

Study on Prescribing Patterns of Antibiotics among Paediatrics According to Who Core Indicators in a Tertiary Care Hospital

Sandhra B James¹, Acsa Joseph², Ruksana Fathima³

¹Pharm D Intern, The Dale View College of Pharmacy and Research Centre, TVM Affiliated to Kerala University of Health Sciences
Email: sandhrajames98[at]gmail.com

²Pharm D Intern, The Dale View College of Pharmacy and Research Centre, TVM Affiliated to Kerala University of Health Sciences
Email: shobhasjosephk[at]gmail.com

³Pharm D Intern, The Dale View College of Pharmacy and Research Centre, TVM Affiliated to Kerala University of Health Sciences
Email: ruksanafathima4818[at]gmail.com

Abstract: Antibiotics can be life saving treatment for children with bacterial infections and the most commonly prescribed therapy among all medicines. The study aims to assess the antibiotic prescribing pattern in paediatric inpatients admitted in a tertiary care hospital, according to WHO core prescribing indicators. **Objective:** Objective of the study was to analyse the prescribing pattern of antibiotics in children using WHO core prescribing indicators and to evaluate the need of probiotics and culture test recommendations in paediatric population. **Methods:** A prospective observational study of antibiotic prescribing pattern in 100 paediatric inpatients aged up to 12 years. The study was done for a period of 6 months in patients diagnosed with various infectious diseases. Patient's demographics and clinical data were recorded in a predesigned performa. **Results:** Among 100 paediatric inpatients in the hospital 67% were male and 27% were female and 66% patients were prescribed with at least one antibiotic. Cephalosporins were the most commonly prescribed followed by penicillins and 100% of the prescriptions were from the hospital formulary. **Conclusion:** The study reveals that the antibiotic prescribing patterns in the paediatric inpatients deviates from the WHO core prescribing indicators and also evaluated the culture test recommendations and probiotic prescribing pattern in antibiotic prescribed patients.

Keywords: Antibiotics, paediatrics, WHO core indicators, Probiotics, Culture test

1. Introduction

Paediatrics is the speciality of medical science concerned with physical, social and mental health of children from birth to young adulthood. Paediatrics is the discipline that deals with social, biological and environmental influences on the developing child and with the impact of disease and dysfunction on development. Children differ from adults physiologically, anatomically, immunologically, metabolically and develop mentally.^[1]

World Health Organization (WHO) has reported that more than half of all drugs are inappropriately administered, dispensed or sold. Moreover 37% of inappropriate antimicrobial uses are reported in India.^[2] The pharmacokinetics profile of the paediatrics differs from adults. This can leads to fatal effects, so the dosage requirements should be altered in this population. Paediatric physicians may occasionally prescribe antibiotics in an irrational manner. Therefore, an effective step should be taken for rational and effective use of antibiotics especially in paediatric population.^[3]

Probiotics are viable microorganism that has a beneficial effect in the prevention and treatment of infectious antibiotic associated diarrhea. They help to balance the intestinal microflora. Antibiotic-associated diarrhea (AAD) occurs due to imbalance in the colonic microbiota caused by antibiotic therapy.^[4]

Most of the antibiotics are prescribed based on cultural test

results therefore obtaining cultures before antibiotic administration can aid clinicians in identifying the pathogenic micorganism. If cultures are drawn after antibiotic administration, there may be a decrease in the blood culture yield. This can leads to increase the cost and length of hospital stay for the patient. So that cultural test influences the patterns of antibiotic use.^[5]

Improper dose of antibiotic prescribed and increased use can cause antimicrobial resistance (AMR). So, it is important to ensure that antibiotics are used appropriately. The rational antibiotic usage can be done by increasing the availability of diagnostic tools, prescribing as per the evidence based guidelines, and increasing the patient consultation time.^[6] Proper choice of antibiotics is a complex process that needs careful clinical judgment. Therefore WHO has composed a set of core drug use indicators, which assess the performance of prescribers, patient's knowledge and experience at health care facilities. This evaluation will boost the development of standards for prescribing, sort out the problems associated with the understanding of instructions provided by consultants to the patients, and even minimize the financial burden on patients.^[7] In the present study, we aimed to audit the prescriptions of the inpatients in the paediatrics department of a tertiary care teaching hospital in India, wherein prescriptions were analyzed using pre-set parameters.

Volume 12 Issue 7, July 2023

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

2. Materials and Methods

Study design and site

The study was a prospective observational study conducted for a period of six months, in paediatric inpatients of a tertiary care hospital, Thiruvananthapuram.

Study population and sample

100 patients were included in the study based on age, inclusion and exclusion criteria. Both genders are included. The wards were visited in all 7 days of the week and patient details including demographics details, prescribing patterns.

Study period

January 2022-june 2022

Study criteria

Inclusion Criteria:

- Subjects from either sex.
 - Age:-up to 12 years.
 - Data were collected only from inpatients.
 - Subjects and caretakers who are willing to participate.
- Exclusion Criteria:
- Outpatients and emergency paediatric population
 - Subjects and caretakers who are not willing to participate.
 - Subjects whose age is > 12years.
 - Subjects with incomplete records or case files.

Study materials

Patient data collection form

A convenient sample size of 100 paediatric patients admitted in the hospital was enrolled in the study with the approval of the hospital research and ethics committee. The data collection form include patient demographic details with laboratory investigations such as culture test, type of antibiotics and Probiotics with their dose, frequency, dosage form and route of administration.

Data analysis

Descriptive statistics were used to summarize and organise the data set. A p value<0.001 was considered statistically significant for all tests. All data were entered into Microsoft excel and statistical analysis were performed using SPSS version 26.

Patient consent

A self designed consent form prepared in both English and malayalam was taken from patients guardian.

3. Results

A total of 100 paediatric inpatients were enrolled in the study. Of these 67 patients were male and 27 patients were female. The study was carried out to assess the antibiotic use and prescribing pattern by medical practitioner. Out of the 100 inpatients, 31% patients undergo culture test, 32 %patients were prescribed with a probiotic and 66% patients were given at least one antibiotic. The study designates that the toddlers were more susceptible to infectious diseases and

least were early adolescence age group. The most prevalent diseases were acute lower respiratory tract infections (30%) followed by febrile illness (28%) and cefaxone (35%) were the most frequently prescribed antibiotic followed by ceftriaxone (31%). The percentage of patients prescribed with a probiotic was 32%.

WHO prescribing indicators: The average number of drugs prescribed per encounter was obtained as 5.9, which is higher than the standard value 2, so it suggest polypharmacy, that could eventually leads to AMR, adverse drug reaction (ADR), and noncompliance.100 % of antibiotics were prescribed from the hospital formulary. Formulary helps for the rational prescribing which may prevent antibiotic resistance and promote cost effective drug therapy. One or more antibiotics were prescribed in 66% of total patient encounters, which shows antibiotic overuse as the value is higher than standard value 30%.

Among 100 sample size, 22.75% (129) prescriptions were prescribed in generic name which is less than the standard value of 100 % in WHO indicator. Generic name prescriptions are recommended to reduce cost to the patients. The number of encounters with an injection prescribed is 25% which is less than the standard value of 20%

Table 1: Gender of patients

Gender	Number of patients (%)
Male	67
Female	33
Total	100

Table 2: Age group of patients

Age groups	Number of patients (%)
Infancy	14
Toddler	28
Early Childhood	21
Middle Childhood	26
Early Adolescence	11
Total	100

Table 3: Distribution of patients according to culture test recommendations

Type of Culture	Number of Patients (%)
Not Done	69
Blood Culture	7
Urine Culture	8
Sputum Culture	1
Throat Swab	1
Blood Culture And Throat Swab	2
Blood And Urine Culture	11
Blood Culture, Urine Culture, Throat Swab	1
Total	100

Table 4: Distribution of patients according to probiotics prescribed

Name of Probiotic	Number of patients (%)
Not Given	68
Econorm	23
Enterogermina	7
Nutrolin B	2
Total	100

Table 5: Antibiotics prescribed in paediatric patients

Name of Antibiotics	Number of patients (%)
Cefaxone	35
Amoxyclav	27
Ceftriaxone	31
Cefexime	4
Azithromycin	19
Amikacin	9
Cefpodoxime	2
Piperacillin	1
Total	100

Table 6: WHO core prescribing indicators in paediatric population

Indicators	Total drugs/encounters	Average/ percent	WHO Standard (2%)
Average number of Medicines per encounter	591/100	5.910	2
Percentage of encounters with drugs prescribed from essential medicines list	100	100%	100
Numbers of encounters with an injection prescribed	25	25%	20
Percentage of prescriptions with generic name	129	22.75%	100
Percentage of encounters with one or more antibiotics	66	66%	30

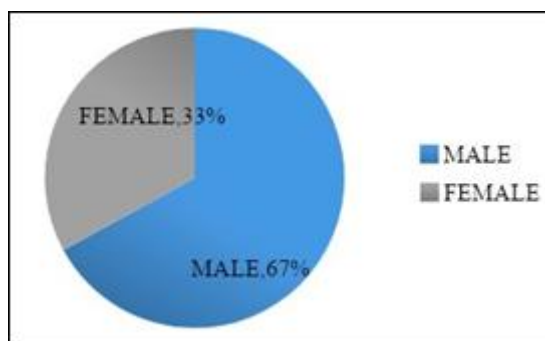


Figure 1: Gender distribution of patients

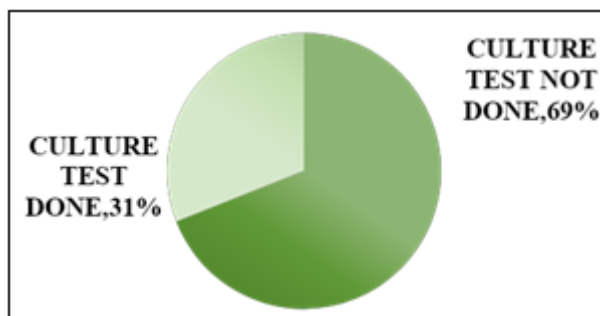


Figure 2: Distribution of patients according to culture test recommendations

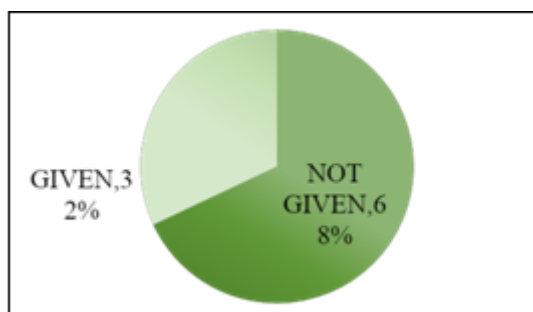


Figure 3: Distribution of patients according to probiotics given

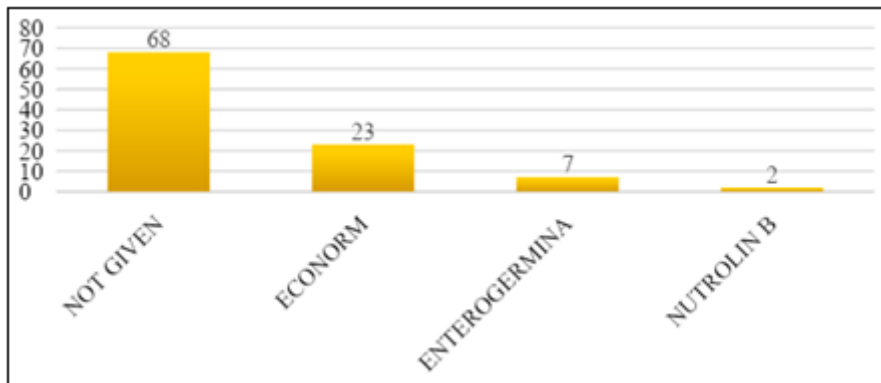


Figure 4: Distribution of patients taking different probiotics



Figure 5: Distribution of patients according to diagnosis

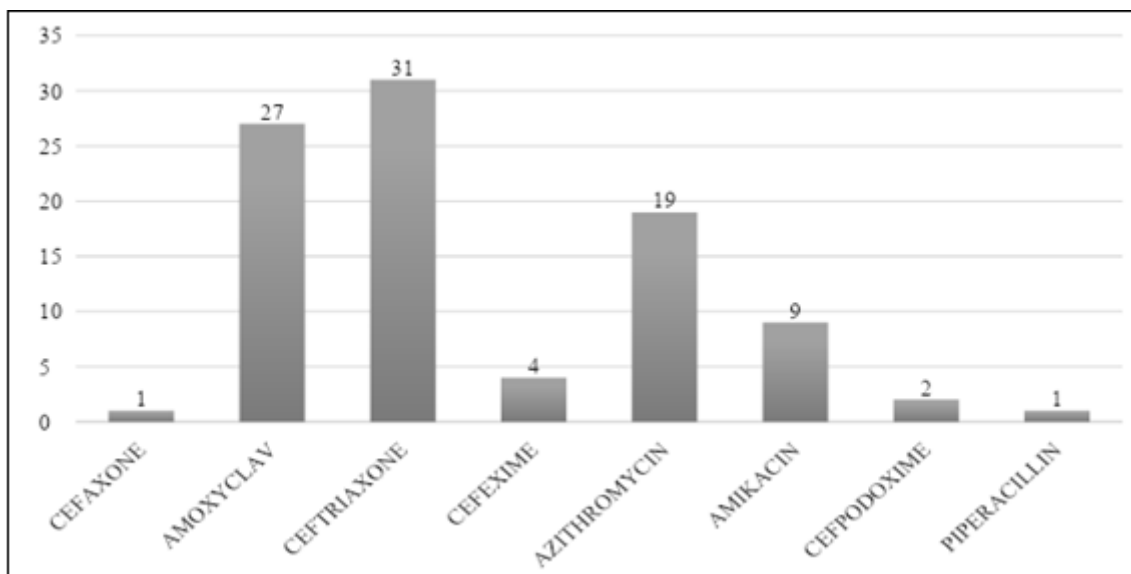


Figure 6: Distribution of patients taking different antibiotics

4. Discussion

The analysis reveals that among the study population, 66% of study subjects were prescribed with antibiotics. It means that about 66% of the patients were prescribed with at least one antibiotic and the remaining 34% of prescriptions were not prescribed with antibiotics.

Among 100 patients, 67 were male and 33 were females. In this current study toddlers were distributed more than other age groups. These findings based on age and gender has a close resemblance with the study of *Sayeri Dutta et al.*

The major diagnosis among the study population was

respiratory tract infections. These findings have a close resemblance with the study of *Sabishruthi S et al.*

Among 100 patients, only 31% were underwent culture test recommendations and it mainly includes both blood and urine culture. This result was having a close resemblance with the study of *Hetal N Jeeyani et al.*

In our current study 32% of patients had Probiotics recommendations. In that 23 % was prescribed with econorm followed by enterogermina. In the prescribing pattern of antibiotics, ceftriaxone was prescribed more. According to the category of antibiotics, cephalosporin's were prescribed with prime importance.

5. Conclusion

The present study reveals the prescribing pattern of antibiotics in children in our tertiary care center. The prescribing pattern of antibiotics shows deviation from WHO standards suggesting that the use of antibiotics should be monitored closely as the use of injectable medications were higher. However, the prescription adhered with the hospital formulary. Thus inclusive educational programs that targeting primary care physician, other health care providers and patients should be developed.

Attention should be diverted to prevent this and to promote well-being of the patients. Clinical Pharmacist must take responsibility for monitoring and notifying the physician and patients about the potential problems. This study has highlighted the need for future studies to be conducted in order to improve the prescriber's awareness on antibiotic prescribing patterns.

Acknowledgement

The authors sincerely thank Dr Meena Krishnan V, Senior consultant, Department of Paediatrics and the patients of SK Hospital, Thiruvananthapuram for their willing consent for the publication of their case by sharing information needed for this research.

Compliance with Ethical Standards

Written informed consent was obtained from the patient for publication.

Conflicts of Interest

The authors declare that they have no conflicts of interest concerning the consent of this work.

References

- [1] Rimsza ME, Hotaling AJ, Keown ME, Marcin JP, Moskowitz WB, Sigrest TD, et al. Definition of a pediatrician. *pediatrics*. 2015 Apr 1; 135 (4): 780-1.
- [2] Mathew R, Sayyed H, Behera S., et al. Evaluation of antibiotic prescribing pattern in pediatrics in a tertiary care hospital. *Avicenna J Med*. 2021 Jan; 11 (01): 15-9.
- [3] Malik A, Nain P, Maini B., et al. Prescription pattern of antibiotics in paediatric patients in a rural teaching hospital of north india. *Journal of Nepal Paediatric Society*. 2021; 41 (2): 211-217.
- [4] Susan Cherian, Siby Joseph., et al. Study on the prescribing pattern of probiotics in paediatric patients of a tertiary care teaching hospital, south india. *Int J Pharm Pharm Sci*.2012; 4 (01): 505-508.
- [5] Giuliano C, Patel CR, Kale Pradhan PB., et al. A Guide to bacterial culture identification and results interpretation. *PT*. 2019 Apr; 44 (4): 192-200.
- [6] Rogawski ET, Platts-Mills JA, Seidman JC, John S, Mahfuz M, Ulak M, et al. Use of antibiotics in children younger than two years in eight countries: a prospective cohort study. *Bull World Health Organ*. 2017 Jan 1; 95 (1): 49-61.
- [7] Richard Ofori Asenso. A close look at the WHO prescribing indicators. *Journal of Pharmacology and Pharmacotherapeutics*. 2018 feb; 7 (1): 51-54.
- [8] Ramasamy SK, Goyal P., et al. Antibiotic prescribing patterns by health care providers in pediatric outpatients: a prospective observational study. *J Compr Ped*. 2021 May 12; 12 (2): 1-6.
- [9] Sweta Shrestha, Sangita Shakya., et al. Prescribing pattern of antibiotics in paediatrics hospital in nepal. *World Journals of Pharmaceutical Research*.2021 jul 3; 10 (9): 901-912.
- [10] Sarker R, Khan MSI, Tareq MA, Ghosh S., et al. Antibiotic use among children under 5 year of age in a tertiary care hospital, bangladesh. *SN Compr ClinMed*.2021Apr; 3 (4): 982-988.
- [11] Gholamreza Sepehri, Mahnaz Amiri., et al. Antibiotic prescription patterns for hospitalised children under 12 years in a tertiary referral teaching hospital, kerman, iran. *Zahedan J Res Med Sci*.2021 Jan; 23 (1): 1-7.
- [12] Haroledpeter PL H, Madhusudhan S, Thirupathykumaresan P T., et al. A prospective study of antibiotic prescribing pattern among pediatrics in a government district headquarters hospital, south india. *IJOPP*. 2021 Apr 15; 14 (2): 123-127.
- [13] Ravi G, Chikara G, Bandyopadhyay A., et al. A prospective study to evaluate antimicrobial prescribing pattern among admitted patients in hilly himalayan region of northern india. *J Family Med Prim Care*. 2021 April; 10 (4): 1607-1613.
- [14] Vineela Chandalavada, Manoharbabu Sitty., et al. Prescribing pattern of antibiotics in children's using who indicators. *Drug Invention Today*. 2020 May16; 14 (4): 618-624.
- [15] Priyadarshini RP, R Kesavan. Antibiotic prescribing pattern among paediatric patients attending tertiary care hospital in south india. *Int J Basic Clin Pharmacol*.2020; 9 (7): 1028-1031.
- [16] Judith Kalonga, Jimmy Hagoma., et al. Antibiotic prescribing patterns in paediatric patients at levymwanawasa university teaching hospital in lusaka, zambia. *Int J Pharm Pharmacol* 2020 Feb 28; 4 (1): 1-7
- [17] Ahmed AH, Y I Alkali., et al. Prescription pattern of antibiotics in paediatric wards of a tertiary hospital in north west nigeria: a retrospective study. *Pharma Tutor* 2019 Jan;7 (7): 1-6.
- [18] T Rajavardhana, A Nagajyothei., et al. Prescribing patterns of antibiotic in paediatric patients of tertiary care hospital in south indian resource limited settings. *Inventi Journals*; 2019 Jun (2) 76-81.
- [19] Chandika G, Shaista Shabnum., et al. Assessment of prescription pattern of paediatric patients using WHO indicators *IJRR Journal* 2019; 6 (7): 48-52.
- [20] Sabisruthi S, Kavitha S., et al. An evaluation on prescribing pattern of antibiotics in paediatric inpatient at tertiary care hospital. *Asian J Pharm Clin Res*.2019; 12 (12); 53-57.
- [21] Patel N, Patel D, Desai H., et al. Antimicrobial utilization pattern among pediatric inpatients of a tertiary care hospital in central gujarat. *Natl J Physiol Pharm Pharmacol*. 2019; 9 (11): 1152-1155.
- [22] Bamel VV, Shahani SR, Mohanty NC., et al. Study of

- drug utilization and antimicrobial prescription pattern of indoor paediatrics cases in tertiary care hospital. *Int J Basic Clin Pharmacol.* 2018 Jan; 7 (1): 98-102.
- [23] Dutta S, Bhattacharjee A, Meena Devi N., et al. Prescription pattern of antibiotics in paediatric inpatients at a tertiary care hospital in north east india. *Int J Basic Clin Pharmacol.* 2017 Oct; 6 (10): 2384-2387.
- [24] Pradeepkumar Bhupalam, Tawfeek Alameri, Narayana Goruntla., et al. Assessment of antibiotic prescribing pattern in paediatric patients: a cross sectional hospital based survey. *Chrismed journal of health and research.* 2017 Oct; 4 (4): 235-237.
- [25] Gopal MB, P Thyagarajan., et al. A study on antibiotic prescription among the hospitalised paediatric patient at a referral center in puthuchery, India. *Int J Contemp Paediatrics* 2017; 4 (3): 700-705.
- [26] Jeeyani HN, Parikh RH, Sivanandan S, Muliya HJ., et al. Study of antimicrobial use in paediatric inpatients in a tertiary care hospital in ahmedabad, india. *Int J Contemp Pediatr.* 2020 Dec 23; 8 (1): 35-40.
- [27] Sharma S, Bowman C, Alladin-Karan B., et al. Antibiotic prescribing patterns in the pediatric emergency department at georgetown public hospital corporation: a retrospective chart review. *BMC Infect Dis.* 2016 Dec; 16 (1): 1-6.
- [28] Kailash Thapaliya, Shakti Shrestha., et al. Prescribing pattern of antibiotics in paediatric hospital in chitwan district in nepal. *WJPPS* 2015; 4 (11): 1631-1641.
- [29] Alakhali KM, Mohammad AAS., et al. Prescribing pattern of antibiotics in pediatric patients in the jazan region, kingdom of saudi arabia. *RGUHS J Pharm Sci.* 2014 Nov 19; 4 (3): 120-124.
- [30] Choudhury Dk, Bezbaruah BK., et al. Antibiotic prescriptions pattern in paediatric inpatient department gauhati medical and hospital, guwahati. *Journal of applied pharmaceutical science.* 2013; 3 (8): 144-148.