AN EVALUATION ON PRESCRIBING PATTERN OF ANTIBIOTICS IN PAEDIATRIC INPATIENTS AT TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: Our objective of the study was to evaluate the prescribing patterns of drugs with cost analysis in pediatric inpatients at tertiary care hospital.

Methods: It is an observational prospective study carried out in pediatric inpatients with a sample of 180 patients based on age, inclusion, and exclusion criteria for period of 3 months. The patient's data were collected using patient case record form and analysis of the data was done.

Results: Of 180 patients data were collected, the results show that majority of gender admitted in the hospital were male children 94 (52%) and many are from age group of early childhood (2–5 years) 67 (37%). Respiratory tract infections are diagnosis most commonly analyzed and off overall 236 prescribed antibiotics cephalosporins 86 (43%) and combination of amoxicillin + clavulanic acid 25 (71%) is the class of antibiotics prescribed higher than other class of drugs. Parental 173 (73%) route of administration was observed to be followed more than other route. The percentage of cost variation of antibiotics observed in the study reveals that the huge variations were seen in the cost of medication in maximum and minimum cost.

Conclusion: The present study reveals that the prescribed antibiotics were as per the diagnosis of the patient and not by proceeding proper culture sensitivity testing. Hence, awareness about antibiotic must be created among practicing physicians to increase the therapeutic compliance of the patient.

Keywords: Pediatrics, Antibiotics, Prescribing, Culture sensitivity test, Awareness.

INTRODUCTION

Antimicrobials are the most common drugs used in the treatment of various infections in the department of pediatrics [1]. Several antibiotics are prescribed unnecessarily in viral infection. Bacterial resistance is a risk for both community and individual which leads to fatal outcomes due to resistant for certain bacterial strains [2]. Inappropriate use of antibiotics results in antimicrobial resistance which leads to high risk in morbidity, mortality, and economic crisis on health care service [3]. In recent times, physicians are including antibiotics as an empirical therapy which may or may not be rational [4,5].

Several studies have shown that antibiotics are most commonly prescribed in developed and developing countries for infections which cannot be avoided [2]. Infants and children are more prone to the infection and vulnerable to harmful effects of drugs due to differences in the pharmacodynamics and pharmacokinetics; hence, the ultimate goal is to accomplish rational use and cost effective [1]. Discriminate use of antibiotics leads to adverse drug reactions, suboptimal therapy, treatment failure, and polypharmacy [6,7]. Etiopathogenesis of the diseased condition and developmental stage of the child can be considered while prescribing at particular time. To minimize these problems and to assure safety antibiotics guidelines are required in the hospital setup [4,7].

Antibiotics guidelines are standard guidelines developed based on culture sensitivity test for the treatment of infectious disease [7]. Evaluation of prescribing patterns helps in decreasing the adverse drug effect and to achieve the rational use of antibiotics. It helps to provide proper medical treatment of pediatric patients with accurate diagnosis, drug regimen, and rational use of antibiotics. Considering these case,

the study aims to obtain the prescribing patterns of the antibiotics in the department of pediatrics.

METHODS

Study design and site
This is an observational and prospective study which was carried out in 500-bedded hospital. It was performed at pediatric department inpatient wards of tertiary care hospital from the duration of 3 months (April 2019–June 2019).

Study population and sample
Patients of both genders are included in the study. 180 patients were selected based on age, inclusion, and exclusion criteria. The wards were visited all 7 days of the week and patient's data were collected in a case record form.

Study criteria
Age criteria

Categories	Age groups
Neonatal	Birth–12 months
Infant	13 months–2 years
Early childhood	2 years–5 years
Middle childhood	6 years–12 years

Inclusion criteria
The following criteria were included in the study:
- Patients of either sex aged 0–12 years
- Patients admitted or treated to the department of pediatrics
- Patients caretakers who are willing to cooperate.

Exclusion criteria

The following criteria were excluded from the study:
- Patients of either sex aged >12 years of age
- Patients who are not willing to cooperate
- Patients admitted in ICU.

Table 1: Gender of patients observed in the study (n=180)

Gender	Number of patients (%)
Male	94 (52)
Female	86 (48)
Total	180 (100)

Table 2: Age groups of patients observed in our study (n=180)

Age groups	Number of patients (%)
Birth–12 months	25 (14)
13 months–2 years	30 (17)
2 years–5 years	67 (37)
6 years–12 years	58 (32)
Total number of patients	180 (100)

Table 3: List of infections and systems affected to patients (n=43)

Types of systems and infections	Number of patients (%)
Respiratory tract infections	11 (26)
Dermatology	7 (16)
Gastrointestinal infections	4 (9)
Urinary tract infections	1 (2)
Central nervous system	8 (19)
Ear, nose, and throat	3 (7)
Cardiology	2 (5)
Hormonal disorders	4 (9)
Others	3 (7)

Table 4: Pharmacological classification of antibiotics prescribed to pediatrics (n=201)

List of class of antibiotics	Number of patients (%)
Macrolides	27 (13)
Fluoroquinolones	14 (7)
Nitroimidazoles	13 (6)
Penicillins	18 (9)
Cephalosporins	86 (43)
Sulphonamides	1 (1)
Anthranilic acid	9 (4)
Aminoglycosides	23 (11)
Carboxylic acid	4 (2)
Glycopeptides	5 (3)
Lincomycin	1 (1)

Study materials

Patient data collection form

Data were collected using a self-designed data collection form, which consists of details such as 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 (ROA).

Data analysis

The prescriptions were analyzed for the numbers of antibiotics were prescribed, their dosage forms, frequency of the treatment, duration of the treatment was analyzed, and descriptive analysis is done. These data were analyzed using Microsoft Excel in the form of master sheet.

Patient consent

A self-designed patient consent form was used. Consent form prepared in both English and Tamil and consent was taken from patient guardian.

RESULTS

Gender of the patients

Of 180 patients, data were collected and the result shows that 94 (52%) patients were male children and 86 (48%) patients were female children. The numbers of male children were higher when compared to female children by 4%.

Age of the patients

Of 180 patients data in the study from inpatient pediatrics department, the majority of the patients of early childhood 67 (37%) belonged to age group of 2–5 years and the least patients were from neonates 25 (14%) belonged to age group of birth – 12 months.

List of infections and systems affected to the patients

Of overall 180 patients enlisted in the data, of 43 diagnosis, it was observed that respiratory tract infections in 11 (26%), followed by central nervous system 8 (19%), dermatological infections in 7 (16%), gastrointestinal and hormonal disorders 4 (9%), ear, nose, and throat and others 3 (7%), cardiology 2 (5%), and urinary tract infections 1 (2%).

List of classes of antibiotics prescribed to patients

Of overall 180 patients enlisted in the data, it was observed that the class cephalosporins 86 (43%) were prescribed higher than other classes of antibiotics, followed by macrolides 27 (13%), aminoglycosides 23 (11%), penicillins 18 (9%), fluoroquinolones 14 (7%), nitroimidazoles 13 (6%), anthranilic acid 9 (4%), glycopeptides 5 (3%), sulphonamides, and lincomycin 1 (1%).

Combination of antibiotics prescribed in pediatric wards

Of overall 180 patients enlisted in the data, it was observed that the combination of amoxicillin + clavulanic acid 25 (71%) was prescribed more compared to other combinations, followed by cefadroxil + clavulanic acid 3 (8%), paracetamol + mefenamic acid 2 (6%), and other combinations 1 (3%) were the least prescribed.

Table 5: Antibiotic combinations prescribed in pediatric wards (n=35)

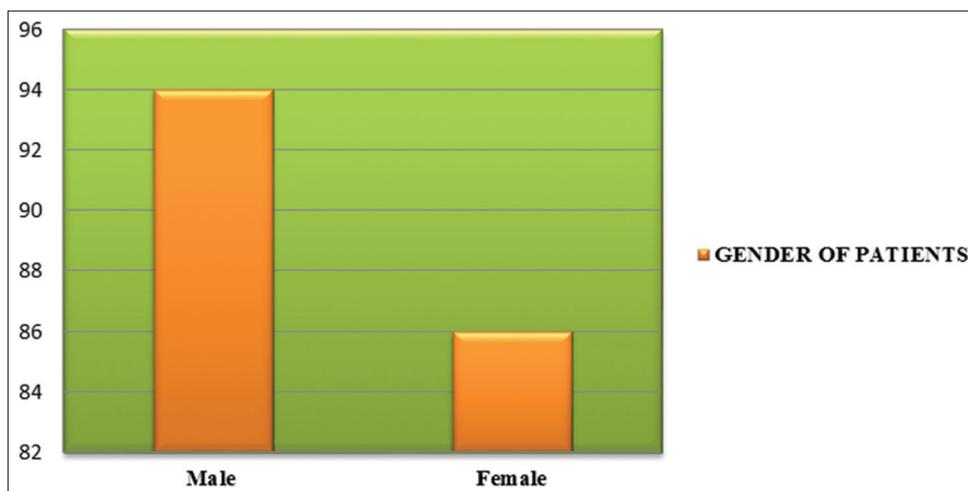| Combination of antibiotics	Class of antibiotics	Number of patients (%)
Amoxicillin+clavulanic acid	Penicillin+beta lactamase inhibitor	25 (71)
Cefadroxil+clavulanic acid	Cephalosporin+beta lactamase inhibitor	3 (8)
Bacitracin+neomycin+polymyxin B	Bacitracin+aminoglycoside+polymyxin B	1 (3)
Paracetamol+mefenamic acid	Antipyretic+anthranilic acid	2 (6)
Ofloxacin+cefixime	Fluoroquinolones+cephalosporins	1 (3)
Cefpodoxime+clavulanic acid	Cephalosporins+beta lactamase inhibitor	1 (3)
Cefixime+linezolid	Cephalosporin+oxazolidione	1 (3)
Piperacillin+tazobactam	Penicillin+beta lactamase inhibitor	1 (3)

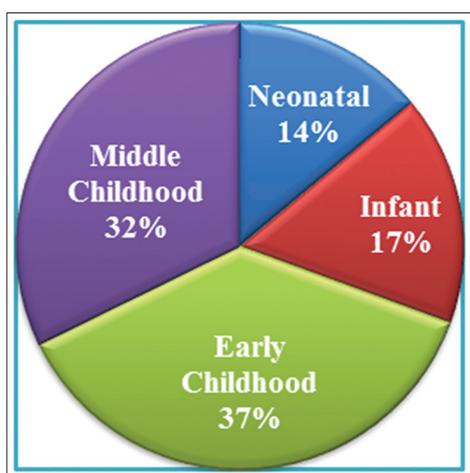Fig. 1: Represents gender groups of patients

Fig. 2: Represents age groups of patients

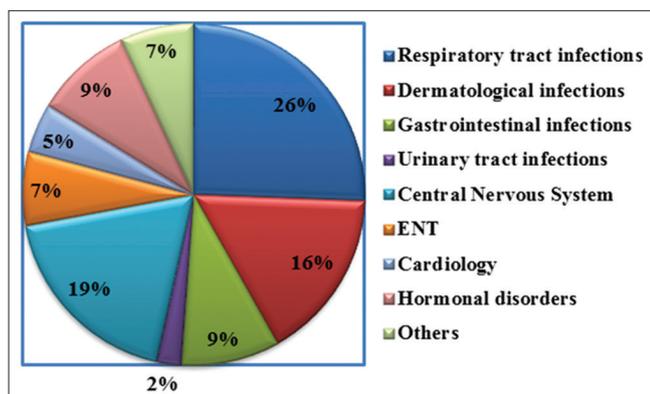Fig. 4: Total number of antibiotics prescribed per patient

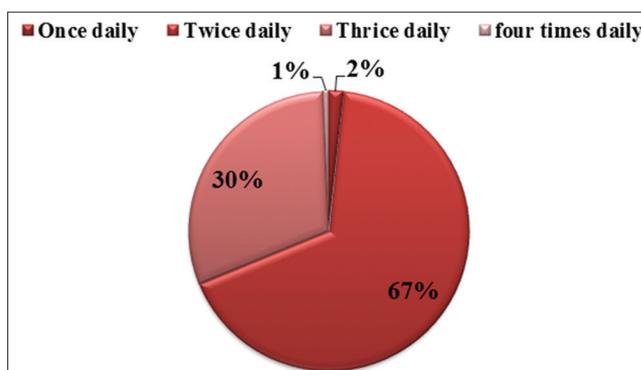Fig. 3: The list of infections and systems affected to patients

Fig. 5: Frequency of antibiotics prescribed per patients

Total number of antibiotics prescribed per patient
Of 180 prescriptions, the study reveals that the maximum number of prescriptions contains single antibiotics 135 (74%) followed by multiple antibiotics prescribed per prescription.

Frequency of antibiotics prescribed per antibiotics
Of overall 236 antibiotic medications, 180 prescription study shows that twice daily 121 (67%) are the most prescribed frequency of medications, followed by thrice daily 55 (30%), once daily 3 (2%), and least frequency prescribed was 4 times daily 1 (1%) which was found in single prescription.

ROA of drugs observed in the study
Of 236 drugs prescribed, the observation shows that most of the drugs administered through parental route 173 (73%) both intravenous route and intradermal route followed by oral route 29 (12%) and topical route 4 (2%).

Cost variation of antibiotics observed in the study
The percentage of cost variation of antibiotics observed in the study reveals that the huge variations were seen in the cost of medication in maximum and minimum cost. Here from the average of cost, the maximum prices were seen within the cost of 0–100: 78 (33%), followed

by 600–700: 68 (29%), 100–200: 30 (13%), 700-800: 25 (11%), and least average 1 (0.4%) shows the cost more than 1000.

DISCUSSION

The analysis reveals that the gender domination in our study was males (Table 1 and Fig. 1), which could be a common gender distribution showed in the majority of the studies and some study findings show similar results [8]. Most of the pediatrics were belongs to age distribution of 2–5 years (37%) (Table 2 and Fig. 2); hence, these age group patients could be more susceptible for infections. Irrational use of antibiotics could result in poor therapeutic compliance of the patient. In present study, percentage of more than two antibiotics prescribed is more and this indicates late diagnosis or selection of inappropriate antibiotic could be given without performed culture sensitivity testing. The majority of the antibiotic prescriptions were based on diagnosis (Table 3 and Fig. 3) of the patient, not on culture sensitivity test. Antibiotics

Table 6: Total number of antibiotics prescribed per patient (n=180)

Number of antibiotics	Number of prescriptions (%)
1	135 (74)
2	36 (20)
3	6 (3)
4	2 (2)
5	1 (1)
Total	180 (100)

Table 7: Frequency of antibiotics prescribed to patients (n=180)

Frequency	Number of patients (%)
Once daily	3 (2)
Twice daily	121 (67)
Thrice daily	55 (30)
Four times daily	11)
Total	180 (100)

Table 8: ROA (n=236)

ROA	Number of drugs (%)
Intravenous route	117 (50)
Oral route	29 (12)
Intradermal route	86 (36)
Topical route	4 (2)
Total	236 (100)

ROA: Route of administration

Table 9: Cost analysis of antibiotics observed in the study (n=236)

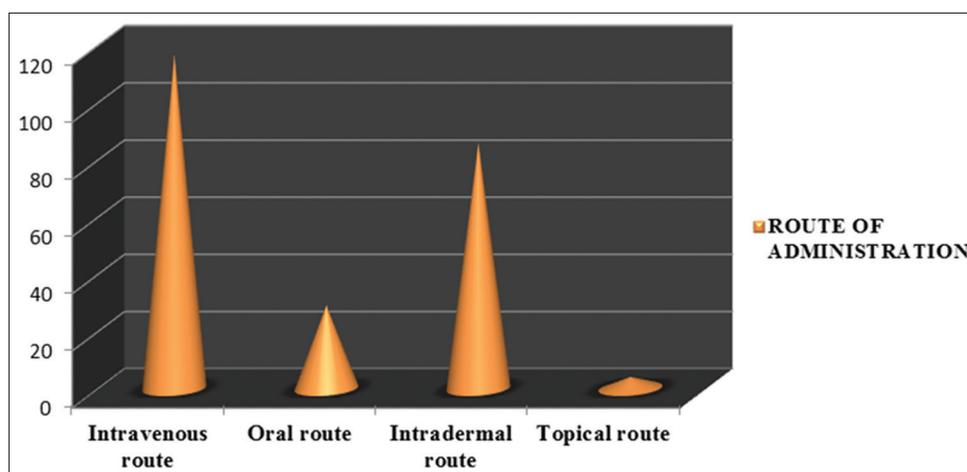| Cost	Number of antibiotics (%)
0–100	78 (33)
100–200	30 (13)
200–300	8 (3.3)
300–400	9 (3.8)
400–500	5 (2.1)
500–600	6 (2.5)
600–700	68 (29)
700–800	25 (11)
800–900	2 (0.8)
900–1000	3 (1.2)
1000–1100	1 (0.4)
1100–1200	1 (0.4)

Fig. 6: The route of administration of drugs observed in the study
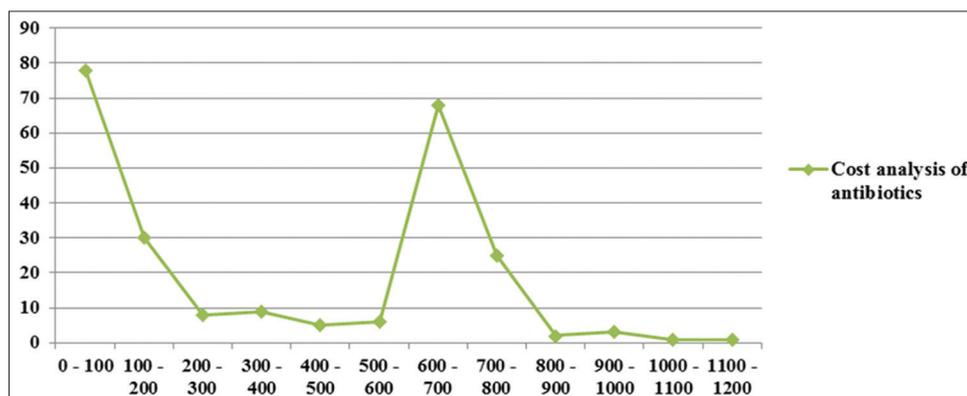

Fig. 7: The sketch line of cost variation observed in the study

should be prescribed with proper examination. This helps to prevent antibiotic resistance, decreases the side effects/adverse effects of drugs and also reduces the cost of treatment to the patients [9-11]. Amoxicillin-clavulanic acid combinations (Table 5) were most commonly prescribed antibiotics, which could be easily available for the infectious conditions. Gupta *et al.* and Resi *et al.* study also reveal a similar result. Cephalosporins were most commonly prescribed medications (Table 4) in pediatrics for conditions such as respiratory tract infections and gastrointestinal infections [12,13]. Rad and Alekhya and de Bie *et al.* also show a similar result in his study [14,15]. The study shows that the maximum number of antibiotics prescribed was one followed by two and more than two (Table 6 and Fig. 4); the relavent result shows in Choudhury and Bezbaruah study [1]. Maximum frequency prescribed was twice a day (Table 7 and Fig. 5). Laya Vahdati Rad study also shows similar result [14]. In present study, 50% of antibiotics were administered by parenteral route (Table 8 and Fig. 6). As per WHO recommends lesser use of injection helps to decrease cost of the treatments which could be more helpful for patient from low socio economic background. Syrups are preferred instead of tablets or capsules for oral dosage regimens [16]. Costs of prescriptions were economic which indicated the irrational cost of antibiotics. About 29% of patients were prescribed at cost of Rs. 600–700 followed by 700–800. However, majority of the patients were prescribed below Rs. 100 (Table 9 and Fig. 7). Hence, prescribing pattern by keeping the number of medicines as low as possible, prescribing medicines by generic names, and using medicines appropriately after selecting will keep the cost of treatment as low as possible [17-20].

CONCLUSION

The present study reveals that the prescribed antibiotics were as per the diagnosis of the patient and not by proceeding proper culture sensitivity testing. Hence, this could also lead to development of antibiotic resistance in the patients. Following strict guidelines on antibiotics help to reduce the development of antibiotic resistance in children. The awareness about antibiotic must be created among practicing physicians to increase the therapeutic compliance of the patient. Physicians are advised to use generic names for prescribing drugs especially in pediatrics at private hospitals because to reduce the cost of therapy and to increase benefits of therapy.

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AUTHORSHIP CONTRIBUTION

All the authors in the study have contributed their equal parts and comply with the journal authorship policy. Sabishruthi designed and framed the study; Kavitha and Jagan analyzed and interpreted the data and revised the article while Priyanka and Arshath participated in data collection and revision of article.

COMPLIANCE WITH ETHICAL STANDARDS

Written informed consent was obtained from the patient for publication. Copies of written consent may be requested for review from the corresponding author.

CONFLICTS OF INTEREST

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

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