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Neonatal Septicemia: Bacterial Isolates & Their Antibiotics Susceptibility Patterns: A Hospital Based Study

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Abstracts
In neonates, sepsis incidence is increasing in the recent years. Neonatal septicemia is an important cause of morbidity & mortality among neonates in India, with an estimated incidence of approximately 4% in intramural live births. This present study was undertaken to study the bacteriological profile of neonatal septicemia cases and their antibiotic sensitivity pattern for planning strategy for the management of these cases. Neonatal septicemia is a life threatening emergency, and rapid treatment with antibiotics is essential for a favorable outcome. Classical empirical treatment of neonatal sepsis consists of amoxicillin & an aminoglycoside. In present study, S.aureus & Gram-negative isolates were frequently found to be resistant to amoxicillin & an aminoglycoside also, thus indicating that the use of these drugs might be ineffective. Therefore great caution is required in selection of antibiotic therapy.
Keywords: *Neonatal septicemia, Bacterial Isolates & antibiotic susceptibility.*

Introduction

In neonates, sepsis incidence is increasing in the recent years. Neonatal septicemia is an important cause of morbidity & mortality among neonates in India, with an estimated incidence of approximately 4% in intramural live births.[1] Neonatal septicemia refers to generalized infection with positive blood culture in the early28 days of life[2] & is one of the four leading causes of neonatal mortality in India.[3] Prior to antibiotic era, the mortality from septicemia was 90%, but it declining to 24-58% after antibiotics came in use.[4] This present study was undertaken to study the bacteriological profile of neonatal septicemia cases and their antibiotic sensitivity pattern for planning strategy for the management of these cases.

Material and Methods

The present study was conducted in the departments of Department of Microbiology, Heritage Institute of medical Science and hospital, Varanasi during the period from February, 2016 to January, 2017. Blood specimens for culture were drawn from 175 newborns admitted in NICU, Heritage Institute of medical Science and hospital, Varanasi with sepsis. Two blood samples from each neonates approximately one or two milliliter of blood was collected using proper aseptic precautions & inoculated immediately into 5 ml of brain heart infusion broth with 0.025% sodium polyanethol sulfonate as anticoagulant. Bottles were incubated at 37^0C for 7 days. Four subcultures were made, first after 24 hr., then at 48 hr., at 72 hr. and on the 7th day on blood agar,

Mac Conkey agar & chocolate agar.[5] Any growth was identified by colonial characteristics & standard biochemical tests.[6] Antibiotic sensitivity testing was performed by Modified Kirby-Bauer disc diffusion method as per CLSI recommendations.[7]

Results and Discussion

During a period of one year, 175 blood samples were collected out of which 81(46.28%) positive bacterial blood culture samples were studied. The incidence of Gram negative & Gram positive organisms was 66.6% & 28.38% respectively. Candida also isolated in 4.93% of cases. Klebsiellae spp. & Staphylococcus aureus were the most common Gram negative & Gram positive organisms together accounting for 44.4% & 23.45% of the isolates respectively. Other common Gram-negative isolates were Escherichia coli (9.87%), Pseudomonas spp. (6.17%), Proteus spp. (3.7%) and other less frequent isolates, (Table – 1).

Table 1. Number of microbial isolates from culture positive neonates:

Isolates	Frequency of isolates (%)
Klebsiella spp.	36(44.4%)
Staphylococci aureus	19(23.45%)
Escherichia coli	8(9.87%)
Pseudomonas spp.	5(6.17%)
Proteus spp.	3(3.7%)
Acinetobacter spp.	2(2.46%)
CONS	4(4.93%)
Candida	4(4.93%)
Total	81(100%)

Table 2. Antibiotic sensitivity patterns of Grampositive isolates:

Antibiotics	Resistant percentages of isolates	
	Organisms	
	Staphylococcus aureus	Coagulase negative Staphylococci (CONS)
Amoxicillin	86. 43	81.56
Erythromycin	50. 50	54. 12
Cephalexin	35. 65	29. 30
Gentamicin	46.02	49.05
Vancomycin	0.00	0.00
Ciprofloxacin	43. 29	41. 41
Amikacin	14.32	3.21

Table 2 and 3 show the antibiotic sensitivity patterns of organisms isolated. In most cases S. aureus was resistant to the commonly used antibiotics, including penicillin, cloxacillin & cefelexin. None of the Gram-positive isolates were resistant to vancomycin. Of the two aminoglycosides studied, amikacin scored over gentamicin in terms of sensitivity for S.aureus. Most of the Gram-negative organisms also were resistant to commonly used antibiotics. Ciprofloxacin were sensitive in about 50-60% of cases isolated. Newer combinations of antibiotics like piperacillin/tazobactum & cefoperazone/ sulbactum were sensitive in more than 95% of cases.

Table 3. Resistance patterns of Gram-negative isolates:

Antibiotics	Resistant percentages of isolates			
	Organisms			
	Kleibsella spp.	Escherichia coli	Proteus spp.	Pseudomonas spp.
Amoxicillin	100	96.3	95.1	100
Co-trimoxazole	82.01	77.21	55.02	96.7
Gentamicin	75.4	82.5	78.3	68.03
Piperacillin/Tazobactum	2.6	1.47	2.76	2.4
Cefoperazone/Sulbactum	3.54	3.13	2.89	3.79
Cefotaxime	41.04	45.1	39.6	48.01
Ciprofloxacin	67.2	76.3	65.01	74.07
Ceftriaxone	29.5	31.3	24.1	21.2

In the present study infection rate in the unit during the period of survey (5 months) was just 4.1% suggestive of good infection control practices existing in the unit. Sick neonates in general are treated prophylactically with antibiotics as per the set antibiotic policy of the NICU before the laboratory results are available. Sindhu S et al reported that knowledge of both the common pathogens causing septicemia in neonates and their antimicrobial susceptibility is essential in order to select appropriate antimicrobial treatment.[8]

For the effective management of neonatal septicemia cases, study of the bacteriological profile with their antibiotic pattern plays a significant role. In this study, blood culture positivity rate in neonatal septicemia cases was 46.20%, similar results found by Kumhar GD et al[9] and also by I roy et al[10].

In the present study Gram-negative organisms constituted the major group of isolates (66.6%) from neonatal septicemia cases, which correlates with the findings (59.8%) of Kumhar GD et al[9]. Among this group Kleibsella spp. has been found

to be the prominent pathogen (47.14%), which correlates with the findings (44.4%) of Madhu Sharma et al[11]. A total 28.38% of Gram-positive organisms have been observed in my study, similar kind of results also find in I Roy et al[10]. Amongst the Gram-positive organisms Staphylococci aureus was the predominant pathogens (23.45%). The results of antibiotic sensitivity pattern revealed that majority of Gram-negative organisms were resistant to commonly used antibiotics like amoxicillin. It has been shown that piperacillin/tazobactum & cefoperazone/sulbactum were the two most effective antibiotics against Gram-negative organisms. Majority of S.aureus was resistant to amoxicillin. Vancomycin still remains the most sensitive drug for S.aureus, not a single case of resistant was found against vancomycin, which is a correlate with the findings of I Roy et al[10]. Resistant to amikacin is less in compared with gentamicin. We did not distinguish between community & hospital acquired infections. Being a retrospective study of microbiological records, correlation with neonatal morbidity and mortality & other markers of sepsis was also not possible.

Conclusion

These findings suggest that the Neonatal septicemia is a life threatening emergency, and rapid treatment with antibiotics is essential for a favorable outcome. Classical empirical treatment of neonatal sepsis consists of amoxicillin & an aminoglycoside. In present study, S.aureus & Gram-negative isolates were frequently found to be resistant to amoxicillin & an aminoglycoside also, thus indicating that the use of these drugs might be ineffective. Therefore great caution is required in selection of antibiotic therapy. In the view of above the strategy of antibiotic usage in the hospital must be reviewed.

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