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## Research article

### A STUDY ON PRESCRIPTION OF ANTIBIOTICS UTILIZATION IN NEONATAL INTENSIVE CARE AT A TERTIARY CARE CENTER

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## ABSTRACT

**Introduction:** The aim of this study is to analyze the utilization of antibiotics at our neonatal intensive care unit (NICU). Neonatal sepsis is one of the most common causes of admission in NICU and the causative bacteria and their respective sensitivity patterns based on the culture sensitive reports helps in achieving the antibiotic policy. **Methods:** This study was done after obtaining the approval from Institutional Human Ethical Committee (IHEC) of Sri Padmavathi Medical College Hospital and Research Institute. The study was carried out during the period of February 2013 to April 2013 at Department of Pediatrics, Neonatology division, the total number of antibiotics used in neonatal intensive care unit (NICU) during the study period was identified and the percentage of the antibiotic prescriptions, individual and fixed dose drug combinations is evaluated. **Results:** Ampicillin and Gentamicin were the maximum (50%) empirically administered followed by the fixed dose combination of Piperacillin and Tazobactam was used in nearly 16% of the babies. **Conclusion:** The study concludes the prescription pattern at our neonatal intensive care unit complies with international studies and standards.

**Key words:** Antibiotics, Neonatology, Intensive care Unit, Prescription.

## INTRODUCTION

The most common groups of drugs prescribed in hospitals are antimicrobial agents. The major admission particularly at neonatal intensive care unit (NICU) is sepsis<sup>[1]</sup>. Major neonatal mortality and morbidity worldwide is due to septicemia is a recorded fact comprising various systemic infections of the newborn such as septic shock, meningitis, pneumonia, arthritis, osteomyelitis, and urinary tract infections<sup>[2]</sup>. Empirical antibiotic therapy should begin immediately on suspicion of septicemia followed by cultures and sensitivity, later based on report reevaluation of antibiotic treatment provided

can be done<sup>[3]</sup>. Prescriptions and drug utilization monitoring can identify the problems and provide feedback to physicians so as to create awareness about irrational use of drugs<sup>[4]</sup>. These studies are useful for obtaining information about drug usage patterns and data for future reference to streamline antibiotic policy<sup>5</sup>. Currently the data about drug usage patterns is not satisfactory. There is lack of data on prescription pattern studies and it is essential to define prescribing

The present study was designed to assess and procure a data of the prescription pattern in the NICU of Sri

Padmavati Medical College Hospital and Research Institute to assess the prescriptions pattern in the context of their adherence to prescription format and rationality of prescription.

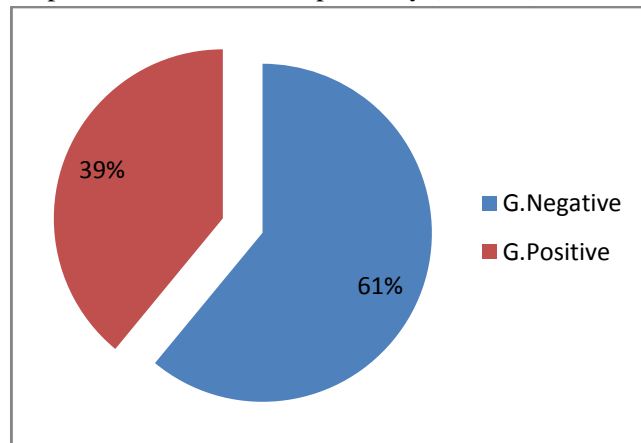
## MATERIALS AND METHODS

This study was done after obtaining the approval from Institutional Human Ethical Committee (IHEC) of Sri Padmavati Medical College Hospital and Research Institute. The study was carried out in collaboration with the Department of Paediatrics, Neonatology division, The Inclusion Criteria were Neonates suspected or diagnosed to have sepsis or probable sepsis in newborn babies admitted in the NICU. The exclusion criteria includes Neonates with surgical problems, major congenital malformations, on antibiotics or those whose mothers have received antibiotics before delivery, were excluded from the present study. The Study was Prospective and observational conducted at SPMCH & RI. This study was done from February 2013 till April 2013. During this period, newborn babies admitted in the neonatal intensive care unit diagnosed or suspected to have sepsis or probable sepsis were analyzed for culture and sensitivity pattern and choice of empirical antibiotics. Details of obstetric history, maternal risk factors, and physical examination were recorded meticulously. Empirical antibiotics were started after taking blood for culture and sensitivity and then changed accordingly.

## RESULTS

Gender Distribution male babies were at a slightly higher preponderance (42.38%) in ratio than female babies (57.62%) who were treated for neonatal sepsis. The majority of babies who were admitted 90. % were preterm as per the gestational age and more than 90% of babies had the onset of sepsis within 72 hrs of birth .There were 61% Gram negative organism which included *Klebsiella pneumoniae*, *Escherichia coli*, *enterobacter* and *pseudomonas*. The rest 39% included Gram Positive organisms *Staph aureus*, *Staph epidermidis* in neonatal intensive care unit during the study period 83% and 9.52% respectively with 2.38% sterile culture(fig:1). The chief organisms revealed in blood culture report are *Klebsiella pneumoniae* and *pseudomonas*

The antibiotics used in NICU during the study period were 6 antimicrobials and 2 fixed drug dose combinations.They are Ampicillin, Gentamicin, Cefotaxime, Amikacin, Ciprofloxacin, and Metronidazole, Piperacillin with Tazobactam and Imipenem and Cilastin respectively (Table-1).



**Fig1: Prevalence of isolated bacteria in neonatal sepsis**

**Table 1: Prescription pattern of antibiotics in NICU**

Sl. No	Antibiotics	Number of Prescription n =250	%
1	Ampicillin	55	21.73
2	Gentamicin	55	21.73
3	Amikacin	50	20.10
4	Cefotaxime	28	11.43
5	Ciprofloxacin	16	06.52
6	Metronidazole	04	01.63

% -percentage of antibiotic utilization

**Table 2: Prescription pattern of Fixed dose drug combination Antibiotics in NICU**

Sl. No	Antibiotics	Number of Prescription n =250	%
1	Piperacillin + Tazobactam	39	15.76
2	Imipenem + Cilastin	3	01.08

% -percentage of antibiotic utilization

Among the prescribed antibiotics Ampicillin, Gentamicin and Amikacin were utilized high at 21.73%, 21.73 and 20.10% respectively, followed by Cefotaxime 11.43%, ciprofloxacin 6.52%, and

Metronidazole 1.63%. Among the fixed Dose drug combinations piperacillin with tazobactam 15.76% and Imipenem with cilastin 1.08%.

## DISCUSSION

The infant mortality rate of India is 47/1000 live births, of which 70 % of deaths is in neonatal period with sepsis being one of the leading causes of death<sup>[6]</sup>.

In our study, both male and female babies were equally affected and babies who had late onset neonatal sepsis were predominantly male. This was similar to a study conducted by Remington *et al*<sup>[7]</sup>.

The present study revealed 92.85% were preterm as per the gestational age. This is a main indicator that preterm babies are more prone for neonatal sepsis than the term babies and more than 90% of babies had the onset of sepsis within 72 hrs of birth, similarly in a study conducted by Sidiropoulos *et al*<sup>[8]</sup>, neonatal sepsis was much predominant in preterm babies and showed significant reduction in mortality rate. In our study also neonatal sepsis rate was found more than 90 % in preterm and low birth weight babies.

The blood culture reports established *Klebsiella* in 4 cases followed by *Pseudomonas* in 2 cases. But major portion of the isolate were sterile, confirming the chief organisms *Klebsiella* and *pseudomonas* in our neonatal intensive care unit during the study period. This result adds strength to empirical treatment provided. This was similar to a study conducted in Bangalore by Shenoi *et al*<sup>[9]</sup>. Another study done by Viswanathan *et al* in 2011 at Vellore, reported *Klebsiella* as the chief organism causing neonatal sepsis followed by *Staphylococcus aureus*<sup>[10]</sup>.

The total numbers of antibiotics used in our NICU during the study period were 6 individual drug and 2 fixed dose drug combinations. Of the 250 prescriptions, Ampicillin and Gentamicin were the maximum with each 40 in number as they were started empirically. This was followed by Amikacin and Cefotaxime based on the progress of clinical features like cyanosis, feeding difficulty, breathing difficulty (grunting), fast breathing (respiratory rate >60 bpm), abnormal behavior and fever/temperature >38°C. Ciprofloxacin and metronidazole were initiated only if the culture and sensitivity report

demands its use and not empirically for a period of 10 days.

The fixed dose combination of Piperacillin and Tazobactam was used in 29 babies ie for nearly 16% of the babies. Another fixed dose combination of Imipenem and Cilastin was given for 2 babies because of resistant strains. The above prescription pattern of antibiotics was similar to study on antibiotic utilization pattern done by Fanos V *et al*<sup>[11]</sup>. Another study done by Liem *et al*<sup>[12]</sup>, by collecting data from all tertiary care NICU s of Netherlands, reported that 6 out of 10 NICUs used extended-spectrum penicillins (amoxicillin and amoxicillin/clavulanic acid), b-lactamase-resistant and sensitive penicillins (flucloxacillin and benzylpenicillin, respectively), amino glycosides (gentamicin and amikacin), cephalosporins(1st and 3rd generation) and glycopeptides (vancomycin and teicoplanin). The limitations of the study are small group and seasonal infections may vary where in this observation is done during a short period and not throughout the year.

The study of antibiotic utilization pattern showed that lactam group of antibiotics, cephalosporins and amino glycosides were used more in our NICU.

## CONCLUSION

The study concludes the prescription pattern at our neonatal intensive care unit complies with international studies.

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**Conflict of Interest** – Nil

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