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ORIGINAL ARTICLE

The Bacterial Profile Of Neonatal Septicaemia In A Rural Hospital In South India

EDWIN DIAS* AND VIGNESHWARAN P**

ABSTRACT

Introduction: Neonatal sepsis is the most common cause for neonatal deaths in the NICU. Newborn blood culture and sensitivity testing are important tools in the diagnosis of neonatal sepsis and in the institution of early antibiotic treatment. **Material and Methods:** This study was conducted by analyzing the blood cultures and the sensitivity reports of 100 newborns who were admitted to the NICU over a period preceding one year. **Results:** Of the 100 newborns, 32 (32%) showed positive blood culture reports. Out of the 32 positive blood cultures, 19 (59.4%) showed positivity for Coagulase negative Staphylococcus, 7 (21.9%) showed positivity for Staphylococcus aureus, 3 (9.4%) showed positivity for Pseudomonas aeruginosa, 1 (3.1%) showed positivity for Enterococci, 1 (3.1%) showed positivity for Micrococci and 1 (3.1%) showed positivity for Flavobacteria. Overall, most of the neonatal sepsis was caused by Coagulase negative staphylococcus. The sensitivity pattern of the first line of antibiotics was as follows; out of the 19 Coagulase negative staphylococcus strains, 13 (68.42%) showed sensitivity to amikacin and ciprofloxacin, 15 (78.95%) to sparfloxacin, 9 (47.37%) to erythromycin, 10 (52.63%) to azithromycin, 12 (63.16%) to gentamicin and cephalexin and 5 (26.32%) to penicillin. Out of the 7 Staphylococcus aureus strains, 6 (85.71%) showed sensitivity to amikacin, 5 (71.43%) to erythromycin, 4 (57.14%) to sparfloxacin and ciprofloxacin, 3 (42.86%) to azithromycin and cephalexin and 1(14.29%) to penicillin and gentamicin. Out of the 3 Pseudomonas aeruginosa strains, 2 (66.7%) were sensitive to ciprofloxacin and amikacin and 1 (33.3%) was sensitive to to sparfloxacin, azithromycin and gentamicin. Enterococci showed sensitivity to sparfloxacin, cephalexin, and ciprofloxacin. Flavobacteria showed sensitivity to gentamicin, erythromycin, ciprofloxacin, sparfloxacin and amikacin. Their resistance patterns were also studied. **Conclusion:** Coagulase negative staphylococcus is the most common cause for neonatal sepsis in the NICU. Most of the organisms were sensitive to Amikacin.

Key Words: Neonatal septicaemia, Blood culture, Antibiotic sensitivity.

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INTRODUCTION

Neonatal sepsis is the most common cause for neonatal deaths in the NICU [1]. Neonatal septicaemia is an important cause of morbidity and mortality among neonates in India, with an estimated incidence of approximately 4% in intramural live births [2].

Neonatal septicaemia is defined as a disease of infants who are younger than 1 month of age,

who are clinically ill, and who have positive blood cultures [3]. Identification of aetiology is important, since it can induce a change in the management policy [4] For the effective management of neonatal septicaemia with appropriate antibiotics that would minimise the risk of severe morbidity and mortality, besides reducing the emergence of multidrug resistant organisms by rational antibiotic use, the study of the bacteriological profile and the antibiotic sensitivity pattern play a significant role [5],[6]. Thus, newborn blood cultures and sensitivity testing are important tools in the diagnosis of neonatal sepsis and in the institution of early antibiotic treatment. The institution of prompt treatment is essential for ensuring optimum outcome in neonates with sepsis, who often reach the health care facilities late and in a critical condition, in order to prevent mortality and morbidity.

This study was carried out to determine the bacteriological profile and antibiotic sensitivity pattern of neonatal sepsis in our NICU, so that the antibiotics which were used in empirical treatment could be tailored to tackle the organisms in our NICU.

MATERIALS AND METHODS

This study was conducted by analysing the blood cultures and the sensitivity reports which were obtained during January 2008 to January 2009 from 100 newborns who were admitted to the NICU, Medical College and Hospital, Sullia, a rural teaching hospital in South Karnataka.

A total of 100 blood samples were collected from the clinically suspected cases of neonatal septicaemia, on the basis of antenatal risk factors, signs and symptoms of sepsis and elevated C- reactive protein levels from a peripheral vein, with proper antiseptic precautions before starting any antibiotic therapy. A second sample was collected on the same day to rule out contamination with the skin flora. Approximately 2cc of blood was drawn and inoculated into Brain Heart Infusion broth and it was incubated at 37^0C for 24 hrs. Subcultures were made on both blood agar and MacConkey's agar after 24 hrs and 48 hrs. Negative cultures were followed up by examining the broth daily for 10 days. Growth, if any, was identified by standard bacteriological techniques [7] including gram staining, colony characteristics and biochemical reactions. Antibiotic sensitivity was performed by the Kirby Bauer's disc diffusion method. Antibiotic sensitivity was tested for the following antibiotics: Gentamicin, Amikacin, Ciprofloxacin, Penicillin, Sparfloxacin, Erythromycin and Cephalexin.

RESULTS

Of the 100 newborns, 32 (32%) showed positive blood culture reports. Out of the 32 positive blood cultures, 28(87.5%) were gram positive bacterial isolates and only 4(12.5%) were gram negative bacteria. The commonest isolate was Coagulase negative Staphylococcus, followed by Staphylococcus aureus [Table/Fig 1].

[Table/Fig 1]: Organisms found in our NICU

Sl.No	Organisms	Number	Percentage
1.	COAGULASE NEGATIVE STAPHYLOCOCCUS AUREUS	19	59.4
2.	STAPHYLOCOCCUS AUREUS	7	21.9
3.	PSEUDOMONAS AUREUS	3	9.4
4.	ENTEROCOCCI	1	3.1
5.	MICROCOCCI	1	3.1
6.	FLAVOBACTERIUM	1	3.1

The results of the antibiotic sensitivity testing [Table/Fig 2] revealed that most of the isolates were sensitive to Amikacin.

[Table/Fig 2]: Antibiotic sensitivity and resistance pattern of organisms found in our NICU

Organisms	Coagulase negative staphylococcus				Staphylococcus aureus				Pseudomonas aeruginosa			
Antibiotic	Sensitivity		Resistance		Sensitivity		Resistance		Sensitivity		Resistance	
	no	%	no	%	no	%	no	%	no	%	no	%
Ciprofloxacin	13	68.42	06	31.58	4	57.14	3	42.86	2	66.7	1	33.3
Erythromycin	09	47.37	10	52.63	5	71.43	2	28.57	0	20	3	100
Sparfloxacin	15	78.95	04	21.05	4	57.14	3	42.86	1	33.3	2	66.7
Amikacin	13	68.42	06	31.58	6	85.71	1	14.29	2	66.7	1	33.3
Azithromycin	10	52.63	09	47.37	3	42.86	4	57.14	1	33.3	2	66.7
Penicillin	05	26.32	14	73.68	1	14.29	6	85.71	0	0	3	100
Gentamicin	12	63.16	07	36.84	1	14.29	6	85.71	1	33.3	2	66.7
Cephalexin	12	63.16	07	36.84	3	42.86	4	57.14	0	0	3	100

DISCUSSION

This study was conducted to determine the most predominant bacteria which caused neonatal septicaemia and their antibiotic susceptibility pattern in our NICU. A majority of our study population was poor and did not have proper antenatal checkups.

In most of the studies, gram negative bacteria were the principle pathogens which caused septicaemia [8],[9]. In the present study, gram positive bacteria were the predominant isolates, among which Coagulase negative Staphylococcus (CONS) [19 (59.4%)] was the commonest cause of neonatal sepsis. Similar findings were noticed by others [10], [11], [12], [13], and [14]. CONS septicaemia was noticed in babies who are hospitalised for 10 days or more. Our findings correlated with the study conducted by Anand *et al* [15]. Previous studies have shown that the colonisation of babies by CONS occurs by the 3rd day of life [16]. CONS is usually isolated from intravascular catheters, cerebrospinal fluid shunts and prosthetic valves, and is normally dismissed as a contaminant when isolated from blood. Though CONS is usually considered as a skin contaminant, the presence of this bacterium in blood in critically ill babies, especially in the 2nd week of life, should be considered as significant and should be treated, especially when it is isolated repeatedly. In our study, we noticed that early onset septicaemias were predominantly caused by gram negative bacteria and Staphylococcus aureus.

5(5%) of the neonates died due to sepsis. The neonates with CONS recovered after intensive treatment. The antibiotics which were used were based on the standard protocol of the hospital and the department policies, which are changed regularly pending the blood culture reports and infectious committee recommendations. The other causative organisms were Staphylococcus aureus- 7 (21.9%), Pseudomonas aeruginosa -3 (9.4%), Enterococci -1 (3.1%), Micrococci- 1 (3.1%) and Flavobacteria - 1 (3.1%). The antibiotic sensitivity pattern differs in different studies as well, at different times in the same hospital [8]. This is because of the emergence of resistant strains as a result of the indiscriminate use of antibiotics. This can be avoided by using drugs to which most organisms are susceptible. From this study, it was suggested that the appropriate empirical regimen should consist of Amikacin until the culture results arrived, as most of the organisms found in our NICU were highly sensitive to Amikacin.

CONCLUSION

Coagulase negative staphylococcus was the most common cause for late onset neonatal sepsis in our NICU. Most of the organisms in our NICU have shown sensitivity to Amikacin, as found in other studies [17].

The microbial aetiology of neonatal septicaemia is diverse. Thus, every NICU should emphasize the importance of a periodic study of the microbial bacterial spectrum and the resistance pattern of the microorganisms which are responsible for neonatal infections, in order to design a specific empirical antibiotic regimen for the NICU.

THE FUTURE PROSPECTS OF THIS STUDY

- To distinguish between the hospital and community acquired infections of newborns
- The correlation of neonatal morbidity and mortality with simultaneous blood cultures and sensitivity profiles

- The correlation of gestation age and birth weight with blood cultures and sensitivity results

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