



Original Research Article

Study on Aetiological Profile of Neonatal Sepsis in a Tertiary Care Hospital in Eastern India an Original Article

Authors

Niloy Kumar Das¹, Alakesh Halder², Baisakhi Soren³, Saheli Misra⁴

^{1,4}Neonatology Division, Pediatric Medicine Department, ²Forensic Medicine, ESI-PGIMSR, ESIC Medical College & Hospital and ODC (EZ), Joka, Kolkata West Bengal

³Pediatric Medicine Burdwan Medical College, Burdwan, India

Corresponding Author

Niloy Kumar Das

8 No Kalinagar Dasher Chalk, Kakdwip, 24 PGS (S), WB, India, 743347

Email: 4niloy@gmail.com, +917278165231

Abstract

Introduction- Neonatal sepsis is a major cause of neonatal mortality and morbidity. For proper management knowledge of the pattern of etiological agents and their sensitivity pattern is crucial. The aim of this study was to determine the aetiology and their sensitivity of neonatal septicemia cases.

Materials and Method- It was a retrospective survey study. During 1 year period blood samples were sent for culture sensitivity. Samples were drawn from sick neonates or those having risk factors for developing sepsis. Blood culture was performed using BACTEC 9240, isolates were identified by standard techniques and antibiotic susceptibility was performed as per the CLSI guidelines.

Results - Total 147 samples were sent for blood culture, 29 (19.7%) came out positive. *Escherichia coli* was the most common organism causing sepsis. All Gram positive organisms were sensitive to Vancomycin where for Gram-negative organisms, Colistin and Meropenem mostly effective.

Conclusion- Gram negative organisms were most commonly associated with neonatal sepsis. Commonly used antibiotics like Amoxicillin, Cefotaxime, Amikacin were ineffective to control sepsis

Keywords: neonatal, sepsis, Gram positive, Gram negative organism.

Introduction

Neonatal sepsis is one of the leading cause of neonatal mortality and morbidity. In India neonatal mortality rate 33/1000 live birth as per census 2010 ⁽¹⁾ whereas in developed country it is 5 ⁽²⁾. Neonatal sepsis is one of the three major contributors to neonatal mortality causing about one-quarter of the deaths ⁽³⁾. Clinical feature of neonatal sepsis is very much nonspecific, it

requires a high index of suspicion specially in an early stage. Appropriate antimicrobial administration is utmost important to prevent the mortality and morbidity of neonatal sepsis. For this, it is essential to know the epidemiology of causative organism and their sensitivity to the antimicrobial. A good number of studies have been done in different parts of the country, and there is no dearth of data in this regard. However, no

etiological study has previously been done in our NICU.

The present study was undertaken to determine the profile of bacteria or fungus and their antimicrobial sensitivity pattern of septicemic neonates from Neonatal Intensive Care Unit (NICU).

Methodology

It was a retrospective study done from August 2014 to July 2015. Data were procured from old case sheet. All the neonate either inborn or outborn who developed the clinical feature of sepsis or had a risk factor(s) for sepsis were included in the study. Clinical features of sepsis were poor suck, lethargy, respiratory distress, abdominal distension, convulsion. Risk factors for sepsis were born to mothers with maternal fever, PROM for more than 18 hours, foul smelling or meconium stained liquor (MSL), or frequent (>3) unclean vaginal examinations, and/or having severe prematurity, or birth asphyxia necessitating active resuscitation.

Blood culture was done using a Bectec Dickinson ped plus aerobic bottles and incubation were performed in the Bactec 9240 system. Then positive bottles were undergone Grams staining

and subcultured on sheep blood agar and MacConkey agar. The plates were incubated at 37°C for 24 hours. Growth was identified by colony morphology, Gram stain and standard biochemical tests. Antimicrobial susceptibility was performed by the Kirby Bauer disc diffusion method as per the CLSI guidelines. The study was approved by the Institutional Ethics Committee.

Results

Total 147 samples were sent for blood culture. 29 (19.7%) sample came up as positive. Among positive samples, 17 neonates were low birth weight (57%). Male female ratio was 4:1. C reactive protein was high in 27 (30%) cases. Platelet was low (<100000/cc) in 18(60%) cases. Leucopenia (<5000/cc) was documented in 5 cases (17%).

The incidence of Gram negative organism 12(41.4%), Gram positive organism 10 (34.5%), fungus 5 (17.2%) and 2 (7%) were contamination. Table 2 & 3 showed the respectively percentage of antibiotics sensitivity. Gram-positive organisms were fully sensitive to Vancomycin whereas Gram-negative organism were sensitive to Colistin followed by Meropenem.

Table No 1 Frequency of isolated organisms

Organism	Frequency (%)
Escherichia coli	5(17.2)
Klebsiella pneumonia	4(13.8)
Methicillin resistant Staphylococcus aureus(MRSA)	4(13.8)
Methicillin sensitive Staphylococcus aureus(MSSA)	1(3.4)
Coagulase Negative Staphylococcus	4(13.8)
Acinetobacter	2(6.9)
Pantoea agglomerans	1(3.4)
Enterococcus faecalis	1(3.4)
Candida	5(17.2)
Micrococcus	2(6.9)

Table 2 Sensitivity percentage of Gram positive organism

Antibiotic	MRSA	MSSA	CONS
Amoxicillin	0	0	0
Amoxicillin-clavulanic acid	0	100	0
Amikacin	50	-	0
Ciprofloxacin	50	-	50
Trimethoprim/sulfamethoxazole	50	-100	50
Vancomycin	100	100	100

Table 3 Sensitivity percentage of Gram negative organism

Antibiotics	E.coli	K.pneumoniae	Acinatobacter
Amikacin	20	50	0
Cefotaxime	0	25	0
Meropenem	80	100	0
Colistin	100	100	100
Ciprofoxacin	100	75	0

Discussion

For adequate and effective management of neonatal sepsis knowledge of profile of causative organism and their sensitivity pattern plays a significant role. For this blood culture and sensitivity test is essential. In our study blood culture positivity rate was 19.7%. This finding was comparable to other studies ⁽⁴⁾. However, a high blood culture positivity rate in septicemic children (56%) had been reported by and Jain *et al.* ⁽⁵⁾. A low blood culture might be due to prior antibiotics administered at lower centre or causative organism might be anaerobes.

The pathogens most often implicated in neonatal sepsis in developing countries differ from those seen in developed countries Overall, Gram-negative organisms are more common and are mainly represented by Klebsiella, Escherichia coli, Pseudomonas, and Salmonella. Of the Gram-positive organisms, Staphylococcus aureus, CONS, Streptococcus pneumonia, and S. pyogenes are most commonly isolated ⁽⁶⁾. In our study incidence of Gram-negative organisms was highest followed by Gram-positive organisms. Similar observations were found by others also.^(7,8)

In our study most common organism was Escherichia coli followed by Klebsiella, CONS, MRSA in same frequency. This differed from the other studies which showed Klebsiella as predominant aetiological agent ^(4,6,9) This might reflect the changing scenario of the aetiological agent of sepsis. A further and more longterm study is needed in this regard.

Antibiotic resistance is today a burnin problem. Reports of multidrug-resistant bacteria causing neonatal sepsis in developing countries are increasing. The easy availability of over-the-counter antibiotics and the inappropriate use of

broad-spectrum antibiotics in the community may explain this situation. It is difficult to compare antibiotic resistance between countries because the epidemiology of neonatal sepsis is extremely variable ^(6,10).

Sensitivity was tested in all isolated bacteria. All Gram positive organisms were resistant to Amoxycillin. High reistance was also found against amoxycillin-clavulinic acid, Amikacin, Trimethoprim/sulfamethoxazole, Ciprofloxacin.

But all were sensitive to Vancomycin.

Gram negative organism were also showed low sensitivity to Amikacin, Cefotaxime. But they were highly sensitive to Meropenem and Ciprofloxacin. All were sensitive to Colistin. This result was in agreement with other in many respect.⁽¹¹⁾ Differenc might be due to difference in antibiotic policy of respective institution

Conclusion

Our study showed that Gram-negative organisms (Escherichia, Klebsiella, Acinetobacter), CONS, and S. aureus are the leading cause of neonatal sepsis and most of them are resistant to multiple antibiotics. Therefore author suggests continuous surveillance is needed due to temporal changes in orgaism and their sensitivity. A low susceptibility to commonly used antibiotics like Amikacin, Cefotaxime is a matter of concern. According to antibiotic sensitivity pattern of the isolates, antibiotics should be used. We also advise that information to be provided to the public on the dangers of indiscriminate use of antibiotics.

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