

# Spontaneous Bacterial Peritonitis: Frequency and Microbial Spectrum in a Tertiary Care Centre

<sup>\*</sup>  
*Bharat Lal, Abdul Sattar Khoso, Riaz Ahmed Qazi, Qaiser Hussain Naqvi*

## ABSTRACT

**Objective:** To determine the frequency and microbial spectrum of spontaneous bacterial peritonitis (SBP) in a tertiary care center.

**Study Design:** Descriptive study.

**Place & Duration:** Department of medicine, Peoples University of Medical & Health Sciences, Nawabshah, from January 2013 to December 2015.

**Material & Methods:** A total of 102 already diagnosed patients of cirrhosis of liver with ascites presenting with suspicion of SBP, admitted in all the medical units were included. After informed consent the demographic data of all the patients was collected on a proforma designed for that purpose. About 20-30ml of fluid was aspirated from each patient, 10 ml of ascitic fluid was immediately inoculated into blood culture bottle at the bed side and sent to the pathology department for bacterial culture, the remaining fluid was sent for detailed report. The subcultures were made from these bottles on blood agar and McConkey's agar plates, the organisms were identified according to morphology of grown colonies and biochemical tests, the organism thus isolated was noted on the respective proforma of the patient. The data collected was tabulated and statistically analyzed.

**Results:** Among the study population 53 (52%) were male and 49 (48%) were female, with ratio 1:1.08. The age ranged from 15 to 70 years (mean 53 ±13). Majority of patients were in group 41-50 years. 27 (26.5%) were diagnosed as SBP or its variant and remaining cases were having sterile ascites. From 27 cases of SBP, majority (63%) of cases were belongs to culture negative neutrocytic ascites (CNNA). The positive culture was seen in 10 cases, comprising 9 (33.3%) cases in classic SBP and one (3.7%) case in bacterascites. The Escherichia coli was detected in majority of cases.

**Conclusion:** SBP and its variants were found a common complication of liver cirrhosis, which is prevalent in 26.5% of cases. Escherichia coli was detected the most offending pathogen in these cases.

**Key Words:** Liver Cirrhosis, Spontaneous Bacterial Peritonitis, Ascitic Fluid Culture, Escherichia Coli

## INTRODUCTION:

In 1971, Conn and Fessel introduced a complication of liver cirrhosis in which they described the infection of ascitic fluid in these cases, called spontaneous bacterial peritonitis (SBP)<sup>1</sup>.

It is now recognized as infection of previously sterile ascitic fluid in the absence of any secondary cause of infection<sup>2,3</sup>. It is a life-threatening complication, develops in 10-30 % of cases in hospitalized patients<sup>4,5</sup>.

Cirrhosis is associated with distinct changes in the composition of fecal pathogens<sup>6,7</sup> and there is an increase prevalence of Enterobacteriaceae<sup>8</sup>, which is promoted by deficiency in paneth cell defensins<sup>9</sup>, decreased motility of gut, reduction in the pancreatobilliary secretions and hypertensive enteropathy<sup>10</sup>. The mesenteric lymph nodes are infected when viable or non-viable bacteria with their products cross the intestinal mucosal barrier by the process of bacterial translocation (BT), and from where they enter in

<sup>\*</sup> Senior Registrar, Medical Unit-II, PUMHS Nawabshah.  
<sup>\*\*</sup> Assistant Professor, Pharmacology, PUMHS Nawabshah  
<sup>\*\*\*</sup> Assistant Professor, Pathology PUMHS Nawabshah.  
<sup>\*\*\*\*</sup> Professor, Pathology Deptt. PUMHS Nawabshah.

### Correspondence to:

**Dr. Bharat Lal**

Senior Registrar, Medical Unit-II  
PUMHS, Nawabshah.  
Cell: 0336-3014981

the blood stream and then ascitic fluid<sup>11</sup>. Patients having decreased defensive capacity in their ascitic fluid are more prone for SBP<sup>12</sup>. Limited translocation of bacteria in the mesenteric lymph nodes is a physiological phenomenon, any increase in the severity of translocation may be harmful for the patient and thus termed pathological translocation<sup>13</sup>. The bacterial translocation in cirrhotic patient is attributed partially to defective immune system. In nosocomial SBP other causes like transient bacteremia due to invasive procedure may be considered<sup>14</sup>.

In most of the cases single organism is involved in the pathogenesis of SBP and is caused by enteric bacteria. About 67% of them are gram negative bacteria and among these *Escherichia coli* is the most frequent isolated organism<sup>15</sup>. The knowledge about the pathogenic organisms causing SBP in a particular population is important for the selection of most appropriate antibiotic regimen<sup>16</sup>. Keeping the above facts in view, we conduct this study to determine the frequency and microbial spectrum of spontaneous bacterial peritonitis in our setup.

#### **MATERIAL & METHODS:**

The study was conducted in the department of medicine, Peoples University of Medical & Health Sciences, Nawabshah, during Jan 2013 to Dec 2015, on 102 already diagnosed patients admitted in all the medical units. The inclusion criteria were diagnosed patients of cirrhosis of liver with ascites presenting with suspicion or risk of SBP. The patient already taking antibiotic therapy and patients with suspicious of secondary peritonitis was excluded from the study. After informed consent the demographic data of all the patients was collected on a proforma designed for that purpose. With suitable sterile precautions the aspiration of peritoneal fluid was performed by disposable syringe and about 20-30ml of fluid was aspirated, 10 ml of ascitic fluid was immediately inoculated into blood culture bottle at the bed side

and sent to the pathology department for bacterial culture, the remaining fluid was sent for detailed report. The blood culture bottles containing Brain Heart Infusion Broth were incubated at 37°C, the subcultures were made from these bottles on blood agar and McConkey's agar plates and incubated at 37°C. the organisms were identified according to morphology of grown colonies and biochemical tests, the organism thus isolated was noted on the respective proforma of the patient. The data collected was tabulated and statistically analyzed.

#### **RESULTS:**

A total of 102 patients were studied, among these 53 (52%) were male and 49 (48%) were female (Table-1) with ratio 1:1.08. The age ranged from 15 to 70 years (mean 53 ±13). Majority of patients were in group 41-50 years (Table-2).

Among these 102 cases, 27 (26.5%) were diagnosed as SBP or its variant and remaining cases were having sterile ascites. From 27 cases of SBP, majority (63%) of cases were belongs to culture negative neutrocytic ascites (CNNA) (Table-3).

The positive culture was seen in 10 cases, comprising 9 (33.3%) cases in classic SBP and one (3.7%) case in bacterascites. The *Escherichia coli* was detected in majority of cases (Table-4).

#### **DISCUSSION:**

In current study we found 26.5% prevalence of SBP, which is within the reported range of 10-30%<sup>4</sup>. Some studies have high positivity of 56%, which is because they include only those cases which were highly suspected for SBP, and having advanced liver disease<sup>16,17</sup>.

Among 27 cases of SBP, bacterascites was seen in one (3.7%) case, in which staphylococcus was isolated, which may represent skin flora contamination of culture, despite the precautions used to tap the ascitic fluid, this patient was asymptomatic and repeated paracentesis did not show any evidence of development of SBP OR CNNA. These results are in agreement with the study of Pungon et al<sup>18</sup>, in which he observed disappearance of bacterial colonization without antibiotic therapy. The CNNA was seen in 17

**Table-1: Demographic Data (n=102)**

S.No.	Parameter	SBP Patients		Non-SBP Patients		Total	
		No	%	No	%	No	%
01	Male	14	13.7	39	38.2	53	52
02	Female	13	12.7	36	35.3	49	48
03	Age (mean+SD)	54+11		52+14			

**Table-2: Age Groups (n=102)**

S.No.	Age Group (Years)	No. of Cases	%
01	15-20	06	5.9
02	21-30	12	11.8
03	31-40	22	21.6
04	41-50	39	38.2
05	51-60	18	17.6
06	61-70	05	4.9

**Table-3: Variants of Spontaneous Bacterial Peritonitis (n=27)**

S.No.	Age Group (Years)	No. of Cases	%
01	Classic Spontaneous Bacterial Peritonitis	9	33.3
02	Culture Negative Neutrocytic Ascites (CNNA)	17	63.0
03	Bacterascites	01	3.7
04	Total	27	100

(63%) cases, confirming the results of previous studies<sup>16,19,20</sup>.

The positive culture was observed in 10 (37%) cases of SBP, which is comparable with other researches reported in Pakistan<sup>21,22</sup>.

**Table-4: Organisms Isolated (n=10)**

S.No.	Organism	SBP		Bacterascites	
		No	%	No	%
01	Escherichia Coli	06	60	00	00
02	Klebsiella	02	20	00	00
03	Streptococci	01	10	00	00
04	Staphylococci	00	00	01	10

The Escherichia coli was isolated in majority (60%) of cases, confirming the results of Amjad et al and Taj et al, who detected it in 66.6% & 61.5% of cases<sup>16,20</sup>.

#### CONCLUSION:

SBP and its variants were found a common complication of liver cirrhosis, which is prevalent in 26.5% of cases. Escherichia coli was detected the most offending pathogen in these cases.

#### REFERENCES:

1. Conn HO, Fessel JM. Spontaneous bacterial peritonitis in cirrhosis: variations on a theme. *Medicine*.1971;50(3):161-97.
2. Gunjaca I, Francetic I. Prevalence and clinical outcome of spontaneous bacterial peritonitis in hospitalized patients with liver cirrhosis: A prospective observational study in central part of Croatia. *Acta Clin Croat*. 2010;49:11-8.
3. Fernandez J, Bauer TM, Navasa M, Rodes J. Diagnosis, treatment and prevention of spontaneous bacterial peritonitis. *Best Pract Res Clin Gastroenterol*. 2000;14:975-90.

The *Escherichia coli* was isolated in majority (60%) of cases, confirming the results of Amjad et al and Taj et al, who detected it in 66.6% & 61.5% of cases<sup>16,20</sup>.

### CONCLUSION:

SBP and its variants were found a common complication of liver cirrhosis, which is prevalent in 26.5% of cases. *Escherichia coli* was detected the most offending pathogen in these cases.

### REFERENCES:

1. Conn HO, Fessel JM. Spontaneous bacterial peritonitis in cirrhosis: variations on a theme. *Medicine*.1971;50(3):161-97.
2. Gunjaca I, Francetic I. Prevalence and clinical outcome of spontaneous bacterial peritonitis in hospitalized patients with liver cirrhosis: A prospective observational study in central part of Croatia. *Acta Clin Croat*. 2010;49:11-8.
3. Fernandez J, Bauer TM, Navasa M, Rodes J. Diagnosis, treatment and prevention of spontaneous bacterial peritonitis. *Best Pract Res Clin Gastroenterol*. 2000;14:975-90.
4. Rimola A, Gacia TG, Navasa, Piddock LJ, Planas R, Bernard B, et al. International ascitic club diagnosis, treatment and prophylaxis of Spontaneous bacterial peritonitis. *J Hepatol*. 2000;32(1):142-53.
5. Mohammad AN, Yousef LM, Mohamed HS. Prevalence and predictors of spontaneous bacterial peritonitis: does low zinc level play any role? *Al Azhar Assiut Med J*.2016;14: 37-42.
6. Chen Y, Yang F, Lu H, Wang B, Chen Y, Lei D, et al. Characterization of fecal microbial communities in patients with liver cirrhosis. *Hepatology*. 2011;54:562-72.
7. Yan AW, Fouts DE, Brandl J, Starkel P, Torralba M, Schott E, et al. Enteric dysbiosis associated with a mouse model of alcoholic liver disease. *Hepatology*. 2011;53:96-105.
8. Bauer TM, Steinbruckner B, Brinkmann FE, Ditzen AK, Schwacha H, Aponte JJ, et al. Small intestinal bacterial overgrowth in patients with cirrhosis: prevalence and relation with Spontaneous bacterial peritonitis. *Am J Gastroenterol*. 2001;96: 2962-7.
9. Teltschik Z, Wiest R, Beisner J, Nuding S, Hofmann C, Schoelmerich J, et al. Intestinal bacterial translocation in cirrhotic rats is related compromised Paneth cell antimicrobial host defence. *Hepatology*. 2012;55(4):1154-63.
10. Wiest R, Krag A, Gerbes A. Spontaneous bacterial peritonitis: recent guidelines and beyond. *Gut*. 2012;61:297-310.
11. Lata J, Stiburek O, Kopacova M. Spontaneous bacterial peritonitis: a severe complication of liver cirrhosis. *World J Gastroenterol*. 2009;15:5505-10.
12. Jain P. Spontaneous bacterial peritonitis: Few additional points. *World J Gastroenterol*. 2009;15:5754-5.
13. Wells CL. Relationship between intestinal microecology and the translocation of intestinal bacteria. *Antonie Van Leeuwenhoek*. 1990;58:87e93.
14. Wiest R, Lawson M, Geuking M. Pathological bacterial translocation in liver cirrhosis. *J Hepatol* 2014; 60 (1):197-209.
15. Jose S, Carlos G, and Runyon BA. Spontaneous Bacterial Peritonitis in; Ascites and renal dysfunction in Liver Disease pathogenesis, Diagnosis and treatment, Blackwell sciences, 1999; 6.99.
16. Zaman A, Kareem R, Mahmood R, Hameed K, Khan EM. Frequency of microbial spectrum of spontaneous bacterial peritonitis in established cirrhosis liver. *J Ayub Med Coll Abbottabad*. 2011;23(4):16-7.
17. Iqbal S, Iman N, Alam N, Rahman S. Incidence of spontaneous bacterial peritonitis in liver cirrhosis, the causative organisms and antibiotic sensitivity. *J Postgrad Med Insi* 2004;18:614-9.
18. Runyon BA. Monomicrobial non-neutrocytic bacterascites a variant of spontaneous bacterial peritonitis. *Hepatology*. 1990;12(4):710-14.

19. Rajput MR, Zuberi BF, Shaikh WM, Solangi GA, Shaikh SM, Shaikh GM. Frequency, microbial spectrum, clinical and biochemical features of SBP and its variants. *J Coll Physicians Surg Pak.* 1999;9(8):347-50.
20. Mohammad T, Ali A, Noor-ul-iman, Yield of ascetic fluid culture in SBP in Cirrhosis. *J Med Sci.* 2010;18(1):59-62.
21. Chowdhry ZI, Khokhar MS. Spontaneous bacterial peritonitis. *Pak J Med Sec.* 1993;9(3):277-89.
22. Iqbal M, Jamal S, Rathor S, Qureshi M. Spontaneous bacterial peritonitis in hospitalized chronic liver disease. *J Rawal Med Coll.* 1997;1(1):2-5.