

Original Research Article

Study of liver function tests and spontaneous bacterial peritonitis in a patients of liver cirrhosis

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ABSTRACT

Background: Liver cirrhosis patients are highly susceptible to bacterial infections specially Spontaneous bacterial peritonitis (SBP) which is commonest infection. this study undertaken to understand liver function tests and Spontaneous bacterial peritonitis in patients of liver cirrhosis admitted to tertiary care hospital.

Methods: A descriptive cross-sectional study conducted among Liver cirrhosis patients in tertiary care center. Total 100 liver cirrhotic patients were included in present study. All the patients were subjected for biochemical evaluation of Serum albumin and globulin level, Serum bilirubin, SGOT (Serum glutamic oxaloacetic transaminase), SGPT (Serum glutamic pyruvate transaminase) and Ascitic fluid polymorph nuclear neutrophil (PMN) count to diagnose SBP.

Results: Spontaneous bacterial peritonitis was present in 12% patients. Relation of Serum bilirubin level and SBP was statistically significant. Relation of serum SGOT, SGPT level and serum globulin between SBP and non-SBP group was statistically non-significant.

Conclusions: Liver cirrhosis patients are susceptible for bacterial infections because of defects in various host defense mechanism and hence patients of liver cirrhosis must be screened for spontaneous bacterial peritonitis along with liver function tests.

Keywords: Liver cirrhosis, Polymorph nuclear neutrophil, Spontaneous bacterial peritonitis

INTRODUCTION

Liver Cirrhosis is the commonest hepatological disorder found. clinically Liver cirrhosis was commonly indolent, asymptomatic and unsuspected until complications of liver disease present. The etiology of hepatic cirrhosis was commonly detected by the patient's history combined with serologic and histologic examination. Commonest causes of liver cirrhosis in western world are Alcoholic liver disease and hepatitis C infection, whereas Hepatitis B is commonly seen in Asia and sub-Saharan Africa. Asymptomatic liver cirrhosis was commonly diagnose by screening tests like liver transaminases or

radiologic findings patients undergoing additional evaluation and liver biopsy.¹

Liver cirrhosis patients were highly susceptible to bacterial infections due to defects in numerous host defense mechanism.² Spontaneous bacterial peritonitis (SBP) was commonest infection in cirrhotic patients followed by urinary tract infections (UTIs), pneumonia, and bacteremia.³ SBP was a commonest infection among patients with cirrhosis and ascites. Apparently, infection can be diagnosed up to 30% of cirrhosis patients with ascites. SBP is associated with significant mortality and morbidity.^{3,4} Intestinal bacterial translocation, altered

immunity and the presence of ascites were the commonest mechanisms for development of SBP.^{5,6}

Spontaneous bacterial peritonitis (SBP) define as 'bacterial infection of ascitic fluid and peritoneum in patients with ascites in absence of any intra-abdominal source of infection or malignancy.⁷⁻¹⁰ SBP diagnosed by a counting of polymorph nuclear neutrophil (PMN) in ascitic fluid equal to or more than 250/mm³. SBP was firstly described in the English medical literature during 1960s, its prognosis was very poor along with 100% hospital mortality.¹¹ However, recently, the consequence of SBP had been noticeably improving due to early diagnosis and the introduction of effective antibiotics. SBP was commonest infection in patients with ascites and cirrhosis. Apparently, this infection could be diagnose up to 30% among cirrhotic patients with ascites who were admitted to the hospital 3.5% of out-patients who were usually asymptomatic.⁹ Once SBP develops, the prognosis of cirrhosis worsens. SBP was associated with significant morbidity and mortality.^{2,3}

There were many advances were occurring in management of liver cirrhosis and complications of end stage liver disease. Majority of studies mainly focused on treating the underlying cause of liver cirrhosis and Portal hypertension.¹ Limited studies had performed for evaluating both LFT's and SBP among liver cirrhosis patients. Present study was conducted with the aim of evaluating liver function tests and spontaneous bacterial peritonitis among liver cirrhosis patients, a descriptive cross-sectional had been planned in tertiary care center.

METHODS

A descriptive cross-sectional study conducted among Liver cirrhosis patients in tertiary care center. Total 100 liver cirrhotic patients were included in present study. All the patients were subjected for biochemical evaluation of Serum albumin and globulin level, Serum bilirubin, SGOT, SGPT and Ascitic fluid PMN count to diagnose SBP.

Approval taken from the Institutional Ethical Committee before commencing the study. Written and Informed Consent obtained from all patients. The patients informed regarding the purpose of the study in their own vernacular language.

Statistical analysis

Data management and analysis was done using Microsoft excel, Epi-info and analyzed by Using IBM SPSS software version 20.0. The categorical variables were assessed using Pearson chi-square.

Inclusion criteria

- Age more than 12 years.
- All patients with liver cirrhosis

Exclusion criteria

- Pregnant women with liver cirrhosis with ascites
- Other causes of peritonitis.

RESULTS

In present study, majority of the liver cirrhosis patients' ascitic fluid sample findings showing <100 PMN/ μ L (85%), followed by 12% patients who had >2500 PMN/ μ L and 3% patients who had 100 - 250 PMN/ μ L. This indicates that 12% liver cirrhosis patients had Spontaneous bacterial peritonitis (SBP) (Table 1).

Table 1: Distribution of patients based on Ascitic fluid PMN level.

Distribution of patients based on ascitic fluid PMN level		
Ascitic fluid polymorph nuclear neutrophils	No. of patients	Percent
<100 PMN/ μ L	85	85.0
100 - 250 PMN/ μ L	3	3.0
>250 PMN/ μ L	12	12.0
Total	100	100.0

Among liver cirrhosis patients with SBP (n=12), 75% patients had serum bilirubin level between 1.3 - 5 mg/dl and 25% had >5 mg/dl. While among liver cirrhosis patients who did not had SBP (n=88), 39.8% patients had serum bilirubin level in normal range (\leq 1.2 mg/dl), 59.1% had serum bilirubin between 1.3 - 5 mg/dl and 1.1% had >5 mg/dl. By applying Chi square test, the relationship of SBP with Serum bilirubin level was found to be statistically significant ($p < 0.05$) (Table 2).

Table 2: Distribution of all patients based on SBP and Serum Bilirubin level.

Distribution of all patients based on SBP and Serum Bilirubin level			
Serum Bilirubin level	Spontaneous bacterial peritonitis (SBP)		Total (%)
	Present (%)	Absent (%)	
\leq 1.2 mg/dl (normal range)	0	35 (39.8)	35 (35.0)
1.3 - 5 mg/dl	9 (75.0)	52 (59.1)	61 (61.0)
>5 mg/dl	3 (25.0)	1 (1.1)	4 (4.0)
Total	12 (100.0)	88 (100.0)	100 (100.0)

Chi square test = 20.25, df = 2, p value <0.001.

Among liver cirrhosis patients with SBP (n=12), 41.7% patients had serum SGOT (Serum glutamic oxaloacetic transaminase) level in normal range (≤ 40 IU/L) and 58.3% had SGOT level >40 IU/L. While among liver cirrhosis patients who did not had SBP (n=88), 35.2% patients had SGOT level ≤ 40 IU/L and 64.8% had SGOT level >40 IU/L. By applying Fisher exact test, the relationship of SBP with Serum SGOT level was found to be statistically non-significant ($p>0.05$) (Table 3).

Among liver cirrhosis patients with SBP (n=12), 75% patients had serum SGPT (Serum glutamic pyruvate transaminase) level in normal range (≤ 56 IU/L) and 25% had SGPT level >56 IU/L. While among liver cirrhosis patients who did not had SBP (n=88), 48.9% patients had SGPT level ≤ 56 IU/L and 51.1% had SGPT level >56 IU/L. By applying Chi square test, the relationship of SBP with Serum SGPT level was found to be statistically non-significant ($p>0.05$) (Table 4).

Table 3: Distribution of all patients based on SBP and SGOT level.

Distribution of all patients based on SBP and SGOT level			
SGOT (Serum Glutamic Oxaloacetic Transaminase)	Spontaneous bacterial peritonitis (SBP)		
	Present (%)	Absent (%)	Total (%)
≤ 40 IU/L (normal range)	5 (41.7)	31 (35.2)	36 (36.0)
> 40 IU/L	7 (58.3)	57 (64.8)	64 (64.0)
Total	12 (100.0)	88 (100.0)	100 (100.0)

Fisher Exact test, df = 1, p value 0.752

Table 4: Distribution of all patients based on SBP and SGPT level.

Distribution of all patients based on SBP and SGPT level			
SGPT (Serum Glutamic Pyruvate Transaminase)	Spontaneous bacterial peritonitis (SBP)		
	Present (%)	Absent (%)	Total (%)
≤ 56 IU/L (normal range)	9 (75.0)	43 (48.9)	52 (52.0)
> 56 IU/L	3 (25.0)	45 (51.1)	48 (48.0)
Total	12 (100.0)	88 (100.0)	100 (100.0)

Chi square test = 2.89, df = 1, p value 0.089

Table 5: Distribution of all patients based on SBP and Serum Albumin level.

Distribution of all patients based on SBP and Serum albumin level			
Serum Albumin level	Spontaneous bacterial peritonitis (SBP)		
	Present (%)	Absent (%)	Total (%)
< 3.5 gm/dl	9 (75.0)	62 (70.5)	71 (71.0)
3.5 - 5.5 gm/dl (normal range)	3 (25.0)	26 (29.5)	29 (29.0)
Total	12 (100.0)	88 (100.0)	100 (100.0)

Fisher Exact test, df = 1, p value 1.000

Table 6: Distribution of all patients based on SBP and Serum Globulin level.

Distribution of all patients based on SBP and Serum Globulin level			
Serum Globulin level	Spontaneous bacterial peritonitis (SBP)		
	Present (%)	Absent (%)	Total (%)
<2 gm/dl	0	2 (2.3)	2 (2.0)
2 - 3.5 gm/dl (normal range)	4 (33.3)	55 (62.5)	59 (59.0)
>3.5 gm/dl	8 (66.7)	31 (35.2)	39 (39.0)
Total	12 (100.0)	88 (100.0)	100 (100.0)

Chi square test = 4.472, df = 2, p value 0.107

Among liver cirrhosis patients with SBP (n=12), 75% patients had serum albumin level <3.5 gm/dl and 25% had Serum albumin level in normal range (3.5 - 5.5 gm/dl). While among liver cirrhosis patients who did not had SBP (n=88), 70.5% patients had Serum albumin level

<3.5 gm/dl and 29.5% had Serum albumin level 3.5 - 5.5 gm/dl. By applying Fisher exact test, the relationship of SBP with Serum albumin level was found to be statistically non-significant ($p>0.05$) (Table 5).

Among liver cirrhosis patients with SBP (n=12), 33.3% patients had serum globulin level in normal range (2 - 3.5 gm/dl) and 66.7% had Serum globulin level >3.5 gm/dl. While among liver cirrhosis patients who did not had SBP (n=88), 2.3% had serum globulin level <2 gm/dl, 62.5% patients had Serum globulin level 2 - 3.5 gm/dl and 35.2% had Serum globulin level >3.5 gm/dl. By applying Chi square test, the relationship of SBP with Serum globulin level was found to be statistically non-significant (p>0.05) (Table 6).

DISCUSSION

Liver cirrhosis patients were susceptible for bacterial infections because of defects in various host defense mechanism.^{2,12} SBP (Spontaneous bacterial peritonitis) was the commonest infection in patients who had liver cirrhosis, other infections were bacteremia, UTI (urinary tract infections) and pneumonia.³ Spontaneous bacterial peritonitis was diagnose by absolute neutrophil count more than 250 cells/mm³ in ascitic fluid samples. All patients suffering from cirrhosis and ascites were at higher risk of getting SBP and the prevalence of SBP in outpatients was 1.5% to 3.5% and around 10% to 30% in hospitalized patient. A delay in detecting spontaneous bacterial peritonitis was leads to fatal outcome among hepatic cirrhosis patient. A descriptive cross-sectional study conducted in 100 Liver cirrhotic patients at tertiary care center. In India, prospective study conducted by Harchand et al, for monitoring the clinical and bacteriological profiles of bacterial infections in 113 cirrhosis patients.¹³ A hospital based cross sectional study conducted by Manohar and Shejpal in 100 liver cirrhosis patients having ascities for observing the spontaneous bacterial peritonitis.¹⁴ In Pakistan, cross sectional study conducted by Bibi et al, in 152 liver cirrhosis patients with ascites, for determining the laboratory and clinical features, bacterial organism and antibiotic sensitivity pattern of SBP.¹⁵

In Nigeria, Oladimeji et al, conducted study in 31 liver cirrhosis patients for evaluating the prevalence of SBP.¹⁶ In Korea, Heo et al, had conducted multicenter retrospective study in 145 hepatic cirrhosis patients for recording the clinical features and prognosis of SBP.¹⁷

Liver function test in spontaneous bacterial peritonitis

In this study, among SBP patients, 100% patients had serum bilirubin level above normal level (1.2 mg/dl) though among non-SBP patients, 60.2% patients had serum bilirubin level above normal level and this relationship was statistically significant (p<0.05). Harchand et al, had found non-significantly higher mean higher mean value of serum bilirubin in non-SBP patients (10.8±9.6 mg/dl) comparing to SBP patients (8.8±8 mg/dl), however among both groups mean value of serum bilirubin was above normal value.¹³ Bibi et al, had found that there was non-significantly lower level of serum bilirubin among SBP patients (2.6±2.7 mg/dl) comparing

to patients who did not had spontaneous bacterial peritonitis (4.2±6.3 mg/dl).¹⁵

In current study, among SBP patients, 58.3% had serum SGOT (Serum glutamic oxaloacetic transaminase) level above normal range (>40 IU/L) though among non-SBP patients, 64.8% had SGOT level above normal level. This relation serum SGOT level and SBP presence was statistically non-significant (p>0.05). However, 25% SBP patients had serum SGPT (Serum glutamic pyruvate transaminase) level above normal (>56 IU/L) and 51.1% non-SBP patients had SGOT level above normal level. This relation of serum SGPT level among SBP and non-SBP group was statistically non-significant. A study by Syed et al, had found that among SBP group patients mean values of serum SGOT and SGPT (102±78.8 IU/L and 45.3±28.4 IU/L respectively) was lower comparing to non-SBP patients (141.9±163.8 IU/L and 58.8±45.5 IU/L respectively).¹⁸

In present study, SBP patients, 75% had serum albumin level below normal range but among non-SBP patients (n=88), 70.5% had below normal serum albumin level and this relationship of was statistically non-significant (p>0.05). However, 66.7% SBP patients had Serum globulin level above normal range (>3.5 gm/dl) while 2.3% non-SBP patients had serum globulin level below normal (<2 gm/dl) and 35.2% non-SBP patients had serum globulin level above normal, this relationship was statistically non-significant (p>0.05). A study by Harchand et al, had found lower level of serum albumin in SBP patients (2.3±0.5 gm/dl) compared to non-SBP patients (2.4±0.5 gm/dl) and this was statistically non-significant.¹³ Similarly a study by Bibi et al, had also found non-significantly lower level of serum albumin among SBP patients (2.6±0.8 gm/dl) comparing to patients with non-spontaneous bacterial peritonitis (2.7±0.7 gm/dl).¹⁵

CONCLUSION

Liver cirrhosis patients are susceptible for bacterial infections because of defects in various host defense mechanism and hence patients of liver cirrhosis must be screened for spontaneous bacterial peritonitis along with liver function tests.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Schuppan D, Afdhal NH. Liver Cirrhosis. *Lancet.* 2008 Mar 8;371(9615):838-51.
- Such J, Runyon BA. Spontaneous bacterial peritonitis. *Clin Infect Dis.* 1998;669-74.
- Fernández J, Navasa M, Gómez J, Colmenero J, Vila J, Arroyo V, et al. Bacterial infections in

- cirrhosis: epidemiological changes with invasive procedures and norfloxacin prophylaxis. *Hepato*. 2002;35(1):140-8.
4. Tandon P, Garcia-Tsao G. Renal dysfunction is the most important independent predictor of mortality in cirrhotic patients with spontaneous bacterial peritonitis. *Clin Gastroenterol Hepato*. 2011;9(3):260-5.
 5. Wiest R, Lawson M, Geuking M. Pathological bacterial translocation in liver cirrhosis. *J Hepato*. 2014;60(1):197-209.
 6. Lutz P, Nischalke HD, Strassburg CP, Spengler U. Spontaneous bacterial peritonitis: The clinical challenge of a leaky gut and a cirrhotic liver. *World J Hepato*. 2015;7(3):304.
 7. Wiest R, Krag A, Gerbes A. Spontaneous bacterial peritonitis: recent guidelines and beyond. *Gut*. 2011;2011.
 8. Nobre SR, Cabral JEP, Gomes JFF, Leitão MC. In-hospital mortality in spontaneous bacterial peritonitis: a new predictive model. *Eur J Gastroenterol Hepato*. 2008;20(12):1176-81.
 9. Evans LT, Kim WR, Poterucha JJ, Kamath PS. Spontaneous bacterial peritonitis in asymptomatic outpatients with cirrhotic ascites. *Hepato*. 2003;37(4):897-901.
 10. Caly WR, Strauss E. A prospective study of bacterial infections in patients with cirrhosis. *J Hepato*. 1993;18(3):353-8.
 11. Conn HO. Spontaneous peritonitis and bacteremia in Laennec's cirrhosis caused by enteric organisms: a relatively common but rarely recognized syndrome. *Ann Intern Med*. 1964;60(4):568-80.
 12. Runyon BA. Early events in spontaneous bacterial peritonitis. *Gut*. 2004;53(6):782-4.
 13. Harchand P, Gupta V, Ahluwalia G, Chhina R. Clinical and Bacteriological Profile of Spontaneous Bacterial Peritonitis in Cirrhotic Patients. *J Gastrointest Infect*. 2017;7(1):15-20.
 14. Manohar TP, Shejpal A. Spontaneous bacterial peritonitis in patients of cirrhosis of liver with ascites. *Int J Infect Dis*. 2016;45:142.
 15. Bibi S, Ahmed W, Arif A, Khan F, Alam SE. Clinical, Laboratory and Bacterial Profile of Spontaneous Bacterial Peritonitis in Chronic Liver Disease Patients. *J Coll Physicians Surg Pakistan*. 2015;25(2):95-9.
 16. Oladimeji AA, Temi AP, Adekunle AE, Taiwo RH, Ayokunle DS. Prevalence of spontaneous bacterial peritonitis in liver cirrhosis with ascites. *Pan Afr Med J*. 2013 Aug 9;15:128.
 17. Heo J, Seo YS, Yim HJ, Hahn T, Park SH, Ahn SH, et al. Clinical features and prognosis of spontaneous bacterial peritonitis in Korean patients with liver cirrhosis: a multicenter retrospective study. *Gut Liver*. 2009;3(3):197.
 18. Syed VA, Ansari JA, Karki P, Regmi M, Khanal B. Spontaneous bacterial peritonitis (SBP) in cirrhotic ascites: a prospective study in a tertiary care hospital, Nepal. *Kathmandu Univ Med J (KUMJ)*. 2007;5(1):48-59.

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