INTERNATIONAL JOURNAL OF ADVANCES IN CASE REPORTS

IJACR

A STUDY ON NEONATAL INTENSIVE CARE UNIT PRESCRIPTION PATTERN OF ANTIBIOTICS UTILIZATION IN A TERTIARY CARE CENTER

*Prabal Joshi[1], Lava kumar Somu[2] and Somasundaram G[3]

[1]Associate Professor, Department of Physiology, SGT Medical College, Hospital & Research Institute, Harayana, India.
[2]Assistant Professor, Department of Pharmacology, Shri Satya Sai Medical College and Research Institute, TamilNadu, India.
[3]Professor, Department of Pharmacology, Mahatma Gandhi Medical College & Research Institute, Puducherry, India.

Corresponding Author:- **Prabal Joshi**
E-mail: joshiprabal@gmail.com

ABSTRACT

Previous studies worldwide on neonatal mortality and morbidity have revealed neonatal sepsis is one of the most common causes. The causative bacteria and their respective sensitivity patterns are different in each hospital and region. Based on the culture sensitive reports and antibiotic policy every institute has its own implementation of empirical therapy in neonatology. The aim of this prospective study is to analyze the prescription pattern of antibiotics at our neonatal intensive care unit. This study was done after obtaining the approval from Institutional Human Ethical Committee (IHEC) of Sri Balaji Vidyapeeth University, Puducherry. This prospective study was carried out during the period of Jan 2012 April 2012 at Department of Paediatrics, Neonatology division, Mahatma Gandhi Medical College and Research Institute offering medical services to the population of both Puducherry and Tamilnadu. 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. Ampicillin and Gentamicin were the maximum (40%) empirically administered followed by the fixed dose combination of Piperacillin and Tazobactum was used in nearly 60% of the babies. The study concludes the prescription pattern at our neonatal intensive care unit complies with international studies and standards.

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 [1]. Major neonatal mortality and morbidity worldwide is due to septicemia is a recorded fact comprising various systemic infections of the newborn such as septicemia, meningitis, pneumonia, arthritis, osteomyelitis, and urinary tract infections [2].

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 [3].

Prescriptions and drug utilization monitoring can identify the problems and provide feedback to physicians so as to create awareness about irrational use of drugs [4]. These studies are useful for obtaining information about drug usage patterns and data for future reference to streamline antibiotic policy [5]. 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 Mahatma Gandhi Medical College 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 Balaji Vidyapeeth University, Puducherry. The study was carried out in collaboration with the Department of Paediatrics, Neonatology division, Mahatma Gandhi Medical College and Research Institute offering medical services to the population of both Puducherry and Tamilnadu. Inclusion Criteria: Suspected or diagnosed to have sepsis or probable sepsis in newborn babies admitted in the NICU. Exclusion Criteria: Neonates with surgical problems, major congenital malformations, on antibiotics or those whose mothers have received antibiotics before delivery, were excluded from the present study. Study Design: Prospective, Observational open label study conducted at MGMC & RI. This study was done from January 2011 till April 2012. During this period, newborn babies admitted in the neonatal intensive care unit diagnosed or suspected to have sepsis or probable sepsis were analysed 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 (52.38%) in ratio than female babies (47.61%) who were treated for neonatal sepsis.

The majority of babies who were admitted 92.85% (fig-1) were preterm as per the gestational age and more than 90% of babies had the onset of sepsis within 72 hrs of birth .The chief organisms revealed in blood culture report were *Klebsiella* and *pseudomonas* in neonatal intensive care unit during the study period 83% and 9.52% respectively with 2.38% sterile culture (fig:2).

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, Metronidazole, Piperacillin with Tazobactum and Imipenem and Cilastin respectively (Table-1).

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 tazobactum 15.76% and Imipenem with cilastin 1.08%.

Table 1. Prescription pattern of antibiotics in NICU

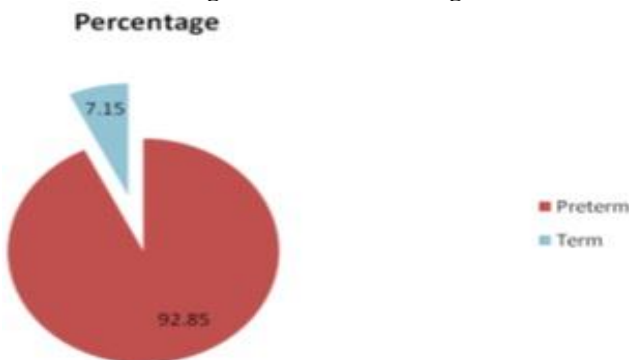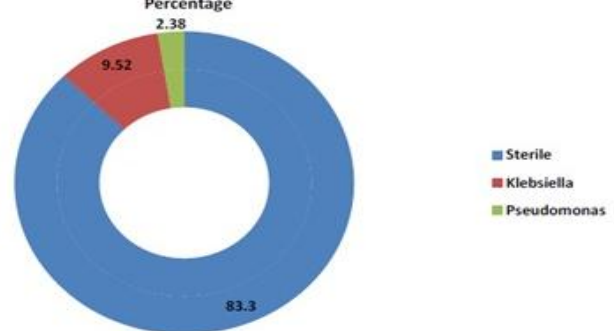| Sl. No	Antibiotics	Number of Prescription n =184	Percentage
1	Ampicillin	40	21.73
2	Gentamicin	40	21.73
3	Amikacin	37	20.10
4	Cefotaxime	21	11.43
5	Ciprofloxacin	12	06.52
6	Metronidazole	3	01.63
7	Piperacillin + Tazobactub	29	15.76
8	Imipenem + Cilastin	2	01.08

Figure 1. Gestational age

Figure 2. Blood culture

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 [6].

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* [7].

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 Sidiropoulus et al [8], 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* [9]. Another study done by Viswanathan *et al* in 2011 at Vellore, reported *Klebsiella* as the chief organism causing neonatal sepsis followed by *Staphylococcus aureus* [10].

The total numbers of antibiotics used in our NICU during the study period were 8. Of the 184 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 featues. Ciprofloxacin and metronidazole were also used depending on the culture and sensitivity report.

The fixed dose combination of Piperacillin and Tazobactum was used in 29 babies ie for nearly 60% 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* [11].

Another study done by Liem *et al* [12] 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), aminoglycosides (gentamicin and amikacin), cephalosporins (1st and 3rd generation) and glycopeptides (vancomycin and teicoplanin)

CONCLUSION

The study of antibiotic utilization pattern showed that β lactam group of antibiotics, cephalosporins and aminoglycosides were used more in our NICU. Further, antibiotic resistance is a big challenge to the treating physicians and the usage of adjuvants like Immunoglobulins, pre and probiotics and by strictly adhering to antibiotic policy of the institutions may decrease the mortality rate.

REFERENCES
1. Lawn JE, Cousens S, Zupan J. (2005). 4 million neonatal deaths, when? Where? Why?, *Lancet*, 365, 891–900.
2. Kaistha N, Mehta M, Singla N, Garg R, Chander J. (2009). Neonatal septicemia isolates and resistance patterns in a tertiary care hospital of North India. *J Infect Dev Ctries*, 41, 55- 7.
3. Yurdakök M. (1998). Antibiotic use in neonatal sepsis. *Turk J Pediatr*, 40, 17- 33.
4. Pradhan SC, Shewade DG, Shashindren CH, et al. (1988). Drug utilization studies. *Natl Med J Ind*, 1, 185-189.
5. Marshner JP, Thurmann P, Harder S, et al. (1994). Drug utilization review on a surgical intensive care unit. *Int J Clin Pharmacol Ther*, 32, 447-451.
6. Park K. (2012). Health information and basic medical statistics. Park's textbook of Preventive and Social Medicine, 21st ed. 529.
7. Remington JS, Klein JO. (2000). Infectious Diseases of the Fetus and Newborn Infant 5Th Ed. WB Saunders, Philadelphia.
8. Boehme U, Sidiropoulos, Muralt GV, et al. (1986). Immunoglobulin supplementation in prevention and treatment of neonatal sepsis, *Pediatric Infectious Disease Journal*, 5, s 193-95.
9. Shenoi A, Nagesh NK, Maiya PP, Bhat SR, Subba Rao SD. (1999). Multicenter randomized placebo controlled trial of therapy with intravenous immunoglobulin in decreasing mortality due to neonatal sepsis, *Indian Pediatr J*, 36(11), 1113-8.
10. Viswanathan R, Singh AK, Basu S, Chatterjee S, Sardar S, Isaacs D, (2012). Arch Dis Child Fetal Neonatal Ed. May, 97(3), F182-7.
11. Fanos V, Cuzzolin L, Atzei A, Testa M. (2007). Antibiotics and antifungals in neonatal intensive care units, a review. *J Chemother*, 19(1), 5–20.
12. Liem TBY, Krediet TG, Fleer A, Egberts TCG, Rademaker CMA. (2010). Variation in antibiotic use in neonatal intensive care units in the Netherlands. *J Antimicrob Chemother*, 1, 65(6), 1270–5.