



Antibiotics Susceptibility Patterns of Bacterial Isolates Among Neonatal Septicemia in Tertiary Care Hospital, Jamnagar, Gujarat

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ABSTRACT

Neonatal sepsis refers to systemic infection of the newborn. Prompt recognition, appropriate antimicrobial therapy and judicious supportive care are the key determinants of positive outcome in this serious pediatric emergency. Material and Methods: Blood culture samples of clinically suspected cases of neonatal septicemia from January 2012 to August 2012 were taken in Glucose broth bottles. From all the bottles subculture were done on Blood agar and MacConkey's agar. After 24 hours of incubation at 37°C of all agar plates, culture Characteristics of colony were observed. Gram stain of colony were done and according to gram positive or gram negative bacteria they were proceed for biochemical tests. Results: finally out of total 302 samples, 131 (43.37%) were positive. From 131 positive cultures, predominant organisms were K. Pneumonia (43.51%) and S.aureus (22.90%). Maximum sensitive drug for Gram negative bacteria was Gatifloxacin and for gram positive bacteria was Linezolid. 3rd generation cephalosporins were least sensitive in both cases.

KEYWORDS: Neonatal Sepsis, Gram negative bacteria, Gram positive bacteria, Antimicrobial therapy.

INTRODUCTION:

Neonatal septicemia was defined as a disease of infants who were younger than 1 month of age, were clinically ill, and had positive blood cultures [6]. Cases in which blood culture was positive and the specimen obtained within 72 hours of birth were considered as EOS, and LOS if obtained after 72 hours [1]. The detection of microorganisms in a patient's blood has a great diagnostic and prognostic significance. In developed countries, Group B Streptococcus (GBS) and Coagulase Negative Staphylococci (CONS) are the most common etiological agents for early onset sepsis (EOS) and late onset sepsis (LOS), respectively. However, in the developing nations these organisms are rare, with an entirely different bacterial spectrum [6,8]. Current study was undertaken to find out the common bacterial pathogens and their susceptibility pattern in neonates in a tertiary care hospital providing neonatal intensive care services. However, recovery of organisms such as coagulase negative staphylococci (CONS), Corynebacterium or Candida spp. is often difficult to interpret. Additional information like the density of Bacteremia, number of positive cultures, duration of incubation of the broth to obtain a positive culture, presence of risk factors or an underlying disease, is required in order to determine whether infection is truly present [1].

MATERIAL AND METHODS: This study was conducted in the department of Microbiology, of Guru-Gobind Singh Hospital, Jamnagar from January 2012 to August 2012. Neonates with clinical signs of sepsis or those who were born to mothers with potential risk factors for infection were screened for sepsis.

Under proper aseptic conditions, 2ml of venous blood was inoculated in 20 ml of sterile 1% Glucose broth. This was further incubated for 24 hours at 37°C. Subcultures were done on 5% Sheep Blood Agar and MacConkey's agar after 24 hours, 48 hours and 72 hours.

Just before subculture a Gram's stain of the broth containing blood sample was performed for provisional report. The colonies isolated were identified by their colonial morphology, motility, Gram's stain. According to Gram positive or Gram negative bacteria conventional biochemical tests were done and further speciation was done. Antimicrobial susceptibility testing was performed by Kirby-Bauer disc diffusion susceptibility method on Mueller Hinton Agar, performed in accordance to CLSI guidelines for Gram positive and Gram negative isolates. Gram negative isolates were subjected to testing for Extended Spectrum Beta Lactamases (ESBL) production and S.aureus for Methicillin resistant S.aureus (MRSA).

RESULTS: During the study period 302 blood samples from clinically suspected cases of neonatal septicemia were obtained. Blood culture was positive in 131 (43.37%) samples. Out of 131 positive samples, those of Early Onset Septicemia (EOS) were 58(44.27%) and Late Onset Septicemia (LOS) was 73(55.72%). From 131 positive samples, 88(67.17%) samples were positive for Gram negative bacteria and 43(32.83%) for Gram positive bacteria.

Table -1 Distribution of Isolates

Sr.no	Organisms	No. Of Samples with percentage
1	K. pneumoniae	57 (43.51%)
2	E.coli	13 (9.92%)
3	Paeruginosa	04 (3.05%)
4	Acinetobacter baumannii	12 (9.16%)
5	Proteus spp.	02 (1.52%)
6	Staph. aureus	30 (22.90%)
7	Enterococci	13 (9.92%)

Maximum numbers of isolates from either EOS or LOS were K. pneumoniae (43.51%), which was followed by S.aureus (22.90%).

Antibiotics sensitivity pattern of Gram negative and Gram positive bacteria are given in Table no.-2 and Table no.-3 respectively.

Table-2: Sensitivity pattern of Gram Negative Bacteria (in percentage)

Name of Antibiotic	K.pneumoniae	E.coli	Paeruginosa	A.baumannii	Proteus spp
AS	11.87	8.0	10	42.0	00
BA	10.00	31.25	20	49.5	00
CF	4.37	00	7.5	45.75	00
PC	7.62	00	37.5	57.0	00
RC	55.37	43.75	27.5	44.63	00
CI	2.75	00	7.5	33.25	00
ZN	53.62	50	27.5	76.25	50.0
GM	20.12	12.5	12.5	43.75	00
AK	26	6.25	12.5	50.37	00
GF	90.64	68.75	32.5	100	50.0

[AS- ampicillin+Sulbactam, BA- Co-Trimoxazole, CF-Cefotaxime, PC-Piperacillin RC- Ciprofloxacin, CI- Ceftizoxime, ZN-Ofloxacin, GM- Gentamicin, AK- Amikacin, GF- Gatifloxacin]

All GNB except *Paeruginosa* were maximum sensitive for GF- Gatifloxacin (68.38%), which was followed by ZN- Ofloxacin. They were least sensitive for CI- Ceftizoxime (7.2%) and CF Cefotaxime (11.52%). *Paeruginosa* was maximum sensitive for PC-Piperacillin (37.5%) and least sensitive for CF-Cefotaxime & CI-Ceftizoxime. Out of total 57 K. pneumoniae 27 (43.37%) were positive for ESBL.

Table-3: Sensitivity pattern of Gram Positive Bacteria (in percentage)

Name of Antibiotics	Staph. Aureus	Enterococci
AS	77.62	49.87
PR	52.12	24.25
CF	66.87	22.0
RC	72.75	33.12
QB	87.25	48.25
LZ	96.0	58.25
CX	58.62	29.00
AT	53.87	34.50
LM	69	24.88
GM	75.38	41.12

[AS-Ampicillin+Sulbactam, PR-Ciprofloxacin, CF- Cefotaxime, RC- Ciprofloxacin, QB- Levofloxacin, LZ-Linezolid, CX-Cloxacillin, AT-Roxithromycin, LM-Lincomycin, GM-Gentamicin]

All GPC were Maximum sensitive for Linezolid (77.25%, which was followed by Levofloxacin (67.75%) and less sensitive for Roxithromycin (53.87%), Cefotaxime (66.87%) and Cephalexin (62.12%). Out of total *S.aureus* (30), 8(26.67%) were positive for MRSA.

DISCUSSION: Bacteria causing neonatal sepsis continue to change. They also differ from developed to developing country and place to place^[8]. We excluded CONS from analysis because we used single blood sample for culture and it was difficult to analyse the true CONS infection from contamination, from single blood culture without additional information^[8].

In this study Blood culture positivity in neonatal septicemia cases was 43.37% which is in line with studies of A.mahmood et al (40.76%)^[2] and Zakariya BP et al (41.6%)^[10].

Overall Gram negative bacteria formed major part of isolates at 67.17% which is in line with studies of A.K Mane et al(61.3%)^[11] and Bhatt Sima K et al(63.0%)^[3] and study of Boma A West et al[4] shows higher isolates of GNB (75.1%) with higher number of K.pneumoniae (58.2%) also consistent with present study.

Overall K.pneumoniae (43.51%) was predominant organism which was followed by *S.aureus* (22.90%) in both EOS as well as LOS^[1, 2, 5]

From total 57 K.pneumoniae, 27(43.37%) were positive for ESBL which is in line with Zakariya BP et al (32.0%)^[10].

From total 30 *S.aureus*, 8(26.67%) were positive for MRSA.

Overall all Gram negative bacteria had good sensitivity against Fluoroquinolones like Gatifloxacin (68.38%), Levofloxacin (51.47%) and Ciprofloxacin (34.25%) which are in line with studies of Mutlu et al^[7], Rushda Aftab et al^[9] and A.k.Mane et al^[11].

Overall all Gram positive bacteria had good sensitivity against Linezolid (77.25%) and Levofloxacin (67.75%) which is consistent with Bhatt Sima k et al^[3].

In present study all Gram positive and Gram negative bacteria were least sensitive to Cephalosporins like Cefotaxime and Ceftizoxime which is as in studies of Mutlu et al^[7] and Zardad Muhammad et al^[11].

The present study has shown a change in the sensitivity pattern of the common pathogens to commonly used antibiotics. Quinolones (Gatifloxacin, Levofloxacin and ciprofloxacin) were observed to be the most potent antimicrobial agents against both Gram negative and positive organisms in our Hospital and least sensitive to Cephalosporins. Reserve drug like Linezolid have not yet developed resistance.

CONCLUSION: Neonatal Septicemia is a life threatening emergency and early treatment and appropriate use of antibiotics would minimize the risk of severe morbidity and mortality in sepsis, and reduce the emergence of multi-drug resistant organisms in Neonatal intensive care unit by rational antibiotic use. For the success of early empiric treatment, periodic review of cases to assess any changing trends in the infecting organisms and their antimicrobial susceptibility is important.

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