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BACTERIOLOGICAL PROFILE AND ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF ISOLATES OF NEONATAL SEPTICEMIA IN A TERTIARY CARE HOSPITAL

Ronni Mol P., Aparna Y. Takpere, P.R. Shahapur

Department of Microbiology, Shri BM Patil Medical College and Research Centre, Bijapur, Karnataka., India.

ABSTRACT

Objectives: Neonatal sepsis is one of the major causes of morbidity and mortality in the newborn. Early diagnosis and appropriate treatment of blood stream infections would minimise the risk besides reducing emergence of multidrug resistant organisms. Therefore the present study was done to know the etiological agents of neonatal sepsis, and their antimicrobial susceptibility pattern.

Methods: All neonates with signs and symptoms of neonatal septicaemia were enrolled in the study. Blood culture was done by conventional method. Any growth was identified by colony characteristics and standard biochemical tests. Antimicrobial susceptibility tests was done by Kirby Bauer Disc Diffusion method according to National Committee for Clinical Laboratory Standards (NCCLS) guidelines.

Results: 115 cases were enrolled in the study . Out of them early onset sepsis occurred in 76(66.08%)and late onset sepsis in 39 (39%) neonates. Rates of infection was high in males (60%) as compared to females(40%). Culture proven sepsis was seen in 45(39.13%) cases. Common isolated pathogen was Klebsiella pneumonia 13(29%) which was sensitive to Cotrimoxazole(69.2%) , Sparfloxacin(15.3%) and Amikacin(15%) . Second most common organism was Pseudomonas aeruginosa 9(20%) which was sensitive to Amikacin(88.8%), Ciprofloxacin(77.7%) and Piperacillin/Tazobactum(77.7%). Among the Gram positive organisms, Coagulase Negative Staphylococcus 7(15.5%) was predominant isolate which was sensitive to Linezolid (100%) and Piperacillin/Tazobactum (71.42%).

Conclusions: Blood culture, antibiotic susceptibility surveillance and rational antibiotic use will reduce the rate of neonatal septicaemia and ensure therapeutic success.

Key Words: Sepsis, Culture, Isolates, Sensitive.

INTRODUCTION

Neonatal sepsis is one of the major causes of morbidity and mortality in the newborn.[1] In India, neonatal septicemia is responsible for one-fourth to nearly half of the neonatal deaths next to perinatal hypoxia.[2]Prior to the antibiotic era, the mortality from septicemia was 90%. But with presently available antimicrobial agents, it may be treated successfully and mortality from septicemia in neonates has declined to 24.58%.[3]

Medical achievements of the last twenty years have increased the survival rate of neonates but these babies with low immunity, always need prolonged hospitalization which is a factor contributing to the high risk of post-infectious complications.[4]

Early diagnosis and appropriate treatment of blood stream infections would minimise the risk besides reducing emergence of multidrug resistant organisms.[5] Therefore the present study was done to know the etiological agents of neonatal sepsis, and their antimicrobial susceptibility pattern.

MATERIALS AND METHODS

A prospective study was undertaken from May 2013 to Mar 2014.All neonates with signs and symptoms of neonatal septicaemia admitted to Neonatal Intensive Care Unit of Department of Paediatrics at Shri B M Patil Medical College, Bijapur were enrolled in this study.

Corresponding Author:
Dr. Ronni Mol P., Department of Microbiology, Shri BM Patil Medical College and Research Centre, Bijapur, Karnataka.
Email: ronnijoji587@gmail.com

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Ethical clearance was obtained from Shri B M Patil Medical College, Bijapur.

115 cases were included in this study. Blood culture sample was collected from peripheral vein by aseptic conditions. Local site was cleansed with alcohol(70%) and povidone iodine (1%), and again by alcohol (70%). Blood culture was done by conventional method with 1:5 dilution of BHI broth with sodium polyanethol sulphonate.

Any growth was identified by colony characteristics and standard biochemical tests. If there was no growth observed on the plates by the next day, subcultures were repeated on day 4 and day 7.[6] Antimicrobial susceptibility testing was performed for all blood culture isolates by Kirby–Bauer disc diffusion method as recommended in the National Committee for Clinical Laboratory Standards (NCCLS) guidelines.

The drugs for disc diffusion testing were:

Ampicillin (10 µg), cloxacillin (1 µg), lomefloxacin (10 µg), amoxiclav (20/10 µg), cephalexin (30 µg), cefuroxime (30 µg), ciprofloxacin (5 µg), erythromycin (15 µg), gentamicin (10 µg), (30 µg), penicillin (10 units), co-trimoxazole (1·25 µg trimethoprim/23·75 µg sulfamethoxazole), amikacin (30 µg), ofloxacin (5 µg), sparfloxacin (5 µg), pefloxacin (5 µg), cefoperazone+ sulbactum (75 µg/30 µg), netilmicin (30 µg), piperacillin/tazobactam (100/10 µg), norfloxacin (10 µg), carbenicillin (100 µg), azithromycin (15 µg), and linezolid (30 µg). The discs were obtained from Himedia (India) Laboratories.

RESULTS

115 cases were enrolled in the study. Out of them Early onset sepsis occurred in 76(66.08%) and Late onset sepsis in 39 (39%) neonates, as shown in Graph-1.

Rates of infection was high in males (60%) as compared to females(40%). Culture proven sepsis was seen in 45(39.13%) cases. Out of them Gram negative bacteria were 31(68.8%) and Gram positive bacteria were 14(31.1%), as shown in Table-1.

Common isolated pathogen was Klebsiella pneumoniae 13(29%) which was sensitive to

Cotrimoxazole (69.2%). Second most common organism was Pseudomonas aeruginosa 9(20%) which was sensitive to Amikacin (88.8%), Ciprofloxacin (77.7%) and Piperacillin/Tazobactum (77.7%). Among gram positive organisms Coagulase Negative Staphylococcus 7(15.5%) was most coomon organism which was sensitive to Linezolid (100%) and Piperacillin/Tazobactum (71.42%). Distribution of the isolated organisms and their antibiotic susceptibility pattern is shown in Table - 2,3,4 and 5.

DISCUSSION

The varying microbial pattern of sepsis warrants the need for ongoing review of causative organisms and their antibiotic sensitivity pattern. In our study male neonates (60%) were affected more than females (40%) which was similar to Pais M et al.[7]

A male predominance with male-to-female ratio of 1.5:1 was found in our study, which agrees with previous reports. This might be because of the importance given to the male infants and also because of more number of male infants born compared to female infants born.[8]

In this study, blood culture-positivity rate is 39.13%. This finding is comparable with other reports. A low blood culture isolation rate could be due to administration of antibiotic before blood collection from the primary centers or the possibility of infection with anaerobes. A negative blood culture does not exclude sepsis and about 26% of all neonatal sepsis could be due to anaerobes.[9]

In our study, the most frequent isolate was Klebsiella pneumoniae (29%) which was in accordance with Roy and colleagues.[10] Even the report of the National Neonatal – Perinatal database showed Klebsiella as the predominant organism(29%).[11]

Common isolated pathogen in our study was Klebsiella pneumonia 13(29%) which was sensitive to Cotrimoxazole(69.2%), Sparfloxacin(15.3%) and Amikacin(15%). Second most common organism was Pseudomonas aeruginosa 9(20%) which was sensitive to Amikacin(89%), Ciprofloxacin(78%) and Piperacillin/Tazobactum(78%).

Among the Gram positive organisms, Coagulase Negative Staphylococcus 7(15.5%) was predominant isolate which was sensitive to Linezolid (100%) and Piperacillin/Tazobactum (71.42%). Other isolates were Streptococcus species which was also sensitive to above antibotics and Enterococcus species which was sensitive to Linezolid(100%)and Pefloxacin(33.3%).

The antimicrobial sensitivity pattern differs in different studies as well as at different times in the same hospital. This is because of emergence of resistant strains as a result of indiscriminate use of antibiotics.

CONCLUSION

It is evident from this study that Klebsiella pneumoniae, Pseudomonas aeruginosa and Coagulase Negative Staphylococcus are the leading cause of neonatal sepsis. Depending on the antibiotic sensitivity patterns of isolates, antibiotics should be used in the hospitals.

In view of the above facts, we conclude that for effective management of neonatal septicaemia cases, study of bacteriological profile and regular antibiotic surveillance and evaluation, and enforcement and periodic review of antibiotic policy should be implemented in all the hospitals.

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Table 1: Total number of Bacterial isolates

Total cases	Culture positive	Gram negative bacteria	Gram positivebacteria
115	45(39.13%)	31(68.8%)	14(31.1%)

Table 2: Distribution of isolated organisms

Organisms	Frequency of distribution(%)
Klebsiella pneumonia	13(29%)
P. aeruginosa	9(20%)
CONS	7(16%)
E. coli	4(9%)
Streptococcus species	4(9%)
Acinetobacter species	3(7%)
Enterococcus species	3(7%)
Citrobacter species	2(4%)
Total	45(100%)

Table 3: Antibiotic susceptibility of Gram Negative Bacteria

Antibiotic discs	E.coli (4)	KLEBSIELLA PNEUMONIAE (13)	Citrobacter species (2)	Acinetobacter species (3)
Ampicillin	1(25%)	0	0	1(33%)
Amoxiclav	1(25%)	0	0	1(33%)
Sparfloxacin	0	3(15.3%)	0	2(50%)
Cefuroxime	0	0	0	1(33%)
Gentamicin	2(50%)	1(7.6%)	0	0
Cotrimoxazole	2(50%)	8(62%)	0	1(33%)
Ciprofloxacin	0	1(7.6%)	0	0
Cloxacillin	0	0	0	0
Amikacin	3(75%)	2(15%)	2(100%)	1(33%)
Lomefloxacin	1(25%)	1(7.6%)	0	0
ofloxacin	1(25%)	0	0	0

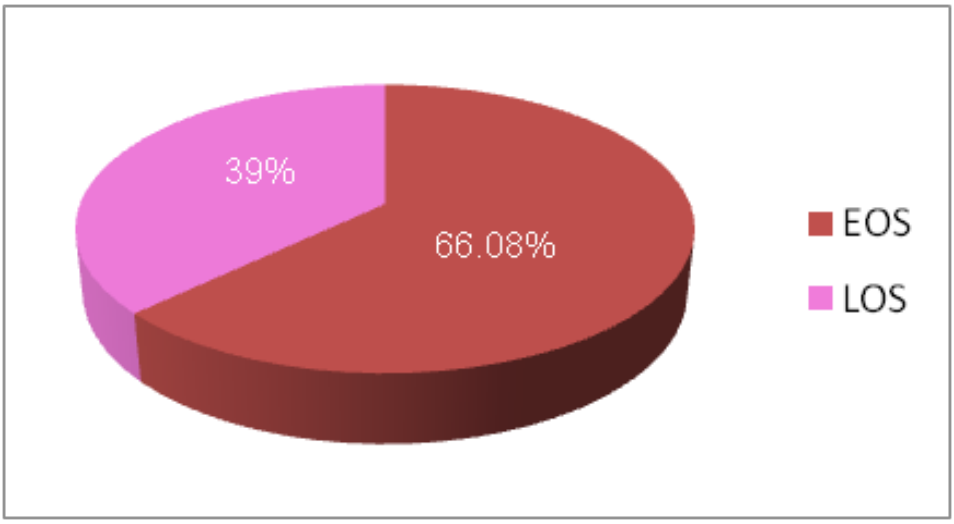
Table 4: Antibiotic susceptibility of P. aeruginosa

Antibiotic discs	p. aeruginosa (9)
Gentamicin	2(22%)
Ciprofloxacin	7(78%)
Norfloxacin	4(44%)
Carbenicillin	5(56%)
Amoxiclav	1(11%)
Amikacin	8(89%)
Piperacillin/Tazobactam	7(78%)
Cefoperazone+ Sulbactum	3(33%)
Ofloxacin	3(33%)
Netilmicin	4(44%)

Table 5: Antibiotic susceptibility of Gram Positive Cocci

Antibiotic discs	Cons (7)	Enterococcus Sp (3)	Streptococcus Sp (4)
Penicillin	2(28%)	0	0
Erythromycin	3(43%)	0	1(25%)
Cephalexin	4(57%)	0	0
Cloxacillin	4(57%)	0	0
Pefloxacin	4(57%)	1(33.3%)	2(50%)
Piperacillin/ Tazobactam	5(71%)	0	2(50%)
Cefoperazone/Sulbactam	4(57%)	0	2(50%)
Gentamicin	-	0	2(50%)
Ciprofloxacin	4(57%)	0	2(50%)
Amoxyclav	3(43%)	0	1(50%)
Cefuroxime	4(57%)	0	1(50%)
Azithromycin	3(43%)	0	1(50%)
Linezolid	7(100%)	3(100%)	1(50%)

Figure 1: Kirby Bauer Disc Diffusion Method



Graph 1: Distribution of early onset neonatal sepsis and late onset neonatal sepsis