Late onset sepsis was significantly higher in this study signifying infection occurring in the post natal period. This is consistent with large studies in the western world^(3,4) but not consistent with data from study in Bangladesh which showed higher incidence of early onset sepsis.⁽⁵⁾ The cases which were culture positive showed slight preponderance of males. Early onset cases showed greater number of males.

Regarding infecting organisms, *Staphylococcus aureus* was by far the predominant organism which could be from carriers among the mothers or health care providers, followed by enterococcus. The gram positive bacteria *Listeria* was isolated in a solitary case. Enterobacteriaceae were not prominent in numbers. *Candida albicans* was the only fungus isolated.

The staphylococci and enterococci isolated were all vancomycin sensitive. The enterobacteriaceae were all sensitive to third generation Cephalosporins, netilmycin and piperacillin-tazobactam. Imipenem resistance was also not found. This antibiotic resistance pattern shows that the resistant bacteria usually found in hospital environment have not yet emerged in this rural part of the country.

CONCLUSION: The major features that emerge in this initial study of bacterial pathogens and their antibiotic resistance pattern in cases of neonatal sepsis are the predominance of late onset sepsis, the significant higher incidence of Gram positive cocci mainly *Staphylococcus aureus* and finally the low numbers of the hospital acquired resistant strains that cause huge problem in management of such cases.

The establishment of an Infection control program with documented Antibiotic policy will help in keeping rates of emergence of resistant organisms low in this region.

ORIGINAL ARTICLE

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	Male	Female	Total
Early onset	5	2	7
Late onset	10	6	16
Total	15	8	23

Table 1: Breakup of culture positive sepsis cases according to time of onset and sex of newborn

Microorganism	Early onset	Late onset	Total
Staphylococcus aureus	5	7	12
Enterococcus species	1	3	4
Klebsiella species	0	2	2
Escherichia coli	1	1	2
Listeria	0	1	1
Coagulase negative Staphylococci	0	1	1
Candida species	0	1	1
Total	7	16	23

Table 2: Causative organisms in the culture positive cases divided according to onset of sepsis

Organisms	Resistance to Penicillin (%)	Resistance to Amoxyclav (%)	Resistance to Piperacillin - Tazobactam (%)	Resistance to Amikacin (%)	Resistance to Cefotaxime (%)	Resistance to Vancomycin (%)	Resistance to Linezolid (%)
S aureus	11 (91)	8(66.6)	6(50)	3(25)	7(58.3)	0	2(16.6)
Enterococcus	3(75)	3(75)	3(75)	-	-	0	0
CONS	1(25)	1	0	0	0	0	0
Listeria	0	0	0	0	1	0	-

Table 3: Antibiotic resistance profile of Gram Positive organism isolated in the study

ORIGINAL ARTICLE

Organisms	Resistance to Amoxy-lav (%)	Resistance To Piptaz (%)	Resistance to Netilmycin (%)	Resistance to Amikacin (%)	Resistance to Ceftriaxone (%)	Resistance to Imipenem (%)
Escherichia coli	2(100)	0	0	0	0	0
Klebsiella	2 (100)	0	0	1 (50)	1 (50)	0

Table 4: Antibiotic resistance profile of Gram negative organism isolated in the study

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