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EVALUATION OF CEPHALOSPORINS USE AMONG PEDIATRIC IN-PATIENTS AT TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Antibiotics are the widely used drugs in modern medical care. These drugs are majorly using for both prophylaxis and treatment of infectious diseases. Cephalosporins are commonly used group of antibiotics in hospitals and health care facilities around the world. A prospective observational study was carried out at inpatient department of pediatrics in Tertiary Care teaching hospital, Tirupati from March 2014 - September 2014 during regular ward rounds. This study was aimed to evaluate the usage of Cephalosporins. The demographic, disease prevalence, immunization history and treatment data of 80 in patients were collected in a specially designed proforma. In this study male patients were listed more 49 (61.25%) than the female patients 31(38.75%). Majority number of patients was in 1day-1year age group 38(47.5%) followed by 27 (33.75%) patients are in 1- 5 years. In our study most of the patients were diagnosed for respiratory tract infections i.e. 22 patients followed by 17 patients were diagnose for fever. In total 80 patients, majority of drugs were NSAIDS 82 (16.04%) followed by cephalosporin's 65(12.72%). Among 65 cephalosporin prescribed patients having only third generation cephalosporins. In that third generation cephalosporins majority cefotaxime 47 (72.30%) was prescribed followed by ceftriaxone 9 (13.84%). Total 28 potential drug- drug interactions were found that cephalosporins with another drugs. This study shows the wider usage of third generation cephalosporins in hospitalized pediatric patients. Rational use of cephalosporins will enhance the appropriate of therapy and treatment, which reduces the resistance of cephalosporin ADR and benefit cost to the pediatric population.

INTRODUCTION

Drug usage is difficult process. Many socio-cultural factors like illiteracy, national drug policy, poverty, drug advertising and promotion, use of multiple health care systems, sale of prescription drugs without prescription, unbiased drug information, competition in the medical and pharmaceutical market place and limited availability of independent may contribute to the different ways of drugs use. The under use, overuse and misuse of drugs may not achieve optimal benefit of drug therapy in patient care. The cost of medical care and microbial resistance may increase due to inappropriate drug use. The adverse effects and patient mortality will also increase. Due to this the drug utilization studies are become as potential tool in evaluation of health systems. The drug utilization studies were first began in early 1960s and its importance has increased because increase in marketing of new drugs, wide changes drug prescribing pattern and consumption, increasing concern about delayed adverse effects and health care costs¹. In past years, the involvement of pharmacists has increased in emerging areas of pharmacy in addition to drug therapy. Pharmacists are expecting to utilize their knowledge in improving policy decision in hospitals. The clinical pharmacist role is to provide the safety, effective and rational treatment to improve the patient's quality of life. This may achieved on interacting with patients and evaluating past medical and medication history, counseling the patients on usage of medicines while leaving the hospital².

Antibiotics are among the most widely prescribed therapeutic agents among paediatric patients. Infants and children represent a large part of the population in developing countries. 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. Acute respiratory infection, acute watery diarrhea and viral fever are the common childhood illnesses accounting for the major proportion of pediatric visits. The use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of pediatric illnesses. Cephalosporins are a commonly used group of antibiotics in hospitals and health care facilities around the world. In the developed countries the use of older cephalosporins is declining, that of the newer generations has increased. This practice causes unnecessary health care expenditure and encourages the development of resistance. Therefore Pharmacist intervention should be needed to improve the rational use of cephalosporin⁴. Our study gives a proper idea of therapy to treat the pediatric patients with the risk factors and also monitoring the prescribing patters of cephalosporin antibiotics. Our study

also gives the proper utilization of drugs which gives the beneficial out come to the patients as well as to the organization⁵.

METERIALS AND METHODS

A Prospective observational study was carried out for a period of six months in a tertiary care teaching hospital after obtaining Ethical approval and consent of the patients. The patients of either sex who are admitted in the pediatric department were included in the study. The out patients were excluded from the study. All the necessary and relevant data were collected from specially designed proforma which includes patient demographics (age, sex, weight, past medical history, past medication history, birth history, immunization history, and developmental history), general examinations, laboratory investigations, drug details (name of the drug, dosage form, frequency, route of administration, duration of treatment) and medication profile. The subject's demographical data, physical examination, past medical history and medication history were recorded in the proforma.

Descriptive statistics were applied to the collected data using Microsoft Excel software. Results are expressed in percentages and mean standard deviation (SD).

RESULTS

During the study period, total of 80 patients (49 males and 31 females) were included in the study. Out of 80 patients male patients 49 (61.25%) were found to be higher than the female patients 31 (38.75%). Among them patients were found to be in 1day-1year age group (47.5%) followed by 1year – 5 years age group (33.75%), 5 – 10 years age group (15%), above 10 years age group (3.75%).

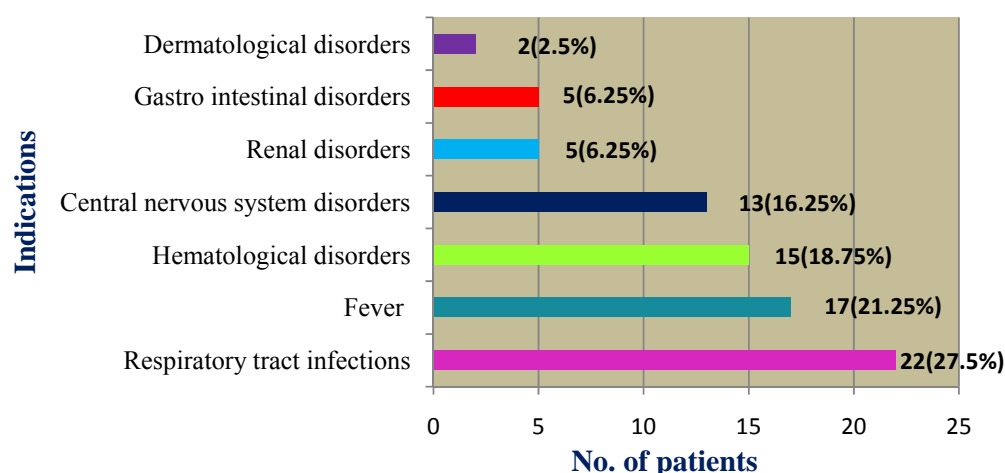


figure 1: distribution of patients according to the indications

Figure 1 shows indication wise distribution of patients. Among 80 patients different Diagnosis was done. Majority of patients are found to be diagnosed with respiratory tract infections 22 (27.5%) followed by fever 17 (21.25%), hematological disorders 15 (18.75%), CNS disorders 13 (16.25%), hematological disorders 15 (18.75%), fever 17 (21.25%) and respiratory tract infections 22(27.5%).

Among 80 patients 511 drugs were prescribed. Majority of patients prescribed with NSAIDS 82(16.04%) followed by cephalosporin antibiotics 65(12.72%) and antibiotics other than cephalosporin's 57(11.15%), antiepileptics 30(5.87%), bronchodilators 27(5.28%), minerals 24(4.69%), O₂ inhalation 22(4.3%), ORS 21(4.1%), antiulcers 20 (3.91%), vitamins 19(3.17%), antiemetics 13(2.54%), NS nebulisation 11(2.1%), corticosteroids 8(1.5%), antimalarials 8(1.5%), antihistamines 7(1.36%), anti tubercular drugs 4(0.78%), antiprotozoals 3(0.58%), diuretics 3(0.58%) and others 34(6.65%).

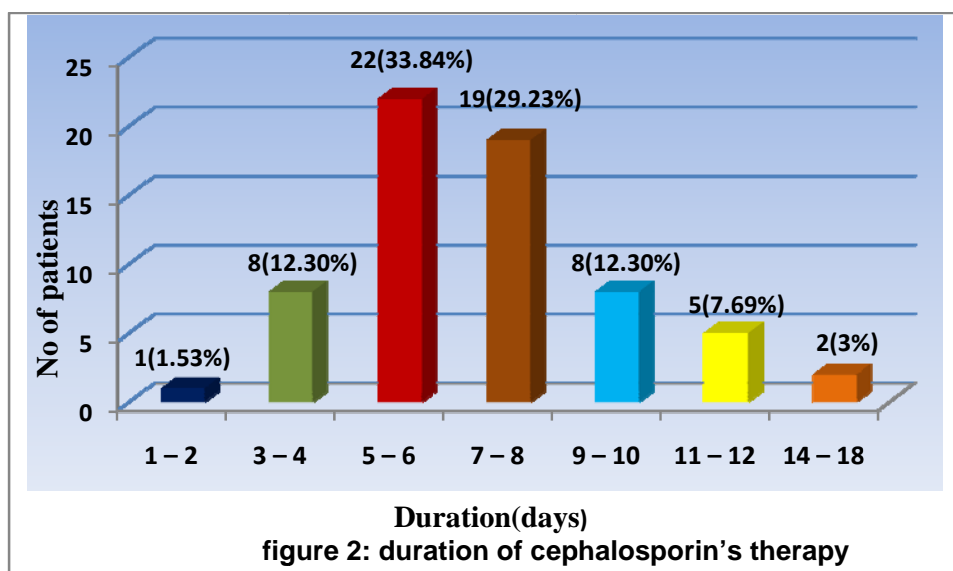


Figure: 2 shows duration of cephalosporin therapy. Among 65 cephalosporin prescribed patients majority of the patients 22 (33.84%) were prescribed cephalosporin's with the duration of 5-6 days, followed by 7-8 days 19 patients(29.23%), 9-10 days 8 patients (12.30%), 3-4 days 8 patients (12.30%) and followed by 11-12 days 5 patients, 14-18 days 2 patients and 1-2 days one patient.

Among 65 patients Cefotaxime was prescribed in 47 patients (72.30%), Ceftriaxone 9 patients (13.84%), Cefotaxime/ Ceftriaxone 7 patients (10.76%), Ceftriaxone / Cefixime 1 patient (1.53%), Cefotaxime / Cefixime 1 patient (1.53%). Among 65 patients of prescribed cephalosporins 63 (96.92%) were injections and 2 (3.08%) were both oral and injection.

Table 1: Immunization history of the patients:

IMMUNIZATION	NO. OF PATIENTS (n=80) (%)
Done	63 (78.75%)
Not done	17 (21.25%)

Table 1 shows Immunization history of patients. Among 80 patients 63 (78.75%) patients were immunized and 17 (21.25%) patients were not immunized.

Table 2: Potential drug- drug interactions founded in total prescriptions:

Severity	No. Of interactions (n=74)
Major	1
Moderate	64
Minor	11

Table 2 shows potential drug- drug interactions. Among 74 drug-drug interactions major was found to be 1, moderate was found to be 64 and minor was 11.

Table 3: Potential Drug- Drug Interactions founded among the cephalosporin's:

Drugs	No. of interactions (n=28) (%)
CEFOTAXIME with AMIKACIN	19 (68%)
CEFTRIAZONE with AMIKACIN	7 (25%)
CEFOTAXIME with GENTAMYCIN	1 (3.5%)
CEFTRIAZONE with GENTAMYCIN	1 (3.5%)

Table 3 shows the drug-drug interactions of cephalosporins with other drugs. Among 28 interactions CEFOTAXIME with AMIKACIN was 19 (68%), CEFTRIAZONE with AMIKACIN was 7 (25%), CEFOTAXIME with GENTAMYCIN was 1 (3.5%) and CEFTRIAZONE with GENTAMYCIN was 1 (3.5%).

DISCUSSION

Drug use evaluation (DUE) is systematized approach designed to control irrational use of drugs. The study on drug utilization will identify problems like irrational drug use, adverse drug reactions, patient non adherence, drug interactions and drug cost. Cephalosporins are currently the most commonly prescribed drugs in hospitals, worldwide. But, excessive and inappropriate use of Cephalosporins, may leads to drug related problems like increased drug resistance ⁽¹¹⁾. Total 80 patients were included in the study. Among them 49 (61.25%) patients were the male and 31(38.75%) patients were female. These results are similar to by Vishwanath M *et.al* (2014) study Assessment of drug utilization in hospitalized children at a tertiary care teaching hospital which reveals predominance of males (53.33%) than females ⁽⁴⁾. Considering the age group the majority number of patients was in 1day-1year age group 38(47.5%) followed by 27 (33.75%) patients are in 1- 5 years. These findings were in related to the Khaja Moinuddin1 *et.al* study of prescribing pattern of antibiotic in pediatric patients with pneumonia ⁽⁶⁾.

In our study most of the patients were diagnosed for respiratory tract infections i.e. 22 patients followed by 17 patients were diagnose for fever. This result shows that pneumonia is more common in pediatric departments and it is more prevalence among children. Epidemiology states that over 1090 Indian children under five years of age die every day Prompt treatment of pneumonia is usually with a full course of appropriate antibiotics like Cephalosporins. For various indications, 511 different drugs were prescribed for treating. Among them majority of drugs were NSAIDS (16.04%) followed by cephalosporin's (12.72%) and (11.15%) of the drugs were antibiotics other than cephalosporin's. These findings are in contrast to the Nema Pallavi *et.al* study where in their study the beta-lactam antibiotics are majorly prescribed drugs than cephalosporins. The cephalosporins were the most common drugs prescribed for treating pneumonia infections. The prescribing of cephalosporin's for treating normal fever is unnecessary ⁽¹⁰⁾.

Among 65 cephalosporin prescribed patients majority of the patients 22 (33.84%) were prescribed cephalosporin's with the duration of 5-6 days, followed by 7-8 days and 19 patients (29.23. these results were similar to the Pandiamunian j *et.al.* study ⁽³⁾.

Among total patients cefotaxime (72.30%) was most commonly prescribed cephalosporin than other cephalosporin's followed by ceftriaxone (13.84%). This study shows the wider usage of third generation cephalosporin in hospitalized pediatric patients. These findings are

similar to the study conducted by Mahendra kumar *et.al*. UNICEF and WHO has given guidelines for treating pneumonia. According to the guidelines, Cotrimoxazole and amoxicillin are effective drugs against bacterial pathogens and are often used to treat children with pneumonia. In this study most of the drugs prescribed were cephalosporin's to treat pneumonia. It was found out that 97% of cephalosporins were prescribed for parenteral administration, while only 3% were for oral route in paediatric patients. A study carried out in Kathmandu valley (2004) showed that, 75% of antibiotics were given by injections.

Among 80 patients 63 (78.75%) patients were immunized and 17 (21.25%) patients were not immunized. These findings are related to the study conducted by Lexley M Pinto Pereira. Immunization will reduce the severity of occurrence of infections ⁽¹⁶⁾.

In this study no ADRs were observed among the patients on using the therapy. All patients were adhere for the drugs and shows compliance. This may because all patients are in patients and they are regularly monitored by the nurses, physicians and pharmacists.

In total 80 prescriptions 74 drug-drug interactions were found. Among them major was found to be 1, moderate was found to be 64 and minor was 11. The all interactions observed were potential drug interactions and no one interaction is observed among the patients. Among 28 interactions CEFOTAXIME with AMIKACIN was 19 (68%), CEFTRIAXONE with AMIKACIN was 7 (25%), CEFOTAXIME with GENTAMYCIN was 1 (3.5%) and CEFTRIAXONE with GENTAMYCIN was 1 (3.5%).

Our study had a number of limitations. The study was prospective observational and seasonal variations were not considered. The patient care indicators were not studied. The study was limited to only a paediatric department. Also, further studies for a longer period of time in all the clinical departments are required. The data presented here will be useful in future, long term and more extensive drug utilization studies in the hospital and in promotion of rational prescribing and drug use in hospitals.

CONCLUSION

The study concludes that the prescribing frequency of third generation cephalosporin's were more frequently in paediatric patients. The treatment regimen application in majority of the cases is done without doing any culture sensitivity test which may lead to wide spread of irrational prescription. So physician must be more specific in their diagnosis despite the financial burden of culture test. ADR recording habit in health care facilities will promote the rational therapy in future. Rational drug usage education programs and antibiotics order form

application in the hospitals will inappropriate therapy. The involvement of the clinical pharmacist may also improve the rational prescribing of cephalosporins.

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