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ASSESSMENT OF DRUG USE PATTERN OF ANTIMICROBIALS AMONG PAEDIATRIC IN-PATIENTS OF TERTIARY CARE TEACHING HOSPITAL

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Antibiotic resistance, Resistance pattern, Dosing regimen, Route of administration

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ABSTRACT: Objective: This study gives an overview of prescribing pattern of antibiotics in children in our tertiary care teaching hospital. **Methods:** It is a prospective observational study carried out on paediatric in-patients with a sample of 160 patients based on age, inclusion, and exclusion criteria for a period of 6 months. The patient's data were collected using a patient case record form and the data analysis was done. **Results:** Out of 160 patients data that were collected, the results showed that the majority of gender which were admitted to the hospital were male children 89 (55.62%), and many were from the age group of early childhood (6-12 years) 64 (40.00%). Respiratory tract infections were the diagnosis most commonly analyzed; overall, 236 prescribed antibiotics, cephalosporins 121 (51.21%) were commonly evident, and parenteral 161 (68.22%) - route of administration was observed to be followed more than other routes. **Conclusion:** Antibiotic Resistance is a worrisome factor worldwide, challenging treatment regimens. Surgeons & Physicians worldwide find it difficult to cope with the increased resistance patterns and design dosing regimens accordingly. This study analyzes the prescribing pattern trend of antibiotics in our hospital and drives a conclusion about antibiotic usage.

INTRODUCTION: Any substance of natural, semi-synthetic or synthetic origin that kills or inhibits the expansion of microorganisms but causes little or no damage to the host is termed to be an antimicrobial. In contrast, the term "antimicrobials" include all agents that act against wide range of microorganisms- bacteria (antibacterial), viruses (antiviral), fungi (antifungal) and protozoa (anti Protozoal).

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An antibiotic could also be a molecular coffee substance produced by microorganisms that at a coffee concentration inhibits or kills other microorganisms [1]. Antibiotics play a crucial role in the management of infectious diseases [2]. Antibiotics are the key drugs for treating infections and are among the foremost common prescription drugs in the Paediatrics department.

Infectious diseases represent a serious explanation for morbidity and mortality in India and are liable for an outsized proportion of hospital admissions, particularly in children. Antibiotics and other antimicrobials constitute a crucial category of medicine, both within the community and hospitals [3]. Irrational prescribing refers to prescribing that fails to evolve to good treatment standards.

This might manifest in five alternative ways: under-prescribing, over-prescribing, incorrect prescribing, extravagant prescribing, and multiple prescribing [4]. Prescription pattern monitoring studies (PPMS) are drug utilization studies with the most specialized in prescribing, dispensing, and administering medicine. PPMS also guides and supports prescribers and dispensers. Therefore the general public on the appropriate use of medicine collaborates and develops working relationships with other key organizations to realize a rational use . Prescription Patterns explain the extent and profile of drug use, trends, quality of medicine, and compliance with regional, state or national guidelines like standard treatment guidelines, drugs from essential medicine list, and generic drugs usage. There's increasing importance of PPMS due to a lift in the marketing of the latest drugs, variations in the pattern of prescribing and consumption of medicine, growing concern about delayed adverse effects, cost of medicine and volume of prescription [5].

Antibiotic guidelines are standard set of guidelines for the treatment of infectious diseases supported local culture sensitivity data. In recent times, physicians are including antibiotics as an empirical therapy which can or might not be rational [6, 7]. These guidelines help the physician to prescribe the antibiotics rationally to paediatric patients when indicated. Therefore, judicious use of antibiotics is crucial thanks to reducing the matter of antimicrobial resistance. So, detailed rationale knowledge of antibiotic prescribing pattern must be implemented within the clinical practice. Paediatric patients require more attention while prescribing antibiotics so as to avoid the resistance, adverse drug reactions, and drug-drug reactions. Moreover, antibiotics are the category of medicine commonly prescribed within the Paediatric department [8]. To minimize these problems and ensure safety, antibiotics guidelines are required in the hospital setup [9].

Subjects and Methods:

Aim & Objectives: The study aims to get the prescribing patterns of antibiotics in the department of paediatrics.

MATERIALS AND METHODS:

Study Design: Prospective observational study.

Study Place: The study was conducted in Apollo children's hospital, in the patient department, Tamil Nadu, which is an 80 bedded multispecialty child care hospital located in urban south India.

Study Period: The study duration was 6 months (December 2020 to May 2021).

Source of Data: Patient data concerning the study was obtained from patient case records.

Subject Recruitment: The study method involves the selection of participants supported by inclusion and exclusion criteria.

Subjects:

Inclusion Criteria: All in-patients of the paediatric department with regulation up to 18 years prescribed with a minimum of 1 antimicrobial agent.

Exclusion Criteria: Patients of either sex aged >18 years. Patients of the outpatient department. Patients who are not willing to co-operate.

Study Procedure: A suitably designed data collection form was used to collect the specified data, including patient demographics, laboratory data, drug therapy and other relevant information. Patient's demographic data contain the information of patient's name, age, sex, date of admission and discharge, chief complaints, diagnosis, history of patients, general and systemic examinations, details of prescribed medications, and their Route of administration.

Statistical Method: A simple percentage calculation was conducted to derive a conclusion from the study. Microsoft word (2010) was used to generate tables, figures, *etc.*

RESULTS: During the study period of 6 months, a total of 160 subjects were included in the study as per the inclusion criteria. In our total study population, 89 (55.62%) cases were from the male population, and 71 (44.38%) were female (**Fig. 1.** Out of 160 paediatric patients, the maximum number of patients in the age group between 6-12 years is 64 (40%) followed by 52 (32.05%) 2-6 years old; 23 1(14.37%) 1 month -2 years old; 18 (11.26%) 12-18 years old and 3 (1.87%) > 1-month-old **Fig. 2.**

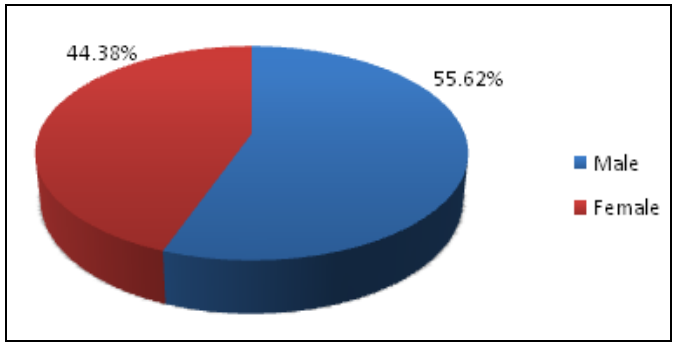

FIG. 1: GENDER-WISE DISTRIBUTION

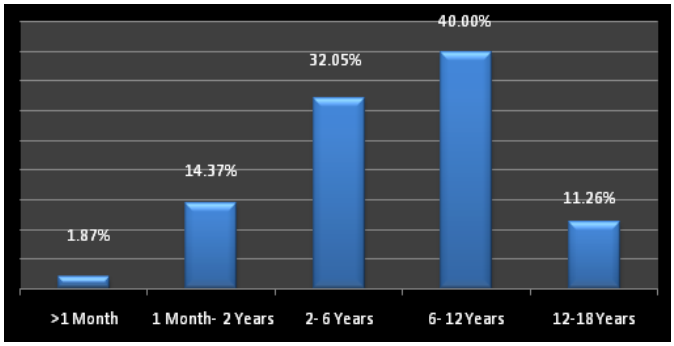

FIG. 2: AGE-WISE DISTRIBUTION

In this present study different clinical conditions were observed among 160 paediatric patients which were Respiratory tract infection 31 (19.4%) followed by Acute gastroenteritis 29 (18.1%) Surgical related cases 28 (17.5%), Urinary tract infection 26 (16.3%), Seizure 11 (6.8%), Acute appendicitis 9 (5.6), Nephrotic syndrome and Dengue fever 7 (4.4%), Ulcerative colitis and Typhoid fever 4 (2.5%), Meningitis 2 (1.3%), Liver disease and anemia 1 (0.6%) **Table 1.**

TABLE 1: DISTRIBUTION OF ILLNESS IN PAEDIATRIC

Diseases	Total	Percentage
Respiratory tract infection	31	19.4%
Acute gastro enteritis	29	18.1%
Surgical related cases	28	17.5%
Urinary tract infection	26	16.3%
Seizure	11	6.8%
Acute appendicitis	9	5.6%
Nephrotic syndrome	7	4.4%
Dengue fever	7	4.4%
Ulcerative colitis	4	2.5%
Typhoid fever	4	2.5%
Meningitis	2	1.3%
Liver disease	1	0.6%
Anemia	1	0.6%

A total of 236 anti microbial drugs were prescribed among 160 patients. The drug class that was commonly prescribed Cephalosporin 121 (51.27%) followed by Penicillin 25 (10.59%), Amino glycosides 16 (6.78%), Carbapenem and Macrolide 12 (5.10%), Glycopeptide 8 (3.38%), Sulfonamide 5 (2.11%), Polypeptide 4 (1.70%), Tetracycline and Lincosamide 3 (1.27%), Oxazolidinone and Fluroquinolone 1 (0.42%), Anti Protozoal 12 (5.10%), Anti fungal 8 (3.38%) and Anti malarial 5 (2.11%) **Table 2.**

A total of 236 anti microbial drugs were prescribed among 160 patients. Ceftriaxone 46 (19.50%), were the most commonly prescribed antimicrobial Followed by, Cefuroxime 25 (10.60%), Cefoperazone 21 (8.90%), Cefixime 19 (8.10%), Amoxycillin + Clavulanic acid and Amikacin 15 (6.35%), Meropenem, Azithromycin and Metronidazole 12 (5.10%), Piperacillin + Tazobactum 9 (3.81%), Cefotaxime and Sulfamethaxazole + Trimethoprim 5 (2.11%), Vancomycin, Fluconazole and Acyclovir 4 (1.70%), Clindamycin 3 (1.27%), Cephalexin , Ceftazidime, Fosfomycin, Teicoplanin, Polymyxin –B, Colistimethate sodium, Tigecycline and Micafungin 2 (0.84%), Ampicillin + Cefpodoxime, Tobramycin, Doxycycline, Linezolid, Ciprofloxacin, Ketoconazole, Flucytosine and Oseltamivir 1 (0.42%) **Table 3.**

TABLE 2: MAJOR CLASS OF ANTIMICROBIALS PRESCRIBED

Antibiotic Class	Total	Percentage
Cephalosporin	121	51.27%
Penicillin	25	10.59%
Aminoglycosides	16	6.78%
Carbapenem	12	5.10%
Macrolide	12	5.10%
Glycopeptide	8	3.38%
Sulfonamide	5	2.11%
Polypeptide	4	1.70%
Tetracycline	3	1.27%
Lincosamide	3	1.27%
Oxazolidinone	1	0.42%
Fluroquinolone	1	0.42%
Anti Protozoal	12	5.10%
Anti Fungal	8	3.38%
Anti Viral	5	2.11%

TABLE 3: PERCENTAGE OF INDIVIDUAL ANTIMICROBIALS PRESCRIBED

Class	Antimicrobial Drugs	Total	Percentage (%)
Cephalosporins	Ceftriaxone	46	19.50%
	Cefuroxime	25	10.60%

	Cefoperazone	21	8.90%
	Cefixime	19	8.10%
	Cefotaxime	5	2.11%
	Cephalexin	2	0.84%
	Ceftazidime	2	0.84%
	Cefpodoxime	1	0.42%
Penicillin	Amoxycillin + Clavulanic acid	15	6.35%
	Piperacillin + Tazobactum	9	3.81%
	Ampicillin	1	0.42%
Carbapenem	Meropenem	12	5.10%
Aminoglycosides	Amikacin	15	6.35%
	Tobramycin	1	0.42%
Macrolide	Azithromycin	12	5.10%
Glycopeptide	Vancomycin	4	1.70%
	Fosfomycin	2	0.84%
	Teicoplanin	2	0.84%
Sulfonamides	Sulfamethoxazole + Trimethoprim	5	2.11%
Polypeptide	Polymyxin- B	2	0.84%
	Colistimethate sodium	2	0.84%
Tetracycline	Tigecycline	2	0.84%
	Doxycycline	1	0.42%
Lincosamide	Clindamycin	3	1.27%
Oxazolidonone	Linezolid	1	0.42%
Fluroquinolone	Ciprofloxacin	1	0.42%
Anti Protozoal	Metronidazole	12	5.10%
Anti Fungal	Fluconazole	4	1.70%
	Ketoconazole	1	0.42%
	Flucytosine	1	0.42%
	Micafungin	2	0.84%
Anti Viral	Acyclovir	4	1.70%
	Oseltamivir	1	0.42%

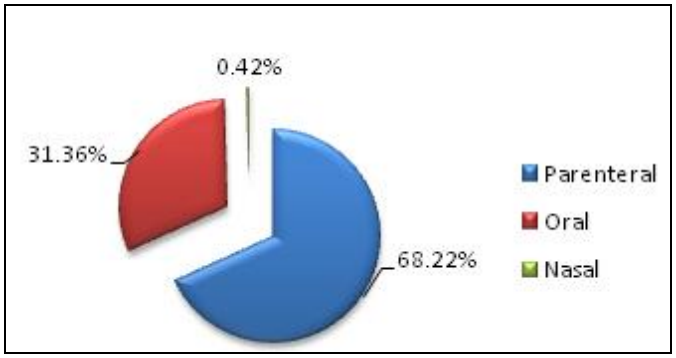

FIG. 3: DIFFERENT DOSAGE FORMS PRESCRIBED

A total of 236 drugs prescribed, the observation shows that most of the drugs were administered through parenteral route 161 (68.22%) followed by the oral route 74 (31.36%) and nasal route 1 (0.42%) **Fig. 3.**

DISCUSSION: In the present study, the total percentage of male patients was 89 (55.62%) as compared to the 71 (44.38%) of female patients which were similar to the studies conducted by Mohapatra S *et al* and Mathai D *et al.* [10, 11] Antimicrobials were found to be given more to children in the age group of 6-12 years 64 (40.00%) followed by young children's in the age group of children's 2-6 years 52 (32.05%), infants in the age group of one month to two years 23 (14.37%), adolescents in the age group of 12- 18 years 18 (11.26%) and neonates in the age group of >1 month 3 (1.87%). Similar results were found in the studies carried out by Kumar S *et al.* (3), but mohapatra S *et al* has shown that patients 1-5 years have received antibiotics more commonly. (10)The bulk of the antibiotic prescriptions were supported with a patient's diagnosis. According to our study, Respiratory tract infection, 31 (19.4%) was the most common indication of the prescribed antibiotics, which were in accordance with the studies conducted by Sabishruthi S *et al.* and Ramesh *et al.* [12, 13].

The study done by Kumar S *et al.* has shown that fever was the most common disorder for prescribing antibiotics followed by a seizure. (3) Antibiotics are the most commonly prescribed drugs in the hospital. About 30% of hospitalized patients are treated with antibiotics [14]. In this study, cephalosporin 121 (51.27%) was the most

commonly prescribed class of antibiotics, followed by Penicillin 25 (10.59%); findings have been shown by studies done by *et al.* [15] a total of 236 antimicrobial drugs were prescribed among 160 patients. Ceftriaxone 46 (19.50%) was the most commonly prescribed antibiotic; similar findings have been shown by studies done by Kumar S *et al* and Dutta S *et al.* [3, 16]. In this study, most common Route of antibiotic administration was found to be parenteral Route which accounted for 161 (68.22%) followed by oral route 74 (31.36%); the result matched with a study done by Feleke M. *et al.* [17].

CONCLUSION: This study gives an overview of prescribing pattern of antibiotics in children in our tertiary care teaching hospital. Almost half of the hospitalized patients were prescribed antimicrobial drugs in this study. Fever was the most common indication for prescribed antibiotics, followed by surgical-related cases. Maximum numbers of patients were in between of age group of 6-12 years old. Cephalosporins were the most commonly prescribed class of antibiotics; Ceftriaxone, cefuroxime, cefoperazone, and cefixime were highly prescribed individual antibiotics, unlike antiprotozoal agents, anti-fungal and anti-viral. Most of the drugs were administered through the parenteral route. It is already a fact of fear & indication that antibiotic resistance may mark as next pandemic since most experts believe that new antibiotic development cannot keep pace with the rate of bacterial resistance and most importantly, already available and conventional antibiotics have already given up under the resistance trend pattern. The matter of worry is that many surgeons worldwide simply accept the fact that organs are even being reported to be removed to manage the infection spread, due to the high rate of antibiotic resistance in some patients.

Our study suggests that strict guidelines should be implemented for the utilization of antibiotics which could have the tendency to reduce the development of antibiotic resistance in children. The very fact that restricts this study that we relied on a small sample size which would compromise the generalizability of the findings.

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CONFLICTS OF INTEREST: Nil

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