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PROSPECTIVE STUDY ON ANTIBIOTIC PRESCRIPTION IN SOUTH INDIAN PEDIATRIC POPULATION – A PEDIATRICIAN'S AND PARENT'S PERSPECTIVE

K. Dinesh*, K. Rangasamy, V. Sreenivasan

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ABSTRACT

Background: Soaring rates of antibiotic prescriptions to children have led to antibiotic resistance in the community. Thus, prescribing, dispensing, administering, and using medication needs special attention in the current scenario. **Objectives**: To study the pattern and rationality of antibiotic use in pediatric patients (1 month to 18 years of age) by using the patient records & prescription and to assess parents' awareness of treatment received and antibiotic awareness by using a questionnaire. **Materials and Methods**: It was a Prospective study performed at Pediatric OPD of Vinayaka Missions Kirupananda Variyar Medical College and Hospital for 6 months wherein a total of 1200 paediatric OPD and IPD patients were included. The patient's/caretaker's adequacy of each parameter was given a Score of 1 and a Score of 0 for inadequacy. Based on these seven parameters, each patient was given a Score of a minimum of 0 to a maximum of 7. **Results:** The patients included Neonates (6%), infants (8%), children (56%) and adolescents (30%). Results showed that 58% of male patients were majorly affected than female pediatric individuals (42%). The use of antibiotics was observed only in 14 out of 1200 prescriptions. Among the antibiotics, cefotaxime was the most frequently prescribed medication. As per the sum of scores obtained by the patients, 492 (42%) of 1200 patients understood their drug use parameters moderately, followed by well-understood 408 (34%) and poorly understood 300 (24%). **Conclusion:** This study highlights the rational use of antibiotics among patients and healthcare professionals, thus paving the way to minimize antibiotic resistance.

INTRODUCTION

Pharmacoepidemiologic research is characterized as the study aimed at discerning the pattern of drug use and its effects in any clinical populations and to comprehend the numerous treatment outcomes like unfavorable drug responses, drug effects including drug-drug interactions, and medication adherence [1]. It focuses on the effectiveness and safety of drugs. Rationalization is the process of stopping the prescription of unnecessary drugs and replacing them with the best possible treatment for the relevant pathologic conditions and the needs of

*Department of Paediatrics, Vinayaga Mission's Kirupananda Variyar Medical College and Hospitals, Salem, Tamil Nadu

***For Correspondence:** **doctordinesh1986@gmail.com**

the individual [2]. To be effective, a treatment must use medications sensibly in order to accomplish therapeutic objectives and maintain standards in accordance with the accepted norm. The precision of pediatric prescriptions poses a distinctive concern that warrants ongoing investigation and vigilant monitoring for the well-being of our young population. Hence the dosing inaccuracies in the pediatric prescription are a special issue that needs to be researched and consistently watched over for the good of the patients [3]. Furthermore, the imperative for more meticulous prescribing practices and careful prescriptions arises to mitigate the risk of antibiotic resistance in pediatric patients [4]. Hence, the rationale behind this study lies in highlighting the emphasis on the prudent utilization of medications, especially antibiotics, influenced by research findings on disease prevalence, age, and gender. Moreover, this study would serve as a foundation for researchers to broaden their exploratory perspectives in related disciplines.

MATERIALS AND METHODS

It was a prospective study conducted at Pediatric OPD of Vinayaka Missions Kirupananda Variyar Medical College and Hospital for 6 months. A total of 1200 paediatric patients from OPD and IPD were recruited as per approximate daily inflow of 30 patients. Out of these, around 15 patients are referred from primary pediatricians outside the hospital. Among that group, 20% of the patients are not under any antibiotic regimen and roughly 10% of the parents do not give consent.

Inclusion Criteria

The patients recruited in the study were both male and female patients between the ages of 1month to 18 years, patient treated with antibiotics, patient/parent who gave written informed consent.

Exclusion criteria

Patients with terminal illness, chronic malnutrition, mental instability, patients on Anti TB drugs, Chronic Steroid Therapy, Antimalarials & Chemo regimen, patients with cerebral Palsy, Restrictive lung disease, major chromosomal abnormalities and patients who were not willing to participate were excluded from the study.

Methodology

As per the inclusion criteria, the patients attending the Outpatient Department of Pediatrics at VMKVMCH, Salem receiving antibiotics were enrolled. The parents were given questionnaire to evaluate their awareness regarding the antibiotic use. The primary investigator with due consent; filled up a preformed questionnaire without disclosing their identity. Informed consent was taken from all the parents/patients while screening for the study recruitment. Study criteria were explained in local language to the parents and only after receiving the consent they enrolled in the study. The primary diagnosis for which the antibiotics were started and their final diagnosis were studied. The common problems and common diagnosis in the pediatric age group and the antibiotics started by the primary pediatrician/non pediatrician for the respective diagnosis were also evaluated. The case sheet of every pediatric patient was followed up weekly twice by doctor of pharmacy students of our Institution until patient was discharged. The subjective evidence, objective evidence, treatment plan were collected from the random case sheets. The demographical factors like age, gender; disease prevalence and drug treatment care given to the patient's especially antibiotic usage were important parameters considered and recorded for this study.

Statistical Analysis

The statistical analysis was performed using SPSS for Windows version 25.0. The findings were presented in number and percentage analyzed by frequency, percent. Chi-square test was used to find the association among variables. The critical value of *P* indicating the probability of significant difference was taken as <0.05 for comparison.

RESULTS

Table 1: Age and Gender classification of Paediatrics patients

Class	Frequency (%)
Neonates	75 (6)
Infants	95 (8)
Children	670 (56)
Adolescents	360 (30)
Males	692 (58)
Females	508 (42)
Total	1200

As per Table 1, it is clear that samples were grouped based upon the ages like; Neonates (6%), infants (8%), children (56%) and adolescents (30%). Mostly Children were more prone to infections and infectious diseases in recent days but the reason

was obscured in certain clinical conditions. It is clearly evident that 58% of male patients were majorly affected than the female pediatric individuals whose frequency was close to 42%. This hierarchical classification of the samples into male and female gender pediatric patients would help researchers in further explorative study in finding the valid reasons for the disease prevalence, which may also help the physicians to diagnose still more efficiently and to provide the right choice of drugs with proper dosing intervals and dosage forms for a specific duration of time.

Table 2. Antibiotics usage in Paediatric prescriptions

Antibiotics	Frequency
Cefotaxime	702
Ceftriaxone	453
Ampicillin	413
Amikacin	345
Gentamicin	213
Doxycycline	200
Metronidazole	155
Ciprofloxacin	110
Cloxacillin	75
Kanamycin	32
Amoxicillin	21
Cotrimoxazole	15
Piperacillin/Tazobactam	04
Tobramycin	02

As per Table 2, it was pointed out that the total number of antibiotics used were only 14 out of the total 1200 prescriptions. Among all the antibiotics prescribed by physicians, cefotaxime, which is a third-generation cephalosporin antibiotic, was the most frequently prescribed medication, as is clear by its frequency of 702 prescriptions. In comparison with the recent survey undertaken by WHO about the increased non-prescribed antibiotic usage, 42.3% of cases were evidenced. Recommendation and familiarity about the antibiotics might lead to non-prescribed antibiotic usage/self-medication from pharmacies.

As per Table 3 with respect to rationalizing the pediatric prescription of drugs, the p\prescriptions without antibiotics were only 6%, remaining 676 (56%) pediatric prescriptions had at least 1 antibiotic drug in each. Pediatric prescriptions with 2 and 3 antibiotics in each prescription were 432 (36%) and 13 (1%) respectively. During the study period only four prescriptions remained with more than 3 antibiotics prescribed by the physician. In this study we observed considerable overuse of antibiotics among pediatric prescriptions. At a certain point, superbugs inevitably emerge, displaying resistance to the majority of antibiotics and other commonly employed medications aimed at treating the infections they induce.

Table 3: Prescribing Pattern of Antibiotics in Pediatric Patient Prescriptions

Indicator	Frequency (%)
No. of prescriptions without antibiotics	75 (6)
No. of prescriptions with 1 antibiotic	676
No. of prescriptions with 2 antibiotics	432
No. of prescriptions with 3 antibiotics	13
No. of prescriptions with more than 3 antibiotics	04

Table 4: Drug use parameters in Paediatric population

Class	Adequate	Inadequate	p-value
Disease	1180	20	0.11
Indication of drug	1000	200	0.22
Dose	1080	120	0.13
Frequency	910	290	0.24
Duration	750	450	0.09
Awareness of side effects	320	880	0.56
Before/after food	570	630	0.07

As per Table 4, of all the drug use parameters evaluated at the time of discharge, disease parameter was understood by almost all patients followed by indication and frequency parameter. There was no statistically significant difference in parameters which suggests that each parameter is comparable.

As per table 5, the patient's/caretaker's adequacy of each parameter was given a Score of 1 and Score of 0 for inadequacy. Based on these seven parameters, each patient was given a Score of minimum 0 to a maximum of 7. After assigning a score to each parameter, the analysis of the sum of scores obtained by patient was performed and it was found that, 492 (42%) of 1200 patients understood their drug use parameters moderately, followed by 408 (34%) who well-understood and 300 (24%) who poorly understood.

Table 5. Parents Perspective in antibiotics adequacy

Class	Well understood	Moderate	Poor
Disease	108	132	80
Indication of drug	100	98	75
Dose	70	58	32
Frequency	30	55	30
Duration	40	63	30
Awareness of side effects	40	42	28
Before/after food	20	44	25

DISCUSSION

1200 pediatric inpatients prescriptions for an observational prospective study on rational usage analysis of medicines throughout the mentioned period were collected regularly. The sample taken for study had been grouped and classified age and gender wise by using demographic data, to make the analysis and interpretation precise as well as convenient [5].

Various infectious and non-infectious disorders include upper and lower respiratory infections, gastrointestinal, urinary, and seizures and other nerve system anomalies. The WHO lists pneumonia and diarrhea as two of the main causes of death in children under the age of five [6]. The rural population that this study took into account was suffering from malnutrition and a lack of basic necessities for living in a nice environment and leading a healthy lifestyle [7]. Fever and upper and lower respiratory tract diseases commonly afflict children [8].

The use of antibiotics might cause adverse reactions like rashes are challenging to pinpoint because it frequently happens in children and could be caused by other trigger factors. Cross reactivity, a clinical condition that happens after taking an alternative antibiotic prescribed by the doctor, may be caused by cephalosporin antibiotics like cefotaxime [9]. However, the American Academy of Pediatrics' evidence-based recommendations supported the use of cephalosporin antibiotics for the treatment of acute bacterial sinusitis and acute otitis media in patients who had previously reported penicillin allergies. [10,11]

Antibiotic prescription recommendations should be provided with adequate packaging and labelling standards.[12] This can be made even easier by stewardship of antibiotics program. According to previous studies, such stewardship programs significantly reduced the DDD (Defined Daily Dose) of numerous antibiotics. [11,12] A new schedule for banning the over-the-counter (OTC) usage of 91 antibiotics with red Rx labels that state that they cannot be sold without a doctor's prescription has recently been prepared by Central Drugs Standard Control Organisation (CDSCO). Since these antibiotics were separately listed as Schedule H1, proper use of antibiotics may result in their future judicious and rational use. Additionally, limiting the use of particular antibacterial drugs is a desirable way to reduce the need for antibiotics, reduce spending, and assist stop the emergence of resistant germs in hospitals [13].

In the current study scenario, every patient received the appropriate care, and majority of instances demonstrated a positive doctor-patient relationship and high levels of therapeutic compliance. Many medications were given a generic name prescription. This seems to provide an indication to encourage the practice of writing generic prescriptions in other healthcare settings as well. We still need to research the specific factors that lead to the development of different diseases in these rural locations if we want to encourage sensible treatment and adequate patient education for everyone.

LIMITATIONS

Since patients with chronic conditions or those on certain medications were excluded from this study, this might seem to be a limitation for the broader applicability of the findings to the entire pediatric population.

FUTURE RECOMMENDATIONS

A concerted effort is needed to reorient pharmaceutical practices aiming at the rational use of medications. The practice of poly-pharmacy, low usage of generic drugs, injudicious usage of antibiotics and injections and low usage of drugs from essential drugs list should be negated.

CONCLUSION

In a nutshell, an important principle to be observed in all doctor-prescribed medications is the rational use of pharmaceuticals. Antibiotics should be administered carefully because if they are prescribed too often, certain patients may develop drug resistance and need alternative treatments. This study seeks to promote rational use of antibiotics among patients and health care professionals and thus pave a way to minimize antibiotic resistance. The research also highlights a distinct requirement

for policy-making bodies to establish guidelines that govern the prescription practices of all healthcare providers in this region. Additional research is necessary to enhance the rationalization criteria in prescriptions by examining information with a comprehensive approach to antibiotics.

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Nil

CONFLICT OF INTEREST
The authors declare no conflict of interest

AUTHOR CONTRIBUTION
All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work. The work was conceptualized and designed by K. Dinesh, K. Rangasamy, Vismaya Sreenivasan. Data acquisition, analysis and interpretation of data was done by all the authors. K. Dinesh and K. Rangasamy drafted the manuscript. All authors contributed to a critical review of the manuscript for important intellectual content.

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