Bacteriological Profile of Neonatal Septicemia in Pravara Rural Hospital

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Abstract :

Septicemia is a leading cause of morbidity and mortality in India. A study of 385 neonates with clinically suspected septicemia was conducted from Sep 2005 to Feb 2006 at Pravara Rural Hospital Loni. Of the 288 blood cultures carried out, 115 (39.93%) were positive and out of the 97 CSF cultures, only 2 (2.06%) were positive. Amongst positive blood cultures, Gram negative organisms were predominently isolated, Klebsiella species being the most frequent offender (51.30%). Most Klebsiella spp. were multi-drug resistant. Other Gram negative organisms isolated were mostly sensitive to ceftazidime, gentamycin and ciprofloxacin. Amongst Gram positive organisms, coagulase negative Staphylococci (CONS) was more frequently isolated than Staphylococcus aureus. Most Gram positive organisms were sensitive to chloramphenicol and tetracycline but resistant to Penicillin. Since Extended spectrum b-lactamases (ESBLs) conferring resistance to the expanded spectrum cephalosporins continue to be a major problem in clinical setups worldwide therefore an attempt was made to study ESBL production amongst members of Enterobacteriaceae (Klebsiella spp. and E. coli). Since all Klebsiella isolates were resistant to most drugs (multi drug resistant), they were screened for ESBL production by double disk diffusion test, Out of 59 Klebsiella isolates, 5(8.47%) were found to be ESBL producers.

Keywords: *Septicemia, Extended spectrum b-lactamases.*

Introduction :

In spite of great advances in antimicrobial therapy, neonatal life support measures and early detection of risk factors, septicemia continues to be a major cause of mortality and morbidity amongst neonates around the world, more so in India. Neonates are particularly vulnerable to infection because of weak immune barrier. Blood stream infections are the most common infections in this age group. The pattern of organisms causing neonatal septicemia is constantly changing, thus compounding the problem of frequent emergence of resistant bacteria in nurseries[2]. The need for bacteriological monitoring in neonatal wards therefore cannot be underestimated. The present study was undertaken to describe the spectrum of isolates in cases of neonatal septicemia, their antimicrobial sensitivity pattern and screening for extended spectrum b-lactamases (ESBLs) production by Gram negative isolates.

Material and methods

A six month study from Sep. 2005 to Feb. 2006 was carried out in the Dept. of Microbiology, Rural Medical College, Loni. The study included 385 cases of clinically suspected neonatal septicemia on the basis of antenatal high risk factors and signs and symptoms of sepsis.

Blood and CSF samples were processed using standard techniques. Aerobic isolates were studied in detail by Gram's staining, colony characteristics, biochemical properties and antibiotic sensitivity tests (Kirby Bauer's disk diffusion method). Multi-drug resistant (MDR) gram negative isolates (Klebsiella and E coli) were screened for ESBLs production by double disk diffusion method[3].

Double disk diffusion test

Lawn culture of the test strain on Muller-Hinton agar was exposed to disks of a third generation cephalosporin, e.g. cefotaxime (30µg) or Ceftazidime (30 µg), and a disk of co-amoxiclav (20 µg amoxicillin/ 10 µg clavulanic acid) arranged in pairs. The disks were so arranged that the distance between them was approximately twice the radius of the inhibition zone produced by the third generation cephalosporin tested on its own. After overnight incubation at 37°C, if the test strain had an ESBLs, the inhibition zone around the cephalosporin disk was extended on the side nearest the co-amoxiclav disk.

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Rerults

Blood culture: Organisms isolated

S. No.	Organism isolated	Number
1.	Klebsiella spp.	59
2.	Staphylococci (Coagulase Negative)	27
3.	Acinetobacter spp.	09
4.	Pseudomonas spp.	06
5.	*Staph. aureus*	05
6.	*E. coli*	04
7.	*Streptococci*	04
8.	Diphtheroids	01

CSF Culture : Organisms isolated

S. No	Organism isolated	Number
1.	*E. coli*	01
2.	*Proteus mirabilis*	01

ESBLs producing Gram negative isolates

Organism	ESBL Producers	%
Klebsiella (n = 59)	5	8.4
E. coli (n = 5)	Nil	Nil

Antibiotic sensitivity pattern of Gram negative isolates

	Klebsiella	Acinetobacter	Pseudomonas	E.coli	Proteus
	(n = 59)	(n = 9)	(n = 6)	(n=5)	(n = D
Chloramphenicol	13.56%	11.11%	33.33%	100%	100%
Tetracycline	1.69%	0%	33.33%	0%	0%
Cotrimoxazole	15.25%	22.22%	16.66%	40%	100%
Cloxacillin	0%	0%	0%	0%	0%
Ampicillin	0%	0%	16.66%	20%	100%
Cefaclor	0%	0%	0%	40%	100%
Cefotaxime	6.78%	11.11%	33.33%	60%	100%
Ceftazidime	6.78%	22.22%	83.33%	60%	100%
Gentamicin	0%	11.11%	50%	60%	100%
Amikacin	1.69%	22.22%	50%	0%	100%
Norfloxacin	1.69%	22.22%	33.33%	40%	100%
Ciprofloxacin	0%	33.33%	83.33%	40%	100%

Antibiotic sensitivity pattern of Gram positive isolates

	CONS (n = 27)	Staph. aureus (n=5)	Streptococci (n = 4)	Diphtheroids (n=l)
Chloramphenicol	70.37%	20%	75%	0%
Tetracycline	59.26%	40%	25%	100%
Cotrimoxazole	33.33%	20%	0%	100%
Penicillin	7.41%	0%	0%	0%
Ampicillin	18.52%	20%	50%	100%
Cefaclor 37.04%	40%	25%	0%	
Cefotaxime	33.33%	40%	25%	100%
Ceftazidime	22.22%	20%	25%	100%
Gentamicin	25.92%	20%	0%	100%
Amikacin	40.74%	40%	0%	100%
Erythromycin	29.63%	40%	0%	0%
Ciprofloxacin	37.04%	40%	0%	100%

Discussion

Blood culture positivity rate was 39.93% which correlates well with other workers[4,5]. Blood culture isolation rate was less than 50% in this study which may be due to several reasons, viz. administration of antibiotics (to mother / baby) before blood collection, infection with anaerobes or due to intermittent bacteraemia. CSF culture positivity rate was 2.06 % (comparable with other workers)[6]. In the present study, Gram negative organisms were the major group of isolates (68.38%). Amongst this group, Klebsiella spp.

was the predominant pathogen and this was in accordance with other Indian studies[4,7]. Gram positive organisms isolated constituted 31.62%, Coagulase negative Staphylococci (CONS) being the most common isolate. These opportunistic pathogens are increasingly being reported as causative agents of neonatal septicemia. Recently, more attention has been focused on the possible role of CONS in causation of neonatal sepsis[8]. Culture positivity in this study was more in outborn (59.83%) than in inborn (40.17%) babies, which can be attributed to late detection, delayed antibiotic therapy, inadequate supportive therapy, late referral and lack of transport facilities and poor hygienic conditions. Sex distribution of positive cultures in this study was more in males as compared to females, the ratio being 3:1. Male neonates in this study constituted 75.21% of the cases. Most studies point to sepsis being more common in male babies[9,10]. It is possible that the factors regulating synthesis of gamma globulins are probably situated on X chromosome. Presence of one X chromosome in male thus confers less immunological protection as compared to the female counterpart[6].

Antibiotic sensitivity pattern revealed that Klebsiella spp. was maximally sensitive to chloramphenicol and co-trimoxazole, and resistant to most other antibiotics. Other Gram negative bacteria were mostly sensitive to ceftazidime, gentamycin and ciprofloxacin. Gram positive bacteria were mostly sensitive to chloramphenicol and tetracycline, most of them being resistant to penicillin. Antibiotic sensitivity pattern is found to be different in different studies, in different parts of the same country as well as at different times in the same hospital[11,14]. This is due to frequent emergence of resistant bacteria, a difficult problem in controlling neonatal septicemia. Screening for ESBL producing Gram negative isolates showed 8.47% of Klebsiella spp. as ESBL producers. No E. coli showed ESBL production. There are few reports available from India which show ESBL positivity in various specimens ranging from 6.6% to 53%[15,16].

The present study indicates the need for proper bacteriological monitoring of clinical isolates and their antibiotic sensitivity for effective therapeutic intervention and management of neonatal septicemia.

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