

**Research Article****DRUG UTILIZATION EVALUATION OF THIRD GENERATION CEPHALOSPORINS IN A TERTIARY CARE HOSPITAL**Saugat Dahal^{1*}, Sushobhan Bhandari¹, Bhisma Ghimire¹, Dr.N.M Mahesh², Dr.MS Krishnamurthy³, Dr.Afzal Khan A.K⁴¹Pharm.D, Department of Pharmacy Practice, Krupanidhi College of Pharmacy, Bangalore-560035²M.Pharm, Ph.D. Professor and Head, Department of Pharmacy Practice, Krupanidhi College of Pharmacy, Bangalore-560035³ Head of Department of General Medicine, MVJ Medical College and Research Hospital, Bangalore-560029⁴Professor, Department of Pharmacology, MVJ Medical College and Research Hospital, Bangalore-560029

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ABSTRACT**Title:** Study on drug utilization evaluation of third generation cephalosporins in tertiary care hospital.**Objective:** To evaluate prescribing pattern, to identify most common infection treated with third generation cephalosporin and to assess drug related problem. **Methodology:** A hospital based prospective study was conducted in MVJ medical college and research hospital between the periods for six months after getting consent from the patients. **Results:** Out of 150 cases collected, the most common prescribed third generation cephalosporins are Ceftriaxone(68%), followed by Cefixime(20.66%) and Cefotaxime(11.33%). In an entire study, the route of administration of parenteral drugs(79.33%) was found more compared to the oral drugs(20.667%). In our study, the drugs per encounter were 5.8 and third generation cephalosporin per prescription was 1.013. Similarly, the most common infections treated with third generation cephalosporins were Lower Respiratory Tract Infection(LRTI) which includes Chronic Obstructive pulmonary Diseases(COPD 34.667%), acute bronchitis(12%), chronic bronchitis(10.667%), pneumonia(23.33%), followed by meningitis(9.33%), acute gastritis (7.33%) and others(2.667%). On culture and sensitivity test, only 12% were found to have done it, majority was done in Blood(33.33%) followed by sputum(22.22%), urine(22.22%), saliva (16.667%) and pleural fluid (5.556%). Regarding drug related problem, two cases(1.33%) were found to have moderate drug-drug interaction between furosemide and ceftriaxone out of total 150 cases. **Conclusion:** Drug use evaluation is an important health issue in an area of medicine. so, health education of the public as well as hospitals and regulation of pharmacies and antibiotic guidelines in hospitals which can help in managing Drug use Evaluation of TGC'S and minimize the risk of future resistance.**Keywords:** Drug utilization, Cephalosporins**Introduction**

Antibiotic use in a correct and suitable way can help minimize the spread and resistance of bacteria within hospitals and communities. The risks of antibiotic resistance due to the use of Third Generation Antibiotics, which are broad spectrum antibiotics, have been emerging lately. The hospital setting is particularly conducive to the development of antibiotic resistance as patients who are severely ill, immune-compromised or

have devices and/or implants in them are likely to receive frequent dose of empirical or prophylactic antibiotic therapy ^[1].

Cephalosporins are the largest and the most diverse family of antibiotics available and possess an extended spectrum of activity. Because of this Cephalosporins are the most widely used antibiotics in hospital setup. Cephalosporins and their wide use have been associated with the development of resistance and have warranted

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the need the need for Drug Utilization Evaluation (DUE). DUE is a monitoring tool which checks the appropriateness of prescribing pattern and utilization of drugs [2].

The World Health Organization (WHO) defines drug utilization as the marketing, distribution, prescription, and use of drug in a society, with special emphasis on the resulting medical, social and economic consequences. DUE examines the process of drug administration, dispensing, outcomes of treatment, thereby helping the health care system to realize, interpret and ameliorate the prescribing, administration and utilization of medication [3]. Therefore, the present study was aimed to evaluate the appropriateness of use of Cephalosporins in terms of choice of drug, dose, and frequency of administration, route of administration, duration of therapy, drug interactions and development of adverse reactions.

Antimicrobials have played a remarkable role in public health through decreasing of morbidity and mortality [4]. This, however, was not without any challenge. Anti-microbial resistance (AMR) due to the over use of the reserved antibiotics is one of the threatening global issue of public health [5, 6]. Low income countries are also the least to regulate drug distribution and utilization quality. The drug regulatory bodies ensure that drug products dispensed to patients will provide the necessary outcome and will not cause harm to the healthcare system of a country.

Concerns during the evaluation of drug use includes incorrect dose, inappropriate drug selection, prescribing drugs that causes ADRs or drug interactions, and the use of expensive drugs when cheaper ones would be possible. The WHO, in recognition to this problem started promoting rational utilization of medicines by forming drug and therapeutic committees [7].

Drug Utilization Evaluation (DUE) has been defined by the American Society of Health System Pharmacists (ASHP) as a "Criteria-based, ongoing, planning and systematic process for monitoring and evaluating the prophylactic, therapeutic and empiric use of drugs to help, assure that they were provided appropriately, safely and effectively [8,9].

Patient management in healthcare setting,

including primary healthcare is considered to be a major component in drug therapy. Pharmacological interventions are valuable because that helps benefit the patients but the consequences due to inappropriate drug use cannot be overlooked [10].

Preventable patient morbidity and mortality, costly remedial care, additional cost for diagnosis and management of iatrogenic disease and unnecessary wastage of health resources can be easily managed by focusing on adverse drug reactions, cost of medications, focus on drug use outcomes and the clinical misuse of drugs. In this respect DUE is retrieved to identify problems of drug use and also serves as a means to rectify the problem, thereby contributing to rational drug therapy [11, 12, 13].

Therefore to help the healthcare system to realize interpreting prescribing, administering, and utilization of medication DUE helps examine the process of drug administration, dispensing, and outcomes of treatment [15].

METHODOLOGY:

Study Design and Human Ethical Clearance:

A prospective, observational study was conducted for duration of 6 months from October 2015 to March 2016 in accordance with the ethical principles of declaration of Helsinki and principles of current Good Clinical Practice (GCP). The study protocol was approved by the Institutional Ethical Committee (IEC) with ethical clearance number: Central Research/MVJ MC & RH/09/2016

Inclusion Criteria:

All patients of age groups more than thirteen years age receiving any third generation cephalosporins in general medicine ward.

Exclusion criteria:

Out-patients treated with third generation cephalosporin and paediatrics patient

Method:

All the patients who met the inclusion criteria were enrolled in the study after taking parental Informed Consent (IC) before commencing the study. The basic demographics, medication related details and laboratory investigation values were

collected by the researchers personally using the Case Report Form (CRF). This information was collected from the patient's case sheets. The medications prescribed for in-patient was compared with WHO prescribing indicator. The regimen such as dose, frequency, strength, route of administration, as well as drug related problem such as drug –drug interaction, ADR, duplication of medication associated with Third generation cephalosporins were assessed and managed. The result was calculated and analyzed by descriptive method.

RESULT:

A total of 150 cases were collected in general medicine ward of MVJ medical college and research hospital for the period of six months. The following evaluation was made from the collected data.

1.Socio-demographic data:

Out of 150 cases, 92 were male and 58 were female to use Third Generation Cephalosporins. Majority of the study subjects who participated in this study were belonging to the age group of 45-60 and followed by 30-45. Similarly, The Patients enrolled were mostly involved in Agriculture which is followed by housewife, businessman and student respectively.

The detailed demographic data is illustrated in Table 1.

TABLE: 1 Demographic Data (N=150)

Gender	Percentage
Male	61.33
Female	38.667
Age in years	
15-30	14.667
30-45	27.33
45-60	44
>60	14
Occupation	
Agriculture	37.33
Student	6
Housewife	34.67
Business	22

2.PRESCRIBING PATTERN OF THIRD GENERATION CEPHALOSPORINS:

Most common prescribed third generation cephalosporins were ceftriaxone, cefotaxime and cefixime. Out of 150 cases collected, 119 were found to be parenteral drugs which were given by intravenously and rest 31 were oral drugs in a tablet form. Drugs were classified to distinguish Parenteral and Oral use of third generation cephalosporin in the hospital according to their brand and generic names.

Table 2: (most common prescribed TGC's)

parenteral	percentage(%)
ceftriaxone	68
inj xone	24.67
inj nuceTex	42
inj ceftriaxone (in generic)	1.33
cefotaxime	11.33
inj taxim	11
inj cefotaxime (in generic)	0.33
oral	20.67
Tab. Taxim	19.37
Tab cefexime (in generic)	1.33

Out of total 150 cases, the average number of drugs per encounter were 5.8 and average number of third generation cephalosporin per prescription were 1.01.

3. ROUTE OF ADMINISTRATION:

We found two route of administration mostly used in patients of Third Generation Cephalosporin which were parenteral and oral. The table for this is illustrated below.

Table (e:3 Route of Administration)

Route	Percentage(%)
parenteral	79.33
oral	20.67

4.DOSE OF DRUGS ALONG WITH FREQUENCY OF ADMINISTRATION:

Table 4:

Drug	Dose of drug	frequency
Ceftriaxone	1000mg	BID
Cefotaxime	1000mg	BID
Cefixime	200mg	BID

5.MOST COMMON INFECTIOUS DISEASES TREATED WITH THIRD GENERATION CEPHALOSPORINS :

Our objective was to find out the most common infectious diseases which were treated with third generation cephalosporins. Out of total 150 cases collected, the most common infectious disease treated with third generation cephalosporins were found to be Lower Respiratory Tract Infection(80.65%) which includes Chronic Obstructive Pulmonary Disease(34.66%),acute bronchitis (12%),chronic bronchitis(10.66%) ,pneumonia(23.33%) followed by central nervous system includes meningitis(9.33%).Similarly, gastro-intestinal System such as acute gastritis(7.33%).As well as other infectious disease least found such as Others(2.66%).

Table 5: (System wise classification)

System along with disease name	Percentage(%)
Respiratory system(LRTI)	
COPD	34.66
Acute Bronchitis	12
Chronic Bronchitis	10.66
Pneumonia	23.33
CNS(Meningitis)	9.33
GI(Acute Gastritis)	7.33
others(Otitis media-ENT)	2.667

6. CULTURE AND SENSITIVITY PATTERN:

Out of 150 cases collected, 18 cases included culture and sensitivity test (12%). The culture and sensitivity tests were done to find out the bacterial resistance against third generation cephalosporins in a Tertiary care Hospital.

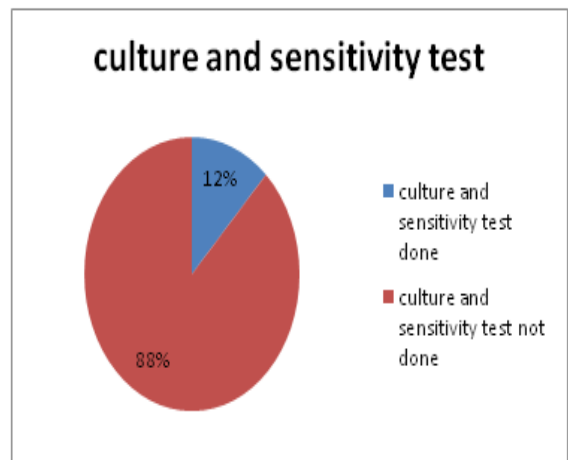


Figure 1:

The body fluids tested to find the resistance were: Blood (33%), Sputum (22.22%), Urine(22.22%), Pleural fluid(5.556%), Saliva(16.667%).

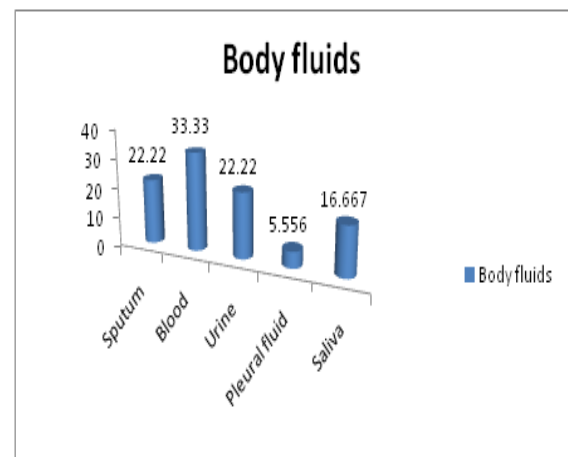


Figure 2:

7. DRUG RELATED PROBLEMS:

Drug-drug interaction:

Out of 150 cases collected, 2 cases were found to have moderate drug-drug interaction between ceftriaxone and furosemide. There was no any major drug-drug interaction was during the study periods in that hospital.

Observation: The observation we found upon patient interview, was that the both patients developed fever, the following day when ceftriaxone was administered along with furosemide.

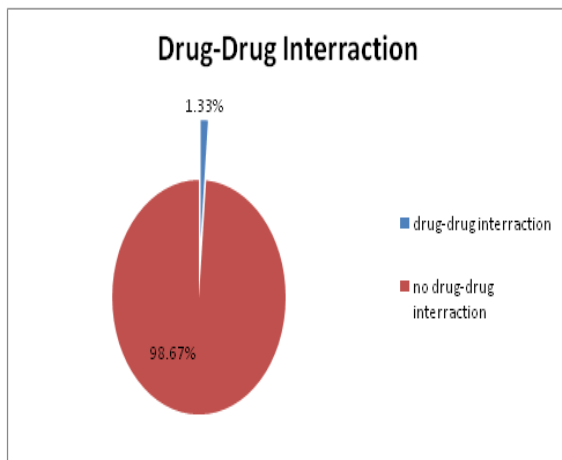


Figure 3:

DISCUSSION:

The present study examined Drug utilization evaluation of third generation cephalosporins in a tertiary hospital. In this study, we found that 68% of patients received ceftriaxone, followed by cefixime at 20.667% and cefotaxime at 11.33%. This is comparable to a study done by Tariku Shimels et al, (2015) where also the use of ceftriaxone precedes with 59%. In another study conducted in Sri Ramachandran Hospital, done by Kalimurthyk, et al. However, they found the use of Cefexime at 32.69%, followed by Cefotaxime at 31.32%.^[30] Also in our study, we found that, the most common disease for which the third generation were prescribed was COPD at 34.66%. This is supported by a study found done in an Italian hospital, Luigi Guglielmo et al (1993) where the frequently used drug for COPD was third generation cephalosporin at 29.9%.^[17] In terms of disease condition and use, our study showed LRTI's to be the most common disease for which third generation cephalosporins were used. The study showed that the use for COPD was greatest at 34.66%, followed by acute bronchitis at 12%, chronic bronchitis at 10.66%, pneumonia at 23.33%. Other than Respiratory, TGC's were used for meningitis, acute gastritis and otitis media at 9.33%, 7.33% and 2.66% respectively. In our study we found that the most common prescribed brand was Inj. Nucetax at 42%, followed by Inj. Xone at 24.6%, Tab. Taxim at 19.07% and Inj. Taxim at 11.33%. The Average number of drugs per encounter were 5.8 and third generation cephalosporins per prescription were 1.013. In our study, we found that out of 150 cases only 18

cases presented with culture and sensitivity tests, which accounted for 12% of the cases. Also the most common test method was using blood at 33.33%, then sputum and urine both at 22.22%, saliva at 16.667% and pleural fluid at 5.556%.

CONCLUSION:

In our study, we found that only 2.66% cases are presented with generic name, rest all prescriptions were found to be according to brand name. In our study, we concluded that the prescription pattern of third generation cephalosporins were not found to be satisfactory, since antibiotic culture and sensitivity tests were carried out in only 12% cases out of the total. In our study we also found that the average number of prescriptions per encounter was 5.8, which indicated polypharmacy according to the WHO indicator. To minimize polypharmacy, prescription should be based on intended indication and irrational drug use should be avoided. The most common infectious disease for which third generation cephalosporins were prescribed was lower respiratory tract infection in majority of the cases. In our study, we found that drug related problems were rarely encountered and only 2 cases showed drug-drug interaction between ceftriaxone and furosemide.

LIMITATION:

In our study, we found the limitation which was very less incidence of culture and sensitivity test carried out in patients before prescribing third generation cephalosporins.

FUTURE OBJECTIVE:

To assess culture and sensitivity tests to patients before prescribing third generation cephalosporins.

CONFLICT OF INTEREST:

The author has no conflict of interest.

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