Research Article **Pharmacology**

International Journal of Pharma and Bio Sciences

ISSN 0975-6299

"EFFECT OF CEFTAZIDIME ON HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS USING ALBINO WISTAR RAT"

ABHISHEK PRATAP SINGH* AND SAUMYA DAS

Department of Pharmaceutical Technology, N.I.E.T, Gr. Noida. India

ABSTRACT

The aim of present study was to determine the changes in biochemical and haematological parameters in healthy *Albino Wistar* rat after 14-day parenteral treatment with Ceftazidime, a third generation cephalosporin. For the hematological and biochemical studies of Ceftazidime, two groups of animals containing five in each group were taken. One group was control (Group I) while other group was treated (Group II). The animals were treated at intervals of 24h for 14 consecutive days. All doses were injected subcutaneously. Blood samples for evaluation of biochemical and haematological parameters were collected on 1st, 7th and 14th day after treatment. Blood collection was done through retro-orbital site. All the blood samples were collected in EDTA coated vacutainer for RBC counts, total WBC counts, and haemoglobin along with Eosinophiles, Lymphocytes, Monocytes, Basophiles and blood glucose level. For biochemical parameters i.e. Serum Glutamic Oxaloacetic Transaminase (SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT) blood sample was send to commercial laboratory. The drug didn't affect the blood glucose level of the treated rats. The value of SGOT and SGPT was continuously increasing, it means the drug effect the liver enzymes of treated rats. From this study it was concluded that Ceftazidime cause thromocytopenia, neutropenia, lymphocytosis, leukocytosis, eosinophila.

KEYWORDS: **Ceftazidime, Haematological, Biochemical, Eosinophiles, Lymphocytes, Monocytes, SGOT, SGPT.**

ABHISHEK PRATAP SINGH
Department of Pharmaceutical Technology, N.I.E.T, Gr.Noida.india

***Corresponding author**

I. INTRODUCTION

Ceftazidime is an antibiotic useful for the treatment of a number of bacterial infections. It is a third-generation cephalosporin. Ceftazidime is not used to treat viral infections and possesses broad spectrum activity against gram positive and gram negative bacteria. It has been reported to be active against *Pseudomonas* aeruginosa and is used in the empirical therapy of febrile neutropenia, in combination with other antibiotics[1]. Ceftazidime Anhydrous is an anhydrous form of ceftazidime, a third-generation, β lactum cephalosporin antibiotic with bactericidal activity. This group provides improved stability against certain β - lactamase enzymes produced by Gram negative bacteria. These bacterial enzymes rapidly destroy earlier-generation cephalosporins by breaking open the drug's β - lactam chemical ring, leading to antibiotic resistance. Though initially active against these bacteria, with the widespread use of third-generation cephalosporins, some Gram negative bacteria known as extended-spectrum β -lactamases (ESBLs) are even able to inactivate the third-generation cephalosporins. Infections caused by ESBL-producing Gram negative bacteria are of particular concern in hospitals and other healthcare facilities.[2] Similar study was design, by using metronidazole. Several studies had reported its tumorigenic, mutagenic and antimicrobial effects, but there was a dearth of information on its effect on blood chemistry. This study was designed to investigate its effect on haematological parameters in male albino rats.[3] One study was carried by using ceftriaxone on Nigerian local turkey poults to find out effect on haematological and biochemical parameters. The pre-treatment blood and serum samples were collected and the weights of animals were taken before the administration for a period of 4 days. Conclusively, the short term administration on of ceftriaxone may cause eosinophilia, hypobilirubinaemia, hypochloraemia and increased b carbonate ion which may be positive response to hypochloraemia.[4]

II. MATERIALS AND METHODS

Experimental Animals

Adult albino rats weighing between 150 g and 180 g bred in the Central Animal Facility, N.I.E.T; Gr Noida was usedThey were housed under standard laboratory conditions with a 12 hours daylight cycle and had free access to feed and water; they were acclimatized to laboratory conditions for two weeks before the commencement of the experiments. All experiments were carried out in compliance with the recommendations of CPCSEA (Registration Number of animal house: 1121/ac/07/CPCSEA) principles on care and use of animals.

Drug

Injection Ceftazidime 1gm was bought from Religare Pharmacy, Fortis Hospital, Noida. Injection Ceftazidime 1gm was dissolved in 10ml of water for injection.

Experimental Design

Ten animals of either sex were randomly divided into two groups with each group consisting of five rats. The two groups of rats were subjected to the following treatments daily for 14 days: Group I rats received 0.5 ml of distilled water as the control group. Group II rats received injection ceftazidime (1g/kg) via subcutaneously as the treated group. The animals were treated at intervals of 24 h for 14 consecutive days. Group II was treated with antibiotic. Blood samples for evaluation of biochemical and haematological parameters were collected on 1st, 7th and 14th day after treatment. All doses were injected subcutaneously.

Collection of Blood Sample

Blood samples were collected into EDTA coated vacutainer.

Determination of Haematological and Biochemical Parameters

Haematological parameters were determined include haemoglobin count, Red Blood Cell (RBC) count, White Blood Cell (WBC), lymphocyte, neutrophils, eosinophil, platelet counts and clotting time. Haemoglobin count was done by using Sahli- Hellige Haemoglobinometer. RBC count was done using Haemocytometer by red blood diluting pipette and by counting chamber. Similarly WBC count was done. Lymphocyte, neutrophils, and essinophill were counted on slide using chemical with help of microscope. For platelet counts sample was send to commercial laboratory. Blood glucose level was counted by using Glucometer. Biochemical parameters were also determined i.e. Serum Glutamic Oxaloacetic Transaminase **(**SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT). For determination of these parameters, sample was send to outside commercial laboratory.

III. RESULTS

In *vivo* study of haematological and biochemical parameters using cephalosporin on Albino *Wistar* rat was carried out. The following results were calculated.

Group I
Control (0.5ml distilled water)

Parameters	Day 1	Day 7	Day 14
RBC $\times10^6$/µL	5.29	5.27	5.29
Hb g/dL	11	11	11
WBC $\times10^3$/µL	10.30	10.30	10.33
Lymphocytes %	28.75	30	29
Neutrophill %	71.75	71.25	72.67
Monocytes %	3.50	3.49	3.45
Eosinophil$\times10^8$/L	1.75	1.79	1.73
Platelets ×105/µL	2.01	2.06	2
Blood Glucose mg/dL	110	113	110
SGOT U/L	21	22	21
SGPT U/L	33	32	34

Group II
Test (Inj. Ceftazidime)

Parameters	Day 1	Day 7	Day 14
RBC $\times10^6$/µL	5.12	5.33	5.31
Hb g/dL	10.35	10.68	11.10
WBC $\times10^3$/µL	8.83	9.23	8.97
Lymphocytes %	30	32.10	34.21
Neutrophill %	70	69	67.5
Monocytes %	3.75	3.55	3.41
Eosinophil$\times10^8$/L	2.75	3	4.33
Platelets ×105/µL	1.70	1.66	1.61
Blood Glucose mg/dL	110	113	111
SGOT U/L	24	31	42
SGPT U/L	30	45	51

Haematological Parameters
Red Blood Cell Count
The RBC Count was observed in test group i.e. group II on day 1 i.e. 5.12×10^6/µL. But on day 7 it was increased to 5.33×10^6/µL, further on day 14 it was 5.31×10^6/µL which was up to mark. In comparison of control group there was not bigger changes in the RBC count of rat.

Haemoglobin Count
The haemoglobin count of group II albino wistar rat in comparison of control was not too much difference.

White Blood Cell Count
The pattern of decline in WBC count was observed on day 1 i.e. after the injection of drugs. On day 1 the value of RBC count was 8.83×10^3/µL, on day 7 it was slight increase to 9.23×10^3/µL while on day 14 it was again fall down to 8.97×10^3/µL, it means that the injection ceftazidime cause leucopenia.

Lymphocytes
Inj. Ceftazidime causes lymphocytosis in albino wistar rat. After injecting the drug in rats, thenumber of lymphocytes was increases on day 1 i.e. 30% and it was continuously increasing on day 7 was 32.10% while on day 14 it became 34.21%.

Neutrophill
Similarly, the number of neutrophill was on slightly decreases in comparison of control. The value of neutrophill on day 1 was 70% but till day 14 it was decrease to 67.5%. Hence it means that the dug cause neutropenia.

Monocytes
The monocytes count of treated rats was up to mark in comparison of control. No changes were noted down.
Platelets
Thromocytopenia was noted down. The number platelets were gradually decreasing from day 1 to day 14.

Eosinophil
The pattern of increase in eosinophil was noted down. It was continuously increases on day 1 to 2.75×10^8/L, on day 7 it was slight increase to 3×10^8/L. Similarly on day 14, it was 4.33×10^8/L.

Biochemical Parameters
Blood Glucose
The normal range of random blood glucose level is 79 - 140 mg/dl. The drug didn't affect the blood glucose level of the treated rat. It was between normal ranges, 110 to 113 in both the group i.e. control and treated.

SGOT and SGPT
From the table, it was observed that the value of SGOT and SGPT was continuously increasing, it means the drug effect the liver enzymes of treated rats. In control group, there was not much difference was noted down while in treated group II the value of both SGOT and SGPT was increasing.

IV. DISCUSSION

The results of current study showed no alterations in physical parameters were observed throughout the dosing period. The increase in body weight, food and water intake were similar to control group in all dose levels. No significant change group mean body weight was observed in all the groups as compared to control

group on 14th day. The effect of Injection Ceftazidime on haematological and biochemical parameter was observed. It was an in vivo study, in this study albino wistar rats were used and rats were of either sex. Above result was time dependent. This study has revealed that ceftazidime did not cause significant increase in the RBC values. The insignificant change in neutrophil count caused by ceftazidime probably indicates that the ability of the body to attack and destroy invading bacteria, viruses and other injurious agents (Phagocytosis) has been compromised. The significant change in lymphocyte count suggests that the acquired immune response of the body has been compromised by ceftazidime; the non significant change in monocyte count probably indicates that the phagocytic function of the body has not been compromised by ceftazidime. The significant change in eosinophil count probably indicates that the anti-allergic and anti-parasitic Iinfectious response of the body have been compromised by ceftazidime. Also, the significant change in the platelet count caused by ceftazidime could be an indication that it does have the potential to stimulate thrombopoietin production.[5]

V. CONCLUSION

In conclusion, this study confirmed that prolonged administration of ceftazidime may cause thrombocytopaenia considering that the rats used in this study were healthy with normal blood parameters. This drug should be used with great caution in patients with anaemia as a further deterioration of an underlying anaemic condition may result. A full haemogram may be necessary and would be beneficial before and in the course of therapy with this cetazidime. This experiment will guide the clinician while deciding whether to discontinue ceftazidime and monitor the patient closely in the course of therapy and ensure safety. Injection Ceftazidime also cause neutropenia, lymphocytosis, leukocytosis, eosinophila and also changes in liver enzymes. This experiment confirmed our hypothesis that, in therapeutic doses, some drugs may cause changes in some haematological and biochemical values, and therefore may be the reason for incorrect diagnoses and improper medication. Our results could be regarded as data providing information about the possible changes that might occur and could be useful when continuing administration of ceftazidime is needed.

VI. REFERENCES

1. Benko A.S., Cappelletty D.M., Kruse J.A.,Rybak M.J. Continuous infusion versus intermittent administration of ceftazidime in critically ill patients with suspected gram-negative infections. Antimicrobial Agents and Chemotherapy. 40(3): 691- 695,(1996).
2. Sharma M., Pathak S.,Srivastava P. Prevalence and antibiogram of Extended Spectrum β-Lactamase (ESBL) producing Gram negative bacilli and further molecular characterization of ESBL producing Escherichia coli and Klebsiella species. Journal of Clinical and Diagnostic Research.7 (10):2173 –2177,(2013).
3. Oyedeji K.O., Bolarinwa AF. Effect of Metronidazole on Haematological Parameters in Male Albino Rats. IOSR Journal of Dental and Medical Sciences. 3(5):61-63, (2013.
4. Saganuwan A. Effects of Ceftriaxone on Haematological and Biochemical Parameters of Turkey. Animal Research International. 3(3):562 565, (2006).
5. Oh Y.R.,, Carr-Lopez S.M., Probasco J.M., Crawley P.G. Levofloxacin-induced autoimmune hemolytic anemia. Annals of Pharmacotherapy. 37(7–8):1010–1013.