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PRESCRIBING PATTERN AND APPROPRIATENESS OF ANTIBIOTICS AMONG PEDIATRIC PATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Inappropriate antibiotic prescription among paediatrics leads to increased costs, wasting of resources and also exposure to adverse drug events. Promoting appropriateness and evaluation of prescribing patterns improves rational drug use and decreases errors. Aims & Objectives: To study the prescribing pattern and appropriateness of antibiotics among paediatric patients in a tertiary care hospital. And also assess the essentiality status of medicines prescribed. Methodology: A prospective observational drug utilization study was conducted in Pediatric IPD & OPD at Karuna Medical College, Vilayodi, Chittur for a period of 6 months. The study is based on data collected from 150 patients visited the pediatric department. Results: In a total of 150 patients males (61%) were higher than females (39%). Most patients belonged to the age group of 1-12 years (53.3%). The most common antibiotic prescribed belonged to the class of Cephalosporins (47.2%) followed by beta lactams (26.7%) The most commonly prescribed antibiotic was found to be Amoxicillin-clavulanic acid (24.4%) followed by ceftriaxone (21%). The average number of antibiotics prescribed is 1.46±0.74. Out of the 150 prescriptions analysed 73(49%) were found to be appropriate while 77(51%) were found to be inappropriate. Of the total 611 drugs prescribed, 428 (70%) medicines were listed according to the essential medicine list of children, and 183 (29.9%) were found to be non-essntial. Conclusion: Inappropriate antibiotic therapy was prevalent in the study. Emphasis on proper diagnosis and treatment guidelines may help rational drug use and improve the prescribing trends while following essentiality status.

Key words Antibiotics, Prescribing pattern, Pediatrics, Appropriateness, Essentiality

INTRODUCTION

Drug use in children has not been extensively researched as in adults. Thus drug utilization patterns are useful as paediatrics physiology is different when compared to that of adults. Drug utilization patterns mainly focus on factors related to prescribing, dispensing, administering and taking of medication and its associated events.(1) Prescribing unnecessary drugs to children has many pitfalls including increased consultation rate wasting of resources and exposing patients to adverse drug events.(2) Antimicrobial agents are commonly used to treat bacterial and viral infections. Inappropriate use of antibiotics for non-bacterial infections and for self-limiting clinical conditions is a major concern.(3) Therapeutic guidelines have been issued by the WHO and Indian Academy of Paediatrics (IAP) which aims at reducing the inappropriate use of antibiotic.(4) Promoting safe and judicious use of drugs in children is fundamental. Regular audit by trained pharmacists will help toward standardizing paediatric therapeutic interventions and thus promote drug safety.(5)

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Thus this study was done to analyse the antibiotic drug utilization and it's appropriateness.

METHODOLOGY

The study was a prospective observational study and conducted in Karuna Medical College Hospital, Chittur, Palakkad. A total of 150 cases were taken from inpatients and outpatients attending the Pediatric Department for a duration of 6 months (February 2021 to July 2021). The study included:

- Patients below 12 years of age.
- Patients who have been prescribed with atleast one antibiotic.
- Guardians willing and able to give informed consent for participation in the trial.

The visits were done at the OP & IP of the Department of Pediatrics of the hospital. Patients were selected based on the inclusion and exclusion criteria. Signed informed consent was obtained from all participants prior to the study. Patient data were collected in pre-designed data collection form. The data include demographics, patient disease history and prescribed medications. The study was approved by Institutional ethical committee of Karuna Medical College Hospital.

The prescribing pattern was analysed. Modified Kunin's criteria and the guidelines of the Indian Academy of Paediatrics, India (IAP) was used to assess the appropriateness of drugs prescribed.[6] The cases was categorized as per the following criteria:

1. Agree with the use of antimicrobial therapy; the protocol (choice, route, duration, and dosage) is appropriate.
2. Agree with the use of antimicrobial therapy; the protocol (choice, route, duration and dosage) is probably appropriate. Usually a microbiology report is missing to classify the protocol in another category.
3. Agree with the use of antimicrobial therapy; but a different antimicrobial (less expensive, less toxic, narrower spectrum, other combination) is preferred.
4. Agree with the use of antimicrobial therapy but a modified dose, interval, duration or route of administration is preferred.
5. Disagree with the use of antimicrobial therapy, administration is un-justified.

The essentiality status of medicines or fixed dose combinations were categorized based on those mentioned in model list of Essential medicines (WHO, 2005) or National Essential Drug List (Government of India, 2002) were considered essential while others non-essential.

The data collected were subjected to descriptive statistical analysis using Microsoft Excel 2010. Results were given in numbers and percentages.

RESULTS

A total of 150 patients were enrolled in the study over a period of six months. The patients that belonged to inpatient and outpatient department was 82(54.6%) and 68(45.3%) respectively. Out of these 92(61%) were males and 58 (39%) were found to be female, clearly male patients being more than females (Table 1). Most patients belonged to the age group of 1-12 years (53.3%). Among the prescriptions analysed most patients received single antibiotics (monotherapy) (66%). The average number of antibiotics prescribed was 1.46±0.74. The percentage of encounters with antibiotics was found to be 36%.

A total of 611 drugs were prescribed which were of different formulations. The mean number of drugs prescribed was found to be 4.07±1.86. Out of the various drugs prescribed antibiotics (222) were the most commonly prescribed class of drug in pediatric population. Antibiotics constituted 36.3% of the total drug consumption during the study period.

The most common antibiotic prescribed belonged to the class of Cephalosporins (47.2%) followed by beta lactams (26.7%)

The most commonly prescribed drug was found to be Amoxicillin-clavulanic acid (24.4%), followed by ceftriaxone (21%), cefixime (12%) and cefotaxime (8.61%). The other antibiotics wer amikacin (8.1%), azithromycin (4.7%) and metronidazole (2.8%). There were a total of twenty six different antibiotics prescribed during the entire study time period.

The appropriateness of antimicrobial usage was evaluated using modified kunin's criteria and IAP guidelines of treatment of infections in paediatric patients. A total of 150 case records were analysed, among them 2(1.3%) belonged to criteria I as confirmatory lab reports were conducted to confirm the etiology. The cases falling under criteria II were 71(47.3%) because they received empirical therapy with appropriate antimicrobial age, but culture sensitivity testing was not done. The cases falling under criteria III were 52(34.6%) as they received more than one antibiotic concomitantly. The cases that fall under criteria IV were 20(13.3%) as the antibiotic therapy was modified either based on dose, route or interval. The cases falling under criteria V were 5(3.3%) as the therapy is not required or justified (Table 3).

Of the total 611 drugs prescribed, 428 (70%) medicines were listed according to the essential medicine list of children, where 183 (29.9%) were found to be non-essential as they were not listed in essential medicine list of children. Of the total 428 essential medicines, 52(98.1%) were prescribed as fixed dose combinations. Among the non-essential medicines, only one (1.89%) was found to be a fixed dose combination (Table 4).

Table 01: Gender wise distribution among study population

SL.NO	GENDER	NUMBER OF PATIENTS (n=150)	PERCENTAGE OF PATIENTS (%)
1	MALE	92	61
2	FEMALE	58	39

TABLE 02: Antimicrobials used in pediatric department

Sl No	Antibiotic Class	Number of drugs prescribed (n=201)	Percentage of drugs prescribed (%)
1.	Cephalosporin	95	47.26
2.	Beta Lactams	54	26.86
3.	Aminoglyco-sides	23	11.44
4.	Anthelmintics	13	6.46
5.	Macrolides	12	5.97
6.	Penicillins	3	1.49
7.	Antifungals	1	0.49

(excluding cephalosporins), aminoglycosides (23%), Antihelminthics (6.4%), macrolides (5.9%), Penicillins (1.4%) and Antifungals (1%) (Table 2).

TABLE 03: Classification of antibiotic appropriateness based on modified kunins criteria.

KUNIN'S CRITERIA (n=150)	n (%)
CRITERIA I – Agree with the use of antimicrobial therapy, the protocol is appropriate.	2(1.33)
CRITERIA II – Agree with the use of antimicrobial Therapy but a microbiology report is missing, to classify the protocol in another category.	71(47.33)
CRITERIA III – Agree with the use of antimicrobial therapy, but a different antimicrobial is preferred.	52(34.66)
CRITERIA IV – Agree with the use of antimicrobial therapy, but a modified dose, interval, duration or route of administration is preferred	20(13.33)
CRITERIA V – Disagree with the use of antimicrobial therapy, administration unjustfied	5(3.33)

TABLE 4: Essentiality status of medicines and fixed dose combination.

Parameter	Essential n(%)	Non-Essential n(%)	Total n(%)
Medicines	428 (70.04)	183 (29.96)	611 (100)
FDCs	52 (98.11)	1 (1.89)	53 (100)

DISCUSSIONS:

This study was mainly aimed at evaluating the appropriateness of antibiotics given in pediatric patients of both inpatient and outpatient department of a tertiary care hospital. A total of 150 patients and prescriptions were analyzed. The majority of the patients were male(61%), as was also seen in another study.[6] Most patients belonged to the age group of 1-12 years (53.3%). This may be due to the fact that these age groups are more prone to diseases and have morbidities than older children. Single antibiotic therapy (66%) is most common in our study which is similar to the study done by Badar et al. And the average number of antibiotics prescribed is 1.46±0.74, whereas it is slightly lower (1.25±0.62) in the study by Badar et al.[6] The use of antimicrobials was higher in our study that in the other study mentioned.

A total of 611 drugs were prescribed which were of different formulations. The mean number of drugs prescribed was found to be 4.07±1.86. This is similar to the studies done by Panchal et al[4] and Mirza et al[7] where the mean was found to be 4.5±3.7 and 3.72±0.07 respectively. Hence it is seen that polypharmacy is prevalent in our setup as well. Polypharmacy is associated with drug related adverse drug reactions, medication errors, clinically significant drug interactions and increased cost burden.[4]

The most common antibiotic prescribed belonged to the class of Cephalosporins (47.2%) followed by beta lactams (26.7%) (excluding cephalosporins) and aminoglycosides (23%). In a similar study by Kanish et al it was cephalosporins followed by aminoglycosides and fluroquinolones.[8]

The most commonly prescribed antibiotic was found to be Amoxicillin-clavulanic acid (24.4%) followed by ceftriaxone (21%). In similar antibiotic utilization studies by Panchal et al, cefotaxime followed by cotrimoxazole and amoxicillin-clavulanic acid was most

commonly prescribed, whereas in a study by Badar et al it was amoxicillin-clavulanic acid, amoxicillin and cefotaxime.[6]

In our study 49% of the patients received antibiotic appropriately while compared to another study it is only 12.6%.[4] Appropriate use of antibiotics is necessary to avoid adverse drug reactions and for misuse of drugs.

Successful implementation of EML in hospitals leads to higher essentiality status. Increase in the use of essential medicines makes the therapy more rational. In this study 70% of the medicines could be rated essential. In a previous study, it was found that the essentiality status was 77.6% which is slightly higher than in our study. The FDCs prescribed in our study was found to be 98.1% essential whereas it was only 39% in another study. Non-essential FDCs are responsible for irrational use of medicines. [9]

Thus our study provides a useful baseline data over drug utilization pattern of antibiotics in pediatric population.

CONCLUSION:

Our study results shows that cephalosporins are the most commonly prescribed class of antibiotic while amoxicillin-clavulanic acid is most commonly prescribed drug. The average number of antibiotics prescribed is slightly higher than the standard value. Definitive therapy and judicious use of drugs is vital to rational prescribing especially among pediatric population. Use of essential drugs must be encouraged as it offers cost effective treatment. Implementation of standard treatment guidelines and emphasis on laboratory investigation help improve appropriateness of antibiotic therapy. Pediatrics is a vulnerable population thus medication safety is a key goal and it can be achieved by appropriate antibiotic usage.

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NIL

CONFLICTS OF INTEREST

NIL

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