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Prevalence of ESBL (Extended Spectrum Beta Lactamase) Producing Organisms amongst Neonatal Infection

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Extended Spectrum Beta Lactamase (ESBL) are enzymes produced by gram negative organisms. The current study was performed to study the prevalence of ESBL amonst neonatal infections. All neonates with suspected sepsis were enrolled in the study over a period of one year and the ESBL producing organisms were isolated from different clinical samples along with their antibiotic sensitivity testing. The prevalence was found to be 5.3%. It is necessary to know the prevalence in all hospitals as it will guide the formulation of antibiotic policy for high risk units.

Key words: ESBL, Neonatal Infections.

ESBL or Extended Spectrum Beta Lactamase are the enzymes produced by gram negative organisms which confer resistance to not only Pencillin group of antibiotics but also cephalosporins. These enzymes are plasmid mediated and are capable of hydrolyzing and inactivating extended spectrum cephalosporins with oxyimino side chain. They have no detectable activity against cephamycins and carbapenams[1]. The first ESBL isolate was discovered in Western Europe in mid 1980s and subsequently in US in late 1980s[2] and since then the prevalence of ESBL has been on a rise.

With the spread of ESBL in hospitals all over the world, it is necessary to know their prevalence, so as to formulate an antibiotic policy in high risk units like neonatology. Equally important is the information on an isolate from a patient to avoid misuse of extended spectrum Cephalosporins, which still remain an important component of antimicrobial therapy in high risk wards. Thus the current study was undertaken to study the prevalence of ESBL amongst suspected cases of neonatal sepsis.

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MATERIALS AND METHODS

The current study was performed in the Department of Paediatrics and Neonatology & Department of Microbiology at Post Graduate Institute of Medical Education and Research & associated Dr Ram Manohar Lohia hospital, New Delhi, over a period of one year (December 2009 – November 2010) and it included all neonates with suspected sepsis who were admitted to neonatology unit of the hospital.

The clinical samples taken from these patients were blood/ urine/ CSF/ pus/ stool/ peripheral catheter tip/CVP tip etc. All the samples were processed in the Dept. of Microbiology as per standard techniques.[3] The bacterial isolates were identified & subjected to antimicrobial susceptibility testing as per CLSI guidelines.[4]The antibiotics used were Ampicillin(30µg), Amikacin (10µg), Aztreonam (30µg), Ceftazidime(30µg),

Ceftazidime+Clavulanic acid(30µg+10µg), Cefotaxime(30µg), Ceftriaxone(30µg), Ciprofloxacin(5µg), Cotrimoxazole(25µg), Chloramphenicol(30µg), Gentamicin(30µg), Mieropenam(1µg), Nalidixic Acid(30µg), Nitrofurantoin(300µg), Netilmicin(30µg), Norfloxacin(10µg), Ofloxacin(5µg) and Tazobactam+Piperacillin(10+100µg) as per CLSI guidelines[4] recommended for different bacterial isolates from different clinical samples.

All ESBL were identified using modified double disc diffusion test using Ceftazidime and Ceftazidime+Clavulanic acid disc.[5]Confirmation was performed using automated ID system by Dade Boehring.

Statistical analysis was performed using student t test and chi square test wherever applicable.

RESULTS AND DISCUSSION

A total of 150 neonates with suspected sepsis were enrolled in the study during the one year period (Dec 2009- Nov 2010). Amongst these 59 were found to be culture positive for gram negative organisms. Out of these, 12 were obtained in a mixture of organisms & were excluded from the study. Hence the study had a total of 47 culture positive neonates. Out of these, 8 neonates had ESBL positive cultures (5.3%) while rest 39 were ESBL negative. Various organisms were isolated from these neonates. A total of 10 ESBL positive organisms were isolated from 8 neonates and 62 ESBL negative organisms were obtained from 39 neonates. The spectrum of organisms is shown in Table 1 and Table 2.

The antibiotic sensitivity pattern of these organisms is shown in fig1. Eighty percent of ESBL producing organisms were sensitive to Piperacillin+Tazobactam and fifty percent to Meropenam. Only 10% of isolates were sensitive to Amikacin.

The prevalence of infections caused by ESBL producing organisms varies considerably in different geographical locations. The prevalence is as low as 7% in US to as high as 68% in Egypt.[6]In Asian countries the prevalence varies from 5% to 56% in Japan,[7] Taiwan,[8] Singapore[6] etc. In India a

Table 1. Organisms producing ESBL

	Blood	*ET tip / aspirate culture	**PICC tip/ ***UVC tip culture	Other Pus Culture
Klebsiella	0	4	1	1
E.coli	2	0	0	1
Pseudomonas	0	0	1	0
Total	2	4	2	2

*Endotracheal tube
**Peripherally inserted Central Venous Catheter
***Umbilical Venous Catheter Tip

Table 2. Non ESBL producing organisms

	Blood	ET tip / aspirate culture	PICC tip/ UVC tip culture	Urine Culture	CSF Culture	Other Pus Culture
Acinetobacter	4	14	4	0	1	5
Enterobacter	0	3	2	1	0	2
Citrobacter	1	0	1	0	0	0
Klebsiella	5	6	1	2	0	3
E.coli	3	0	1	0	0	0
Pseudomonas	0	1	1	0	0	1
Total	13	24	10	3	1	11

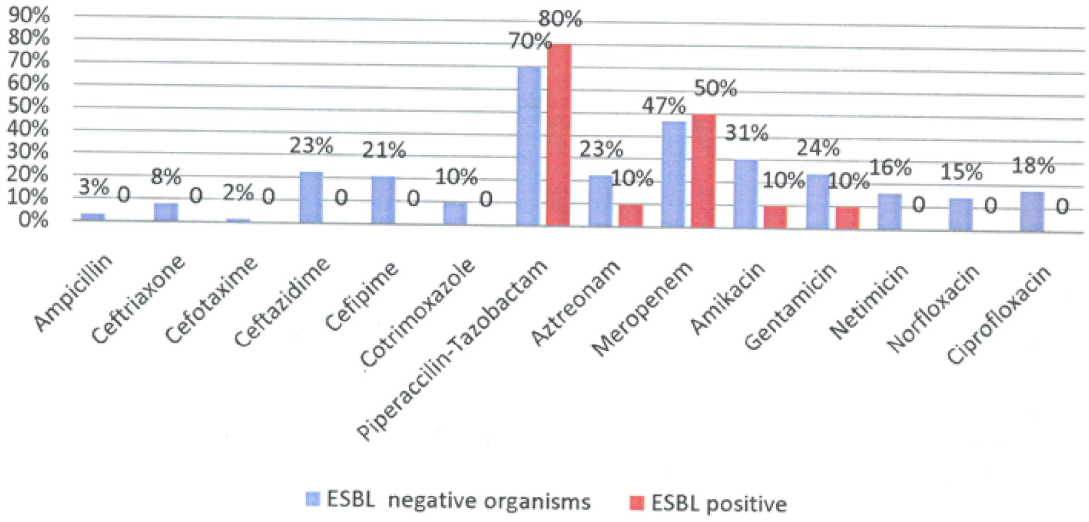

Fig. 1. Antibiotic sensitivity pattern

recent study from Aligarh reported a 36.5% and 28.6% prevalence of ESBL producing E.coli and Klebsiella respectively in neonatal infection.[9]

A similar study conducted in neonatal ICU in Pune found a prevalence of 22%.[10] In our study the frequency of ESBL producing organism was 5.3% Klebsiella (60%) was the most common ESBL producing organism followed by E coli (30%) and Pseudomonas spp.(10%). Ours is the first study report on ESBL prevalence from neonatal ICU from a tertiary care hospital situated in New Delhi.

CONCLUSIONS

The prevalence of ESBL producing organisms from neonatal infections in our hospital was 5.3%. We conclude that ESBL testing should be routinely done in all culture positive samples growing gram negative organisms as the infections caused by them are a significant problem in neonates. Hospitals should use broad spectrum antibiotics judiciously as prior antibiotic usage is a significant risk factor for ESBL acquisition. Thus continuous surveillance of the microbial flora along with their antibiotic sensitivity pattern should be a regular feature in all the hospitals to know the current trend of existing flora and for appropriate management of infections by these organisms.

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