BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN OF ISOLATES OF NEONATAL SEPTICEMIA

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ABSTRACT: BACKGROUND: In India neonatal septicemia is a leading cause of mortality. Region-wise variation regarding the predominant pathogens and their antibiotic sensitivity pattern were observed. The study was undertaken to know the pattern in this region. **METHOD:** The study comprised of 210 clinically suspected cases of neonatal septicemia admitted in the neonatal intensive care unit. Two to three ml blood was collected aseptically in Trypticase Soya broth and isolates were identified. **RESULT:** Growth was obtained in 106(50.47%) samples. Gram negative organisms were predominant. Multidrug resistant was observed in most of the organisms. **CONCLUSION:** As there was species-wise variation in antibiotic resistant pattern of organisms, we recommend antibiotic sensitivity should be done before starting antibiotics. As far as possible, first and second line antibiotics should be included in primary sensitivity testing to avoid delay in treatment and inappropriate use of antibiotics.

KEY WORDS: antibiotic sensitivity, bacteriological profile, neonatal septicemia

INTRODUCTION: In India, neonatal septicemia is a leading cause of neonatal mortality next to perinatal hypoxia ⁽¹⁾. Neonatal septicemia remains one of the important causes of mortality despite considerable progress in hygiene, introduction of new antimicrobial agent and advanced measures for early diagnosis and treatment ^(2, 3). Infection of the mother at the time of birth, particularly genital infections is the principle pathway of maternal transmission ⁽⁴⁾ and can play an important role in the development of infection in the neonate. There are variations regarding the predominant pathogen and its sensitivity pattern from developing and developed countries ^(3, 5, 6). Group B streptococci is the most common cause of neonatal in Europe and north America ⁽⁷⁾ but there is predominance of gram negative organisms in tropical and developing countries ^(8,9).

As neonatal septicemia is life threatening emergency, delays in diagnosis and treatment with appropriate antibiotics may have devastating consequences. Surveillance is needed to identify the common pathogens of neonatal septicemia as well as the antibiotic sensitivity pattern for the agents of septicemia in a particular area. The purpose of the study is to identify the common organisms of neonatal septicemia for their antibiotic sensitivity pattern in our region.

MATERIAL AND METHODS: A total of 210 cases of clinically suspected cases of neonatal sepsis admitted in the neonatal intensive care unit of a tertiary hospital from 1 February 2012 to 31 January 2013 were included in this study. Criteria used for selecting cases were maternal fever, prolonged rupture of membranes, foul smelling lochia, temperature instability, feeding difficulties, respiratory distress, jaundice, convulsion and autonomic disturbances.

2-3 ml of blood sample was aseptically collected in Trypticase Soya Broth, as it is a recommended transport as well as enrichment media used for aerobic blood culture and sensitivity

study. Blood cultures bottles were incubated at 37^o C in incubator and subcultures were done every alternate day using the standard techniques ⁽¹⁰⁾ and the aerobic isolates were identified by Gram's staining, colony characteristics and biochemical properties. Cultures were labeled negative if there was no growth after 1 week incubation. Antibiotic sensitivity pattern of isolates were performed by Kirby Bauer's disc diffusion method ⁽¹¹⁾. (Automated system for incubation was not used in this study for non-supply of media due to some institutional reasons during the study period).

RESULTS: Out of 210 cases of clinically suspected neonatal sepsis (photograph 1), culture was positive in 106 cases (50.47%). Out of 106 culture positive cases, gram negative bacilli were most common i.e. 83 (78.30%) and 23 (21.69%) were gram positive cocci. *K. pneumoniae* was most common isolate 40/106 (37.73%) followed by *Enterobacter cloacae* 21/106 (19.81%), *E. coli* 16/106 (%), Non fermenter 4/106 (3.77%) and one each of *S. typhi* 1/106 (0.94%) and *Acinetobacter* 1/106 (0.94%). In gram positive cocci coagulase negative *Staphylococci* was common 14/106 (7.94%) followed by coagulase positive *Staphylococci* 8/106 (7.54%) and one *Enterococcus* (0.94%) (Table1).

Study of antibiotic sensitivity pattern of isolates was done as per CLSI guidelines. Selection of antibiotics was also done as per CLSI guidelines. It showed species-wise variation in resistance pattern. Most organisms showed multidrug resistance (Resistance to three or more antibiotics). Commonest isolate *Klebsiella* showed 100% resistance to ampicillin, ceftazidime, cefazolin & cefotaxime followed by 95% resistance to gentamycin. Even for life saving drug like amikacin, *Klebsiella* showed 82.60% resistance. About 50% resistance was seen to ciprofloxacin. Most useful drug against *Klebsiella* was found to be imipenem. Next common organism, *Enterobacter cloacae* showed 100% resistance to ampicillin, cefazolin followed by cefotaxime (95.23), ceftazidime (95.23%) and gentamycin (90%). Effective drug against *Enterobacter cloacae* seems to be imipenem (100%) and amikacin (93.37%), ciprofloxacin showed only 23% sensitivity. Third common organism *E. coli* showed multidrug resistance similar to *Klebsiella pneumoniae* showing sensitivity to imipenem and amikacin only. Single isolate of *Salmonella typhi* showed sensitivity to all first line antibiotics whereas single isolate of *Acinetobacter* was found sensitive to only imipenem.

Some degree of resistance was seen in gram positive cocci. Coagulase positive *Staphylococci* showed resistance to penicillin, ampicillin, erythromycin, oxacillin (62.5%, 87.5%, 62.5%, and 50% respectively). All strains of *staphylococci* were sensitive to vancomycin. Antibiotic sensitivity pattern of single isolate of *Enterococcus* showed multidrug resistance with sensitivity to amikacin and imipenem only. Coagulase negative *Staphylococci* also showed resistance to penicillin, ampicillin erythromycin and oxacillin (64%, 64%, 21.42% and 35% respectively) (Table2). We have not done any test for lactamase production.

DISCUSSION: For the effective management of neonatal septicemia cases, study of bacteriological profile with their antibiotic sensitivity pattern plays the significant role. Septicemia is still a major cause of morbidity and mortality in first month of life. New treatment alternatives are being explored throughout the world due to changing bacterial profile and higher mortality rate. Out of 210 cases of neonatal septicemia, 106 blood cultures showed bacterial growth (50.47%). This is in accordance with Sharma et al (56%). Very low incidence was reported by Mathur et al (24.88%).

High incidence in present study may be due to the fact that our hospital is a tertiary hospital serving the poorest of the society. Gram negative septicemia was predominately seen in present study (78.30%), which is similar to other studies ⁽¹³⁾. Multidrug resistance Klebsiella was the leading cause of septicemia, followed by Enterobacter and E. coli. The predominance of Klebsiella and Enterobacter species were also reported by Mahapatra et al & Chugh et al as leading cause of septicemia whereas Naushad et al ⁽¹⁵⁾ reported E. coli as predominant isolate from neonatal septicemia. Isolation of Salmonella typhi from a case of neonatal septicemia case is alarming sign. An increase of incidence of Salmonella (2.4%) was found by Sharma et al. A close watch needs to be kept for increasing incidence of this organism.

Low incidence of gram positive cocci (21.69%) was observed in present study which correlated well with other study ^(9, 8). The result of antibiotic sensitivity reveals that gram negative isolate showed multidrug resistance and there was species wise variation in resistance pattern of isolate. Antibiotic sensitivity pattern showed that gram positive cocci are resistance to penicillin and semi synthetic penicillin whereas gram negative bacilli in addition to that showed resistance to other group of antibiotics like cephalosporins, aminoglycosides and even showed resistance to amikacin

In conclusion present study shows that multidrug resistance Klebsiella pneumoniae is the leading cause of neonatal septicemia in our region closely followed by Enterobacter cloacae. Since the common isolate of neonatal septicemia are resistance to ampicillin, cephalosporins and to large extent quinolones so first and second line antibiotics should be included in primary sensitivity testing to prevent the delay in reporting and to start the right treatment in time as most of the gram negative organism are multidrug resistance. We also recommend treatment according to antibiotic sensitivity pattern of the isolate to avoid the unnecessary use of antibiotics and further increase in antibiotic resistance of the organism.

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TABLE 1:- Showing the isolates from blood

Sr. no.	Gram's Reaction	Name of isolates	Number	Percentage
1.	Gram positive Cocci	Coagulase negative staphylococci	14	13.21
		Coagulase positive staphylococci		
		Enterococcus	8	7.5
			1	0.94
2.	Gram negative bacilli	Klebsiella pneumonia	40	37.73
		Enterobacter cloacae	21	19.81
		Escherichia coli		
		Non-fermenter	16	15.09
		Salmonella typhi	4	3.77
		Acinetobacter	1	0.94
			1	0.94
		TOTAL	106	

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Table 2:- Showing antibiotics resistant pattern of isolates

Antibiotics	Coagulase positive Staphylococcus %	Coagulase Negative Staphylococcus %	Klebsiella sp. %	Enterobacter Sp %	E. coli	Non-fermentor
Penicillin	62.5	64	-	-	-	-
Ampicillin	87.5	64	100	100	100	100
Oxacillin	50	35	-	-	-	-
Cefazolin	37.5	21.43	100	100	100	50
Ciprofloxacin	-	-	50	7	6.25	25
Cefotaxime	75	42.86	100	95.23	100	25
Gentamycin	20-	12-	95	90	0.25	0.25
Ceftazidime	-	-	100	95.23	100	0.25
Amikacin	-	-	82.60	6.63	18.75	50
Erythromycin	62.5	21.42	-	-	-	-

- Salmonella was sensitive to all antibiotics used for gram negative organisms.
- Acinetobacter was resistance to all antibiotics used for gram negative organisms

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