

## Original Article

### Evaluation of microbiological profile and antibiotic sensitivity pattern of spontaneous bacterial peritonitis in patients of cirrhosis with ascites

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#### ABSTRACT:

**Background:** The present study was undertaken for assessing the microbiological profile and antibiotic sensitivity pattern of spontaneous bacterial peritonitis in patients of cirrhosis with ascites. **Materials & methods:** A total of 100 patients were enrolled. Complete demographic and clinical details of all the patients was obtained. The physical examination including BP, Pulse, Icterus, detailed general examination and systemic examination including abdominal Palpation of liver, spleen. SBP was identified and its microbiological profile was assessed. Diagnostic paracentesis was done within 24 hrs of admission under aseptic conditions or whenever peritonitis was suspected. Ascitic fluid was sent for Culture analysis and for evaluation of antibiotic susceptibility pattern. **Results:** Out of 100 patients, overall, SBP was present in 10 percent of the patients. All of them were AF culture positive. Out of 10 patients with culture positive SBP, E.coli was found in 60 percent of the patients while Klebsiella spp and Streptococcus spp were found in 30 percent and 10 percent of the patients. Among the Klebsiella spp., multidrug resistance was seen in 2 cases out of 3 cases. Norfloxacin, Ceftriaxone and Amoxicillin/clauvanic acid resistant sensitivity was seen in 1, 2 and 1 case respectively. Among the E.Coli., multidrug resistance was seen in 2 cases out of 6 cases. Norfloxacin, Ceftriaxone and Amoxicillin/clauvanic acid resistant sensitivity was seen in 3, 2 and 2 case respectively. Among the streptococcus spp, multidrug resistance was seen in 1 case. Norfloxacin, Ceftriaxone and Amoxicillin/clauvanic acid resistant sensitivity was seen in 1, 0 and 1 case respectively. **Conclusion:** Antibiotic prophylaxis and treatment of SBP should carefully take into account potential differences in the microorganisms causing SBP and antibiotic resistance patterns.

**Key words:** Chronic liver disease, Spontaneous bacterial peritonitis

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#### INTRODUCTION

Chronic liver diseases (CLD) cause significant morbidity and mortality worldwide. Multiple etiological factors lead to a similar clinico-pathological syndrome in CLDs, although the rates of progression and clinical course may be different. Cirrhosis of liver, a final pathway for different types of CLDs is defined as diffuse fibrosis of liver parenchyma and the conversion of normal liver architecture into structurally abnormal nodules.<sup>1, 2</sup>

Ascites is a very common manifestation of decompensated cirrhosis and represents a pathologic accumulation of fluid within the peritoneal cavity. Cirrhotic ascitic fluid accumulation results from a

number of factors broadly defined in terms of hormonal and cytokine dysregulation and related volume overload in the setting of portal hypertension. Spontaneous bacterial peritonitis (SBP) is a very common bacterial infection in patients with cirrhosis and ascites requiring prompt recognition and treatment.<sup>3</sup> SBP is by definition an infection of previously sterile ascitic fluid, without any apparent intra-abdominal source of infection. The infecting organisms are usually those found among the normal intestinal flora. When first described, its mortality exceeded 90% but it has been reduced to approximately 20% with early diagnosis and treatment. The most common organisms isolated in

SBP patients are *Escherichia coli* and other gut bacteria; however, gram positive bacteria including *Streptococcus viridians*, *Staphylococcus aureus* and *Enterococcus* sp, can also be found. A single organism is noted in 92% of cases and 8% of cases are polymicrobial.<sup>4,5</sup> Hence; under the light of above-mentioned data, the present study was undertaken for assessing the microbiological profile and antibiotic sensitivity pattern of spontaneous bacterial peritonitis in patients of cirrhosis with ascites.

## MATERIALS & METHODS

The present study was conducted for assessing microbiological profile and antibiotic sensitivity pattern of spontaneous bacterial peritonitis in patients of cirrhosis with ascites. A total of 100 patients were enrolled. Complete demographic and clinical details of all the patients was obtained. The physical examination including BP, Pulse, Icterus, detailed general examination and systemic examination including abdominal Palpation of liver, spleen. SBP was identified and its microbiological profile was assessed. Diagnostic paracentesis was done within 24 hrs of admission under aseptic conditions or whenever peritonitis was suspected. Ascitic fluid was sent for Culture analysis and for evaluation of antibiotic susceptibility pattern. All the results were recorded in Microsoft excel sheet and were evaluated

using SPSS software. Chi-square test was used for assessment of level of significance.

## RESULTS

Mean age of the patients was 58.1 years. 73 percent of the patients were males while the remaining 27 percent were females. Etiology was alcohol in 62 percent of the patients while it was hepatitis C virus in 28 percent of the patients. Jaundice was the most common presentation found in 92 percent of the patients while oliguria and hematemesis was seen in 72 percent and 85 percent of the patients respectively. Out of 100 patients, overall, SBP was present in 10 percent of the patients. All of them were AF culture positive. Out of 10 patients with culture positive SBP, *E.coli* was found in 60 percent of the patients while *Klebsiella* spp and *Streptococcus* spp were found in 30 percent and 10 percent of the patients. Among the *Klebsiella* spp., multidrug resistance was seen in 2 cases out of 3 cases. Norfloxacin, Ceftriaxone and Amoxicillin/clauvanic acid resistant sensitivity was seen in 1, 2 and 1 case respectively. Among the *E.Coli*., multidrug resistance was seen in 2 cases out of 6 cases. Norfloxacin, Ceftriaxone and Amoxicillin/clauvanic acid resistant sensitivity was seen in 3, 2 and 2 case respectively. Among the *streptococcus* spp, multidrug resistance was seen in 1 case. Norfloxacin, Ceftriaxone and Amoxicillin/clauvanic acid resistant sensitivity was seen in 1, 0 and 1 case respectively.

**Table 1: SBP among patients of liver cirrhosis admitted with ascites**

SBP	Number	Percentage
Present	10	10
Absent	90	90
Total	100	100

**Table 2: Culture of Ascitic fluid**

Bacteriology	Number of patients	Percentage
<i>Klebsiella</i> spp	3	30
<i>E.coli</i>	6	60
<i>Streptococcus</i> spp.	1	10
Total	10	100

**Table 3: Antibiotic sensitivity**

Bacteriology	Multidrug resistant	Norfloxacin	Ceftriaxone	Amoxicillin/clauvanic acid resistant
<i>Klebsiella</i> spp (n= 3)	2	1	2	1
<i>E. coli</i> (n= 6)	2	3	2	2
<i>Streptococcus</i> spp. (n= 1)	1	0	1	1

## DISCUSSION

Spontaneous bacterial peritonitis (SBP) is a very common bacterial infection in patients with cirrhosis and ascites requiring prompt recognition and treatment. SBP is by definition an infection of previously sterile ascitic fluid, without any apparent intra-abdominal source of infection. The infecting organisms are usually those found among the normal intestinal flora. When first described, its mortality

exceeded 90% but it has been reduced to approximately 20% with early diagnosis and treatment. One-year mortality after a first episode of SBP has been reported to be 31% and 93%. The pathophysiology of SBP is not completely understood. Translocation of bacteria and endotoxins from the gastrointestinal tract to peritoneal fluid is believed to be a key mechanism behind the development of SBP, and is facilitated by impaired

defensive mechanisms in cirrhotic patients. Proteins of the complement cascade have lower levels in cirrhotic patients and the opsonic and phagocytic properties of neutrophils are decreased in patients with cirrhosis. Bacteremia from the urine or the respiratory tract can also lead to infection of the ascitic fluid. SBP may also be iatrogenic, such as after endoscopic treatment of esophageal or gastric varices.<sup>6-9</sup> Hence; under the light of above-mentioned data, the present study was undertaken for assessing the microbiological profile and antibiotic sensitivity pattern of spontaneous bacterial peritonitis in patients of cirrhosis with ascites.

Etiology was alcohol in 62 percent of the patients while it was hepatitis C virus in 28 percent of the patients. Jaundice was the most common presentation found in 92 percent of the patients while oliguria and hematemesis was seen in 72 percent and 85 percent of the patients respectively. Out of 100 patients, overall, SBP was present in 10 percent of the patients. All of them were AF culture positive. Sheikhbahaei S et al determine the microbial agents of SBP and the pattern of antibiotic resistance, in a large number of ascitic samples. SBP was found in 482 (24.33%) of samples, of which 314 (65.15%) were culture positive. The most prevalent isolated pathogen was *E. coli* (33.8%), followed by *Staphylococcus aureus* (8.9%) and *Enterococcus* (8.6%). No significant changes in the proportion of gram-negative/gram-positive infections occurred during this period. A percentage of resistant strains to cefotaxime (62.5%, 85.7%), ceftazidim (73%, 82.1%), ciprofloxacin (30, 59.8%), ofloxacin (36.8%, 50%), and oxacilin (35%, 51.6%) were significantly increased. *E. coli* was most sensitive to imipenem, piperacillin-tazobactam, amikacin, ceftizoxime, and gentamicin.<sup>10</sup> Other investigations unveiled the poor prognosis of enterococcal SBP and declared that *Enterococcus* strains were mostly resistant to third-generation cephalosporins range between 77% and 100%.<sup>11</sup>

Out of 10 patients with culture positive SBP, *E. coli* was found in 60 percent of the patients while *Klebsiella* spp and *Streptococcus* spp were found in 30 percent and 10 percent of the patients. Among the *Klebsiella* spp., multidrug resistance was seen in 2 cases out of 3 cases. Norfloxacin, Ceftriaxone and Amoxicillin/clavulanic acid resistant sensitivity was seen in 1, 2 and 1 case respectively. Among the *E. coli*., multidrug resistance was seen in 2 cases out of 6 cases. Norfloxacin, Ceftriaxone and Amoxicillin/clavulanic acid resistant sensitivity was seen in 3, 2 and 2 case respectively. Among the *Streptococcus* spp, multidrug resistance was seen in 1 case. Norfloxacin, Ceftriaxone and Amoxicillin/clavulanic acid resistant sensitivity was seen in 1, 0 and 1 case respectively. Oey RC et al assessed potential changes in the microbiology of SBP in two patient cohorts studied at a 10-year interval. In total 312 patients were included, 125

patients in the first and 187 patients in the second cohort. SBP was diagnosed in 132 of 840 analyzed ascitic fluid samples; 62 samples were culture positive. An increase of Gram-positive bacterial isolates was noted from 26% to 46% between cohorts ( $p=0.122$ ). The prevalence of multidrug-antibiotic-resistant pathogens increased from 25% to 32% ( $p=0.350$ ). Survival after SBP among the two cohorts was comparable. Their study found a modest but nonsignificant increase in the proportion of patients with SBP caused by Gram-positive bacteria and multidrug-antibiotic-resistant bacteria over a 10-year period.<sup>12</sup>

## CONCLUSION

From the above results, the authors conclude that antibiotic prophylaxis and treatment of SBP should carefully take into account potential differences in the microorganisms causing SBP and antibiotic resistance patterns.

## REFERENCES

1. Caly WR, Strauss E. A prospective study of bacterial infections in patients with cirrhosis. *J Hepatol*. 1993 Jul; 18(3):353-8.
2. 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;15:128.
3. Paul K, Kaur J, Kazal HL. To Study the Incidence, Predictive Factors and Clinical Outcome of Spontaneous Bacterial Peritonitis in Patients of Cirrhosis with Ascites. *J Clin Diagn Res*. 2015;9(7):OC09-OC12.
4. Mukherjee PS, Vishnubhatla S, Amarapurkar DN, et al. Etiology and mode of presentation of chronic liver diseases in India: A multi centric study. *PLoS One*. 2017;12(10):e0187033. Published 2017 Oct 26.
5. Acevedo J, Silva A, Prado V, Fernandez J. The new epidemiology of nosocomial bacterial infections in cirrhosis: therapeutic implications. *Hepatology International*. 2013;7(1):72-79
6. Moore CM, Van Thiel DH. Cirrhotic ascites review: Pathophysiology, diagnosis and management. *World J Hepatol*. 2013;5(5):251-263.
7. Chiejina M, Kudravalli P, Samant H. Ascites. [Updated 2021 Jul 18]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK470482/>
8. Tandon P, Garcia-Tsao G. Bacterial infections, sepsis, and multiorgan failure in cirrhosis. *Semin Liver Dis*. 2008 Feb; 28(1):26-42.
9. Bac DJ, Siersema PD, Mulder PGH, et al. Spontaneous bacterial peritonitis: Outcome and predictive factors. *Eur J Gastroenterol Hepatol* 1993; 5: 635-640
10. Sheikhbahaei S, Abdollahi A, Hafezi-Nejad N, Zare E. Patterns of antimicrobial resistance in the causative organisms of spontaneous bacterial peritonitis: a single centre, six-year experience of 1981 samples. *Int J Hepatol*. 2014;2014:917856
11. Lee J-H, Yoon J-H, Kim BH, et al. *Enterococcus*: not an innocent bystander in cirrhotic patients with

- spontaneous bacterial peritonitis. *European Journal of Clinical Microbiology and Infectious Diseases*. 2009;28(1):21–26
12. Oey RC, de Man RA, Erler NS, Verbon A, van Buuren HR. Microbiology and antibiotic susceptibility patterns in spontaneous bacterial peritonitis: A study of two Dutch cohorts at a 10-year interval. *United European Gastroenterol J*. 2018 May;6(4):614-621