Original Research Paper

Volume - 13 | Issue - 01 | January - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Paediatrics

NEONATAL SEPSIS'S CLINIC-BACTERIOLOGICAL PROFILE

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ABSTRACT **Introduction:** Neonatal sepsis one of the most common causes for neonatal mortality and morbidity in developing countries and Neonatal sepsis is one of the preventable causes of death. The aim of this study was to determine the etiology, clinical characteristics and outcome of neonatal septicaemia cases. **Materials and Methods:** A prospective observational study was conducted over 6 months period, at the Department of Paediatrics. The study included 120 suspected sepsis neonates admitted to our NICU. Data was Collected data was analysed **Results:** The prevalence of EOS and LOS was 56.7% and 43.3%, respectively. Culture positivity was seen in 16.7 % of the cases. In culture-proven septicaemia, 80% of neonates presented with EOS and 20% presented with LOS. In our study, we found that CONS were the most commonly isolated organisms followed by E coli.**Conclusion:** Organisms causing neonatal sepsis and their antibiotic susceptibility vary from place to place. Each neonatal unit should have its antibiotic policy based on antibiotic susceptibility studies.

KEYWORDS : Neonatal sepsis, antibiotics, culture-proven septicaemia

Introduction:

Even nowadays neonatal Sepsis remains one of the most important causes of mortality in neonates. According to recent data from National Neonatal Perinatal Database (NNPD) 2000, the incidence of neonatal sepsis has been reported to be 38 per 1000 intramural live births in tertiary care institutions.[1] Neonatal sepsis is one of the preventable causes of death unlike other causes like congenital anomalies and indicates that the mortality rate can be reduced if appropriate measures are implemented. The clinical signs and symptoms of neonatal sepsis are indistinct and nonspecific, making its early diagnosis difficult.[2]

Neonatal sepsis is defined as a disseminated disease with positive blood culture during the first month of life and encompasses various systemic infections of the newborn such as septicemia, meningitis, pneumonia, arthritis, osteomyelitis and urinary tract infection.[3]

Neonatal sepsis can be divided into two main subtypes depending on whether the onset is during the first 72 hours of life i.e., early onset sepsis (EOS), or later i.e., late-onset sepsis (LOS). Clinical signs and symptoms vary from decreased sucking, lethargy, inactivity, paleness "just not looking right", and hypothermia. A high index of suspicion may be necessary.[4]

Knowledge about potential risk factors would help in the early diagnosis of sepsis. Early signs of sepsis are frequently non-specific and subtle. It has been one of the major diagnostic problems for physicians due to the non-specificity of its symptoms and the absence of a reliable paraclinical marker. Furthermore, the gold standard for the detection of blood culture is unreliable when intrapartum antibiotics have been administrated. [5,6]

The main aim of the study is to note which are the common organisms causing sepsis in our area and their sensitivity to antibiotics. This will help us to use appropriate antibiotics and reduce the development of antibiotic resistance.

METHODS:

This study was conducted in the NICU of tertiary care hospital during June 2022- November 2022. It's a hospital-based, prospective, analytical study. All babies admitted to the Neonatal Intensive Care Unit with the clinical suspicion of sepsis during the study period were included in the study. Babies who were already on antibiotics, with congenital anomalies were excluded. Informed written consent was taken from either of the parents of the babies who were included in the study.

In all cases, a Complete blood picture, and platelet count was done by the automated cell counter method. CRP was done by using serum and it is a qualitative and semi-quantitative latex agglutination kit. Blood culture was done in all cases, Blood for culture was inoculated into a culture bottle containing 5ml of Brain Heart infusion broth and incubated at 37 Celsius for 24 hours. Subcultures were done o blood agar and MacConkey agar on day 1,4,7 if bottles did not show turbidity. Isolates are identified by their characteristic appearance on their respective media and gram staining and confirmed by the pattern of biochemical reactions using the standard method.

Results:

During the study period total of 220 cases were admitted out of these 120 cases diagnosed as sepsis, the prevalence of sepsis in our study period was 54.5%. Out of 120 sepsis cases 45 cases were born in our hospital and 75 cases were outborn and referred from different hospitals. 56 cases (46.7%) of them were males and the rest 64 (53.3%%) were females. There were 42 (35%) preterm babies 78 (65%) were term babies. The signs and symptoms of babies with clinical sepsis and their distribution of patients based on clinical signs and symptoms was shown in Table 1. The distribution of cases based on haematological investigations was shown below in Table 1. Out of 120 sepsis new-born cases, 68 (56.7%) had early onset sepsis and 52 (43.3%) had late-onset sepsis. In our study total of 120 cases were diagnosed as neonatal sepsis out of these 20 cases (16.7%) culture positive neonatal sepsis. In culture-proven septicaemia, 16 (80%) neonates presented with EOS and 4 (20%) neonates presented with LOS. In culture-positive neonatal sepsis cases, common isolates were Coagulase negative Staphylococci (CONS, E. coli (Escherichia coli), Klebsiella pneumonia, Enterobacter Pseudomonas, Acinetobacter, Staphylococcus aureus was the predominant isolate organisms. Drug-sensitive patterns for specific bacteria was shown in Table 2.

Table 1: **Demographic Characteristics of Neonatal Sepsis Cases**

Characteristics	Number of cases	Percentage
Inborn	45	37.5%
Out born	75	62.5%
Gender		
Male	56	46.7%
Female	64	53.3%
Gestational age		
Preterm	42	35%
Term	78	65%
Mode of delivery		
Normal vaginal delivery	54	45%
LSCS	66	55%

Onset of sepsis		
Early Onset of sepsis	68	56.7%
Late Onset of sepsis	52	43.3%
Culture-positive sepsis 16.7%	20 cases	
Culture +ve in EOS	16	80%
Culture +ve in LOS	4	20%
Clinical signs and symptoms		
Poor feeding/Irritability	75	62.5%
Difficulty in breathing (RDS)	32	26.7%
Fever	20	16.6%
Hypothermia	12	10%
Vomiting's	30	25%
Abdominal distension	20	16.6%
Jaundice	8	6.7%
Apnea	12	10%
Shock	6	5%
Investigation		
Abnormal total leukocyte count >15000/ cu mm	38	31.7%
Abnormal total leukocyte count <5000/ cu mm	22	18.3%
C-reactive protein >6 mg/dl	90	75%

Table 2: Pathogens isolated from blood culture and antibiotic Sensitivity pattern

Bacteria isolation	Total no of Culture positive sepsis (20)	antibiotic Sensitivity pattern
Coagulase-negative Staphylococci (CONS)	8	Amoxiclav, Linezolid, Amikacin, Erythromycin, Vancomycin. Clindamycin, Levofloxacin,
E. coli (Escherichia coli)	4	Cefotaxime, Ceftriaxone, Amikacin, Gentamicin, Levofloxacin
Klebsiella pneumonia	2	Ceftriaxone, Ceftazidime, Levofloxacin, Piperacillin-Tazobactam, Imipenem. Ofloxacin
Enterobacter	1	Ampicillin, Amoxicillin-clavulanic acid, Linezolid.
Pseudomonas	2	Ceftazidime, Amikacin, Ciprofloxacin, Piperacillin -tazobactam, Meropenem
Acinetobacter	1	Ceftazidime, Levofloxacin, Amikacin, Piperacillin-Tazobactam, Imipenem
Staphylococcus aureus	2	Cotrimoxazole, Linezolid, Vancomycin, Ciprofloxacin. Clindamycin, Amikacin.

Discussion:

The present study was done over 6 months. Out of 220 neonatal cases admitted during this time 120 (54.5%) were with clinical neonatal sepsis. 20(16.7%) were proven culture-positive neonatal sepsis. In this study, the majority of the neonates presented with early onset sepsis (56.7%) as compared with late-onset sepsis (43.3%) similar to studies done by Jain NK et al7 and Vinod Kumar CS et al8 Prevalence of higher EOS than LOS (68%7and 73%8).

The total blood culture positivity rate among neonates with sepsis in this study group was 16.6%, which was comparable to the study by Martin et al., who reported Culture positive neonatal sepsis in 9.5% of the cases 9 whereas a lower rate of 4.1% was reported by Aletayeb et al.10 Higher culture positivity rates seen in studies done by Jain NK et al7 (28.3%). Blood culture positivity was higher in EOS (80%) as compared with LOS (20%), which is similar to a study done in Iran where the incidence of EOS and LOS was 64% and 36%, respectively.[10]

most common neonatal sepsis clinical symptoms were in the present study 62.5% were presented with poor activity/ poor crying followed by 26.7% with respiratory distress. Whereas 52% of neonates presented with respiratory distress in the study of Shresta S and Singh DS.[11]

C reactive protein was positive in 75% of clinical sepsis cases and was similar to the observation of Basu et al in their study where it was positive in 79.83% of cases.12 Whereas Shresta et al noticed positive CRP only in 15% of cases.[11]

Out of 20 culture-positive cases, 40% of cultures showed the growth of CONS and 10% Staphylococci and the remaining 50% of cases had growth of gram-negative bacteria, pseudomonas Acinetobacter, Enterobacter and E. coli.

All CONS isolates were sensitive to amoxiclav, Clindamycin, Linezolid, Vancomycin, and levofloxacin. This is consistent with the observation of R Anegundi, and Raghavendra.13 Gram-negative organisms Kleibsella and Acinetobacter showed sensitivity to Ceftazidime, Amikacin, Ciprofloxacin, Piperacillin-tazobactam, and Meropenem.

CONCLUSION:

Neonatal sepsis creates a significant burden due to its impact on neonatal mortality and long-term morbidity. Organisms causing neonatal sepsis and their antibiotic susceptibility vary from place to place. Each neonatal unit should have its antibiotic policy based on antibiotic susceptibility studies. This will help paediatricians to choose appropriate empirical treatment for the management of neonatal sepsis.

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