International Journal of Biomedical Research
ISSN: 0976-9633 (Online); 2455-0566 (Print)
Journal DOI: https://doi.org/10.7439/ijbr
CODEN: IJBRFA

Original Research Article

Drug Utilization Study in Neonatal Intensive Care Unit at a tertiary care centre, South Tamilnadu

Vijai Sundar E[1] and Vinitha M[2*]

[1]*Assistant Professor, Department of Pharmacology, Kanyakumari Government Medical College, Kanyakumari, Tamilnadu 629201, India*
[2]*Undergraduate Student, Department of Pharmacology, Kanyakumari Government Medical College, Kanyakumari, Tamilnadu 629201, India*

Abstract

Objectives: To study the current trends of drug utilization pattern in Neonatal Intensive Care Unit (NICU) using WHO core indicators and to find out the trend towards polypharmacy in neonates.
Methodology: A retrospective observational study was conducted from January to December 2017 in NICU at Kanyakumari Government Medical College. Data of 469 neonates were collected and analyzed.
Results: Out of 469 cases, 54% were males and 46% were females. Only 62% of them were full term babies.80% of them were admitted within 24 hours of birth. The commonest reason for hospitalization of neonates was prematurity (29%) followed by small for gestational age (16%), neonatal sepsis (8%) and birth asphyxia (7%). Average number of drugs per patient was 2.9. 66% of the prescriptions were from WHO model list of Essential Medicines 2017. Antibiotics (82%) was the main class of drug prescribed followed by Central Nervous System drugs (8%), Respiratory drugs (4%) and Cardiovascular System drugs (2%). Most frequently used drugs were Amikacin (68%), Ampicillin (55%), Piperacillin + Tazobactam fixed combination (42%), Gentamicin (31%) and Phenobarbitone (12%). Premature infants had high exposure to antibiotics and CNS drugs.
Conclusion: This study highlights the problem of over prescription of antibiotics and a trend towards polypharmacy.
Keywords: Drug utilization study, NICU, Neonates, Prescription.

***Correspondence Info:**
Dr. Vinitha M.
Undergraduate Student,
Department of Pharmacology,
Kanyakumari Government Medical College,
Kanyakumari, Tamilnadu 629201, India

***Article History:**
Received: 05/10/2019
Revised: 21/10/2019
Accepted: 24/10/2019
DOI: https://doi.org/10.7439/ijbr.v10i10.5286

QR Code

How to cite: Vijai Sundar E and Vinitha M. Drug Utilization Study in Neonatal Intensive Care Unit at a tertiary care centre, South Tamilnadu. *International Journal of Biomedical Research* 2019; 10(10): e5286. DOI: 10.7439/ijbr.v10i10.5286 Available from: https://ssjournals.com/index.php/ijbr/article/view/5286

1. Introduction

Drug utilization study is one of the currently powerful explorating tool to facilitate rationale use of drugs in population. As per the WHO-'rational use of medicines requires that the patients receive medication appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, and at the lowest cost to them and to their community.'[1]

The neonatal period is the most vulnerable time for a child's survival. Out of 2.6 million neonatal deaths worldwide, India alone accounts to 0.6 million (24%), the highest for any country in the world according to the United Nations Children's Fund (UNICEF).[2] Inspite of many advances in neonatal care, there is paucity of information to guide rational prescription among neonates. Hence, evidence of safety and efficacy of drugs in adults is often extrapolated to neonates without the evidence of systematic studies in neonates. Such practices often result in ineffective drug therapy, increased use of off-label drugs, wastage of resources, increased mortality and morbidity, adverse events and cost of the treatment.[3]

Neonates particularly from high-risk pregnancies, premature infants, or those with both risk factors are at greater risk for medication exposure. Fetal maturity plays a vital role in determining the pharmacokinetics of drugs. This is due to developmental factors affecting,

1) Drug absorption (in case of orally administered drugs).
2) Drug distribution such as body compartment sizes/total body water content, protein binding, hemodynamic factors and so on.

3) Drug metabolism/clearance (either renal or hepatic)due to ontogenetic differences in blood flow through the metabolizing organs as well as drug-metabolizing enzyme activity.[4]

Thus, newborn infants are more prone to drug adverse events when compared to adults.

Exposure to multiple drugs is also known to be a factor leading to increased incidence of adverse events in neonates.

Considering current scenario, this study is taken up with the purpose of generating some valid data on drug utilization and providing useful information for improving the quality of neonatal care.

2. Methodology

2.1 Study design

A retrospective observational study was conducted in NICU of neonatology department of Kanyakumari Government Medical College, Tamilnadu, India. The study protocol was approved by the Institutional Ethics Committee.

2.2 Study sample

Data of 469 neonates admitted in NICU over a period of one year from January to December 2017 were included in the study with inclusion criteria.

2.3 Selection criteria of patients:

2.3.1 Inclusion criteria:

Neonates admitted to NICU of either sex, who received one or more medications.

2.3.2 Exclusion criteria:

Neonates who received only fluids/electrolyte solutions, parenteral nutrition, nutritional supplements, blood and blood products, oxygen, phototherapy and vaccinations.

2.3.3 Study method:

Data of patients matching inclusion criteria were recorded in a predesigned proforma. Parameters included were age, gender, birth weight, gestational age, congenital anomalies, diagnosis and duration of hospital stay, discharge status, and drug prescriptions.

2.3.4 Statistical analysis:

Data was entered into Microsoft Excel and analyzed for proportions.

3. Results

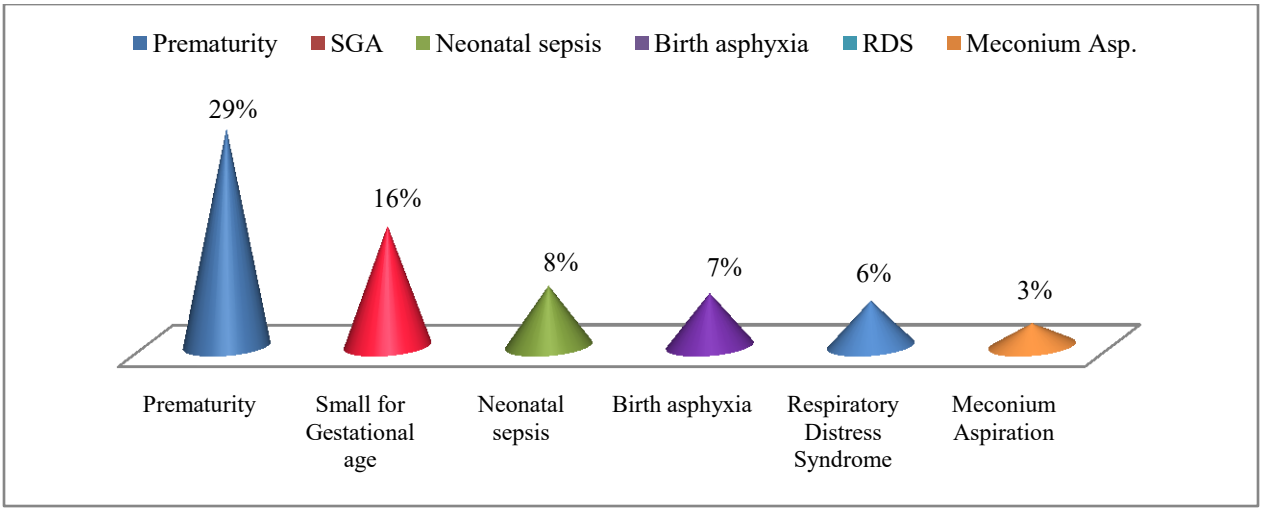
Out of 469 neonates, 54% were males and 46% were females. Only 62% of them were full term babies and 38% had birth weight less than 2.5 kgs. 80% (376) of the neonates were admitted within 24 hours of birth while 15% were admitted within 1-7 days as shown in table1 .51% (i.e)half of the patients were in hospital for more than 5 days.

Table 1: Age at admission in NICU

Age in days	Frequency	Percentage
Within 24 hrs	376	80%*
1-7 days	69	15%
8-28 days	24	05%
TOTAL	**469**	**100%**

The commonest reason for hospitalization of neonates was prematurity (29%) followed by small for gestational age (16%), neonatal sepsis (8%) and birth asphyxia (7%) as shown in figure 1.

Figure 1: Morbidity pattern



Average number of drugs per patient was 2.9. 66% of the prescriptions were from WHO model list of Essential Medicines 2017.The drugs prescribed by generic name outnumbered than branded name. WHO core indicators are shown in table2.Injection was the most commonly used dosage form (91.5%) followed by drug solution (3.7%) and syrup(1.9%).

Table 2: WHO Core indicators

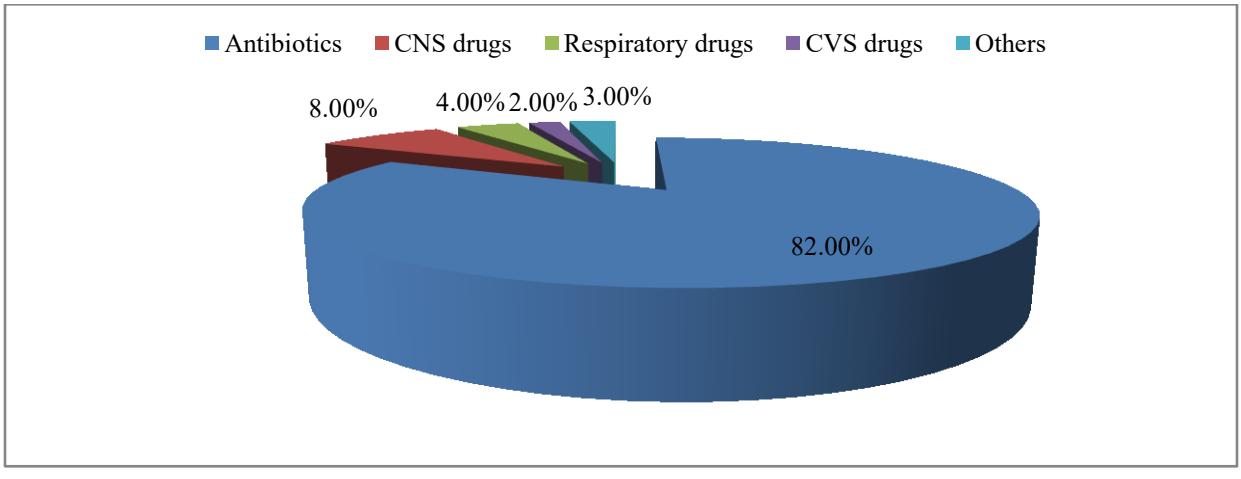
WHO Core Indicators	Inpatients
Average number of drugs prescribed per encounter	2.9
Percentage of drugs prescribed by generic name	98.20%
Percentage of encounters resulting in the prescription of an antibiotics	99.97%*
Percentage of drugs prescribed from WHO Essential Medicine List (EML) 2017	66.00%

The most frequently prescribed therapeutic class of drugs were antibiotics (82%) followed by Central Nervous System drugs (8%), Respiratory drugs (4%)and Cardiovascular System drugs (2%) as shown in figure 2. In the collected prescriptions, 53% (i.e.) a little more than half of the prescriptions received 2 drugs, followed by 3 drug prescriptions as shown in table 3.

Table 3: Overall Drug Pattern

Number of drugs	Number of encounters	Percentage
1	43	09%
2	246	53%*
3	74	16%
4	43	09%
>4	63	13%
Total	**469**	**100%**

Figure 2: Therapeutic class of drugs prescribed

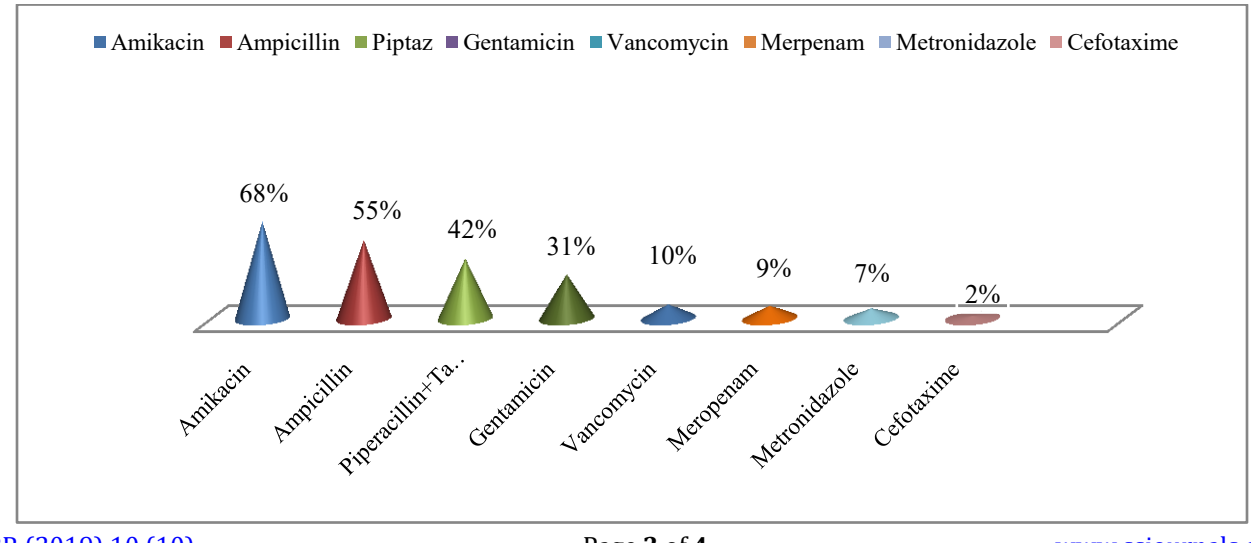


Most frequently used drugs were Amikacin (68%) followed by Ampicillin (54%), Piperacillin + Tazobactam fixed combination (42%), Gentamicin (31%) and Phenobarbitone (12%). The most frequently used antibiotics are shown in figure 3 and other drugs used are shown in table 4.In the collected prescriptions, only 0.03% were spared from antibiotics.

Table 4: Other drugs used in management

Drugs	Frequency	Percentage
Dopamine	20	4.5%
Surfactants	49	10.0%
Phenobarbitone	56	12.0%
Caffeine	35	7.5%
Phenytoin	11	2.4%

Figure 3: Antibiotics used in treatment



4. Discussion

Advances in medical technology have resulted in improved survival rates in both preterm and term infants including high-risk, low birth weight infants. There is general appreciation that neonates especially preterm have high drug utilization rates, Systemic evaluation is needed to see the trends of medication use, define the group that are high risk of adverse effects.

Among the 469 neonates, male: female ratio is 1.2:1. Most of them (80%) were admitted within 24hrs of birth which was consistent with other studies.[4,5] Prematurity (29%) was the most common cause for admission to NICU followed by small for gestational age(16%), neonatal sepsis(8%) and birth asphyxia(7%) which is contradiction to study done in Karnataka where perinatal asphyxia (48%) being the commonest cause followed by MAS and septicemia.[4]

In this study, the average number of drugs per encounter were 2.9 and 98.2% drugs were prescribed by generic name which is appreciable and consistent with findings of *choure et al.*(68%).[5] Increasing generic prescribing would rationalize the use and reduce the cost of drugs.

The most common drugs used in our study were Amikacin(68%) and Ampicillin(55%) compared to study done by *Brijal et al* showed most common antibiotic used were Amikacin (59.3%) and Cefotaxime (52.48%).[6] High rate of antibiotic exposure in our study is similar to studies published in the past[5]and is probably due to the standard practice of administering antibiotics pending bacterial culture results in sick neonates and is not true reflection of bacterial infection.

5. Conclusion

This study gave us an overall pattern of drug use profile in a tertiary care NICU and reflects the major problems for which neonates were admitted to the NICU. Antibiotics were of major concern. Similar studies are required in large scale and regular intervals to reflect the changing pattern of drug prescription.

Acknowledgement

I would like to thank Dr.Ashok Kumar, Former HOD, Department of Pharmacology for his support.

References

[1]. KD Tripathi. Essentials of medical pharmacology 8th ed New Delhi: Jaypee press; 2019.p.81-83.

[2]. Every child alive: The urgent need to end newborn deaths, UNICEF 2018 available at https://www.unicef.org/publications/index_102640.html accessed on 2nd Oct 2019.

[3]. Shailesh Atmaram Chauthankar, Padmaja Anil Marathe, Anirudha Vyankatesh Potey and Ruchi Nimish Nanavati. Drug Utilization in Neonatal Intensive Care Unit of a Tertiary-care Hospital in Mumbai, India. *Indian Pediatr* 2017; 54:931-934.

[4]. Sharanappa, Y. Vishwanath, K.Lakshminarayana and Swathi Acharya. Pattern of Drug Utilisation in Neonatal Intensive Care Unit in a Tertiary Care Hospital, Bellary, Karnataka, India. *Int J of Biomed Res* 2014; 5(9).

[5]. Mangal K Choure, Jadhav RR, Padwal SL. Drug utilization study in neonatal intensive care unit at rural tertiary care hospital, Ambajogai, Beed, Maharashtra, India. *Asian Journal Pharm Clin Res* 2017; 10(4)102-104.

[6]. Patel Brijal S, Kubavat Amita R, Sondarva Divyesh B, Piparva Kiran G. Drug Utilization Study in Neonatal Intensive Care Unit at tertiary care hospital, Rajkot, Gujarat: A prospective study. *World J Pharm Pharm Sci* 2015; 4(7): 2034-42.