

Bacteriological profile and Antimicrobial resistance in Neonatal Septicemia

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Abstract: Septicemia remains significant cause of morbidity and mortality in the newborns, more so in the developing countries. Reports of multi resistant bacteria causing neonatal sepsis in developing countries are increasing. The prompt administration of the appropriate, efficient antibiotic to treat newborn infections would increase the number of lives saved. So this study will show predominant organisms causing septicemia and their antibiotic susceptibility testing. It was a retrospective study conducted in Department of Microbiology, Surat for April 2016 to September 2016. Samples received by department were included in the study. Blood culture samples were processed as per protocol and organisms were identified using standard biochemical tests. Antibiotic sensitivity was studied by Kirby-bauer disc diffusion method according to CLSI guidelines. A total of 56 isolates were identified out of 126 samples. Out of which *Klebsiella pneumoniae* was the most common followed by *Enterococcus* spp. and Coagulase Negative *Staphylococcus*. On sensitivity testing, >70% of gram negative bacilli isolates were sensitive to Ertapenem, Doripenem and Gatifloxacin whereas Methicillin resistance in gram positive cocci isolates was >75%. The present study shows the importance of periodic surveys for predominant organisms and sensitivity pattern responsible for neonatal septicemia. This will help in antibiotic policy of the institute.

Keywords: Antibiotic susceptibility test, Blood culture, Neonates, Organisms, Septicemia.

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I. Introduction

A healthy start of life is important for the healthy nation. India has been making considerable progress in improving child health. During last two decades India has achieved gross reduction in number of child death. Neonatal deaths are one of the most important causeS of child death, so attempt to improve neonatal survival are in turn decreasing child deaths.

Neonatal septicaemia is a clinical syndrome with various sign and symptoms like high grade fever, weight loss, hypotension, shock etc which can threaten to life. It is one of the most important causes of mortality and morbidity amongst the neonates [1,2]. Early diagnosis of it is a challenging task. Neonatal septicaemia can be diagnosed clinically in conjunction with various serum markers like C reactive Protein, White Blood Cell Counts, Bacterial culture etc.

Blood culture is a valuable method for the isolation and identification of the bacteria as well as antibiogram of the organism. Both Gram negative organisms such as *Klebsiella* species, *Escherichia coli*, *Pseudomonas* spp., *Salmonella* spp., and Gram positive organisms such as *Staphylococcus aureus*, coagulase negative staphylococci (CONS) and *Streptococcus pneumoniae* are the pathogens most commonly known for causing neonatal sepsis. Antibiotic resistance is now a global problem [3]. Reports of multi resistant bacteria causing neonatal sepsis in developing countries is a burning issue today. The prompt administration of an appropriate and efficient antibiotic to treat these infections would increase the number of lives saved [4]. So this study will show predominant organisms causing septicaemia and their antibiotic susceptibility testing in New Civil Hospital, Surat.

II. Material And Methods

It was a retrospective study conducted in Department of Microbiology, Surat from April 2016 to September 2016. Samples of blood culture inoculated in Brain Heart Infusion Broth received by Department of Microbiology, from Neonatal Intensive Care Unit, were included in the study. Blood culture samples were incubated at 37°C. They were sub cultured on Mac Conkey agar in aerobic atmosphere, Chocolate agar and on human blood agar in 5% CO₂.

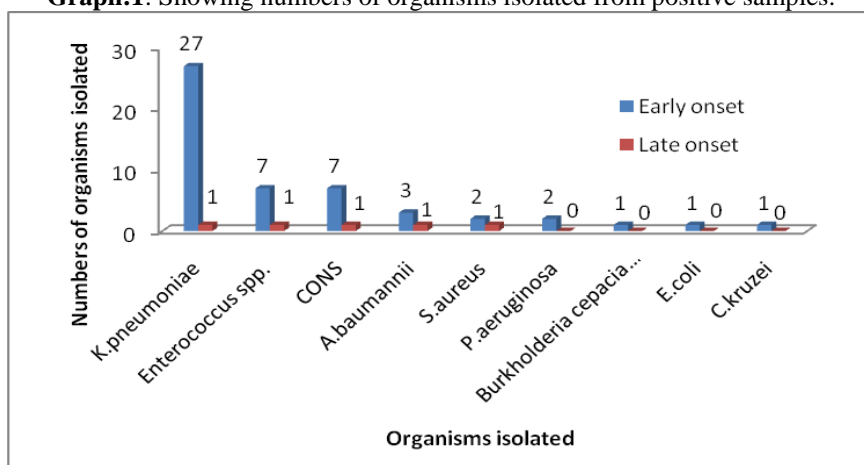
Identification of bacteria was done by colony morphology, gram staining, motility and different biochemical reactions which included Citrate utilization test, Triple sugar iron test, Urease test, Methyl red test, Voges proskauer test, Indole test, Sugar fermentation test, Catalase test, Coagulase test, Bile esculin hydrolysis test, etc [5]. After isolation of the organism, antibiotic susceptibility was done on Muller hinton agar using Kirby bauer

disc diffusion method. Drugs tested for the organism as well as results were interpreted according to Clinical and Laboratory Standards Institute (CLSI) Guidelines 2016 [6].

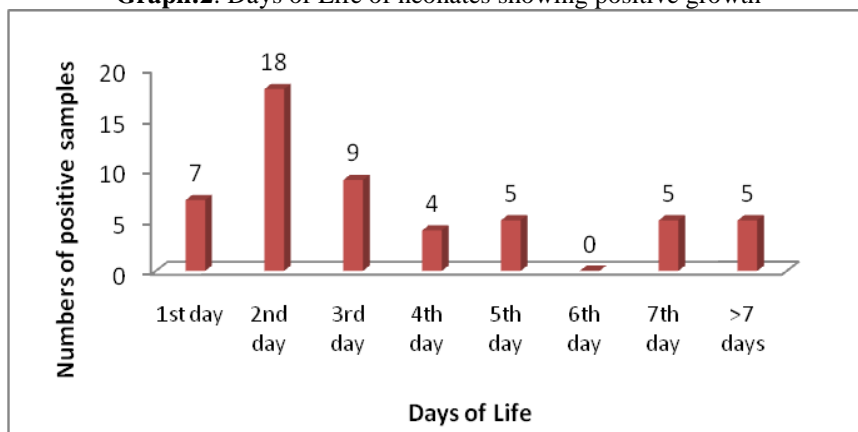
III. Results

Total of 126 samples were included in the study. From that 56 isolates were obtained. Out of which *Klebsiella pneumoniae* (28/56) was the most common followed by *Enterococcus* spp. (8/56), Coagulase Negative *Staphylococcus* (8/56), *Acinetobacter baumannii* (4/56), *Staphylococcus aureus* (3/56), *Pseudomonas aeruginosa* (2/56), *Burkholderia cepacia* complex (1/56), *Escherichia coli* (1/56) and *Candida krusei* (1/56). Results also shows that out of total isolates, 37 (69.81%) were of male neonates whereas 16 (30.18%) were of female neonates. Out of total positives, 51 samples were from <7 days of neonatal age whereas only 5 samples were from neonates of >7 days. 49 samples showed positive growth on 1st subculture and 4 showed on 2nd subculture.

Graph:1: Showing numbers of organisms isolated from positive samples:



Graph:2: Days of Life of neonates showing positive growth



Antibiotic sensitivity testing of Gram positive bacteria is shown in table 1 and that of Gram negative bacteria in table-2.

Table-1: Antibiotic sensitivity of Gram positive cocci showing % of susceptibility to drugs:

Drugs	<i>Enterococcus</i> spp.	Coagulase negative staphylococcus	<i>Staphylococcus aureus</i>
Penicillin G	33.33%	0%	0%
Erythromycin	11.11%	22.22%	66.66%
Cefoxitin	-	0%	33.33%
Amikacin	-	66.66%	66.66%
Rifampicin	33.33%	77.77%	100%
Tetracycline	100%	100%	100%
Doxycycline	100%	100%	100%

Vancomycin	88.88%	100%	100%
Linezolid	77.77%	100%	100%
Teicoplanin	100%	100%	100%
Daptomycin	100%	100%	100%

Table-2: Antibiotic sensitivity of Gram negative organisms showing % of susceptibility to drugs:

Drugs	Enterobacteriaceae	Pseudomonas aeruginosa	Acinetobacter baumannii
Ampicillin	0%	-	-
Ampicillin-sulbactam	0%	-	33.33%
Cefazoline	0%	-	-
Cefepime	0%	-	-
Ceftriaxone	0%	-	0%
Cefotaxime	0%	-	-
Cefuroxime	0%	-	-
Ceftazidime	0%	50%	0%
Aztreonam	11.53%	50%	-
Doripenem	76.92%	50%	0%
Ertapenem	80.76%	-	-
Imipenem	42.30%	50%	0%
Amikacin	0%	50%	0%
Netilmicin	0%	50%	33.33%
Piperacillin	0%	50%	0%
Piperacillin-tazobactam	38.46%	50%	0%
Colistin	100%	100%	100%
Polymyxin B	100%	100%	100%

Gram negative isolates show 100% sensitivity to Polymyxin group of drugs whereas variable resistance to Penicillins, Aminoglycosides, Cephalosporins and Carbapenems. Gram positive cocci show 100% sensitivity to Glycopeptides, Lipopeptides and Tetracyclines.

IV. Discussion

Neonatal septicemia can be classified into early onset (<7 days) and late onset (>7 days) [7]. The present study shows more of early onset neonatal septicemia in New Civil Hospital, Surat. It shows predominance of Gram negative bacilli with *Klebsiella pneumoniae*- the most common. It shows around 16% of Extended spectrum beta lactamase producing organisms. The second most common organism isolated was *Enterococcus* spp. And Coagulase negative staphylococcus with 10% Vancomycin resistant enterococci and 100% methicillin resistant Coagulase negative staphylococci. Our study shows similar results with study of Annette Onket [7], Jamal Falahi [8] and Rahul Kamble [9]. Early onset neonatal septicemia may be due to increased use of indwelling catheters and umbilical cannulas [10]. Efforts can be made to decrease use of the same. It is a big challenge today to decrease mortality and morbidity of neonates in the era of emerging Multidrug resistant organisms.

V. Conclusion

As neonatal deaths are still a major problem in developing countries, periodic surveys should be done for documenting predominant organisms responsible for neonatal septicemia and their antibiogram which will help in establishing antibiotic policy of the institute in future. Limitation of our study includes its retrospective study design with lack of its correlation with diagnostic clinical and serum markers.

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