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Bacterio-Antibiotic Susceptibility Profile in Neonatal Sepsis At A Tertiary Neonatal Care Centre

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Abstract: *Neonatal sepsis is defined as a clinical syndrome of bacteremia with systemic signs and symptoms of infection in the first 4 weeks of life. This study was undertaken to determine the bacteriological profile and antibiotic sensitivity patterns of microbial isolates from blood cultures of neonates suspected with neonatal sepsis, in Coimbatore Medical College Hospital. An analysis was conducted on all blood culture reports obtained between 1st of July 2015 to the 31st of December 2015. During the study period, 797 newborns with clinical sepsis were admitted. Blood culture reports were positive in 281 cases (35.26%).Out of 281 cases, 109 (38.8%) had early-onset sepsis and 172 (61.2%) had late-onset sepsis.The most frequently isolated organism was Klebsiella pneumoniae (49.47%), Staphylococcus aureus (18.14%) followed by Escherichia coli (13.17%).Best overall sensitivity among Gram-negative isolates was to Imipinem (94.67%) followed by Amikacin (78.73%) and best sensitivity among Gram positive isolates was to Vancomycin(87.75%), followed by Cloxacillin and Ampicillin (around 60%).Out of 281 positive cultures, 18 were multi-drug resistant. Conventionally used antibiotic for neonatal sepsis at various centres like cefotaxime , seems to be least useful. Multidrug resistant (ESBL) Gram Negative organisms prevalence is on the rise which necessitates surveillance. Prevalence rate of GBS (Group B Streptococci) is underestimated in developing countries.*

Keywords: *Neonatal sepsis, antibiotic susceptibility, Blood culture*

I. Introduction

Neonatal sepsis is defined as a clinical syndrome of bacteremia with systemic signs and symptoms of infection in the first 4 weeks of life[1].Neonatal sepsis is broadly divided into two types: Early onset sepsis is caused by organisms prevalent in the maternal genital tract, labour room or operating theatre, while late onset sepsis usually results from nosocomial or community-acquired infection. It is more common among male babies and preterm births[2]. It is one of the major causes for NICU admissions and mortality in neonates. Neonatal mortality rate is one of the indicators for measuring the health status of a nation. According to World Health Organization (WHO) estimates, there are about 5 million neonatal deaths a year, with 98% occurring in developing countries[3]. The incidence of neonatal sepsis according to the data from National Neonatal Perinatal Database (NNPD, 2002-03) is 30 per 1000 live births and contributes to 19% of all neonatal deaths[4].

Neonatal sepsis is caused by a variety of Gram +ve as well as Gram -ve bacteria, and sometimes yeasts[5]. Clinically, it is difficult to diagnose neonatal sepsis. If early signs or risk factors are missed, mortality increases. Hence, even a slight suspicion of sepsis warrants empirical therapy with antibiotics till blood culture results are obtained. The spectrum of organisms that causes neonatal sepsis changes over time and varies from region to region. This is due to the changing pattern of antibiotic use and changes in lifestyle[6]. Periodic evaluation of organisms responsible for neonatal sepsis is essential for the appropriate management of neonates.

II. Objective

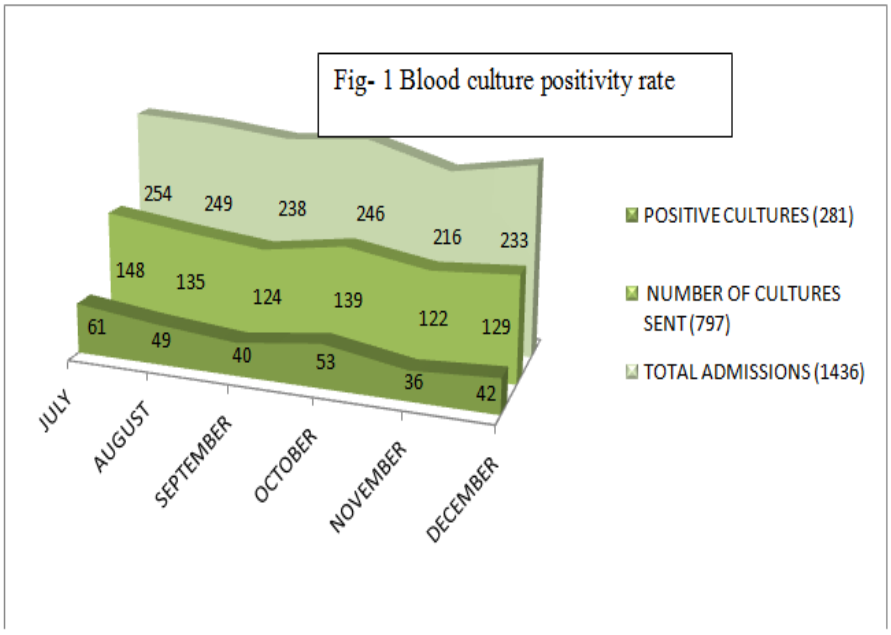
This study was undertaken to determine the bacteriological profile and antibiotic sensitivity patterns of microbial isolates from blood cultures of neonates suspected with neonatal sepsis, in Coimbatore Medical College Hospital, a tertiary care centre, to aid in the choice of drugs for empirical therapy to be initiated early and to be more effective.

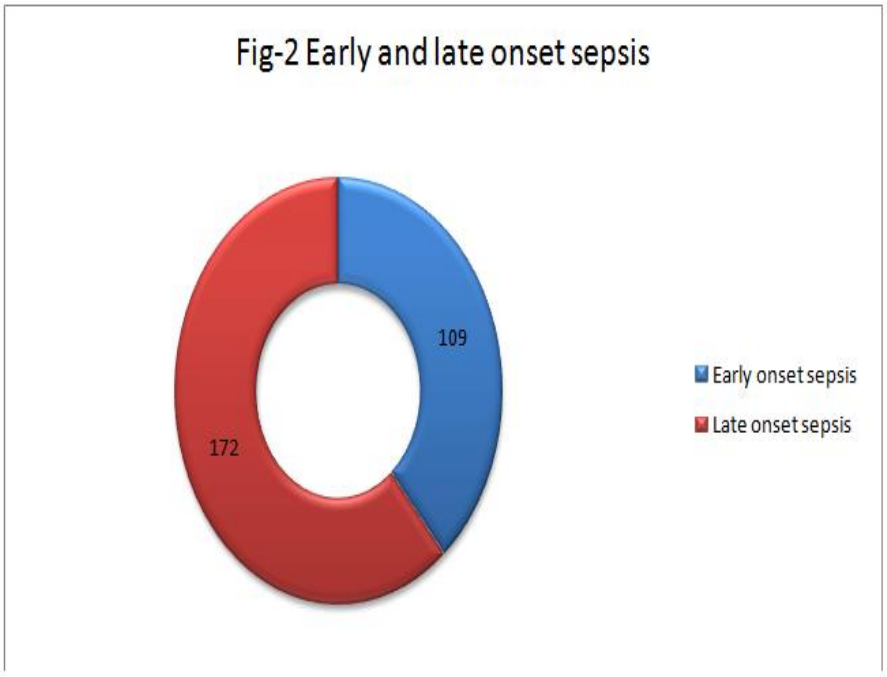
III. Methodology

An analysis was conducted on all blood culture reports obtained between 1st of July 2015 to the 31st of December 2015 from newborns admitted to the Department of Pediatrics and the Neonatal Intensive Care Unit (NICU) at Coimbatore Medical College Hospital. Blood culture was done for all neonates suspected to have septicemia. Blood culture sample included a single sample collected from a peripheral vein or artery under aseptic conditions. The local site was cleansed with 70% alcohol and povidone iodine (1%), followed by 70% alcohol again. Blood cultures were incubated at 37˚C and analysed at Microbiology department of Coimbatore Medical College Hospital. Isolates were identified by the characteristic appearance on their respective media, Gram staining and confirmed by the pattern of biochemical reactions using the standard method and antibiotic sensitivity was also tested.

IV. Results

1) During the study period, a total of 1436 neonates admitted in our newborn care unit , of which 797 newborns with clinical sepsis were admitted. Blood culture reports were positive in 281 cases (35.26%).[Fig-1]
2) Late-onset sepsis cases were found to be 1.58 times higher than early-onset sepsis. Out of 281 cases, 109 (38.8%) had early-onset sepsis and 172 (61.2%) had late-onset sepsis.[Fig-2]
3) The most frequently isolated organism was Klebsiella pneumoniae (49.47%), Staphylococcus aureus (18.14%) followed by Escherichia coli (13.17%).[Fig -3]
4) Best overall sensitivity among Gram-negative isolates was to Imipinem (94.67%) followed by Amikacin (78.73%) and best sensitivity among Gram positive isolates was to Vancomycin(87.75%), followed by Cloxacillin and Ampicillin (around 60%).[Fig – 4,5,6]
5) Out of 281 positive cultures, 18 were multi-drug resistant.[Fig- 7]





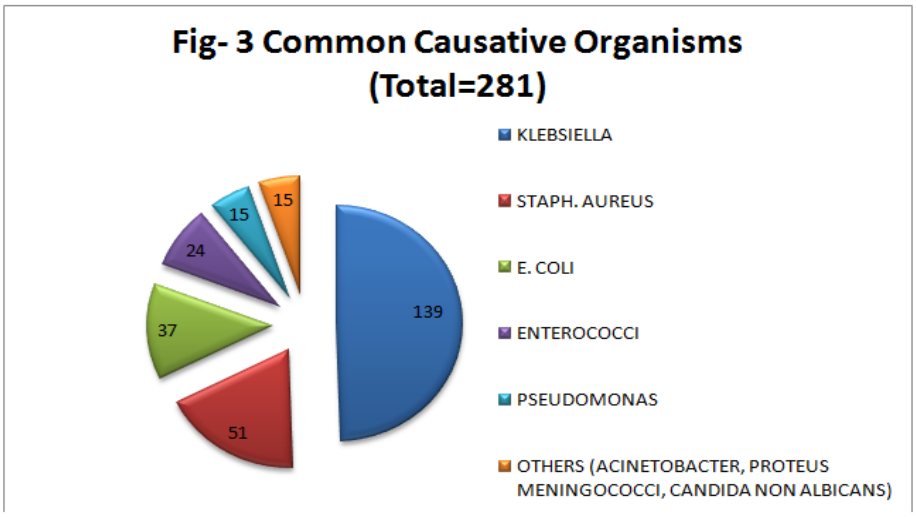


Fig- 4 Antibiotic Sensitivity Pattern of Klebsiella (Total=139)

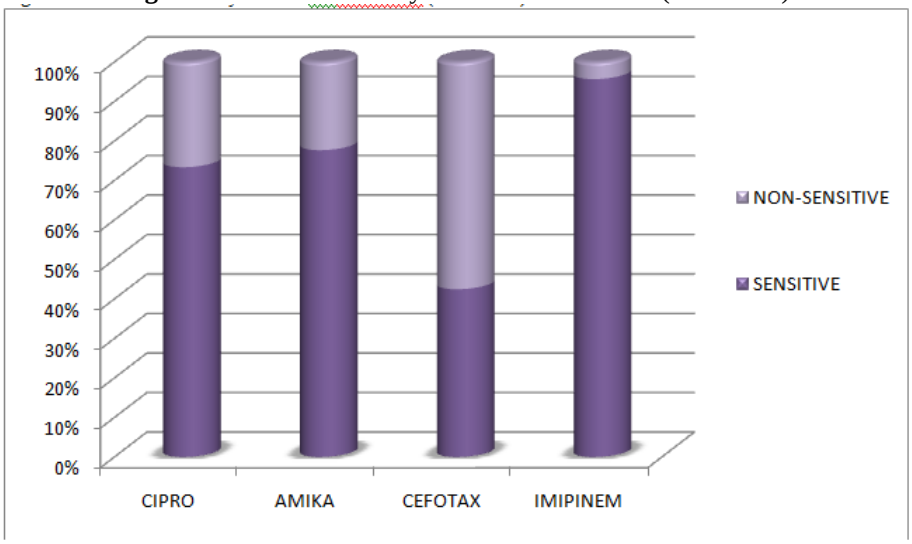


Fig- 5 Antibiotic Sensitivity Pattern Of Staphylococcus Aureus (Total=51)

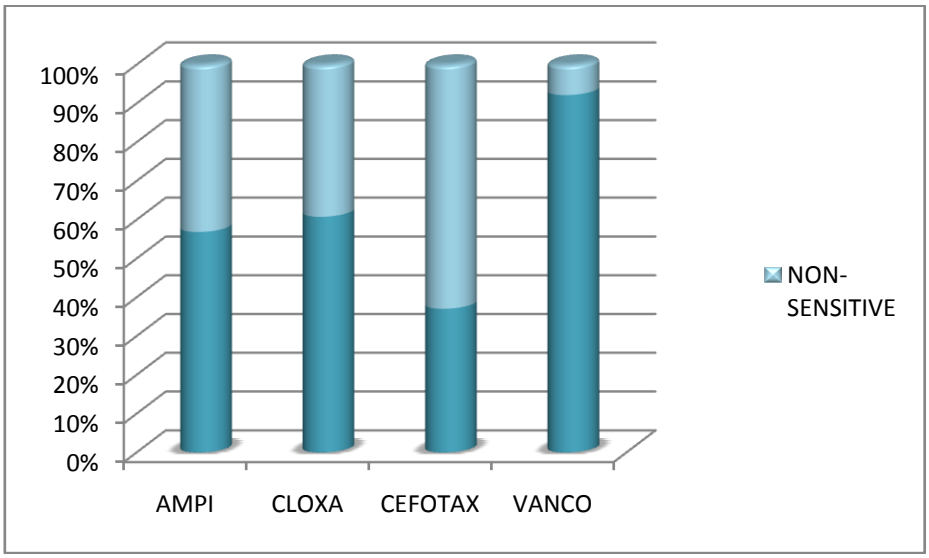
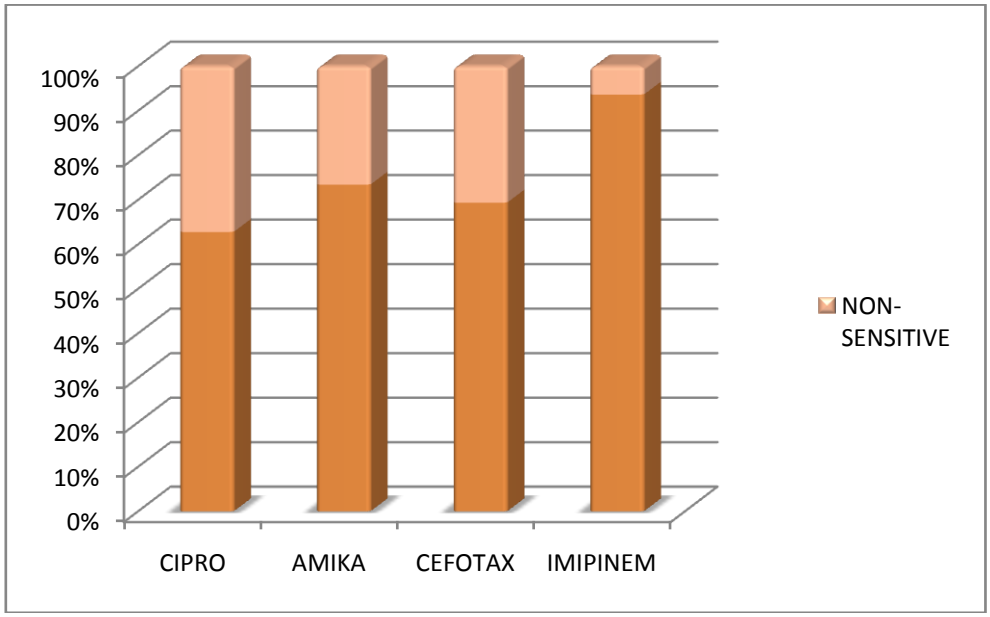
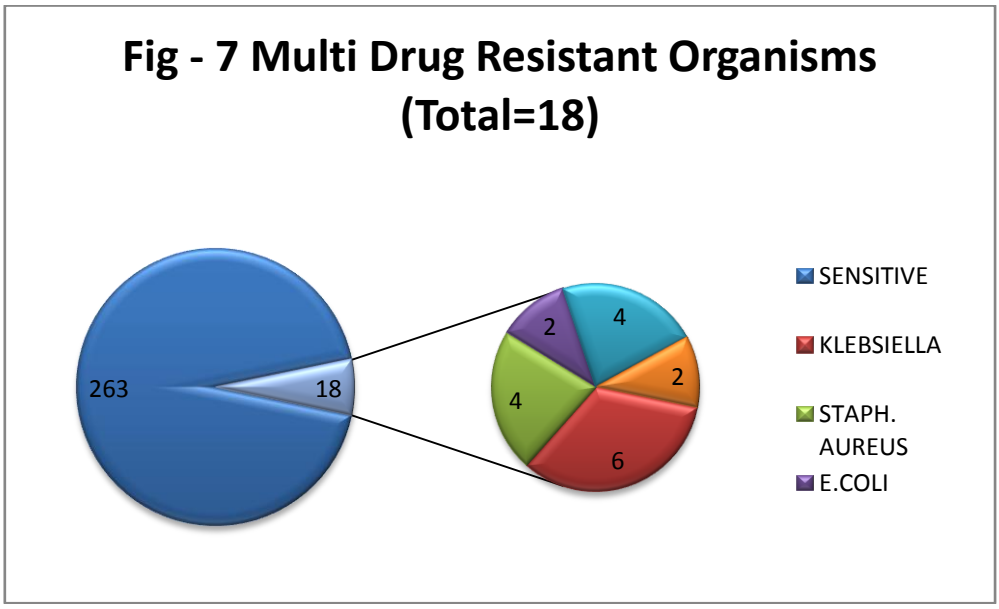


Fig – 6 Antibiotic Sensitivity Pattern Of Other Organisms (E.Coli, Proteus, Pseudomonas, Acinetobacter) (Total=65)





V. Discussion

1) The pathogens most often implicated in neonatal sepsis in developing countries differ from those seen in developed countries[3]. In this study, out of 281 positive cultures, majority of causative organisms were Gram negative (73.32%), and specifically, the most common organisms were Klebsiella (49.47%) and Staphylococcus aureus (18.14%). It is consistent with the data from NNPD 2000, that the most common organisms responsible for neonatal sepsis in India are Klebsiella and Staph. aureus[1].
2) Gram-negative and Gram-positive septicemia was encountered in 73.32% and 26.68% of the culture-positive cases in this study, which is comparable to a study conducted by Agnihotri et al.,[7]
3) The analysis of drug resistance pattern showed that, among Gram-negative isolates, 50.98% were resistant to cefotaxime(which is a commonly used drug) and 46 % resistant to ciprofloxacin.
4) Antibiotic resistance is a global problem today. Reports of multi drug resistant bacteria causing neonatal sepsis in developing countries are increasing .The wide availability of over-the-counter antibiotics and the inappropriate use of broad-spectrum antibiotics in the community may explain this situation[3]. In this study, out of 281 positive cultures, 18 were multi drug resistant.
5) Prevalence rate of Group B streptococci is underestimated in developing countries, probably due to lack of vigilance in bacterial culturing techniques. This is comparable to the results of a study done by Donal Waters[8].

6) There cannot be a single recommendation for the antibiotic regimen for neonatal sepsis in all settings. The choice of antibiotics depends on the prevailing flora responsible for sepsis in the given unit and their antibiotic sensitivity. Thus, a periodic bacterial surveillance is necessary.

VI. Conclusion: (What's New In This Study!!)

1) Conventionally used antibiotic for neonatal sepsis at various centres- cefotaxime , seems to be least useful.
2) Multidrug resistant (ESBL) Gram Negative organisms prevalence is on the rise which necessitates surveillance
3) Prevalence rate of GBS (Group B Streptococci) is underestimated in developing countries.

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