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Study Of Ceftriaxone Induced Adverse Effect in Tertiary Care Teaching Hospital

A Ashvil *, Jyothi D*, Manda Jayasree Reddy*, Jerry Zohmingthanga*, Kiran Jadhav*, Dr.Varun Lal**

*Pharm D Internship, TVM College of Pharmacy , Bellari, Karnataka, India, **Assistant Professor, Department of Pharmacy Practice, TVM College of Pharmacy, Ballari, Karnataka, India.

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ABSTRACT

Introduction : Ceftriaxone is the third-generation cephalosporin utilised as a empiric antibiotic treatment option for tertiary teaching care hospital.Appropriate use of antibiotics has contributed to the dramatic fall in morbidity and mortality from communicable and infectious diseases over the last 50 years globally.

Objective : The main objective is to determine ceftriaxone induced adverse effects in tertiary care teaching hospital and to identify medication related problems.

Methods :A prospective observational study was conducted for a period of six months. The data was collected from 150 enrolled subjects, collected data was assessed and analysed.

Result : In the total sample, 58.6 % were males and 41.4% were females. Most of the ADR was observed the age group of 46-60 (35.1%) followed by 31-45 (26%). A total number of 66 ADRs has been reported (includes one and more than one ADRs) among which Hypersensitivity reaction (22.7%) were found to be more followed by increase in Liver enzymes (21%).

Conclusion : The adverse effect of Ceftriaxone can be minimized by replacing the antibiotic therapy for the diseased patients and by conducting continuous awareness programs regarding updated prescribing guidelines in the hospital.

Keywords: Antibiotic resistance, Hypersensitivity reactions, Adverse Drug Reaction, Clinical Pharmacists.

I. INTRODUCTION

Ceftriaxone is an antiretroviral drug cephalosporin used to treat many types of bacterial infections, including serious or life-threatening strains such as E.Coli, pneumonia or meningitis. Ceftriaxone is also used to prevent infection in people with certain types of surgery. Ceftriaxone is one of the most widely used antimicrobial drugs due to its high antibacterial power, wide spectrum of action and low toxicity. Ceftriaxone was used appropriately based on six criteria namely use, dosage, frequency of administration, duration of treatment, drug interactions, cultural testing and sensitivity.

Ceftriaxone is a third-generation antiretroviral or intramuscular drug cephalosporin. It is one of the most widely used antimicrobials due to its high antibacterial properties, high activity and low toxicity.

Ceftriaxone is a third-generation antibiotic from the cephalosporin family of antibiotics. It is within the β-lactam family of antibiotics. Ceftriaxone selectively and irreversibly inhibits bacterial cell wall synthesis by binding to transpeptidases, also called transamidases, which are penicillin-binding proteins (PBPs) that catalyse the cross-linking of the peptidoglycan polymers forming the bacterial cell wall. High dosages of Ceftriaxone are used to treat central nervous system (CNS) infections. Dosage adaptation according to the glomerular filtration rate is currently not recommended.Based on this model, a dosing nomogram was developed, using the estimated glomerular filtration rate (eGFR) and total body weight as covariates to determine the optimal dosage allowing achievement of targeted plasma trough concentrations. Efficacy and toxicity endpoints were based on previous reports, as follows: total plasma Ceftriaxone concentrations of ≥20mg/litre in >90% of patients for efficacy and ≤100mg/litre in 90% of patients for toxicity.

Cephalosporins are the most widely used antibiotics for treating common infections. The Cephalosporins are a large group of related beta-lactam antimicrobial agents with broad spectrum of activity, low rates of toxicity and ease of administration.Various Cephalosporins are effective for treatment of many conditions, including pneumonia, skin and soft tissue infections and meningitis.Cephalosporins are classified by “generation”; first, second, third and

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fourth. In general, lower-generation Cephalosporins have more gram-positive activity and higher-generation Cephalosporins more gram-negative activity.Ceftriaxone is one of the most commonly used antibiotics due to its high antibacterial potency, wide spectrum of activity and low potential for toxicity.

II. MATERIALS AND METHODS

This prospective observational study was conducted for a period of six months, at Vijayanagara Institute of Medical Science Bellary, Karnataka, India with sample size of 150 patients after obtaining Ethical clearance.

Inclusion Criteria:

- Patient age group from 16 to 80 years.
- All patient cards recorded from only in medical wards that contained ceftriaxone.
- Patient of either sex.
- Patients prescribed with parental (IV and Infusion).
- Patients who are willing to participate in this study and signed in the consent form

Exclusion Criteria:

- Outpatients.
- Patient records with insufficient information
- Patient in intensive care unit and post-surgical unit
- Emergency visits
- Patient admitted in any other wards (pediatric, surgery, emergency and gynecology who took ceftriaxone).

III. RESULTS

01. A prospective observational study was conducted for a period of six months in a tertiary care teaching hospital, VIMS, BELLARY. A total number of 150 subjects were covered during the study period. Out of 150 subjects 88 were males (58.6 %) and 62 were females (41.4%) .

GENDER	TOTAL NUMBER (n=150)	PERCENTAGE
Males	88	58.6%
Females	62	41.4%

Table 01: Distribution of patients according to gender

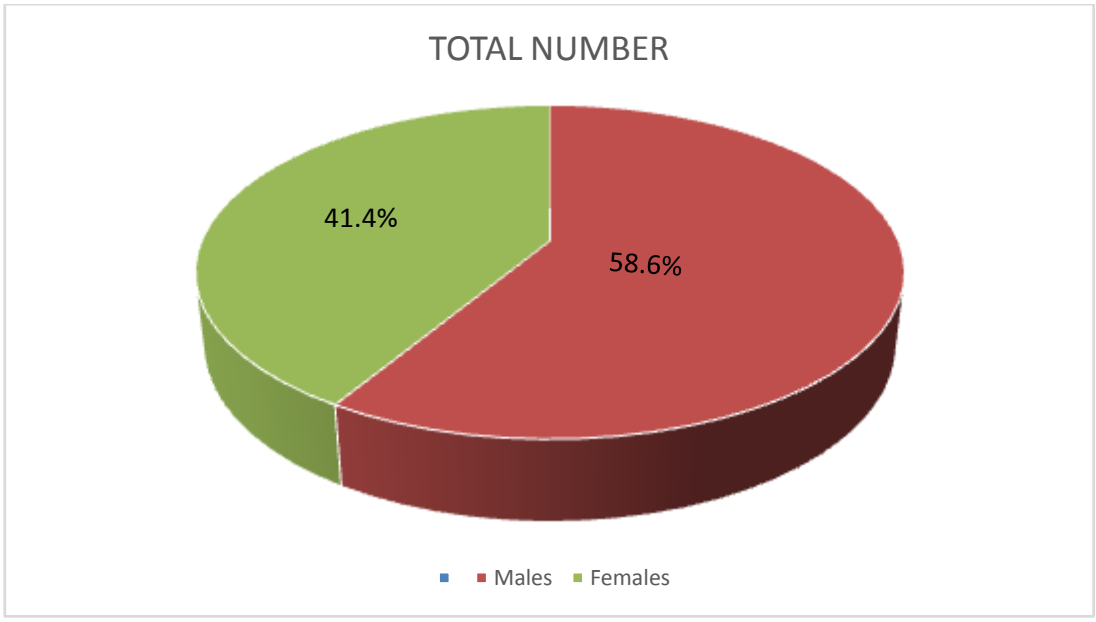

Figure 01: Distribution of patients according to gender

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3.2 Among 150 subjects, the maximum number of patients were between 46-60 years [(n=51), 34%] followed by 31-45 years [(n=41), 27.3%]

AGE GROUP IN YEARS	TOTAL NUMBER OF PATIENTS (n=150)	PERCENTAGE
16-30	22	14.7%
31-45	41	27.3%
46-60	51	34%
61-80	36	24%

Table 02: Age wise distribution

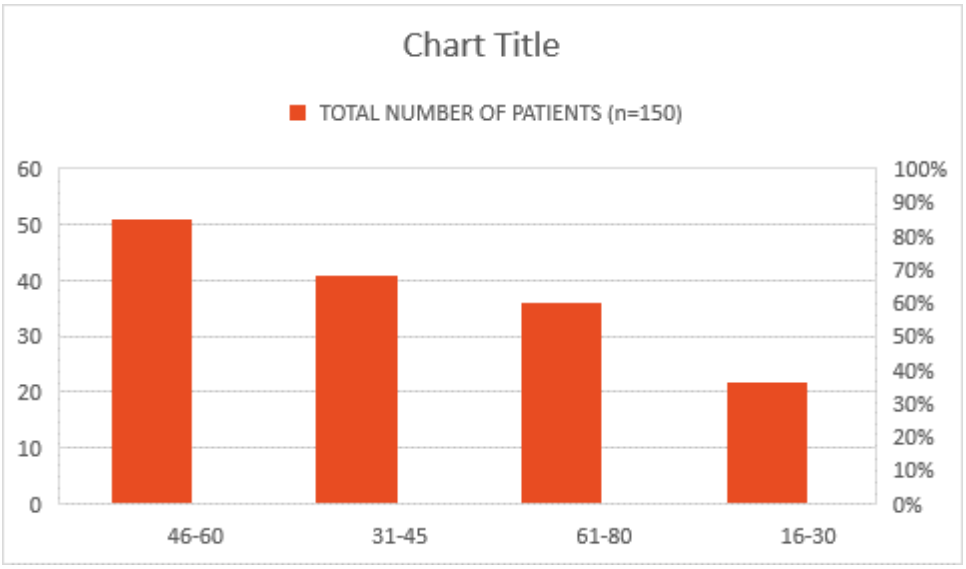

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Figure 02: Age wise distribution

3.3 Among 150 patients, 54 patients were encountered with Adverse drug effects induced by Ceftriaxone, in which 45 patients encountered with single ADR and 9 patients with more than one ADRs.

NO OF ADR	TOTAL NUMBER OF ADR (N=54)	PERCENTAGE
One ADR	45	83.3%
More than one ADR	9	16.7 %

Table 03: Distribution of patients encountered with adverse effects

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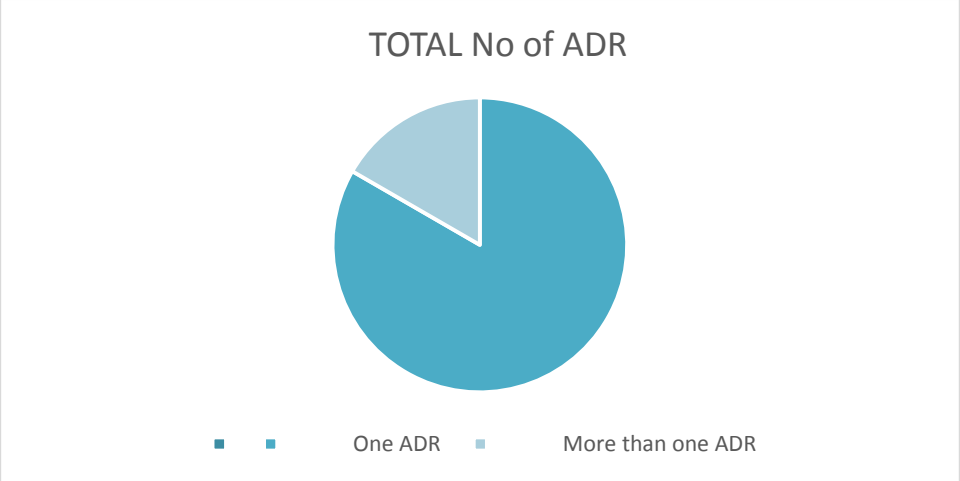

Figure 03: Distribution of patients encountered with adverse effects

3.4 Among 150 patients, 63 patients were treated with Ceftriaxone for 3 days followed by 80 patients who were treated for 4-7 days and 7 were treated for more than 7 days.

DURATION IN DAYS	NUMBER OF PATIENTS(N=150)	PERCENTAGE %
4-7 days	80	53.3%.
1-3days	63	42%
More than 7	7	4.7%

Table 04: Distribution of patients according to the duration of Ceftriaxone therapy

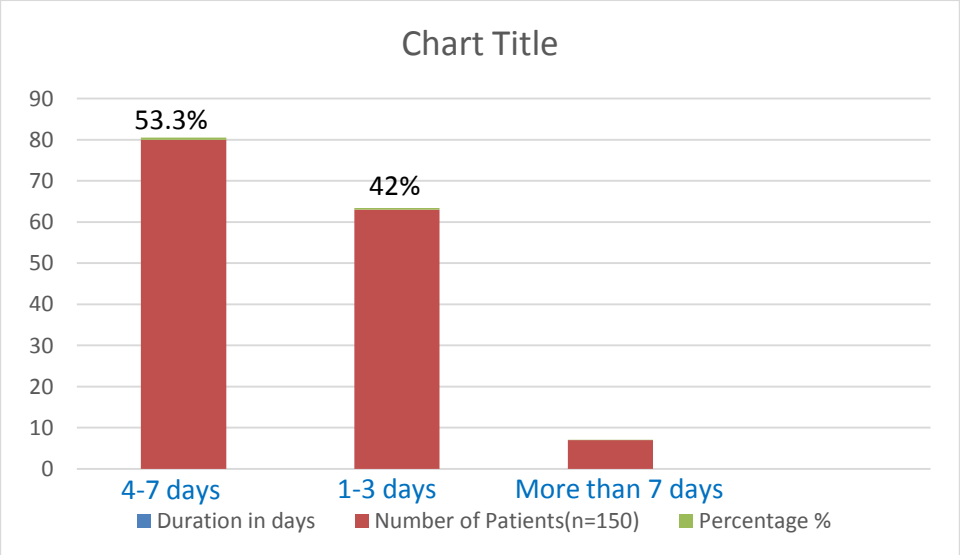

Figure 04: Distribution of patients according to the duration of Ceftriaxone therapy

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3.5 In our study, most of the Adverse drug effects were observed in the age group of 46-60 (35.1%) and followed by 31-45 (26%)

AGE GROUP IN YEARS	TOTAL NUMBER OF PATIENT (n=54)	PERCENTAGE
46-60	19	35.1%
31-45	14	26%
61-80	14	26%
16-30	7	12.9%

Table 05: Distribution of adverse effects with respect to age

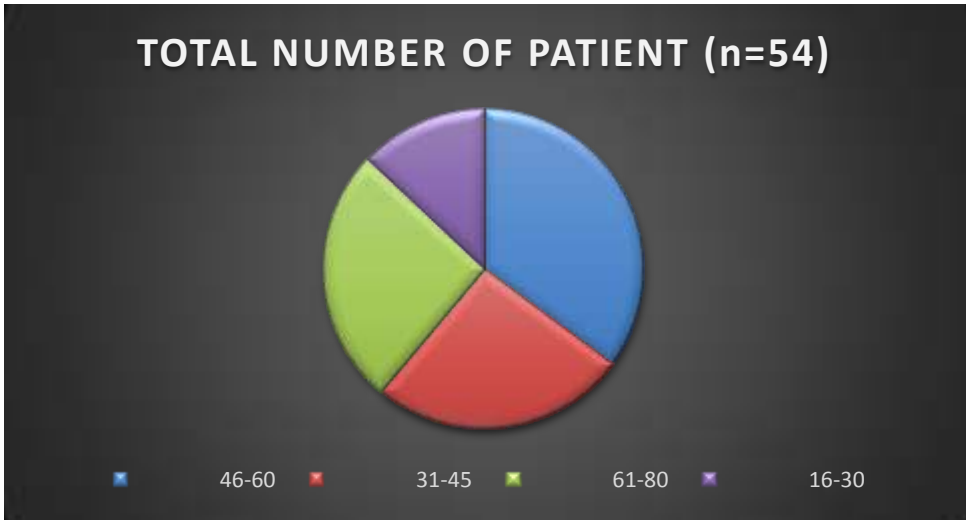

Figure 05: Distribution of adverse effects with respect to age

3.6 In our study, a total number of 66 ADRs has been reported (includes one and more than one ADRs) among which Hypersensitivity reaction (22.7%) were found to be more followed by increase in Liver enzymes (21%).

TYPE OF ADVERSE EFFECT	TOTAL NO OF ADVERSE EFFECTS (N=66)	PERCENTAGE
Hypersensitivity reactions	15	22.7%
LFT	14	21%
Eosinophils	12	18.3%
Rashes	10	15.1%
Diarrhea	10	15.1%
Vomiting	5	7.8%

06: Distribution of patients according to adverse effects

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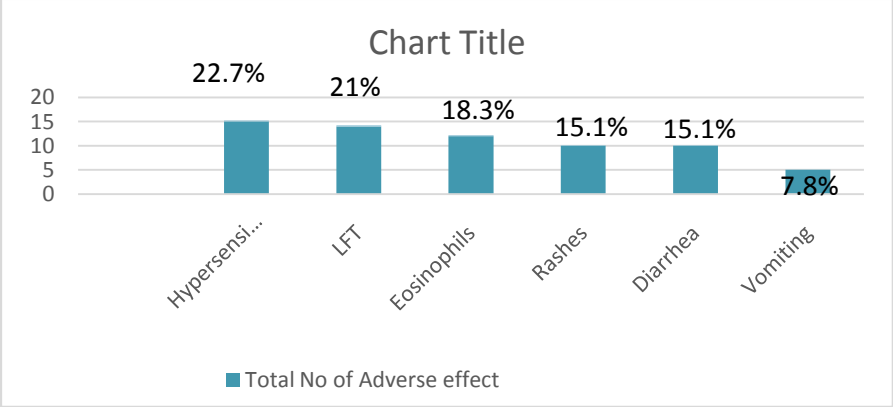

Figure 06: Distribution of patients according to adverse effects

3.7 Among 54 patients with adverse effects, 12 patients were diagnosed with kidney disease followed by 8 patients were diagnosed with respiratory disease

NAME OF DISEASE	TOTAL NO OF DISEASE WITH ADR (N=54)	PERCENTAGE
Others	23	42.6%
Kidney Disease	12	22.2%
Respiratory Disease	8	14.8%
Brain Disorder	7	13%
Heart Disease	4	7.4%

Table 07: Distribution of Patient According to ADR and Diagnosis

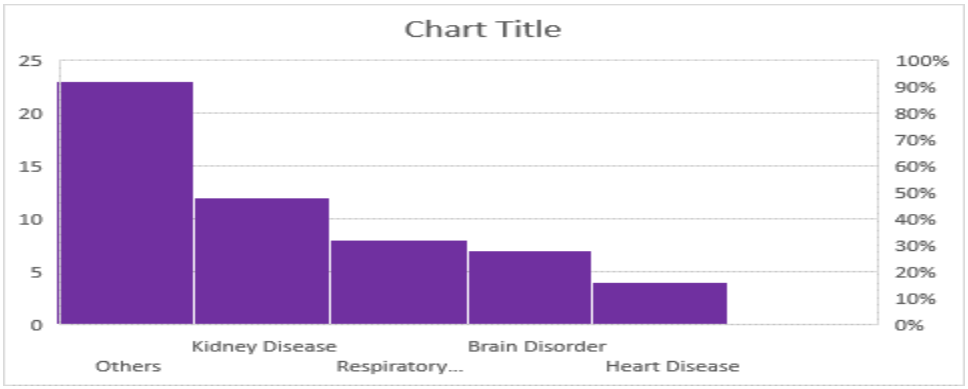

Figure 07: Distribution of Patient According to ADR and Diagnosis

IV. DISCUSSION

The study was carried out to investigate the ceftriaxone use among inpatients in a tertiary care VIMS teaching Hospital in Ballari. A total of 150 prescriptions were collected on the basis of ceftriaxone used by the patients.

In contrast higher number i.e., 1049 prescription were analysed and among them only 120 prescriptions were found to be treated with Ceftriaxone in the study conducted by Yohana Haile Berhe, et al. In contrast a total number of 316

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prescriptions were analysed in the study conducted by Getasew A. Ayinalem, et

The present prospective study observed that Ceftriaxone was given more in males (88) than in females (62).In our hospitals most commonly complaining cases were of Kidney disease (22.2%) followed by respiratory disease (14.8%).

The study included the subjects who are aged more than 18 years and majority of the patients were in the age group of 46 to 60 years. This was strongly in liaison with the study conducted by Yohana Haile Berhe, et al. where the majority of patients were among the age group of 15-65 years. In the study carried out by Kavita Dhar, et al. the males had more adverse effects than female.

In our study only 54 patients got adverse effects out of 150 patients. Among 54 patients 32 were males and 22 were females. The predominance of male sex for ADR's with Ceftriaxone may be due to majority of admitted patients were male with more ceftriaxone use during the study period.

In our study, the duration of ceftriaxone therapy was found to be a high range of 4-7 days (53.3%) which was similar with the study conducted by Firehiwot Amare et al. where the duration was high in the range of 2-7 days (51.69%).

In this study, most of the Adverse drug effects were observed in the age group of 46- 60 (35.1%) followed by 31-45 (26%). A total number of 66 ADRs has been reported (includes one and more than one ADRs) among which Hypersensitivity reaction (22.7%) were found to be more followed by increase in Liver enzymes (21%). In our study 54 patients got ADR in which probable were more (76%) followed by possible (20.3%)

V. CONCLUSION

In our hospital WHO and National Guidelines are strictly followed in General Medicine Wards. Clinical Pharmacist and Clinicians need to play vital role in minimizing the antibiotic associated problems by conducting continuous awareness programs regarding updated prescribing guidelines in the hospital and also can contribute for minimizing the antibiotic resistance.

The adverse effects were highest in patients with kidney impairment (22.2%). The occurrence of Adverse effect while administering Ceftriaxone varies among male and female patients. The adverse effect of Ceftriaxone can be minimized by replacing the antibiotic therapy for the diseased patients

The adverse effects which we observed in our study were hypersensitivity reactions, rashes, diarrhoea, vomiting, abnormalities in LFT and increase in Eosinophils. Among these adverse effects we found that 15 patients got hypersensitivity Reaction (22.7%), 14 patients got abnormalities in LFT (21%), 12 patients got increase in Eosinophils (18.3%), 10 patients got rashes (15.1%), 10 patients got diarrhoea (15.1%), 5 patients got vomiting (7.8%).

The study was conducted to evaluate the adverse effects of Ceftriaxone in the patients during their treatment. Out of total 150 sample size, the number of males were found to be 88(58.6%) and females were 62(41.4%). The age group of 46-60 contributed more number of patients with a percentage of 34% (51). Out of total 150 sample size we have observed adverse effects in 54 patients and among them males were 32 and females were 22. The adverse effects were found more in the age group of 46-60 years (35.1%).

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