International Journal of Research in Hospital and Clinical Pharmacy

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

Shaik Abdul Rehman*[1], Shaik Noorudin*, B. Syed salman[3]

[1] *Department of pharmacy practice, Rao`s college of pharmacy, Nellore, Andhra Pradesh, India*
[2]*Department of Pharmaceutics, P. Rami Reddy Memorial college of pharmacy, Kadapa, Andhra Pradesh, India*

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.

ISSN: Awaiting
Research Article

Corresponding Author

Name: Mr. Shaik Abdul Rehman
Email: arpharma2016@gmail.com

Article Info

Received on: 22-10-2018
Revised on: 12-11-2018
Accepted on: 26-11-2018

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 effective18. Appropriate drug utilization it 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 βlactamase; 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 pneumononiae 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 doe 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 Multispeciality 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 othernecessary tools.

We conducted aprospective observational study on prescribing pattern of antibiotics in paediatric outpatient departmentpatients 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 1-3years 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.

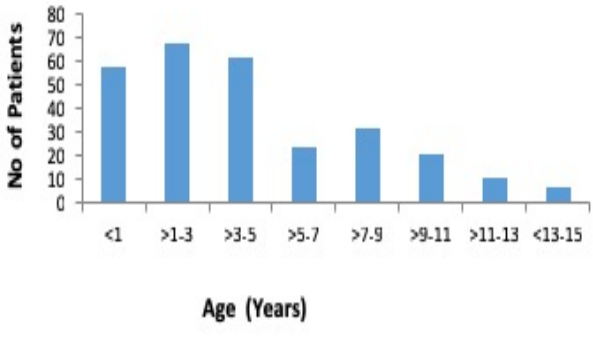

Figure 1: Based on age distribution

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.

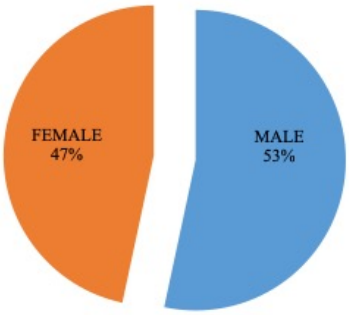

Figure 2: Based on gender distribution

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.

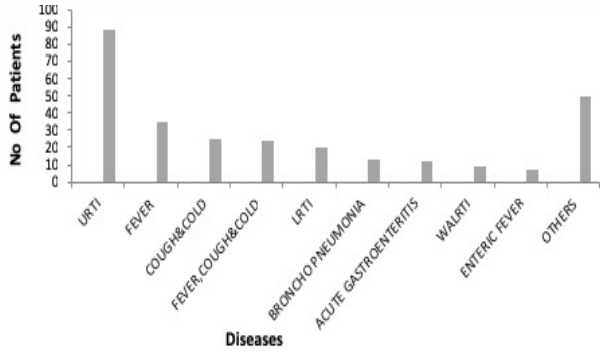

Figure 3: Based on disease diagnosed

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-lactum antibiotic may be attributed to its broad spectrum of activity and tolerance across all age group [7].

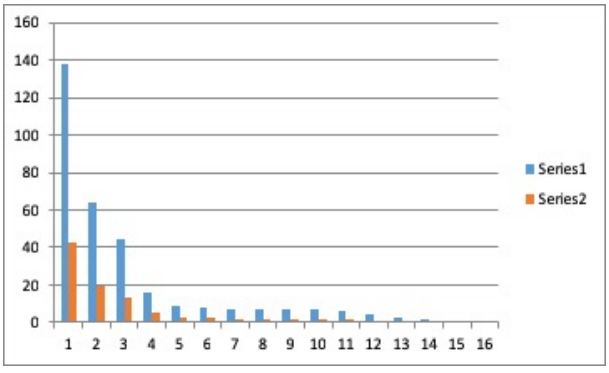

Figure 4: Based on antibiotics prescribed

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).

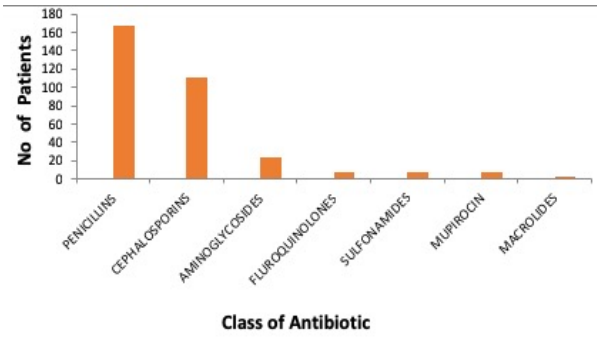

Figure 5: Based on class of antibiotics

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 altitude 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-lactum 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 increases 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.

REFERENCES

1. PunamSachdeva, B G Patel & B K Patel, "Drug Use in Pregnancy; a point to ponder!", Indian Journal of Pharmaceutical Sciences; 2009, Vol.71, No.1: Page No.: 1-7.
2. Prescribing pattern: Found on the Internet at: http://www.kumj.com.np/issue/5/35-42.pdf.

3. OP Ghai. Essential Pediatrics, fourth edition, published by interprint A-16, Naraina II, New Delhi-110 028, India.
4. Sanz EJ, Bergman U and Dahlstorm M. Paediatric drug prescribing. Eur J clinpharmacol 1989; 37:65-8. 3. Summers RS and Summers B. Drug prescribing in paediatrics. Ann Trop paediatr 1986; 6:129-33.
5. Principi N et al. Control of antibiotic therapy in paediatric patients. Developmental pharmacology and therapeutics 1981; 2:145-55.
6. Schollenberg E and Albritton WL. Antibiotic misuse in a paediatric teaching hospital. Can Med Assoc J 1980;122:49-52.
7. Dr. M. Ipp. Reduced antibiotic use in a Paediatric practice: Practical office strategies based on current evidence. Published in June 2000.
8. Shankar RV, et al. Prescribing patterns of antibiotics and sensitivity patterns of common microorganisms in the Internal Medicine ward of a teaching hospital in Western Nepal: a prospective study. Ann ClinMicrobiolAntimicrob 2003; 2:7.
9. Rehana HS and Nagrani MA. A study on the drug prescribing pattern and use of antimicrobial agents at a tertiary care teaching hospital in eastern Nepal. Indian Journal of Pharmacology 1998; 30: 175-80.
10. Kafle KK. Pradhan YMS, Shrestha AD and Karki SB. Drug use in PHC facilities of Kathmandu. Journal of the Institute of Medicine 1992; 14:318- 26.
11. Kafle KK. Prescribing and dispensing practices in PHC facilities of Terai districts of Nepal. Journal of the Institute of Medicine 1996; 18:61-6.
12. Kolar J, Kadakova E. Prescription of antimicrobial drugs to hospitalized children. Ann Pharmacother 1993; 26: 974-7.
13. Marr JJ, Moffet. Kunin CM. Guidelines for improving the use of antimicrobial agents in hospitals: a statement by the Infectious Disease Society of America. J Infect Dis 1988; 157; 869-76.
14. The rational use of drugs. Report of the conference of experts, Geneva, World Health Organization, 1985.
15. Promoting rational use of medicines: core components. WHO Policy Perspectives on Medicines, Geneva, World Health Organization, 2002; 5.
16. Crockett B. Prescribing and drug costs in the Province of Ontario. Nurse Clinical North America, 2005; 40: 33-49.
17. Uppal R, Chhabra A, Narang A. Pattern of drug use in neonatal intensive care unit. Indian Journal Pediatrics, 1984; 35: 647-649.
18. Uppal R, Chhabra A, Narang A. Pattern of drug use in neonatal intensive care unit. Indian Journal Pediatrics, 1988; 353.
19. Dubey AK, Subish P, Shankhar PR, Upadhyay DK, Mishra P. Prescribing patterns among paediatric inpatients in a teaching hospital in western Nepal. Singapore Medical Journal, 2006; 47(4): 261-265.
20. Ghai OP, Vinod K, Aravind B. Disorders of Respiratory System. Essential Journal of Pediatrics, 2009; 7: 351-352.
21. Bharathiraja R, Sridharan S, Chelliah LR, Suresh S, Senguttuvan M. Factors affecting antibiotics prescribing pattern in paediatric practice. indian journal of paediatric, 2005; 72: 877-880.
22. www.informationvine.com
23. World Health Organization. The evolving threat of antimicrobial resistance: Options for action. World Health Organization. 2012.Available: http://whqlibdoc.who.int/publications/2012/9789241503181_eng. pdf. Accessed 4 Sept 2015.
24. Goossens H, Ferech M, Stichele Vander R, Elseviers M. Outpatient antibiotic use in Europe and association with resistance: a cross-national database study. Lancet. 2005; 365:579-587. PMID: 15708101 .
25. Bassani DG, Kumar R, Awasthi S, Morris SK, Paul VK, Shet A, et al. Causes of neonatal and child mortality in India: a nationally representative mortality survey. Lancet. 2010; 376(9755):1853-1860. doi: 10.1016/S0140-6736(10)61461-4 PMID: 21075444 .
26. Karande S, Sankhe P, Kulkarni M. Patterns of Prescription and Drug Dispensing. Indian J Pediatr. 2005; 72:117-121. PMID: 15758532 .
27. Kumar R, Indira K, Rizvi a, Rizvi T, Jeyaseelan L. Antibiotic prescribing practices in primary and secondary health care facilities in Uttar Pradesh, India. J Clin Pharm Ther. 2008; 33(6):625-634. doi: 10. 1111/j.1365-2710.2008.00960.x PMID: 19138240.
28. Pathak D, Pathak A, Marrone G, Diwan V, Lundborg CS. Adherence to treatment guidelines for acute diarrhoea in children up to 12 years in Ujjain, India-a cross-sectional prescription analysis. BMC Infect Dis. 2011; 11(1):32 .
29. Kotwani A, Chaudhury RR, Holloway K. Antibiotic-prescribing practices of primary care prescribers for acute diarrhea in New Delhi, India. Value Health. 2012; 15(1 Suppl):116-119.
30. Indian Academy of Pediatrics. List of Essential Medicines for Children of India, First List. Indian Academy of Pediatrics.2011. Available:

http://apps.who.int/medicinedocs/documents/s19040en/s19040en. pdf. Accessed 4 Sept 2015.

31. Chandy SJ, Thomas K, Mathai E, Antonisamy B, Holloway K a, StalsbyLundborg C. Patterns of antibiotic use in the community and challenges of antibiotic surveillance in a lower-middle-income country setting: a repeated cross-sectional study in Vellore, South India. J AntimicrobChemother. 2013; 68 (1):229-236. doi: 10.1093/jac/dks355 PMID: 22945913.

32. Gravatt LAH, Pakyz AL. Challenges in measuring antibiotic consumption. Curr Infect Dis Rep. 2013; 15 (6):559-563. doi: 10.1007/s11908-013-0374-9 PMID: 24097249 .

33. World Health Organization. Medicines: rational use of medicines. World Health Organization. 2010. Available: http://www.wiredhealthresources.net/resources/NA/WHO-FS_MedicinesRationalUse.pdf. Accessed 4 Sept 2015.

34. World Health Organization. Promoting rational use of medicines: core components. WHO Policy Perspectives on Medicines. 2002. Available: http://apps.who.int/medicinedocs/en/d/Jh3011e/1. html#Jh3011e.1. Accessed 4 Sept 2015.

35. Kotwani A, Holloway K. Trends in antibiotic use among outpatients in New Delhi, India. BMC Infect Dis. 2011; 11(1):99.

36. Pathak A, Mahadik K, Dhaneria SP, Sharma A, Eriksson B, Lundborg CS. Surveillance of antibiotic consumption using the "focus of infection" approach in 2 hospitals in Ujjain, India. PLoS One. 2012; 7 (6):e38641. doi: 10.1371/journal.pone.0038641 PMID: 22715402.

37. Sharma M, Eriksson B, Marrone G, Dhaneria S, Lundborg CS. Antibiotic prescribing in two private sector hospitals; one teaching and one non-teaching: a cross-sectional study in Ujjain, India. BMC Infect Dis. 2012; 12:155. PMID: 22788873 Antibiotic Prescribing to Pediatric Inpatients in Two Indian Hospitals PLOS ONE | DOI:10.1371/journal.pone.0142317 November 5, 2015 11 / 12 .

38. Sharma M, Damlin AL, Sharma A, St√•lsbyLundborg C. Antibiotic prescribing in medical intensive care units-a comparison between two private sect.

39. David J. Weber M.D. ,Nina E. Tolkoff,ÄêRubin M.D. ,Robert H. Rubin M.D.,Amoxicillin and Potassium Clavulanate: An Antibiotic Combination Mechanism of Action, Pharmacokinetics, Antimicrobial Spectrum, Clinical Efficacy and Adverse Effects.May,ÄêJune 1984.

40. Michael ParnhamVesnaerakovichaberEvangelos J. Giamarellos-Bourboulis , Azithromycin: Mechanisms of Action and Their Relevance for Clinical Applications.,ÄÇPharmacology [?] Therapeutics143(2) ¬∑ August 2014,ÄÇ.

41. G Dent, M A Giembycz, P M Evans, K F Rabe and P J Barnes,Suppression of human eosinophil respiratory burst and cyclic AMP hydrolysis by inhibitors of type IV phosphodiesterase: interaction with the beta adrenoceptor agonist albuterol. Journal of Pharmacology and Experimental Therapeutics December 1994, 271 (3) 1167-1174.

42. M.ElizabethBrockson ,Laura A. Novotny ,Elaine M. Mokrzan ,Sankalp Malhotra ,Joseph A. Jurcisek ,Rabia Akbar ,AishwaryaDevaraj ,Steven D. Goodman ,Lauren O. Bakaletz ,Evaluation of the kinetics and mechanism of action of anti,Äêintegration host factor,Äêmediated disruption of bacterial biofilms.29 July 2014.

43. B. G. Spratt ,Biochemical and genetical approaches to the mechanism of action of penicillin . Published 16 May 1980.DOI: 10.1098/rstb.1980.0045.

44. Robert I.KetchellMDaMarianneW.JensenRNaPhilipLumleyPhDbAndrewM.WrightMScbMarkI.AllenbyMDaBrianJ.O'ConnorM , Rapid effect of inhaled fluticasone propionate on airway responsiveness to adenosine 5,Ä≤-monophosphate in mild asthma. Journal of Allergy and Clinical ImmunologyVolume 110, Issue 4, October 2002, Pages 603-606.

45. Prednisolone sodium phosphate-Eli O.MeltzerMD,ÅéDonA.BuksteinMD , The economic impact of allergic rhinitis and current guidelines for treatment. Annals of Allergy, Asthma & ImmunologyVolume 106, Issue 2, Supplement, February 2011, Pages S12-S16.

46. J. R. Vane and R. M. Botting , Anti-inflammatory drugs and their mechanism of action .Inflamm. res. 47, Supplement 2 (1998) S78-S87 q Birkha¬®userVerlag, Basel, 1998 1023-3830/98/020S78-10.

47. htJaime A Lagos and Gailen D MarshalTherClin Risk Manag,Montelukast in the management of allergic rhinitis.. 2007 Jun; 3(2): 327-332.

48. Marcia A. Kielhofner, MD ,Trimethoprim- Sulfamethoxazole: Pharmacokinetics, Clinical Uses, and Adverse Reactions.Tex Heart Inst J. 1990; 17(2): 86-93.

49. H Rode, D Hanslo, P M de Wet, A J Millar, and S Cywes ,Efficacy of mupirocin in methicillin-resistant Staphylococcus aureus burn wound infection. Antimicrob Agents Chemother. 1989 Aug; 33(8): 1358-1361.

50. MARGARET AUSTIN, PH.D., NATALIE STAATS REISS, PH.D., Mechanism Of Action In ADHD. NOV 5, 2007.
51. E.BradThompson1Marc E.Lippman2Mechanism of action of glucocorticoids 2001vol.4.
52. NICHOLAS SALTOS , PETER,ÄÇG. GIBSON , Acute Anti-inflammatory Effects of Inhaled Budesonide in Asthma https://doi.org/10.1164/ajrccm.163.1.9807061.
53. Marc LeBelPharm.D.Ciprofloxacin: Chemistry, Mechanism of Action, Resistance, Antimicrobial Spectrum, Pharmacokinetics, Clinical Trials, and Adverse Reactions 2011,vol.05.
54. John W. Kebabian, Gary L. Petzold, Dopamine-sensitive adenylate cyclase in caudate nucleus of rat brain, and its similarity to the "dopamine receptor" dec-3,2001.
55. Rob Roy MacGregor, M.D., Inhibition of Granulocyte Adherence by Ethanol, Prednisone, and Aspirin, Measured with an Assay System,;1999;jan;vol-01.
56. Antipyrine and Benzocaine Drug Information, Professional - Drugs.com
57. PDR.net. Available at: "http://www.pdr.net/home/pdrHome.aspx". Accessed May 18, 2008.
58. RxList - The internet drug index. Available at: "http://www.rxlist. com". Accessed May 18, 2008.
59. Wilson W, Taubert KA, Gewitz M, et al. Prevention of infective endocarditis: Guidelines from the American Heart Association. Circulation. 2007;116(15):1736-1754. Correction Circulation. 2007; 116:e376-e377. Available at: "http://circ.ahajournals.org/cgi/content/full/116/15/1736". Accessed May 23, 2008.
60. Wynn RL, Meiller TF, Crossley HL. Drug Information Handbook for Dentistry, 13th edition. Lexi-Comp, Hudson, Ohio. 2007.
61. D K Choudhury, B K Bezbaruah. Antibiotic prescriptions pattern in Paediatric In-patient department Guwahati medical college and hospital, Guwahati. Journal of Applied Pharmaceutical Science, 2013; 3(8):144-148.
62. Achalu T and Mensa M, Retrospective Drug Use pattern of antibiotics in Pediatric ward of Shenan Gibe Hospital, Oromia Region, EthiEthiopia. Journal of antibiotics Research.2017; 1(1): 1-10.
63. Shales DM , Gerding DN, Jphn JF Jr, Craig WA, Bornstein DL, Duncan RA, et al. Society for Healthcare Epidemiology of America and Infectious Diseases Society of Americ Joint Committee on the Prevention of Antimicrobial Resistance: Guidelines for the prevention of Antimicrobial Resistance in hospitals. Clin Infect Dis 1997; 25: 581-99.
64. Palikhe N.et.al., Prescribing pattern of antibiotics in paediartic hospitals of kathmandu valley. Kathmandu University Medical Journal, 2004; 2(1): 6-12.
65. Muenchhoff M &Gaulder P. Sex difference in Pediatric Infectious Diseases. The Journal of Infectious Diseases, 2014; 209(S3): S120-6.
66. Prakash SK, Arora V, Prashad R, Sharma VK. In vitro activity of ceftriaxone plus tazobactam against members of enterobacteriaceae. Journal of The Association of Physicians of India, 2005; 53: 595-8.
67. Majeed A and Moser K. Age and sex specific antibiotic prescribing patterns in general practice in England and Wales in 1996. Br J Gen Pract 1999; 49:735 736.
68. Khodabakhshi B, Moradi A. Pattern of antibiotics prescriptions in a referral academic hospital, northeast of Iran. J Glob Infect Dis 2014; 6(1):42-43.
69. KanishR,Gupta K, JunejaS,Bains HS, Kaushal S. Prescription pattern of antibiotics in the department of pediatrics in a tertiary care medical college and hospital in northern India. Asian journal of medical sciences 2014.5(4); 69-72.
70. Arulmouli SK, Sivachandiran S, Perera BJC. Prescribing patterns of antibiotics for children in Jaffna teaching hospital. Sri Lanka Journal of Child Health, 2009; 38: 121-123.
71. N. Venkateswaramurthy, R.Murali, R. Sampathkumar. The study of drug utilization pattern in pediatric patients. International Journal of Pharmacy and Pharmaceutical Sciences. 2012; 05(03):140-144.
72. Marta L. CiofiDegliAtti, Raponi.M, Tozzi. AE, Ciliento.G. Point prevalence study of antibiotic use in a pediatric Hospital in Italy. Euro Surveill. 2008;13(41):pii=19003.
73. Amin H., et al., Antibiotic profile in Pediatric wards, Department of Child Health, Cipto M41. angunkusumo Hospital. PaediatricaIndonesiana,(2004) ;44: 3-4.
74. KG Dinesh, L Padmasani, J Vasantha, RB Veera, P Sudhkar, MR Uma. Indian Journal of Pharmacy Practice, 4(2), 2011, 85-89.
75. Goodman & Gilman's. The Pharmacological basis of Therapeutics. McGraw-Hill Medical Publishing Division. 11th Edition, 2001; 1179-1206.
76. Introduction to drug utilisation research. WHO International Working Group for Drug Statistics Methodology, WHO Collaborating Center for

Drug Statistics Methodology, WHO Collaborating Center for Drug Utilisation Research and Clinical Pharmacological Services. Geneva: WHO; 2003.

77. Using Indicators To Measure Country Pharmaceutical Situations. Fact Book on WHO Level I and Level II monitoring indicators. Geneva, World Health Organization, 2006.

78. Academy of managed care pharmacy (2009) Drug use evaluation. Asian J Med Sci 1: 8890.