WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 11, Issue 10, 1047-1056. Research Article ISSN 2277– 7105

A PROSPECTIVE OBSERVATIONAL STUDY ON PRESCRIPTION PATTERN OF ANTIBIOTICS FOR PEDIATRICS IN A TERTIARY CARE TEACHING HOSPITAL, DAVANAGERE

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Article Received on
30 May 2022,

Revised on 20 June 2022,
Accepted on 10 July 2022

DOI: 10.20959/wjpr202210-24873

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ABSTRACT

Background: Antibiotics are the most commonly prescribed drug for infections in pediatric population. The indiscriminate use of antibiotics may lead to unfavorable consequences such as antibiotic resistance, polypharmacy, drug interactions, adverse effects and high cost of therapy. Hence, a study on prescription pattern of antibiotics may help to discern the possibility of such adverse circumstances. **Objectives:** To evaluate the prescribing pattern of antibiotics for pediatrics using WHO core prescribing indicator. **Methods:** A prospective observation study was conducted for a period of 6 months in the pediatric department of Chigateri district Hospital, Davanagere. The prescriptions were enrolled on the basis of inclusion criteria. **Results:** A total of 130 prescriptions were analysed as per WHO prescribing indicator. Majority of the patients were presented with lower respiratory tract infection and ceftriaxone was most widely used antibiotic (39.32%).The average number of drugs per encounter was 4.53.The percentage of antibiotics prescribed was 30.16% with an average of 1.36 antibiotics per prescription. Out of 178 antibiotics, 91.01% were injectable which is much higher than WHO standard value. All of the antibiotics prescribed was from National list of essential medicines and those prescribed with generic names were 74.15%. **Conclusion:** Antibiotic prescription pattern was not rational as per WHO prescribing indicator as there is polypharmacy and inappropriate use of antibiotics. But it was rational regarding adhering to National List of Essential Medicine.

Hence, it is imperative that prescriber should follow rational antibiotic prescription by abiding Standard Treatment Guidelines.

KEYWORDS: Antibiotics, Pediatrics, Prescription pattern, WHO core prescribing indicator.

INTRODUCTION

Pediatrics is the branch of medicine which deals with medical care of infants, children and adolescents. As per ICH guidelines 2000, pediatrics is defined as those younger than 18 years.[1]

Antimicrobials are the most drugs prescribed for the treatment of infections in pediatrics department. There is a lot of studies reported that 50% to 85% of children receive antibiotics in developed and developing countries prescribed by physicians.[2] India is a lower middle income developing country in South Asia which have high potential for overuse and misuse of antibiotics and have less public awareness of antimicrobial resistance.[3] It is most commonly prescribed for children with conditions for which they provide no benefit, including mosquito borne viral disease like dengue and common cold.[4] The indiscriminate use of antibiotics often results in increased incidence of adverse drug reactions, suboptimal therapy, treatment failure, polypharmacy and most importantly, the emergence of antibiotic resistance.[5] The factors that are associated with increasing antibiotic resistance in India are high prevalence of disease, easy access to antibiotics, irrational dispensing and misuse of antibiotics.[6] The practioner should be made aware of the importance of combination therapy so that the chances of resistance development can be ameliorated to the most possible extent.[7] Adverse drug reactions due to antibiotics can be reduced by appropriate monitoring and active participation of pharmacovigilance.

Antibiotic Guidelines are the standard set of guidelines for the treatment of infectious disease based on the local culture sensitivity data. These guidelines help the physician to prescribe the antibiotics rationally to pediatric patients when definitely indicated.[8] Proper choice of antibiotics is a complex process that needs careful clinical judgement. World Health Organisation (WHO) has composed a set of core drug use indicators, which assess the performance of prescribers, patients' knowledge and experience at healthcare facilities and effective functioning of health care personnel.[9] Prescribing patterns studies are an important indicator to judge the quality and standard of clinical practice among health care professionals.[10] Hence, the aim of this study was to monitor the prescribing pattern of

antibiotics using WHO prescribing indicator among pediatric inpatients in a tertiary care teaching hospital.

MATERIALS AND METHODS

A prospective observational study was conducted for a period of six months in pediatric department of Chigateri district hospital, Davangere. The ethical clearance for the study was obtained from Institutional Ethical Committee of SCS College of Pharmacy. About one hundred and thirty inpatients were enrolled as per the study criteria:

Inclusion criteria

- Patient of either sex.
- Patient age under 18.
- Inpatient under antibiotic therapy.
- Cases with comorbid conditions.

Exclusion criteria

- Patient admitted in intensive care units (ICU).
- Patient who are treated from outpatient department.
- Cases where the caretakers are not willing to give informed consent to participate in the study
- Prescription with insufficient and incomplete data

The relevant data was collected from the patient's case sheets using suitably designed data collection form. The collected data was computed using MS Excel and finally analyzed with WHO core prescribing indicators.

RESULTS

➢ Age and Gender wise distribution of study population

In our study, patients were divided into four groups based on age as per USFDA guidelines. Out of 130 study population, the neonates were 2(1.53%), Infants were 49(37.69%), children were 57(43.84%) and adolescents were 22 (16.92%). The age group between 1 year -11 year (children) were highest and the number of male patients73(56.15%) were found to be high than females57(43.84%).

Table 1: Age and Gender wise distribution of study population.

Parameter	No. of patients	Percentage
Age		
Neonates (0-1 month)	2	1.53%
Infants (1month-1year)	49	37.69%
Children (1 year-11 years**)**	57	43.84%
Adolescents (12years-16 years)	22	16.92%
Gender		
Male	73	56.15%
Female	57	43.84%

- **Distribution of patients according to the disease**

Out of total enrolled population n=130, the most commonly observed disease was lower respiratory tract infection (n=49,37.69%) followed by acute gastroenteritis(n=23,17.69%), and the least common was viral hepatitis(n=2,1.53%).

Table 2: Distribution of patients according to the disease.

Disease		No. of patients	Percentage
URTI		9	6.92%
LRTI		49	37.69%
AGE		23	17.69%
Dengue fever		14	10.76%
Enteric fever		6	4.61%
AFI		12	9.23%
Meningitis		8	6.15%
Other viral infections	Viral hepatitis	2	1.53%
	Viral fever	4	3.07%
	Viral meningoencephalitis	3	2.30%
Total		130	100%

- **Number of drugs per prescription in pediatrics**

The average number of drugs per patient was 4.53 and more than 98% of the patients were exposed to at least two drugs. The maximum number of drugs per patient was 8(0.76%).

Table 3: Number of drugs per prescription.

No. of drugs per patient	No. of patients	Percentage
1	0	0
2	1	0.76%
3	16	12.30%
4	44	33.84%
5	56	43.07%
6	10	7.69%
7	2	1.53%
8	1	0.76%

➢ **Distribution of antibiotics prescribed**

The most frequently prescribed antibiotic in the study was Ceftriaxone, i.e., 70 (39.32%) followed by Amoxicillin-clavulanic acid, i.e.,36 (20.22%) and least prescribed was Azithromycin, i.e., 1(0.56%)

Table 4: Distribution of antibiotics prescribed.

Name of antibiotics	Frequency	Percentage
Amoxicillin	4	2.24%
Amoxicillin-clavulanic acid	36	20.22%
Ceftriaxone	70	39.32%
Amikacin	25	14.04%
Ampicillin	6	3.37%
Cefotaxime	9	5.05%
Doxycycline	12	6.74%
Piperacillin	3	1.68%
Gentamycin	2	1.12%
Vancomycin	6	3.37%
Meropenem	4	2.24%
Azithromycin	1	0.56%
Total	178	100%

➢ **Number of antibiotics per prescription**

Out of 130 prescriptions containing antibiotics, a high percentage of patients 83 (63.84%) were prescribed with single agent. About 46 (35.38%) patients were prescribed with two agents and three agents were prescribed to only 1 (0.76%) patient. The average number of antibiotics per prescription was about 1.36.

Table 5: Number of antibiotics per prescription.

No. of antibiotics	No. of prescriptions	Percentage
1 Agent	83	63.84%
2 Agent	46	35.38%
3 Agent	1	0.76%
Total	130	100%

➢ **Dosage forms of antibiotics prescribed**

In our study, out of 178 antibiotics prescribed 91.01% of antibiotics were injectable, 6.17% were tablets and 2.80 % were syrups. Injectable was the most preferred dosage form for antibiotics among the study population and syrups were less commonly used.

Table 6: Dosage forms of antibiotics prescribed.

Dosage forms	No. of antibiotics	Percentage
Syrup	5	2.80%
Tablet	11	6.17%
Injection	162	91.01%
Total	178	100%

- **Drug-drug interactions associated with antibiotics**

Majority of drug interactions observed during the study was between antibiotics and other non-antibiotic drugs, i.e., 49 (59.03%) and drug interactions of antibiotics with other antibiotics accounts 34 (40.96%).

Table 7: Drug-drug interactions associated with antibiotics.

Drug-drug interactions	Number	Percentage
Antibiotics interacting with other antibiotics	34	40.96%
Antibiotics interacting with other drugs	49	59.03%
Total	83	100%

- **Distribution of antibiotics prescribed by generic name and brand name**

Among 178 antibiotics prescribed, a great percentage of antibiotics 132 (74.15%) were prescribed by their generic name and rest were prescribed by their brand name 46 (25.84%).

Table 8: Distribution of antibiotics prescribed by generic Name and Brand name.

Antibiotics prescribed by	No. of antibiotics	Percentage
Brand name	46	25.84%
Generic name	132	74.15%
Total	178	100%

- **WHO core prescribing indicators**

A total of 590 drugs were prescribed with an average of 4.53 drugs per patient. The percentage of antibiotics prescribed was 30.16% with an average of 1.36 per prescription. Majority of antibiotics were targeted at respiratory tract infections. Of the 178 antibiotics prescribed, 91.01% were injectable, 74.15 % were prescribed with generic name and all of the antibiotics (100%) were prescribed from the NLEM.

Table 9: WHO core prescribing indicator.

Indicators	Percentage (n)	Standard (%)
Average number of drugs per encounter	4.53% (590)	<2
Percentage of antibiotics prescribed	30.16% (178)	20-26.8
Percentage of antibiotics with an injectable	91.01% (162)	13.4-24.1
Percentage of antibiotics with generic name	74.15% (132)	100

Percentage of antibiotics prescribed from NLEM	100% (178)	100

DISCUSSION

Pediatrics are the age group which are more prone to many acute and chronic infections. Antibiotics are the most commonly prescribed drug for such illness in these sub populations. In the current study, out of 130 pediatric patients, the total percentage of male patient was predominant (n=73, 56.15%). Males are more prone to infections than females because females have a stronger humoral and cellular immunological response to infections or antigenic stimulations.[11] In our study, majority of antibiotics received to the age group of children (1- 11 years) which accounts 57(43.84%). This was supported by the study conducted in Uttar Pradesh by Sarita J *et al*[8] who concluded that out of 147 patients enrolled, the majority of patients were children (n =109,74.14%). Most of the patients were diagnosed with LRTI (n= 49, 37. 69%) followed by Acute gastro enteritis (n= 23, 17.69%), which complied with a study conducted in Telangana by Sri PN *et al*[12] reported a greater number of patients were having LRTI (n =104, 35.25%), but it doesn't coincide with the study conducted by Dr. Shivaleela *et al*[13] in Shivamoga were majority of diagnosed diseases were acute gastro enteritis (n= 20, 20%) out of 100 pediatric patients. To assess the rationality of prescription, the average number of drugs prescribed per prescription was calculated using the WHO core prescribing indicators. The ideal WHO standard value for average drugs per encounter is less than 2. The value should be as low as possible to prevent the unfavorable outcomes of polypharmacy such as increased risk of drug interactions and cost of therapy, noncompliance and emergence of resistance.[2] The average number of drugs per prescription in this study is 4.53 which signifies the presence of polypharmacy. The obtained result is higher than the study conducted in Northern Ethiopia by Mezgebe B H*et al*[14] which was 4.0. The percentage of antibiotic prescription in our study was 30.16% which was higher than the WHO recommendation of 20% antibiotic use for these common childhood illnesses. The study reveals that majority of patients (n=83, 63.84%) were prescribed with single antibiotics and a smaller number of patients (n=1, 0.76%) were prescribed with 3 antibiotics and the average number of antibiotics per prescription in this study is 1.36.Among antibiotics, cephalosporins were found to be widely prescribed which accounts about 79 (ceftriaxone-70,39.32%, cefotaxime-9, 5.05%,) followed by penicillin which is about 49 (amoxiclav- 36, 20.22%, amoxicillin-4, 2.24%, ampicillin-6,3.37%). Our findings appeared similar with the study conducted in Maharashtra by Mathew R *et al*[9] in which cephalosporins was prescribed for majority of patients (n=224, 45%) followed by

penicillins (n=133, 27%). The higher prescription rate of cephalosporins could be attributed to its broad spectrum of activity, clinical efficacy and tolerance across all age group.[9] About 91.01% of antibiotics were administered as injection and the least preferred dosage form was syrup (2.80%). It is clear that the use of parenteral antibiotics in our study was much higher than the acceptable range of 13.4-24.1%. An excessive use of injectable may lead to higher probability of blood-borne diseases, development of complications, increased treatment cost.[9] In our study, about 49 (59.04%) interactions were found between antibiotics and other drugs and that of antibiotics with other antibiotics accounts 34(40.96%). This finding coincides with the similar findings obtained from the study conducted by Bekele F *et al*[15] in Ethiopia. The high prevalence of interaction of antibiotics with other drugs in this study reveals that polypharmacy is one of the major reasons for drug- drug interaction. WHO recommends the optimal value of 100% in prescribing antibiotics by generic name while our study presented with only 74.15%.[9] Generic prescribing has been recognized to be much simpler, minimizing dispensing errors, facilitates coordination and transparency between health care providers and clients, as well as being comparatively cheaper than branded drugs.[9] An evident finding from our study was that all of the prescribed antibiotics (100%) were from NLEM. This could be explained by the fact that, since this study was conducted in a public hospital most of their medicines were supplied by Government which predominantly supplies medicines based on the national EML.[16] Prescribing drugs from EDL is recommended by the WHO for the rational antibiotic prescription because it is less expensive than the newer drugs and have already been tested with proven clinical use.[9]

CONCLUSION

The study gives an overview of prescribing pattern of antibiotics for pediatrics in a tertiary care hospital. In this study, male were found to be predominant than female and the commonly presented age group was between 1-11 years (children). The most prevalent disease in this study was Lower respiratory tract infection and ceftriaxone was the most frequently prescribed antibiotic. The study mainly focused on the trend of antibiotic prescription pattern in pediatrics based on WHO core prescribing indicator. The assessment based on indicator reveals that the average number of drugs per encounter was high indicating polypharmacy, percentage of antibiotics prescribed was high which point outs the overuse of antibiotics and the percentage of encounters with injectable antibiotics was also high. The percentage of antibiotics with generic names did not meet the acceptable level of 100% set by WHO. As a result, precise monitoring of antimicrobial therapy is required

because these indiscriminate antibiotic use may add to the patient's burden by increasing disease related complications, hospital stays and expense of therapy. A moral discovery was made about the proportion of antibiotics prescribed from NLEM. It demonstrates that every antibiotic prescribed was from National List of Essential Medicine. Based on the findings of our study, we advise that, in order to minimize the risk of antibiotic resistance in pediatric patients, prescriber should restrict empirical therapy and encourage effective diagnosis based definitive therapy. In addition, we advocate that physicians adopt a standard treatment guideline for rational antibiotic prescription.

ACKNOWLEDGEMENT

We would like to thank staffs of SCS College of Pharmacy, Harapanahalli for their support and encouragement throughout the study.

Financial Support and Sponsorship

Nil

Conflict of interest

The author declares no conflict of interest.

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