

# Comparison of Efficacy of Intravenous Ciprofloxacin and Ceftriaxone in the Management of Spontaneous Bacterial Peritonitis in patient of Liver Cirrhosis

Ghazanfar Ali Sandhu, Zaheer Ahmad, Ghulam Abbas Tahir, Jamshaid Mumtaz

## Authors

- 1. Dr. Ghazanfar Ali Sandhu**  
Associate Professor of Medicine,  
Punjab Medical College, Faisalabad
- 2. Dr. Zaheer Ahmad**  
Senior Registrar Medical Unit I,  
Sir Ganga Ram Hospital, Lahore
- 3. Dr. Ghulam Abbas Tahir**  
Senior Registrar Medical Unit I,  
Allied Hospital, Faisalabad
- 4. Dr. Jamshaid Mumtaz**  
Medical Officer,  
DHQ Hospital, Jhang

## Corresponding Author

**Dr. Zaheer Ahmad**  
Medical Officer Medical Unit I, Sir  
Ganga Ram Hospital, Lahore  
Contact: +92 345-7946168  
Email: truemans228@gmail.com

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## ABSTRACT

Cirrhosis of liver is a very common problem that is associated with a very high mortality & morbidity in Pakistan. Liver cirrhosis is the result of liver cell damage that results in attempts at regeneration. This interplay of damage and repair leads to nodularity of liver. Spontaneous Bacterial Peritonitis is a serious and common complication requiring urgent treatment. It has deadly consequences if not treated immediately. **Objective:** Our objective was to compare the efficacy of intravenous ciprofloxacin and ceftriaxone in the management of spontaneous bacterial peritonitis (SBP) in patients of cirrhosis. **Design:** Randomized controlled trial. **Setting:** Medical Unit I, Allied Hospital, Faisalabad. **Duration:** 04-02-2013 to 03-08-2013. **Methodology:** Patients of liver cirrhosis who fulfilled the inclusion criteria were selected. Patients were divided randomly in two groups (Group A and B). In group A, 226 patients were given intravenous ciprofloxacin 200mg 12 hourly for 5 days and in group B 226 patients were given ceftriaxone 1g 12 hourly for 5 days and efficacy of treatment was determined by resolution of clinical symptoms, i.e. decrease in temperature, no abdominal pain, ascitic fluid examination after 5 days of treatment. **Results:** The mean age in group A was 49.9±9.2 years and in group B was 47.5±10.1 years. In group A, 110 (48.7%) were male patients and 116 (51.3%) were female patients. In group B 116 (51.3%) were male patients and 110 (48.7%) female patients. Treatment was efficacious 166(73.5%) patients in group A and 184(81.4%) patients in group B (p-value 0.055). **Conclusion:** It the conclusion of the study is that intravenous ciprofloxacin is as effective as ceftriaxone in the treatment of SBP in cirrhotic patients. **Keywords:** Spontaneous bacterial peritonitis, efficacy, ciprofloxacin, ceftriaxone, liver cirrhosis.

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## INTRODUCTION

Liver Cirrhosis is a chronic disorder of liver resulting in degeneration of liver cells leading to fibrosis and regenerating nodules leading to portal hypertension and its complications.<sup>1</sup> Cirrhosis of liver is a very common problem that results in very high mortality & morbidity in Pakistan. In Pakistan, the commonest cause of liver cirrhosis is chronic viral hepatitis.<sup>2</sup> Prevalence of Hepatitis C and Hepatitis B is 4.8% & 2.5%, respectively, which reflects an overall prevalence rate of 7.6% in the general population.<sup>3</sup> SBP is an ascitic fluid infection without obvious infection source inside abdomen that usually occurs in advanced liver disease. It is seen in 30% of patients with hepatic cirrhosis having ascities.<sup>4</sup> Mortality rate is between 20 to 40%.<sup>5</sup>

A symptomatic spontaneous bacterial peritonitis can present as first presentation of ascites in chronic liver disease patients.<sup>6</sup>

Cefotaxime or ceftazidime were considered the first-choice antibiotic for empirical treatment in patients of cirrhosis developing spontaneous bacterial peritonitis. It has been suggested that ciprofloxacin could be an alternative to ceftazidime or ceftriaxone in cirrhotic patients developing spontaneous bacterial peritonitis. The resolution of spontaneous bacterial peritonitis was found 82 % vs. 91% in intravenous ciprofloxacin and ceftriaxone groups respectively.<sup>7</sup>

All cases of SBP are caused by a single bacterial infection.<sup>8</sup> Most common bacteria are enteric gram-

negative bacteria (Klebsiella pneumonia, E coli) or gram-positive bacteria (Streptococcus pneumoniae, Enterococcus species, viridans streptococci). Anaerobic bacteria do not cause SBP.<sup>9</sup>

Ciprofloxacin is as effective as ceftriaxone & cefotaxime in the empirical treatment of spontaneous bacterial peritonitis in patients of cirrhosis and is less expensive with advantage of oral administration.<sup>10</sup>

The aim of our study was to identify the preferred antibiotic in treatment of spontaneous bacterial peritonitis among intravenous ciprofloxacin and intravenous ceftriaxone as an empirical therapy.

## OBJECTIVE

Our objective was to compare the efficacy of intravenous ciprofloxacin and ceftriaxone in the management of spontaneous bacterial peritonitis (SBP) in patient with liver cirrhosis.

### Operational definitions

**Efficacy:** Efficacy of the drugs was defined as if all symptoms of spontaneous bacterial peritonitis (SBP) resolve completely up to five days i.e. decrease in temperature by using thermometer to 98.6 °F, no abdomen pain by palpatory method on clinical examination of abdomen and decrease in ascitic fluid polymorphic neutrophil count < 250/mm<sup>3</sup>.

**Spontaneous bacterial peritonitis:** SBP is defined as a patient of liver cirrhosis with all of the following:

1. Abdomen pain
2. Fever more than 98.6°F
3. Ascitic fluid Neutrophil count should be more than 250/mm<sup>3</sup>

**Null hypothesis:** There is no difference in efficacy of Intravenous ciprofloxacin and ceftriaxone management of SBP in patients of liver cirrhosis with ascites.

**Alternate hypothesis:** There is a difference in efficacy of Intravenous ciprofloxacin and ceftriaxone management of SBP in patients of cirrhosis with ascites.

## METHODOLOGY

**Setting:** This study was conducted in Medical Unit I, Allied Hospital, Faisalabad.

**Study design:** Randomized controlled trial

**Sample size:** Sample size was calculated using who sample size calculator for two proportions (2-sided). Sample size = 452 (226 in each group)

**Study duration:** From 04-02-2013 to 03-08-2013.

**Sampling technique:** Non-probability purposive sampling

### Inclusion criteria:

1. Patients 16 years to 60 years.
2. Patients of liver cirrhosis with SBP as mentioned in operational definition.

### Exclusion criteria:

1. Hemorrhagic ascites (on ascitic fluid examination RBC >50000/mm<sup>3</sup>)
2. Peritonitis due to trauma or surgery.

**Data collection procedure:** After taking approval from Hospital Ethical Review Committee, all the patients of liver cirrhosis fulfilling the inclusion criteria were selected from Medical Units of Allied Hospital Faisalabad. Informed consent was taken. Demographic characteristics like age, sex and addresses were recorded.

Diagnosis of SBP was made on history and clinical examination and diagnostic ascitic fluid aspiration was performed by sterile method with 20 cc syringe for the ascitic fluid examination. Patients were divided randomly in two groups by using Computer generated random number table (Group A and B). In group A, 226 patients were given intravenous ciprofloxacin 200mg 12 hourly for 5 days and in group B 226 patients on ceftriaxone 1g 12 hourly for 5 days. Efficacy of treatment was determined by means of evaluating clinical symptoms, i.e. decrease in temperature by using thermometer to normal 98.6°F, no abdominal pain by palpatory method on clinical examination of abdomen, ascitic fluid examination for neutrophil count in 20 cc ascitic fluid obtained by paracentesis by sterile method in Hospital laboratory after 5 days of treatment. All the collected information was recorded on a performa.

### Statistical analysis

All the collected data was entered into SPSS versions 20 and analyzed. Quantitative variable like age, weight, temperature and ascitic fluid polymorphonuclear neutrophil count were presented as mean and standard deviation. Qualitative variables like sex and abdominal pain and efficacy were presented as frequency and percentage. The efficacy was compared between the two groups by using Chi Square test. P value of <0.05 was considered as significant.

## RESULTS

The mean age of the patients in group A was 49.9±9.2 years and in group B was 47.5±10.1 years. Out of 452 patients, 226 patients (50%) were male and 226 (50%) were female. (Table 1)

In group A, there were 110 (48.7%) male patients and 116 (51.3%) female patients. In group B there were 116 (51.3%) male patients and 110 (48.7%) female patients (Table 2).

166 (73.5%) patients had efficacy of treatment in group A and 184 (81.4%) patients had efficacy of treatment in group B (p-value 0.055) (Table 3).

**Table 1: Distribution of patients by age**

Age (Years)	Group A (n=226)		Group B (n=226)	
	No.	Percentage	No.	Percentage
16-20	6	2.7	7	3.1
21-30	4	1.8	10	4.4
31-40	31	13.7	47	20.8
41-50	87	38.4	82	36.3
51-60	98	43.4	80	35.4
Mean±SD	49.9±9.2		47.5±10.1	

**Table 2: Distribution of patients by gender**

Sex	Group A (n=226)		Group B (n=226)		Total	
	No.	Percentage	No.	Percentage	No.	%age
Male	110	48.7	116	51.3	226	50
Female	116	51.3	110	48.7	226	50
Total	226	100.0	226	100.0	452	100

**Table 3: Patients distribution by efficacy of treatment**

		Group		Total
		A (n=226)	B (n=226)	
Efficacy	Yes	166(73.5%)	184(81.4%)	350
	No	60(26.5%)	42(18.6%)	102
Total		226(100%)	226(100%)	452
p-value		0.055		

## DISCUSSION

SBP is the bacterial infection of the ascitic fluid in cirrhotic liver without any obvious intraabdominal source of infection. It is a potentially fatal complication of cirrhosis with ascites. Infection related mortality associated with SBP is upto 27% even with standard treatment.<sup>11</sup>

A symptomatic SBP can be present as first presentation of ascites in chronic liver disease patients. Early diagnosis and prompt treatment with antibiotic can save patients lives. Different options in antibiotics are ceftriaxone, cefotaxime, ampicillin, ciprofloxacin ofloxacin and metronidazole.

SBP involves the bacterial translocation from the intestinal lumen to the lymph nodes, with subsequent bacteremia and infection of the ascitic fluid. *E. coli* is the commonest organism followed by streptococcal pneumoniae.<sup>12</sup> Symptoms of infection occur in most patients with SBP including abdominal pain, fever, mental status changes and ileus.

Cefotaxime or ceftriaxone are considered the first-choice antibiotic for empirical treatment in patients of cirrhosis developing SBP. It has been suggested that ciprofloxacin could be an alternative to cefotaxime or ceftriaxone in patients of cirrhosis developing SBP. The resolution of SBP was found 80% vs. 83% in intravenous ciprofloxacin and ceftriaxone groups respectively. These results suggest that orally ciprofloxacin is as effective as ceftriaxone & cefotaxime in the empirical treatment of SBP in patients of cirrhosis, and is also less expensive and can be administered orally. In our study in group A, 73.5% patients had efficacy of treatment and in group B, 81.4% patients had efficacy of treatment. As compared with the study of Tuncer et al the efficacy of treatment was found 80% vs. 83% in intravenous ciprofloxacin and ceftriaxone groups respectively.<sup>13</sup>

In our study the mean age of the patients in group A was 49.9±9.2 years and in group B was 47.5±10.1 years. As compared with the study of Fransa et al the mean age of the patients was 45 years, which is comparable with our study.<sup>14</sup> In our study, in group A, there were 48.7% male patients and 51.3% female patients. In group B there were 51.3% male patients and 48.7% female patients. As compared with the study of Fransa et al there were 70% male and 30% female patients, which is comparable with our study.<sup>14</sup> In another study conducted by Fransa et al the efficacy of treatment on day 5 of ceftriaxone was achieved in 73% of the patients, which is almost same and comparable with our study.<sup>14</sup>

According to the study of Angeli et al intravenous-oral step-down schedule was possible in 82% patients who received ciprofloxacin; in which 74% patients were discharged before the end of antibiotic treatment and completed it at home.<sup>15</sup>

Eighty patients were allocated to receive ciprofloxacin. Intravenous 200 mg/12 h for 7 days (group A, n= 40) or i.v. 200 mg/12 h during 2 days followed by oral 500 mg/12 h for 5 days (group B, n=40). All patients with SBP admitted to the hospital were included. The infection resolution rate was

76.3% in group A and 78.4% in group B.<sup>16</sup> It is also true in other pathogens like urosepsis etc.<sup>17</sup> On the above discussion it is concluded that intravenous ciprofloxacin is as effective as ceftriaxone in the treatment of SBP in patients of cirrhosis.

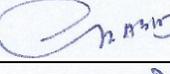
## CONCLUSION

It is concluded from this study that intravenous ciprofloxacin is as effective as ceftriaxone in the treatment of SBP in patients of cirrhosis.

## REFERENCES

- Lawrence S, Friedmon MD. Liver, biliary tract and pancreas. In: Tierney LM, Stephen J, editors. Current medical diagnosis and treatment. 51th ed. New York: McGraw -Hill; 2012. p. 644-98.
- Memon MS, Zaki M. Burden of Chronic Liver Disease and Liver Transplantation in Sindh. J LUMHS. 2013;12:01:1-2.
- Qureshi H, Bile KM, Jooma R, Alam SE, Afridi HU. Prevalence of hepatitis B and C viral infections in Pakistan: findings of a national survey appealing for effective prevention and control measure. East Mediterr Health J. 2010;16 Suppl:S15-23.
- Koulaouzidis A. Diagnosis of spontaneous bacterial peritonitis: an update on leucocyte esterase reagent strips. World J Gastroenterol. 2011;17:1091-4.
- Alaniz C, Rega RE. Spontaneous bacterial peritonitis: a review of treatment options. Pharm Ther. 2009;34:204-10.
- Kasztelan-Szczerbinska B, Słomka M, Celinski K, Serwacki M, Szczerbinski M, Cichoz-Lach H. Prevalence of spontaneous bacterial peritonitis in asymptomatic inpatients with decompensated liver cirrhosis - a pilot study. Adv Med Sci. 2011;56:13-7.
- Khan I, Subhan F, Khan Z. Spontaneous bacterial peritonitis. Comparison of treatment with ciprofloxacin and ceftriaxone in patients with cirrhosis liver and ascites. Professional Med J. 2012;19:482-7.
- Reuken PA, Pletz MW, Baier M, Pfister W, Stallmach A, Bruns T. Emergence of spontaneous bacterial peritonitis due to enterococci - risk factors and outcome in a 12-year retrospective study. Aliment Pharmacol Ther. 2012;35(10):1199-208.
- Kenneth R, McQuaid MD. Gastrointestinal disorders. In: Stephen J, Maxine AP, editors. Current medical diagnosis and treatment. 51st ed. New York: McGraw -Hill; 2012:546-643.
- Sunil K. Taneja and Radha K. Dhiman, "Prevention and Management of Bacterial Infections in Cirrhosis," Int J Hepatol. 2011;2011:784540.
- Desai AP, Reau N, Reddy KG, et al. Persistent spontaneous bacterial peritonitis: a common complication in patients with spontaneous bacterial peritonitis and a high score in the model for end-stage liver disease. Therap Adv Gastroenterol. 2012;5(5): 275-83.
- Shah BA, Singh G, Naik MA, Dhobi GN. Bacteriological and clinical profile of Community acquired pneumonia in hospitalized patients. Lung India. 2010;27(2):54-7.
- Tuncer I, Topcu N, Durmus A, Turkdogan MK. Oral ciprofloxacin versus intravenous cefotaxime and ceftriaxone in the treatment of spontaneous bacterial peritonitis. Hepatogastroenterology. 2003;50(53):1426-30.
- Fransa A, Giordano HM, Seva-Pereira T, Soares EC. Five days of ceftriaxone to treat spontaneous bacterial peritonitis in cirrhotic patients. J Gastroenterol. 2002;37(2):119-22.
- Angeli P, Guarda S, Fasolato S, Miola E, Craighero R, Piccolo F, et al. Switch therapy with ciprofloxacin vs. intravenous ceftazidime in the treatment of spontaneous bacterial peritonitis in patients with cirrhosis: similar efficacy at lower cost. Aliment Pharmacol Ther. 2006;23(1):75-84.
- Terg R, Cobas S, Fassio E, Landeira G, Rios B, et al. Oral ciprofloxacin after a short course of intravenous ciprofloxacin in the treatment of spontaneous bacterial peritonitis: results of a multicenter randomized study. J Hepatol. 2000;33(4):564-9.
- Javed MS, Subhani GM, Tahir S, Javed SH. Significance of Indwelling Time for Bacterial Colonization of Double J Stents. APMC. 2016;10(1):36-40

## AUTHORSHIP AND CONTRIBUTION DECLARATION

Name of Author	Contribution to the paper	Author's Signatures
Dr. Ghazanfar Ali Sandhu	Main Author, Principal Investigator	
Dr. Zaheer Ahmad	Proof Reading and manuscript writing	
Dr. Ghulam Abbas Tahir	References and Data collection	
Dr. Jamshaid Mumtaz	Co-Author	