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DRUG UTILIZATION PATTERN IN PAEDIATRIC POPULATION IN A TERTIARY CARE HOSPITAL, HYDERABAD

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ABSTRACT

Background: There have been numerous drug utilization reviews conducted all over the world, but only a few studies have been conducted on the drug use patterns among children, especially in India. Infectious diseases such as acute and chronic are more common in infants and children, which account for 20 to 25% of the world's population. The incomplete development of a paediatric physiological condition, as well as the speed of development and rapid growth of a child, requires accurate diagnosis and evidence-based treatment. Hence this study endeavors to describe-quantitatively and qualitatively-the characteristics of the populations using each drug (or class of drugs) and/or the conditions in which users are taking it (for example, indications, duration of treatment, dosage, previous or associated treatments and compliance)**. Methodology:** The study was conducted at Aster Prime Hospital in Hyderabad, India, and was conducted for a period of six months. It was a retrospective, descriptive, cross-sectional study, and the treatment charts of patients in the inpatient ward of the pediatric department were included. **Results:** The study was approved by the ethics committee. In the study, the sample size taken was 125 pediatric patients and all the patient data is available in medical records. The study was performed for 6months with regular follow up. We included individuals of both genders

of age few days to 18 years. The patients with autoimmune disorders, Type-I diabetes and cancer were excluded. The age distribution among enrolled patients was Neonates (Up to 4 weeks): 11 (8.8 %), Infants (Up to 1 year): 3(2.4%), Children 1 (1 to 6 years): 21(16.8%), Children 2 (6 to 12 years): 35(28%), Children 3 (12 to 18 years): 55(44%) were included. The distribution of diagnosis pattern among pediatrics patients was 31(24.8%) with Viral Pyrexia, 5(4%) with Enteric Fever, 4 (3.2%) with Hepatic Problems, 3(2.4%) with kidney problems, 2 (1.6%) with Meningitis, 3 (2.4%) with seizures, 8 (6.4%) with Cerebral Palsy, 4 (3.2%) with Acute Gastroenteritis, 5 (4%) with Fracture, 7(5.6%) with Sepsis,6 (4.8%) with URTI and 47 (37.6%) with other Diagnose. **Conclusion:** In this retrospective study, we found many instances of irrationality in drug prescription, such as the use of antibiotics for patients with viral pyrexia, which led us to suggest the incorporation of more stringent guidelines, like the inclusion of antibiotics and restricted antibiotics proforma to instill proper empiric and definitive antibiotic use among pediatric patients. Malnutrition rates in this population were also high, indicating that appropriate dosing and dosage forms are needed in order to prevent detrimental outcomes.

KEYWORDS: Paediatric, DUR, Antibiotic, Malnutrition, Prescription.

INTRODUCTION

In India, many factors like illiteracy, poverty, use of multiple health care systems, drug advertising and promotion, sale of prescription drugs without prescription, competition in medical and pharmaceutical market place and limited availability of drug information are the main reasons for not achieving the optimal health care[1] Various drug utilization reviews have been conducted all over the world but only limited studies are conducted addressing the drug use pattern in paediatric population especially in India.[2] 20 to 25% of total world population comprise paediatric, which are more prone to acute and chronic infectious disease. The incomplete development of paediatric physiological conditions and their rapid growth and development need some accurate diagnosis and evidence-based medical treatment.[3] Knowledge of drug administration in children and infant's lags behind that of adults for many reasons. These include developmental differences that affect the pharmacodynamic and pharmacokinetic profiles of drugs, ethical and financial reasons, research capabilities, and regulatory guidelines and constraints.[4] Most of the drugs prescribed for children have not been tested in the pediatric population due to the difficulties in carrying out clinical studies in children and ethical issues due to children not being able to make their own decisions to

participate in a clinical trial. Epidemiological evaluation of medicine use in elderly is now a highly visible topic, but drug prescribing studies in pediatric patients have been limited. The higher incidence of infections in pediatric population as compared to adults leads to higher prescription of Antimicrobial Drugs (AMDs), at times more than two in single prescription. The recognition of drug toxicity following inappropriate drug selection and dosing predominantly in paediatric patients is exceedingly important.[5] The use of antibiotics in children has been a major area of concern. Periodic prescriptions analysis and effective feedback to clinician should be done based on results to ensure rational prescribing and effective health care management, which will ultimately lead to a better child health.[6] The European Medicines Agency (EMEA) and the Food and Drug Agency (FDA) encourage the development of studies involving individuals less than 18 years of age.[7] Drug prescribing studies in pediatrics have been limited. So, there is the need for the safe and effective drugs for use in sick neonates, infants, children and adolescents requires the establishment of thoughtful drug therapy strategies.[8] This study was undertaken to evaluate the prescription patterns according to WHO guidelines and the diseases, for which they are being prescribed, to identify the common diseases and common medications used. A drug utilization study is therefore a study designed to describe-quantitatively and qualitatively-the population of users of a given drug (or class of drugs) and/or the conditions of use (for example, indications, duration of treatment, dosage, previous or associated treatments and compliance).[9]

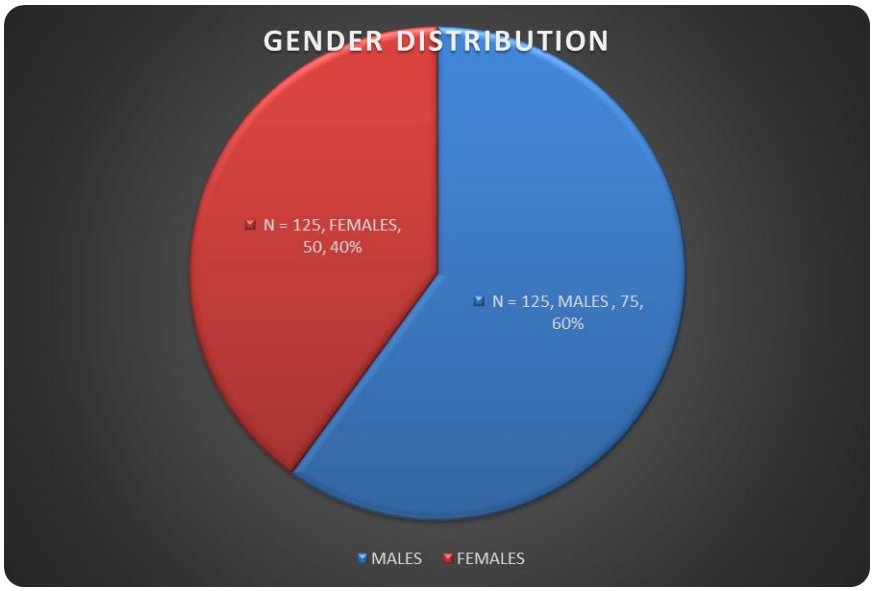
MATERIALS AND METHODS

The study was conducted at Aster prime hospital, Hyderabad, India for a period of 6 months. Approval for the study was obtained from the ethics committee at the hospital Regd no: AP/EC/2021/007. It was a retrospective, descriptive, cross-sectional study and the treatment charts of patients in the inpatient ward of the pediatric department was included. The study was approved by the ethics committee. In the study, the sample size taken was 125 pediatric patients and all the patient data is available in medical records. The study was performed for 6months with regular follow up. We included individuals of both genders of age few days to 18 years. The patients with autoimmune disorders, Type-I diabetes and cancer were excluded. Data collection included patient information as age, gender, diagnosis, treatment, etc. Statistical analysis was carried out using the statistics software version 2007. All data was entered and saved to Microsoft Excel 2016 and data cleaning was carried out by a professional statistician using SAS Software. Graphic representations like bar graphs and pie charts were used for visual interpretations to analyze the data.

RESULTS

1. GENDER DISTRIBUTION

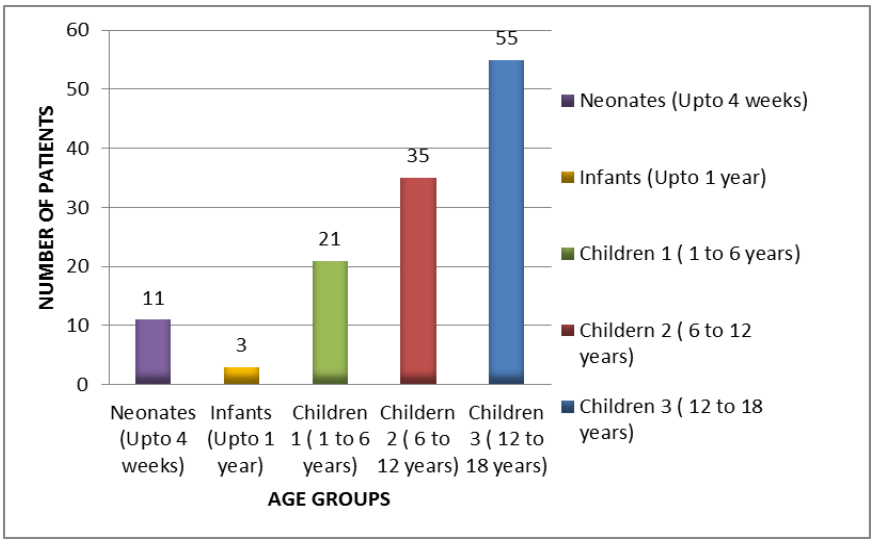
In our study of Drug Utilization Pattern in Pediatrics, a total of 125 patients were enrolled in which the gender distribution was 125 (60%) were males and 50 (40%) were females.



Graph 1: Indicates Gender Distribution Of Patients Studied In The Wards From Pediatrics.

2. AGE DISTRIBUTION

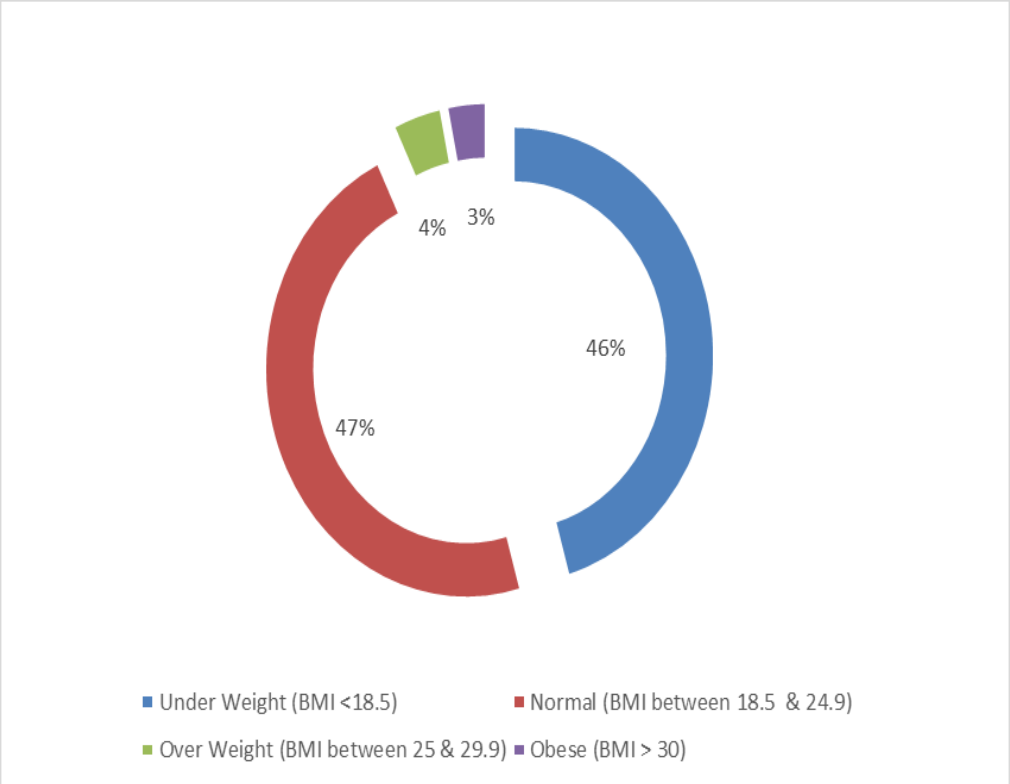
The age distribution among enrolled patients was Neonates (Upto 4 weeks): 11 (8.8 %), Infants (Upto 1 year): 3(2.4%), Children 1 (1 to 6 years): 21(16.8%), Children 2 (6 to 12 years): 35(28%), Children 3 (12 to 18 years): 55(44%) were included.



Graph 2: Indicates age distribution of patients studied in the wards from Pediatrics.

3. BODY WEIGHT DISTRIBUTION

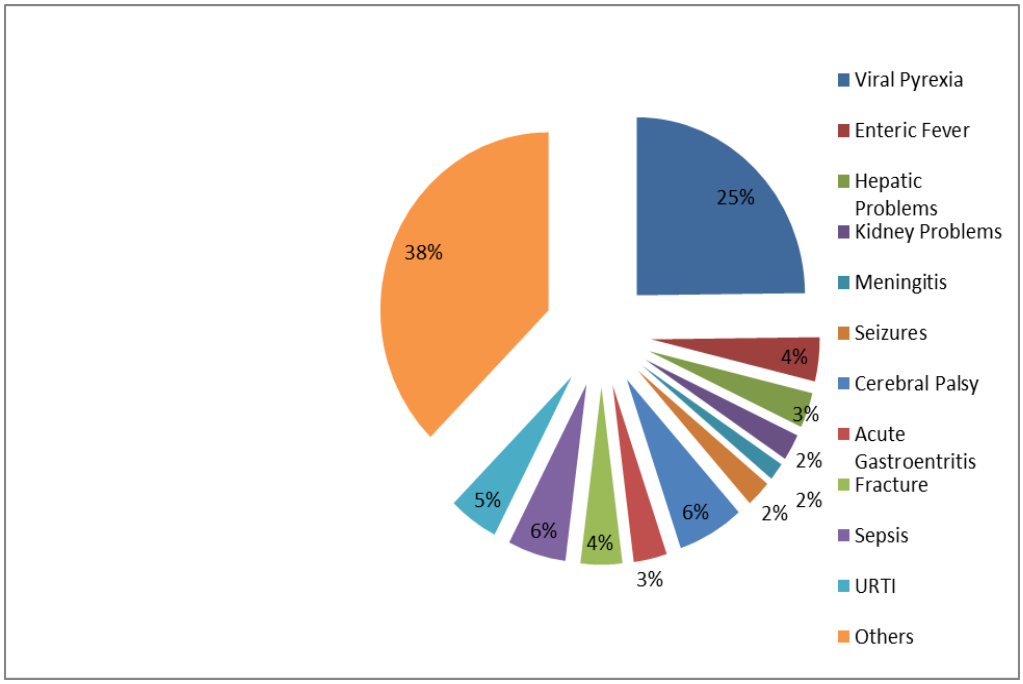
The Body Weight distribution among pediatrics patients was calculated based on BMI and was categorized as Under Weight (BMI <18.5): 57(45.6%), Normal (BMI between 18.5 & 24.9): 59(47.2%), Over Weight (BMI between 25 & 29.9): 5(4%), Obese (BMI>30): 4(3.2%) were included.



Graph 3: Indicates body weight distribution of patients studied in the wards of pediatrics.

4. DIAGNOSIS PATTERN IN PEDIATRICS

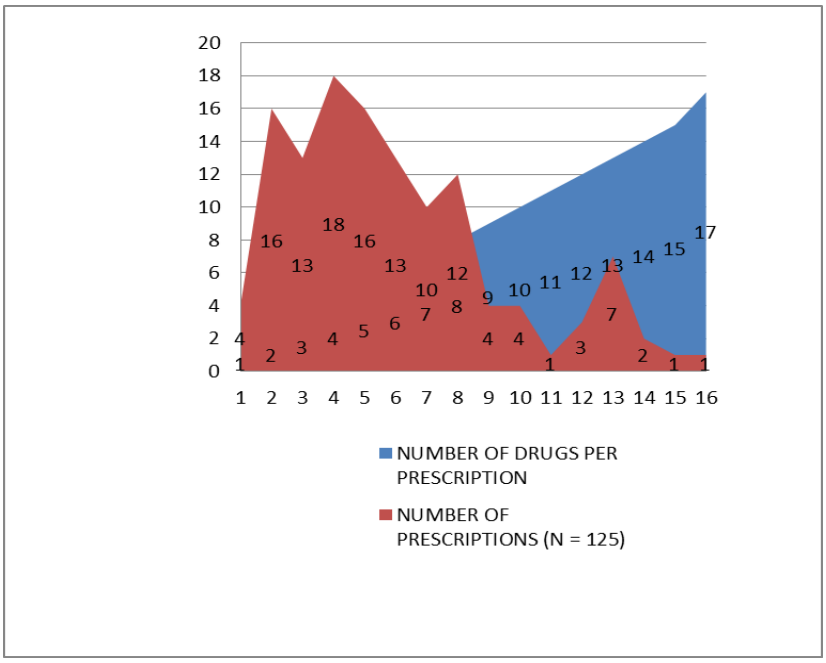
The distribution of diagnosis pattern among pediatrics patients was 31(24.8%) with Viral Pyrexia, 5(4%) with Enteric Fever, 4 (3.2%) with Hepatic Problems, 3(2.4%) with kidney problems, 2 (1.6%) with Meningitis, 3 (2.4%) with seizures, 8 (6.4%) with Cerebral Palsy, 4 (3.2%) with Acute Gastroenteritis, 5 (4%) with Fracture, 7(5.6%) with Sepsis, 6 (4.8%) with URTI and 47 (37.6%) with other diagnosis.



Graph 4: Indicates diagnosis pattern of patients in wards of pediatrics.

5. DRUG DISTRIBUTION IN PEDIATRIC PATIENTS

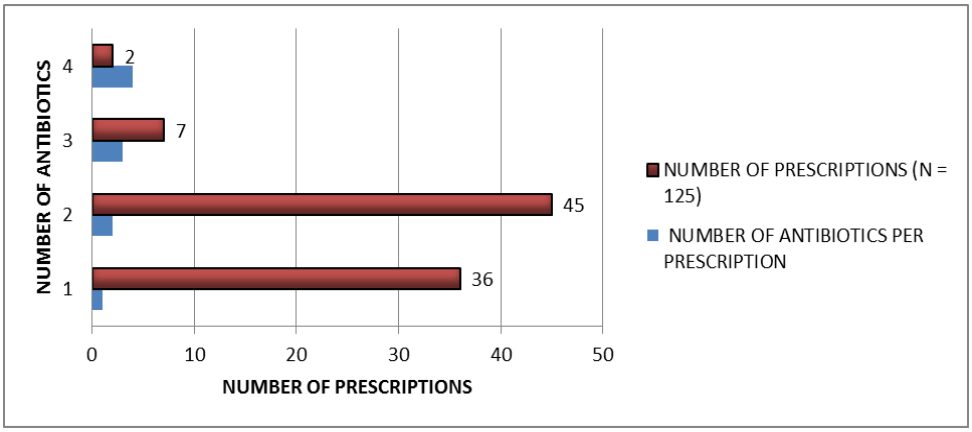
The Drug Distribution per prescription in pediatric patients was 1 drug: 4(3.2%), 2 drugs: 16(12.8%), 3 Drugs: 13(10.4%), 4 Drugs: 18(14.4%), 5 Drugs: 12(12.8%), 6 Drugs: 13(10.4%), 7 Drugs: 10(8%), 8 Drugs: 12(9.6%), 9 Drugs: 4(3.2%), 10 Drugs: 4(3.2%), 11 Drugs: 1(0.8%), 12 Drugs: 3(2.4%), 13 Drugs: 7(5.6%), 14 Drugs: 2(1.6%), 15 Drugs: 1(0.8%), 17 Drugs: 1(0.8%) were included.



Graph 5: Drug Distribution In Pediatric Patients.

6. ANTIBIOTICS PER PRESCRIPTION

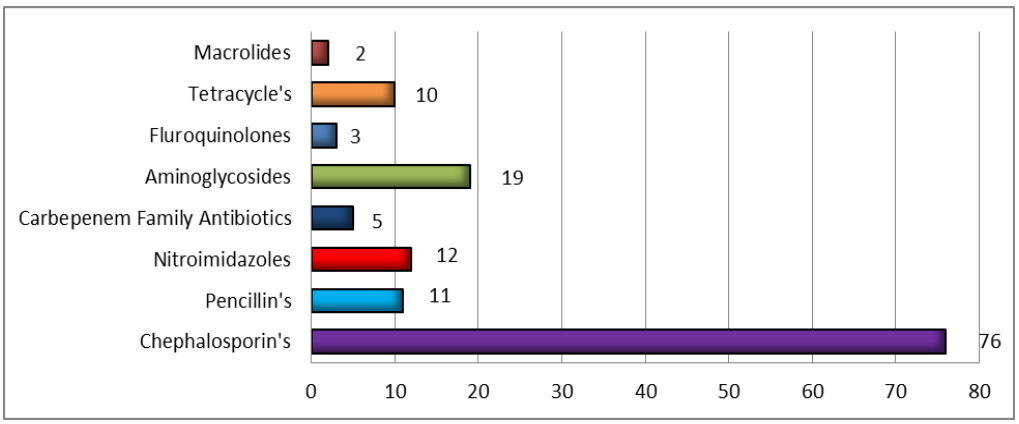
The Antibiotics per prescription in pediatrics was 1 Antibiotic: 36(28.8%), 2 Antibiotics: 45(36%), 3 Antibiotics: 7(5.6%), 4 Antibiotics: 2(1.6%) were included.



Graph 6: Indicates antibiotics per prescription per patient in pediatric wards.

7. ANTIBIOTICS CLASS DISTRIBUTION AMONG PRESCRIPTION

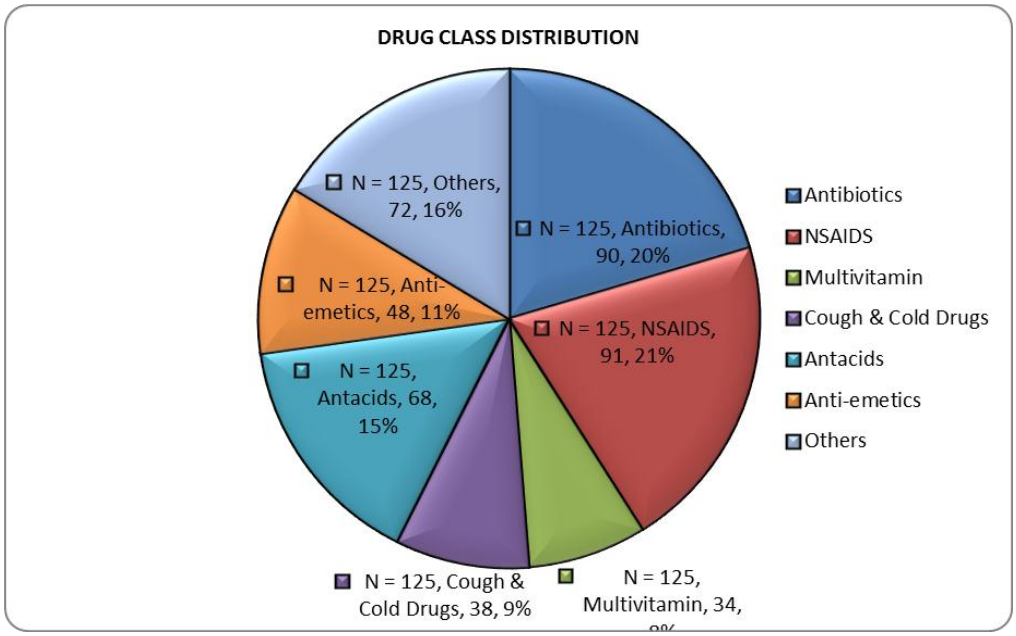
The Antibiotics Class Distribution among pediatric prescriptions was Cephalosporin's: 76(55%), Penicillin's: 11(8%), Nitroimidazole's: 12(9%), Carbapenem Family Antibiotics: 5(4%), Aminoglycosides: 19(14%), Fluroquinolones: 3(2%), Tetracycline's: 10(7%), Macrolides: 2(1%) were included



Graph 7: Indicates Antibiotic class distribution among pediatric prescriptions.

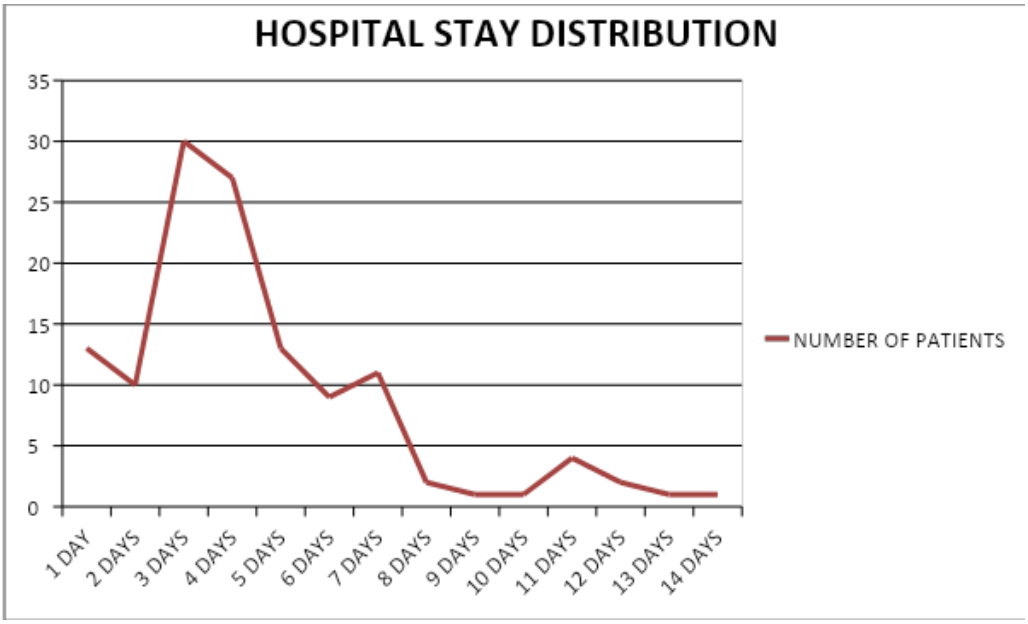
8. DRUGS PRESCRIBED AMONG PEDIATRICS

The classes of drugs prescribed among pediatric patients was Antibiotics: 90(72%), NSAIDS: 91(72.8), Multivitamin: 34(27.2%), Cough and Cold Drugs: 38(30.4%), Antacids: 68(54.4%), Anti-emetics: 48(38.4%), others: 72(57.6%) were included.



Graph 8: Indicates classes of drug among pediatric patients.

9. HOSPITAL STAY DISTRIBUTION



Graph 9: Indicated hospital duration among pediatric patients.

DISCUSSION

- The number of males was high when compared with those of females admitted to the hospital as shown in Graph 1. The Gender distribution of males was 125 (60%) and females were 50 (40%), which is consistent with the results published in similar studies performed previously.

- From Graph 2 it is clear that the maximum number of patients were from the age group of 12 to 18 years (44%). Followed by 6 to 12 years (28%), 1 to 6 years (16.8%), Neonates (8.8%) (Up to 4 weeks) and least were from the age group of infants (2.4%) (Up to 1 year). This shows us that school-going children are being admitted more to the hospital in our setting when compared with infants and neonates. Our results vary a bit differently from those of previous studies, which may be due to the geographical parameters of the hospital location.
- It is depicted in Graph 3 that 57 (45.6%) of our patients were found to be underweight and 5 (4%) patients were overweight, and 4 (3.2%) patients were obese. This clearly shows us the prevalence of malnutrition among paediatrics even with many awareness programs; it clearly shows us the need for more emphasis on nutritional programs that improve nutrition among paediatrics.
- Inpatient prescription analysis also showed us that there is high usage of oral and parenteral formulations when compared with other dosage forms shown in Graph 4. This can be attributed to the reason that here we are analyzing the inpatient prescriptions where we need I.V access for multiple medications whenever the oral route is inaccessible. Because of this parenteral dosage forms are a bit highly used than oral dosage forms. This contrasts with the results of a study performed on outpatient prescriptions by Anandithа Sharma Kopparthy et.al (2019).
- Prevalence of viral pyrexia was highest with 31 patients (24.8%) and meningitis showed the least prevalence with 2 patients (1.6%) as shown in Graph 5. Other conditions that were reported include patients from different specialties like gastroenterology, hepatology, nephrology, neurology, orthopedics, and infectious diseases. The Presence of viral pyrexia and greater antibiotic use among patients suggests that there is still a prevalence of antibiotic usage among viral pyrexia patients; this is clear evidence of irrationalities in the prescription.
- Analysis of 125 prescriptions showed that 4 drugs were present in 18 prescriptions and 5 drugs were present in 16 prescriptions whereas the highest number of drugs was 15 and 17 drugs in 2 prescriptions. From Graph 6 it is clear that the average number of drugs per prescription was 1(1.09) which was lower than previously existing studies that were reporting this parameter, Ahmad Najmi et.al (2015).
- In Graph 7 it has been elucidated that at least one antibiotic was present in each prescription, 45 (36%) prescriptions were showing 2 antibiotics in them. Only 2 (1.6%) prescriptions were having 4 antibiotics on them. In Table 8 and Graph 8 we showed that

Cephalosporins are the highest prescribed (55%) among the antibiotic classes whereas Macrolides were the least prescribed (1%) from different antibiotic drug classes. Similar results were provided in a study by Ahmad Najmi et.al where they showed cephalosporin's (45%) as a highly prescribed antibiotic class and Macrolides (9%) were the least prescribed(2015)

- When analyzing different drug categories antibiotics and NSAIDs top the prescriptions with 72% and 72.9% respectively as shown in Graph 9. This shows that there need to be more stringent hospital policies to regulate antibiotic use among pediatrics,thereby preventing irrationalities in the therapy of patients. The antibiotic use here isexactly the opposite to the use of antibiotics in older studies where they reported the least antibiotic use, Anandítha Sharma Kopparthy et.al (2019).

CONCLUSION

In this retrospective observational drug utilization review, we observed various irrationalities in the prescription like empirical antibiotic therapy for patients with viral pyrexia which made us suggest the incorporation of more stringent policies like the inclusion of antibiotic and restricted antibiotics proforma. To inculcate appropriate empiric and definitive use of antibiotics in the pediatric patient population.

Oral and parenteral formulations were used more in number when compared with other formulations, the inclusion of inpatient data might have paved the way for this result. Prevalence of malnutrition among the pediatric population was also observed, this shows us that we need appropriate dose and dosage form adjustment among these populations to prevent any adverse outcomes.

We conclude that there needs to be more emphasis from the department of clinical pharmacy, in the development of antibiotic and restricted antibiotic proforma and dose adjustment towards pediatrics. Thus, our objectives of availability in the pediatric department and identifying rationality in the prescription were met.

LIMITATIONS OF THE STUDY

- Limitations of this study include small sample size, small duration of study which could increase our work significance .
- Seasonal variations.

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CONFLICT OF INTEREST

None.

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