A study on prescribing pattern of antibiotics in paediatric outpatient department at a multispeciality hospital nellore

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ABSTRACT

In our study antibiotics are prescribed to paediatric patients based on empirical therapy without performing any sensitivity tests. Collaborative (Physician, Pharmacist, Microbiologist) research can be helpful, in addition to get a clear understanding of need for microbiological tests, pharmacist intervention and physician good judgment in clinical situation. Exact identification of disease and its management gives an important aspect of patient care which is important in paediatric patients. Prescriber should minimize the empirical therapy as much as possible. To limit or reduce the antibiotic prescribing all necessary references, Standard Treatment Guidelines (STG) and antibiotic prescribing policies should be provided by the hospitals. Physician should refer to STG for minimal prescribing of antibiotics. Specific effective interventions should be developed to reduce the inappropriate antimicrobial prescription. All diabetes mellitus patient treated in the Inpatient department of General medicine and Nephrology department during March-August 2014 were monitored, collect relevant data and entered into the data sheet. Based on the inclusion and exclusion criteria of the protocol approved by the IEC, patients belonging to the age group 40-70 of both sex were selected and enrolled for the study.

Keywords: Antibiotics; prescribing pattern; paediatric; out patients.

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INTRODUCTION

Drugs play an important role in improving human health and promoting well-being [1]. The study of Prescribing Pattern is a component of medical audit which seeks monitoring, evaluation and necessary

modification in the prescribing practices of the prescribers to achieve rational and cost effective medical care [2]. Drug use in paediatrics is a controversial and emotionally charged area because of medico-legal and ethical implications.

Paediatrics is the branch of medicines dealing with the development, diseases and disorders of children [3]. Infancy and childhood is a period of rapid growth and development. Compared to adult medicine, drug use in pediatrics is not extensively researched and the range of licensed drugs in appropriate dosage form is limited.

Drug therapy is considered to be major component of paediatric management in health care setting like hospital. Effective medical treatment of a pediatric patient is based upon an accurate diagnosis and optimum course of therapy, which usually involves a medication regimen. Infants and children are among the most vulnerable population groups to contract illnesses. The use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of paediatric illnesses [4,5].

The key role of antibiotics for the treatment of infectious diseases that are prevalent everywhere in developing countries may not be denied. However,

there are also reports of an irrational use of antibiotics [6,7] which may even lead to infections that are worse than the originally diagnosed ones. The pediatricians and other medical personnel who provide health care for infants and children in developing countries confront a number of challenges during the day to day practice of medicine due to the shortage of appropriate drugs and other facilities. The rising incidence of bacterial resistance to common antibiotics, particularly, multi- drug resistant pneumococci, has prompted the need to use antibiotics judiciously in paediatric practice.

Many of the antibiotics are unnecessarily prescribed for viral infections such as common cold. In a Kentucky study, 60 percent of patients were prescribed antibiotics for the common cold [8]. In a Canadian study from Saskatchewan, 85% of antibiotics prescribed for respiratory tract infection in children less than 5 years of age were considered inappropriate [9,10].

Appropriate drug utilization studies have been found to be crucial to evaluate whether drugs are properly used and utilized in terms of medical, social and economic aspects [11,12]. Several professional societies have issued guidelines designed to reduce the use of antibiotics world- wide by means of various control strategies [13,14]. Detailed knowledge of antibiotic prescription pattern is important before the policies and measures can be implemented.

Medicine use is rational (appropriate, proper, correct) when patients receive the appropriate medicines, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost both to them and the community [15].

Irrational (inappropriate, improper, incorrect) use of medicines is when one or more of these conditions are not met. Worldwide, it is estimated that over half of all medicines are prescribed, dispensed or sold Inappropriately [16]. Prescribing practices are a reflection of health professional's abilities to determinate among the various choices of drugs and determine the ones that will most benefit the patients [17].

The study of prescribing pattern is a part of the medical audit and seeks to monitor, evaluate and if necessary, suggest modification in prescribing practices to make medical care rational and cost effective [18]. Appropriate drug utilization in terms of efficacy, safety, convenience and economic aspects at all levels in the chain of drug use [19].

Epidemiological evaluation of medicine use in the elderly is now a highly visible topic, but drug utilization studies in pediatric population have been limited. The assessment of medicine utilization is important for clinical, educational and economic purpose [20]. Infants and children represent a large part of the population in developing countries [21]. Pediatric population is prone to suffer from recurrent infections of the respiratory tract and gastrointestinal system.

Lower respiratory tract infections are the leading cause of death in children below 5 five years of age [22]. Acute respiratory infection, acute watery diarrhoea and viral fever are the common childhood illnesses accounting for the major proportion of pediatric visits.

Antibiotic resistance, which is a threat to public health, is rapidly increasing globally. Use of antibiotics, including irrational and unnecessary antibiotic treatment, contributes to the development of antibiotic resistance [23,24]. Infectious diseases are common among pediatric patients in India and contribute to the total mortality rate, which is the highest in the world [25].

Pneumonia and diarrhoeal diseases account for 50% of total 1.34 million deaths among Indian children between 1 month to 5 years of age. Appropriate use of antibiotics is vital in reducing the mortality caused by bacterial infections. However, antibiotics are often prescribed inappropriately for un-indicated conditions. Studies from India have shown antibiotics as one of the most commonly prescribed drug classes in pediatric patients [26,27].

Despite the fact that high proportions of acute respiratory tract infections and diarrhoea in pediatric patients are caused by viruses and should not be treated with antibiotics; patients with diarrhoea were prescribed antibiotics in India [28,29]. The World Health Organisation (WHO) advises implementing national lists of essential medicines with assured quality for rational use of medicines. In order to avoid unnecessary antibiotic prescribing and development of antibiotic resistance, pediatric healthcare facilities in India are advised to follow the Indian Academy of Pediatrics list of essential medicines (IAP-LEM) [30].

The IAP-LEM includes 16 different antibiotics with recommended dosage and route of administration for children in India but is not a diagnosis specific guideline. Analyses of antibiotic prescription practices provide the basis for development of diagnosis specific antibiotic prescribing guidelines, which contribute to appropriate use of these life- saving medicines [31,32].

According to the WHO, it is important to document antibiotic prescribing practices among in-patients and compare it with other hospitals to identify areas for intervention for rationalizing prescribing [33,34]. Some studies from India have shown overall higher antibiotic prescribing rates at private sector health care facilities compared to public sector facilities [35].

The private sector hospitals are major health service providers in India, yet, most Indian studies of antibiotic prescribing practices among pediatric patients have been conducted among out-patients and at public health care facilities [36].

Absence of studies that links antibiotic prescribing with the indication or focus of infection at pediatric Antibiotic Prescribing to Pediatric Inpatients. AGE, Acute gastroenteritis; ATC, Anatomical therapeutic

chemical; CME, Continuing medical education; DDD, Defined daily dose; DU, Drug utilisation; ESBL, Extended spectrum β -lactamase; FDCs, Fixed dose combinations of antibiotics; IAP-LEM, Indian academy of pediatrics list of essential medicines for children in India; NICU, Neonatal intensive care unit; NTH, Non-teaching hospital; POC, Point of care; RTI37, Respiratory tract infection; TH, Teaching hospital; URTI, Upper respiratory tract infection; WHO, The World Health Organisation; WHOCC, The World Health Organisation Collaborating Centre for Drug [38].

The list of the most prescribed drugs for children and teens can help you understand the medicines your kids might be prescribed by your pediatrician. This list comes from analysis of a large prescription database over the course of eight years. Antibiotics top the list, although their use declined during the eight years of the study.

Other than the fact that there are no drops for pink eye, such as Polytrim, Vigamox, or Moxeza, this list is about what you would expect from the average pediatrician. Ideally, you would see many fewer scripts for narcotic pain relievers and more scripts for combination inhalers to help control asthma, such as Advair, Dulera, and Symbicort.

Amoxicillin

It shouldn't be surprising that the most commonly prescribed medications for children. Amoxil (amoxicillin) is very inexpensive as a generic drug and is usually well tolerated. It can treat strep throat as well as childhood pneumonia, ear infections, and sinus infections, especially when used at high-dose levels [39].

Azithromycin

Another antibiotic, Zithromax (azithromycin) is also available as a generic. It has the convenience of being just once a day for five days, three days (ear infections), or even just one dose (ear infections) [40].

Albuterol

The first drug on the list that isn't an antibiotic, albuterol is a bronchodilator that is used to relieve asthma symptoms. It is available in a form for a nebulizer and as a metered dose inhaler (ProAir HFA, Proventil HFA, Ventolin HFA, etc.). The syrup form of albuterol is very rarely used by most pediatricians.

Albuterol nebulizer solution is an inexpensive medication. Albuterol asthma inhalers are more expensive. There is a Ventolin HFA inhaler with only 60 actuations (vs 200 in most other inhalers) that is less expensive [41].

Amoxicillin/Clavulanate

Augmentin (amoxicillin/clavulanic acid) combines amoxicillin with the β -lactamase inhibitor potassium clavulanate to help it overcome resistant bacteria. It is commonly used to treat ear infections, sinus infections, pneumonia, infected bites, and oral infections.

High-dose Augmentin (Augmentin ES) is also available to help treat resistant *Streptococcus pneumoniae* infections.

Cefdinir

Omnicef (cefdinir) is a broad spectrum third-generation cephalosporin that is commonly used to treat sinus infections, ear infections, and pneumonia. Cefdinir is not usually considered to be a first-line treatment. In general, cefdinir is a little more expensive than some other antibiotics [42].

Cephalexin

Unlike many of the other antibiotics on this list, Keflex (cephalexin), has a more narrow range of action, treating strep throat, skin infections (cellulitis and impetigo), and bone and joint infections, etc. It is a first-generation cephalosporin. It is available as an inexpensive generic [43].

Fluticasone

Fluticasone is a steroid that is the main ingredient in many different medications, including Flonase nasal spray (generic), Flovent MDI, Cutivate cream and ointment (generic), and Veramyst nasal spray. Depending on the formulation, it can be used to treat kids with eczema, allergies, and/or asthma, etc. Generic fluticasone propionate nasal spray is now available over-the-counter and is one of the less expensive prescription nasal allergy medications [44].

Prednisolone Sodium Phosphate

Available in both a 25 milligram/5 milliliter and 15 milligram/5 milliliter syrup, prednisolone is a liquid steroid that is commonly used to treat flare-ups of asthma, poison ivy reactions, croup, and other corticosteroid-responsive disorders [45].

Ibuprofen

Ibuprofen is a nonsteroidal anti-inflammatory drug (NSAID) that is commonly used to treat fever, pain, and inflammation in children. Although available over-the-counter (Motrin and Advil), there are also prescription-strength formulations of ibuprofen [46].

Singulair (Montelukast Sodium)

Singulair (montelukast sodium) is a leukotriene receptor antagonist and is approved to prevent and treat asthma, prevent exercise-induced asthma, and relieve symptoms of seasonal allergic rhinitis and perennial allergic rhinitis. It is now available as a generic [47].

Trimethoprim/Sulfamethoxazole

Bactrim or Septra (trimethoprim/sulfamethoxazole) is an older antibiotic that is most commonly used to treat urinary tract infections, except when resistance might be a problem. It is also being used more often now to treat methicillin-resistant staph aureus infections (MRSA) [48].

Codeine Phosphate/Acetaminophen

This is a narcotic pain reliever with Tylenol (acetaminophen). The FDA warns that codeine should only be used when the benefits will outweigh the risks, which can include unusual sleepiness, confusion, shallow breathing, and other signs of morphine overdose.

Hydrocodone Bitartrate/Acetaminophen

This is a narcotic pain reliever with Tylenol (acetaminophen) that is more potent than codeine.

Mupirocin

Bactroban (mupirocin) is a topical antibiotic that is often prescribed to treat bacterial skin infections, such as impetigo. Although both mupirocin cream and ointment are both available as generics, mupirocin ointment is considerably less expensive than the cream [49].

Nystatin

Most parents are familiar with Nystatin, an antifungal medication that is used to treat yeast infections, including thrush and candidal diaper rashes.

Methylphenidate

Methylphenidate is the generic name for a class of stimulants that are used to treat children with ADHD, and which include Ritalin, Concerta, Daytrana, Methylin, and Metadate, etc. Prices for methylphenidate products can vary.

Dextromethorphan/Phenylephrine/Chlorpheniramine

This is a combination cough and cold medication, with a cough suppressant, decongestant, and an antihistamine. While this seems like a popular combination cold medicine, it is important to remember that experts warn against using these types of cough and cold medicines in children under age 4 to 6 years. Many also warn against using such combination medicines, instead recommending that you use cold medicines that target your child's symptoms in age-appropriate formulations. For example, don't use a combination cough and cold syrup if your child just needs a decongestant.

Mometasone

Mometasone is the active ingredient in Nasonex nasal spray, Elocon cream and ointment (generic), and the AsmanexTwisthaler.

Triamcinolone

Another steroid, triamcinolone is the active ingredient in Nasacort AQ nasal spray and triamcinolone acetonide cream and ointment. Triamcinolone acetonide cream (TAC) is one of the least-expensive medications to treat eczema flares and other skin rashes. Nasacort nasal spray is available as a generic and is now over-the-counter.

Prednisone

Prednisone is used to treat a number of corticosteroid-responsive disorders in children. It is probably most commonly used in small dosages for short periods of time to treat asthma flares, poison ivy reactions, and croup.

Sodium Fluoride

For infants and children who don't have access to fluoridated tap water, fluoride supplements can be an important way to keep their teeth healthy and prevent dental caries.

Multivitamins with Fluoride

In addition to fluoride supplements, when necessary, children can take a multivitamin with fluoride. In addition to fluoride, these usually include vitamin A, D, and C, and sometimes iron.

Amphetamine/Dextroamphetamine

Adderall and Adderall XR are the brand names for this class of stimulants that are used to treat ADHD. Generic versions of intermediate release Adderall and extended-release Adderall XR are available [50].

Hydrocortisone

Hydrocortisone is a low-potency topical steroid that is available as an ointment, cream, lotion, gel, and in other forms [51].

Budesonide

Budesonide is a steroid that is available as Pulmicort Respules (generic), Pulmicort Flexhaler, and Rhinocort nasal spray. Rhinocort nasal spray is available over-the-counter [52].

Ciprofloxacin/Dexamethasone:

Ciprodex is the brand name for this combination of an antibiotic with a steroid that is often used to treat swimmer's ear and middle ear infections in kids with a perforated eardrum or ear tubes. There is no generic version of Ciprodex, but the manufacturer does offer a Ciprodex instant rebate [53].

Promethazine

Available as suppositories, tablets, and as a syrup, Phenergan (promethazine) can be used to prevent and control nausea and vomiting. Warnings that it "may cause breathing to slow or stop, and may cause death in children," should be limiting its use now, especially as more pediatricians prescribe Zofran instead [54].

Prednisolone:

Prednisolone is a liquid steroid that is commonly used to treat flare-ups of asthma, poison ivy reactions, croup, and other corticosteroid-responsive disorders [55].

Antipyrine/Benzocaine

Also simply called A/B otic drops, these analgesic ear drops can help to relieve the pain and discomfort that can accompany an ear infection.

Unfortunately, most were not FDA approved and the FDA announced enforcement actions against manufacturers in 2015. According to the FDA, "The unapproved prescription ear drops contain active ingredients such as benzocaine and hydrocortisone and have not been evaluated by the FDA for safety, effectiveness, and quality. The labels on these products do not disclose that they lack FDA approval, and health care professionals may not be aware of their unapproved status [56]

Lisdexamfetamine

Vyvanse (lisdexamfetamine) is the brand name of this class of stimulant that is used to treat ADHD. It is not available as a generic. You can get a Vyvanse coupon [57].

METHODOLOGY

This is a prospective observational study to be performed in the department of paediatrics. The study will be conducted in paediatrics department of Multi-speciality hospital Nellore.

Inclusion criteria

1. AGE: Patients with age of below 15 years.
2. GENDER: Irrespective of gender.
3. Patients who are on antibiotic therapy.

Exclusion criteria

1. Patients of more than 15 years of age.
2. Patients with compromised immune system (HIV).
3. Prescriptions not containing antibiotics.

Sample size

Out of 500 patient profile forms, 283 forms are included in the study based on the inclusion Criteria

Source of data

Pediatric outpatient prescription data relevant to the study. A specially designed data collection form was used to enter the patient details like patient name, age, gender, body weight, reason for admission, chief complaints, diagnosis, vitals like temperature, pulse rate and blood pressure, prescribed drugs (drug name, dose, dosage form, frequency, route of administration).

Study materials

Baseline clinical and demographic characteristics can be obtained from all types of headache patients.

1. Patient informed consent form
2. Patient data collection proforma

RESULTS AND DISCUSSION

Analysis of data

Result analysis

All the information recorded in the patient profile form were analyzed for various parameters like age, gender, body weight, antibiotic used, disease diagnosed and combination therapy.

Statistical analysis

The data is analyzed by using suitable statistical methods. Necessary statistical figures were shown using bar diagrams, pie chart and other necessary tools.

We conducted a prospective observational study on prescribing pattern of antibiotics in paediatric outpatient department patients at a multispeciality hospital, Nellore. We observed Out of 500 patient profile forms, 283 forms are included in the study based on the inclusion Criteria are as follows:

1. Based on age wise distribution.
2. Based on gender wise distribution.
3. Based on disease diagnosed.
4. Based on antibiotics prescribed .
5. Based on class of antibiotics.
6. Based on number of drugs per prescription.
7. Based on antibiotics combination .
8. Based on route of administration.
9. Based on drug interactions.

Based on age distribution

Among 283 patients the highest number of patients were in age group 1-3 years i.e., 68 (24.03 and lowest number were in age group 13-15 i.e., (2.47). The average age group of pediatric patients is 2.72.

Figure 1: Based on age distribution

Based on gender distribution

Out of 283 paediatric patients receiving antibiotics, 151 patients were male and 132 were female. The

percentage of male and female patients was 53.36% and 46.64% respectively.

Figure 2: Based on gender distribution

Based on disease diagnosed

The most prevalent disease among studied patients was upper respiratory tract infection i.e. 88 (31.09%) followed by fever i.e. 35 (12.37%) and cough, cold i.e. 25 (8.84%) being in third position.

Figure 3: Based on disease diagnosed

Based on antibiotics prescribed

In our study conducted on paediatric patients the commonly prescribed antibiotics are amoxicillin – clavulanic acid i.e. 138 (42.60%) followed by Ceftriaxone i.e. 64 (19.75). Higher prescription rate of beta-lactam antibiotic may be attributed to its broad spectrum of activity and tolerance across all age group [7].

Figure 4: Based on antibiotics prescribed

Based on class of antibiotics

Beta lactum classes of antibiotics are prescribed more frequently (Penicillins- 167 (51.54 %) followed

by cephalosporins- 110 (33.95%). Cephalosporin is the class of antibiotics prescribed more for fever followed by Upper Respiratory Tract Infections (URTI) then Lower Respiratory Tract Infection (LRTI).

Figure 5: Based on class of antibiotics

For URTI patient's one drug is prescribed for 78 patients (88.63%), two drugs for 8 patients (9.10%) and three drugs for 2 patients (2.27%). For patients with fever, one drug is prescribed for 24 patients (68.57%) 2 drugs for 11 patients (31.43%).

Based on antibiotic combinations

In our study among all the combination of drugs [39] the frequently used combination of drugs are Cefixime and Amikacin 12, (30.7%). More frequently used category of drugs in combination is β -lactam antibiotics as it covers both gram positive and gram negative bacteria.

Combination of such same category medication have the identical impact, as increasing the effective concentrations of either alone and is therefore of little interest. The term additive is employed /applied to such combinations. Combinations should be reserved for specific issues, during which they are capable of achieving results unobtainable by single drug.

Out of 39 combination of antibiotics used, maximum number of combination of antibiotics are used for Upper respiratory tract infections (URTI) [8], followed by fever.

Based on route of administration

Compliance in children is influenced by the formulation, taste, appearance and ease (route) of administration of a preparation [15]. The site of infection and bioavailability of the antimicrobial agent is a very important determinant in selecting the route of administration. Out of all antibiotics prescribed for pediatric patients, 173 (53.39%) antibiotics are prescribed in oral route, because of it's convince for children and aim to stick drug regimen to improve health condition.

In the study 283 patients are prescribed with a total of 324 antibiotics. Out of all the antibiotics administered, 31 drug-drug interactions of 6 combinations

Table 1: Based on age wise distribution

Age (years)	Male		Female		Total	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
0-1	38	25.17	20	15.15	58	20.50
1-3	28	18.54	40	30.30	68	24.03
3-5	31	20.53	31	23.49	62	21.90
5-7	17	11.25	07	5.30	24	8.48
7-9	18	11.92	14	10.62	32	11.31
9-11	10	6.62	11	8.33	21	7.42
11-13	04	2.65	07	5.30	11	3.89
13-15	05	3.32	02	1.51	7	2.47

Table 2: Based on gender distribution

Gender	No. of patients (n=283)	Percentage (%)
Male	151	53.86%
Female	132	46.64%

Table 3: socioeconomic status of patients

Name of antibiotic	Frequency	Percentage (%)
Amoxicillin + Clavulanic acid	138	42.60
Ceftriazone	64	19.75
Cefixime	44	13.58
Amikacin	16	4.94
Gentamycin	9	2.78
Tobramycin	8	2.47
Sulfamethaxazole + Trimethoprim	7	2.16
Ofloxacin	7	2.16
Amoxicillin	7	2.16
Mupirocin	7	2.16
Ampicillin	6	1.85
Soframycin	4	1.23
Azithromycin	3	0.93
Cefotaxime	2	0.61
Framycetin	1	0.31
Neomycin	1	0.31

Table 4: Based on number of drugs per prescription

Number of drugs	Frequency	Percentage (%)
One drug	244	86.22
Two drugs	36	12.72
Three drugs	3	1.06

Table 5: Based on antibiotic combinations

Antibiotic combination	Frequency	Percentage (%)
Ceftriaxone + amikacin	12	30.79
Ampicillin + gentamycin	6	15.39
Amoxicillin + clavulanic acid + ceftriazone	3	7.70
Cefixime + amikacin	3	7.70
Amoxicillin+ clavulanic acid + mupirocin	3	7.70
Ceftriaxone + ofloxacin	1	2.56
Amoxicillin+ clavulanic acid + cefixime + Amikacin	1	2.56
Cefotaxime + ceftriaxone	1	2.56
Amoxicillin + clavulanic acid + ceftriaxone + Amikacin	1	2.56
Amoxicillin+ clavulanic acid + tobramycin	1	2.56
Cefixime+ mupirocin	1	2.56
Amoxicillin+ clavulanic acid + cefixime	1	2.56
Amoxicillin+ clavulanic acid + framycetin	1	2.56
Amoxicillin+ clavulanic acid + soframycin	1	2.56
Amoxicillin+ clavulanic acid + gentamycin	1	2.56
Cefixime+soframycin	1	2.56
Amoxicillin+ clavulanic acid +cefixime + Gentamycin	1	2.56

Table 6: Based on route of administration

Route of administration	Frequency	Percentage (%)
Oral	149	53%
Intravenous	114	40%
Topical	8	3%
Eye	6	2%
Nasal	3	1%
Ear	3	1%

Table 7: Based on drug interaction

Drug combination	Type of interaction	Frequency	Potential interaction
Ceftriaxone+ amikacin	Minor	13	Increases kidney damage
Ceftriaxone+ cefotaxime	Minor	1	Cefotaxime levels increases
Cefixime+ amikacin	Moderate	4	Increases kidney damage
Ceftriaxone+ amoxicillin-clavulanic acid	Moderate	4	Ceftriaxone increases amoxicillin-clavulanic acid levels
Ampicillin+ gentamycin	Moderate	6	Gentamycin activity decreases
Cefixime+ amoxicillin-clavulanic acid	Minor	3	Increases kidney damage

were found. Out of 6 combinations of drug interactions, three drug interactions are moderate and three drug interactions are minor.

DISCUSSION

The consideration of uncertainty of headache patients and the various classes of drugs to be used in the treatment by the physicians has to weigh the pros and cons of each and every drug before using.

The drug utilization study is been conducted widely and it is being carried out in different health care setups. Such studies are helpful to determine the behavior of the use of medicines in a society. A survey based on prescription is considered to be one of the most effective methods to determine the prescribing approach of physicians.

A prescription by a physician denotes his or her attitude towards the disease and medication. The various prescribing parameters and description of categories of drugs in the prescription analyzed in this study provided an insight into the prescription pattern in our hospital center.

The present study was conducted to find out prescribing patterns of drugs used in chronic headache in a multispecialty hospital Nellore.

Among 283 patients the highest number of patients were in age group 1-3years i.e., 68 (24.03) and lowest number were in age group 13-15 i.e., (2.47). The average age group of pediatric patients is 2.72.

Most of the hospitalized paediatric patients belonged to age group of 1-3yrs. This is the indicative of condition of 1-3yrs towards numerous infective diseases. This can be terribly natural because during this age, the children's immune power is going to be less and are highly susceptible for infections [64].

Out of 283 paediatric patients receiving antibiotics, 151 patients were male and 132 were female. The percentage of male and female patients was 53.36%

and 46.64% respectively. Males are more prone for infections than females because females have stronger humoral and cellular immunological response to infection or antigenic stimulation [65]. There is a positive correlation between male and female pediatric patients.

The most prevalent disease among studied patients was upper respiratory tract infection i.e. 88 (31.09%) followed by fever i.e. 35 (12.37%) and cough, cold i.e. 25 (8.84%) being in third position. The authors expressed that upper respiratory tract infections are (square measure) the most leading diseases in children through there are straight forward, safe, effective and cheap interventions to reduce the risk [66].

In our study conducted on paediatric patients the commonly prescribed antibiotics are amoxicillin – clavulanic acid i.e. 138 (42.60%) followed by Ceftriaxone i.e. 64 (19.75). Higher prescription rate of beta-lactam antibiotic may be attributed to its broad spectrum of activity and tolerance across all age group [75].

Beta lactum classes of antibiotics are prescribed more frequently (Penicillins- 167 (51.54 %) followed by cephalosporins- 110 (33.95%). Cephalosporin is the class of antibiotics prescribed more for fever followed by Upper Respiratory Tract Infections (URTI) then Lower Respiratory Tract Infection (LRTI).

A number of Canadian and US studies have advised that the prescription of antibiotics is influenced by medical practitioner characteristics such as location of medical training, specialty, years in practice, hospital affiliation and sort of practice [76].

Only bacterial and fungal infections are treated with antibiotics. Antibiotics have no impact on viruses. Several infections such as cold and some stomach upsets causing inflicting looseness of bowels by viruses will be destroyed by the body's own defense mechanism [67].

Higher prescription rate of cephalosporin can be attributed to its broad spectrum of activity and tolerance across all age group [68,69]. Fluroquinolones were used least because of their toxic effects in children below 14 years old [70].

For URTI patient's one drug is prescribed for 78 patients (88.63%), two drugs for 8 patients (9.10%) and three drugs for 2 patients (2.27%). For patients with fever, one drug is prescribed for 24 patients (68.57%) 2 drugs for 11 patients (31.43%).

There is no significant difference between the drugs prescribed. But, there is a significant difference between three drugs with respect to reaction time.

Average number of antibiotics per prescription in our study was 1.10. Average number of drugs is an indication for assessing rationality of prescription.

The united nations agency recommends that the average number of drugs per prescription worth ought to be less than 2. The average variety of medication per prescription value should be as low as attainable to prevent the unfavourable outcomes of poly pharmacy corresponding to increased risk of drug interactions, increased value of medical care, non-compliance and emergence of resistance in case of use of anti-microbials [77].

In our study among all the combination of drugs [39] the frequently used combination of drugs are Cefixime and Amikacin 12, (30.7%). More frequently used category of drugs in combination is β -lactam antibiotics as it covers both gram positive and gram negative bacteria.

Combination of such same category medication have the identical impact, as increasing the effective concentrations of either alone and is therefore of little interest. The term additive is employed /applied to such combinations. Combinations should be reserved for specific issues, during which they are capable of achieving results unobtainable by single drug [61].

Out of 39 combination of antibiotics used, maximum number of combination of antibiotics are used for Upper respiratory tract infections (URTI) [8], followed by fever [6].

Compliance in children is influenced by the formulation, taste, appearance and ease (route) of administration of a preparation [71]. The site of infection and bioavailability of the antimicrobial agent is a very important determinant in selecting the route of administration. Out of all antibiotics prescribed for pediatric patients, 173 (53.39%) antibiotics are prescribed in oral route, because of it's convince for children and aim to stick drug regimen to improve health condition.

Whether the route of administration ought to be oral or parental it's going to rely on whether the patient is in a position to require oral treatment dependably.

The use of non-oral routes of administration could also be hampered by troublesome application, local irritation, fluid overload, electrolyte imbalance or poor drug acceptability. In neonates intravenous administration could cause volume overload. Moreover, measuring small dose volumes may cause massive dose variations and errors [72].

In oral dosage forms the most ordinarily used dosage form was syrup. Children are comfortable with dosage form like syrup and drops compared to tablets and capsules. It will increase compliance and helps in completing the treatment regimen [73,78].

Pediatric patients need special attention from health professionals in terms of drug interactions as they react to medication differently and the body parts that are liable for the excretion and elimination method are not totally developed until one year of age, leading to extended half life of metabolized medicine and reduced excretion, which may result in toxicity issues [74].

More frequent drug interactions were those of the second significance rating, delayed onset, moderate severity and established documentation. Whereas three cases of drug interactions were of the second significance and the opposite three cases of interactions were of the third significance.

CONCLUSION

The aim of the study was to carry out drug utilization study in an outpatient setting in paediatric population. The study concluded that, antibiotics are mostly prescribed for pediatrics. In our study antibiotics are prescribed to paediatric patients based on empirical therapy without performing any sensitivity tests. Collaborative (Physician, Pharmacist, Microbiologist) research can be helpful, in addition to get a clear understanding of need for microbiological tests, pharmacist intervention and physician good judgment in clinical situation.

Exact identification of disease and its management gives an important aspect of patient care which is important in paediatric patients. Prescriber should minimize the empirical therapy as much as possible. To limit or reduce the antibiotic prescribing all necessary references, Standard Treatment Guidelines (STG) and antibiotic prescribing policies should be provided by the hospitals. Physician should refer to STG for minimal prescribing of antibiotics. Specific effective interventions should be developed to reduce the inappropriate antimicrobial prescription.

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