International Journal of Research in Medical Sciences
Goel S et al. Int J Res Med Sci. 2019 Nov;7(11):4256-4260
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20194622

Original Research Article

Clinico-bacteriological profile of spontaneous bacterial peritonitis in cirrhosis of liver with ascites

Shewtank Goel[1], Pooja Tripathi Pandey[2]*, Abhay Kumar[3], Nidhish Kumar[4], Deval Kumar Arora[5], Abhishek Singh[6]

[1]Department of Microbiology, [2]Department of Physiology, [3]Department of Otorhinolaryngology, [4]Department of Pathology, [5]Department of Dentistry, Autonomous State Medical College, Shahjahanpur, Uttar Pradesh, India
[6]Department of Community Medicine, SHKM Government Medical College, Mewat, Haryana, India

Received: 27 September 2019
Accepted: 09 October 2019

***Correspondence:**
Dr. Pooja Tripathi Pandey,
E-mail: abhishekparleg@gmail.com

ABSTRACT

Background: A good and an effective empirical treatment of SBP is not possible unless bacteriological spectrum and their antibiogram is clear. This becomes more important in country like India due to high antibiotic resistance. Authors aim was to assess the prevalence of SBP, clinical and microbiological profile of its variants, in patients with cirrhosis seeking care at a tertiary care teaching hospital.
Methods: Patients of liver cirrhosis with ascites seeking care at study subject during January- December 2018 formed the study population. Diagnosis was based on clinical examination, biochemical investigation and ultrasonography. Diagnostic abdominal paracentesis was performed on subjects within 24 hours of admission. Ascitic fluid was aspirated. It was sent for microbiological examination.
Results: Prevalence of SBP was 16.12%. Out of total ten subjects with Spontaneous Bacterial Peritonitis (SBP), six subjects were of Culture Negative Neutrocytic Ascites (CNNA). Thus most common (60%), variant of Spontaneous Bacterial Peritonitis (SBP) was Culture Negative Neutrocytic Ascites (CNNA). Prevalence of Mono-microbial Non-neutrocytic Bacterascites (MNBA) and Classic-Spontaneous Bacterial Peritonitis (C-SBP) was 20%. Two subjects found positive for MNBA, *Staphylococcus aureus* and *Acinitobacter spp.* was detected in each patient. *Klebseila pneumonia*, *Escherichia coli* and Coagulase negative Staphylococcus were found in ascitic fluid culture of C-SBP. In clinical variants of SBP, 80% subject's complaint about abdominal pain. Hepatic-encephalopathy and fever was seen in 7(70%) patients. Rebound tenderness was seen among 60%.
Conclusions: Diagnostic paracentesis should be advised to all cirrhotic patients with ascites. Ascitic fluid analysis should be sent for better selection of antibiotics thus better outcome of cirrhotic patients.

Keywords: Bacteria, Cirrhosis, Liver, Spontaneous bacterial peritonitis

INTRODUCTION

As per the estimations of World Health Organization, cirrhosis is responsible for 1.1% of all deaths occurring worldwide.[1] Cirrhosis is a clinical condition associated with liver presenting as diffuse destruction and regeneration of hepatic parenchymal cells leading to disorganization of the lobular architecture.[2] Alcoholic liver disease, primary biliary cirrhosis, hepatitis, and primary sclerosing cholangitis are a few main causes of cirrhosis. Important complications are ascites, gastro-intestinal (GI) bleed, hepatic failure, variety of bacterial infections, encephalopathy etc.[3,4]

Spontaneous bacterial peritonitis (SBP) is a clinical condition commonly encountered by physicians in

patients with liver disease and ascites. It can present with a variety of presentations like slow and insidious or remain clinically unrecognized until the appearance of symptoms like fever and abdominal pain.[5,6] The incidence of SBP in cirrhotic patients varies between 7 and 30% per year.[7] This condition carries high mortality and morbidity as mortality rate among untreated patients is around 50%. Thus early detection of this condition is quite important as far as favorable outcomes are concerned. SBP presents with clinically quite variable spectrum from asymptomatic to symptomatic.[8]

A good and an effective empirical treatment of SBP is not possible unless bacteriological spectrum and their antibiogram is clear. A few factors like dynamic bacteriological spectrum, increasing number of invasive procedures and admission in intensive care units, advocate the necessity for the microbiological assessment. This becomes more important in country like India due to high antibiotic resistance. Objective of this study was to assess the prevalence of SBP, clinical and microbiological profile of its variants, in patients with cirrhosis seeking care at a tertiary care teaching hospital.

METHODS

This hospital-based study was conducted by the department of microbiology of a tertiary care teaching institute of northern India. Patients of liver cirrhosis with ascites seeking care at study subject during January-December 2018 formed the study population. Study was conducted during the same study period. Diagnosis was based on clinical examination, biochemical investigation and ultrasonography. An inclusion criterion was patients with confirmed diagnosis of liver cirrhosis with ascites. Exclusion criteria were subjects who took antibiotics within two weeks before admission at this study center, subjects with secondary peritonitis, ascites due to causes like tuberculosis, malignancy, renal or cardiac diseases.

Routine investigations were performed in all the study subjects like complete blood count, urine analysis, blood sugar, renal function tests, chest X-ray. Liver function tests, prothrombin time and ultrasonography of abdomen were also carried out. Serological tests for Hepatitis B and Hepatitis C were carried out as and when needed. ELISA confirmed the results.

Diagnostic abdominal paracentesis was performed on subjects within 24 hours of admission. Ascitic fluid was aspirated. It was sent for microbiological examination. Ascitic fluid was also subjected to biochemical analysis for estimation of sugar, proteins, and albumin, Gram's stain, ZN stain for AFB, malignant cytology and culture and sensitivity.

Study subjects were classified in three groups based on the results of ascitic fluid analysis. (A) Classic-Spontaneous Bacterial Peritonitis (C-SBP): a. Ascitic fluid neutrophil count is equal to or more than 250 cells /ml; b. Ascitic fluid culture grows a single type of pathogenic organism; c. No surgically treatable intra-abdominal source of infection. (B) Mono-microbial Non-neutrocytic Bacterascites (MNBA): a. Ascitic fluid neutrophil count is less than 250 cells /ml; b. Ascitic fluid culture grows a single type of pathogenic organism; c. No surgically treatable intra-abdominal source of infection. (C) Culture Negative Neutrocytic Ascites (CNNA): a. Ascitic fluid neutrophil count is equal to or more than 250 cells/ml; b. Ascitic fluid culture is sterile; c. No surgically treatable intra-abdominal source of infection.

The study adhered to the tenets of the Declaration of Helsinki for research in humans. The research study was approved by the Institutional Ethics Committee (IEC). Diagnostic abdominal paracentesis was performed only after taking written informed consent from the patient. All the proforma were checked and then coded for computer entry. After compilation of collected data, analysis was done using EpiInfo software and valid conclusions were drawn. Results were expressed mainly in terms of percentages or proportions.

RESULTS

In this study, data of sixty-two patients having cirrhosis of liver with ascites, was collected and analyzed. Study participants were studied for presence of Spontaneous Bacterial Peritonitis (SBP). Mean age of study subjects was 57.04±10.48 years. Out of sixty-two patients of cirrhosis of liver with ascites, ten subjects were found positive for Spontaneous Bacterial Peritonitis (SBP) thus prevalence of SBP was 16.12%. Most of the patients with SBP were in 5th and 6th decades with mean age of 55.86±10.48 years. Male subjects (n=9) outnumbered female subjects (n=1) with a male to female ratio of 9:1. Out of total ten subjects with Spontaneous Bacterial Peritonitis (SBP), six subjects were of Culture Negative Neutrocytic Ascites (CNNA). Thus most common (60%), variant of Spontaneous Bacterial Peritonitis (SBP) was Culture Negative Neutrocytic Ascites (CNNA). Prevalence of Mono-microbial Non-neutrocytic Bacterascites (MNBA) and Classic-Spontaneous Bacterial Peritonitis (C-SBP) was 20% (Table 1).

Ascitic fluid culture was done to find out microbiological profile of clinical variants of Spontaneous Bacterial Peritonitis. Ascitic fluid culture was negative among subjects with Culture Negative Neutrocytic Ascites (CNNA). Two subjects found positive for Mono-microbial Non-neutrocytic Bacterascites (MNBA), Staphylococcus aureus and Acinitobacter spp. was detected in each patient. *Klebseila pneumonia*, *Escherichia coli* and Coagulase negative Staphylococcus were found in ascitic fluid culture of Classic-Spontaneous Bacterial Peritonitis (C-SBP) (Table 2).

In clinical variants of Spontaneous Bacterial Peritonitis, 80% subject’s complaint about abdominal pain. Hepatic-

encephalopathy and fever was seen in 7(70%) patients. Rebound tenderness was seen among 60% (Table 3).

Table 1: Pattern and prevalence of spontaneous bacterial peritonitis and its clinical variants.

Variable	Number or prevalence
Cases of cirrhosis of liver with ascites	62
Patients screened for Spontaneous Bacterial Peritonitis (SBP)	62
Subjects positive for Spontaneous Bacterial Peritonitis (SBP)	10
Prevalence of SBP	16.12%
Subjects positive for Culture Negative Neutrocytic Ascites (CNNA)	6
Prevalence of CNNA	60%
Subjects positive for Mono-microbial Non-neutrocytic Bacterascites (MNBA)	2
Prevalence of MNBA	20%
Subjects positive for Classic-Spontaneous Bacterial Peritonitis (C-SBP)	2
Prevalence of C-SBP	20%

Table 2: Microbiological profile of clinical variants of spontaneous bacterial peritonitis.

Type of SBP	Organism detected
Culture Negative Neutrocytic Ascites (CNNA)	No Organism Grown
Mono-microbial Non-neutrocytic Bacterascites (MNBA)	*Staphylococcus aureus*
	Acinitobacter spp.
Classic-Spontaneous Bacterial Peritonitis (C-SBP)	*Klebseila pneumoniae*
	Escherichia coli
	Coagulase negative Staphylococcus

Table 3: Clinical features among variants of spontaneous bacterial peritonitis.

Signs and symptoms	C-SBP		MNBA		CNNA						Total N (%)
	1	2	1	2	1	2	3	4	5	6	
Fever	+	-	+	+	-	+	+	+	-	+	7 (70%)
Abdominal pain	-	+	+	+	+	+	+	-	+	+	8 (80%)
Upper GI bleed	-	-	+	-	+	-	-	+	+	-	4 (40%)
Tenderness	-	+	+	-	+	+	-	-	+	+	6 (60%)
Hypotension	+	-	-	+	-	-	+	-	-	-	3 (30%)
Absent bowel sounds	+	-	+	-	-	-	-	-	-	-	2 (20%)
Hepatic-encephalopathy	-	+	+	-	-	+	+	+	+	+	7 (70%)

DISCUSSION

SBP may present as a serious complication for individuals with ascites and cirrhosis, with high mortality and poor long-term prognosis.[9] Early identification of patients that are at high risk for the development of SBP has been shown to be critical for prognostic improvement.[10] SBP may be asymptomatic or have minor symptoms only. With the early diagnosis of the disease and prompt and appropriate antibiotic treatment, the in-patient mortality of an episode of SBP has been reduced to approximately 20%.[11]

We observed that most of the patients with SBP were in 5th and 6th decades with mean age of 55.86±10.48 years. Our findings are similar to the findings of Boxieda et al, who reported the mean age of SBP cases to be 56.67 years respectively.[12] However, in the study by Amarapurkar DN et al, mean age of SBP cases was significantly lower i.e., 42 years.[13] This difference may be due to relatively younger patients in their study.

In this study, out of sixty-two patients of cirrhosis of liver with ascites, ten subjects were found positive for Spontaneous Bacterial Peritonitis (SBP) thus prevalence of SBP was 16.12%. In a hospital based study, Amarapurkar DN et al, reported the prevalence of SBP as 22%.[13] Burden of SBP depends on many factors, one of them being the severity of liver dysfunction. Jain AP et al, reported that the prevalence of SBP was 34.92% out of 63 patients.[14] Puri AS et al, reported 21 of 70, that is, 30% had SBP or its variants.[15] The results of our study

are in contrast with some of the studies like that of Lata J et al, who in their study of 99 patients, have reported the SBP prevalence of 35.5%.[16]

We observed that most common (60%), variant of Spontaneous Bacterial Peritonitis (SBP) was Culture Negative Neutrocytic Ascites (CNNA). Prevalence of Mono-microbial Non-neutrocytic Bacterascites (MNBA) and Classic-Spontaneous Bacterial Peritonitis (C-SBP) was 20%. These findings are contradictory to many studies, where C-SBP is the most common variant. Patnaik et al, reported 16 C-SBP cases and 6 cases of CNNA among 24 cases of SBP.[17] In another study by Almadal TP et al, out of 14 cases of SBP, 8 were C-SBP, 4 were MNBA and only 2 were CNNA.[18] The higher frequency of CNNA observed in our study might be due to use of conventional culture method of ascitic fluid.

Regarding clinical features, this study observed that in clinical variants of Spontaneous Bacterial Peritonitis, 80% subject's complaint about abdominal pain. Hepatic-encephalopathy and fever was seen in 7(70%) patients. Rebound tenderness was seen among 60%. Mihas et al, reported fever in 54%, pain in abdomen in 57%, and hepatic encephalopathy in 67% patients.[19] In another study by Pelletier et al, 89% patients were having fever, 42% had UGI bleeding, 53% patients had pain abdomen, and 50% cases had hepatic encephalopathy.[20] Completely asymptomatic cases have been reported between 14% and 100%. Study conducted by Weinstein M.P et al, has reported abdominal pain in 79%, fever in 68%, hepatic encephalopathy and absent bowel sounds in 54%, rebound tenderness in 42% of the cases, hypotension in 14% of cases as the presenting symptom.[21]

This study observed that two subjects found positive for Mono-microbial Non-neutrocytic Bacterascites (MNBA), Staphylococcus aureus and Acinitobacter spp. was detected in each patient. *Klebseila pneumonia*, *Escherichia coli* and Coagulase negative Staphylococcus were found in ascitic fluid culture of Classic-Spontaneous Bacterial Peritonitis (C-SBP). Other studies have reported similar findings with prevalence of *P. aeruginosa* varying from 3% to 9% in culture-positive cases.[22] Similar observations were reported in a study by Thanopoulou AC et al, with ascitic fluid culture positive in 24.7% of cases and *E.coli* in 60% of cases.[23] However in a study, Jain AP et al, have reported Staphylococcus aureus (44.44%) as the commonest organism followed by *E.coli* (22.22%).[14]

CONCLUSION

In the light of above discussion, it can be said that SBP is one of the common complication of cirrhosis of liver with ascites. Poorly managed Spontaneous Bacterial Peritonitis (SBP) may lead to high mortality and morbidity. Diagnostic paracentesis should be advised to all cirrhotic patients with ascites. Ascitic fluid analysis should be sent for better selection of antibiotics thus better outcome of cirrhotic patients.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Oliveira AM, Branco JC, Barosa R, Rodrigues JA, Ramos L, Martins A, et al. Clinical and microbiological characteristics associated with mortality in spontaneous bacterial peritonitis: a multicenter cohort study. Eur J Gastroenterol Hepatol. 2016 Oct 1;28(10):1216-22.
2. Bert F, Johnson JR, Ouattara B, Leflon-Guibout V, Johnston B, Marcon E, et al. Genetic diversity and virulence profiles of Escherichia coli isolates causing spontaneous bacterial peritonitis and bacteremia in patients with cirrhosis. J Clini Microbiol. 2010 Aug 1;48(8):2709-14.
3. Tsung PC, Ryu SH, Cha IH, Cho HW, Kim JN, Kim YS, et al. Predictive factors that influence the survival rates in liver cirrhosis patients with spontaneous bacterial peritonitis. Clini Molecular Hepatol. 2013 Jun;19(2):131.
4. Dever JB, Sheikh MY. Spontaneous bacterial peritonitis–bacteriology, diagnosis, treatment, risk factors and prevention. Aliment Pharmacol Ther. 2015 Jun;41(11):1116-31.
5. Bhat G, Vandana KE, Bhatia S, Suvarna D, Pai CG. Spontaneous ascitic fluid infection in liver cirrhosis: bacteriological profile and response to antibiotic therapy. Indian J Gastroenterol. 2013 Sep 1;32(5):297-301.
6. 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 Pak. 2015 Feb 1;25(2):95-9.
7. Purohit PH, Malek SS, Desai KJ, Sadadia M. A study of bacteriological profile of ascitic fluid in suspected clinical cases of spontaneous bacterial peritonitis at a tertiary care hospital in India. Int J Med Sci Public Health. 2015 Apr 1;4(4):496-501.
8. Trikudanathan G, Israel J, Cappa J, O'sullivan DM. Association between proton pump inhibitors and spontaneous bacterial peritonitis in cirrhotic patients-a systematic review and meta-analysis. Internat J Clini Practice. 2011 Jun;65(6):674-8.
9. Evans LT, Kim WR, Poterucha JJ, Kamath PS. Spontaneous bacterial peritonitis in asymptomatic outpatients with cirrhotic ascites. Hepatol. 2003 Apr 1;37(4):897-901.
10. Castellote J, Girbau A, Maisterra S, Charhi N, Ballester R, Xiol X. Spontaneous bacterial peritonitis and bacterascites prevalence in asymptomatic cirrhotic outpatients undergoing

large-volume paracentesis. J Gastroenterol Hepatol. 2008 Feb;23(2):256-9.
11. Jeffries MA, Stern MA, Gunaratnam NT, Fontana RJ. Unsuspected infection is infrequent in asymptomatic outpatients with refractory ascites undergoing therapeutic paracentesis. Am J Gastroenterol. 1999 Oct 1;94(10):2972-6.
12. Boxieda D, De Luis DA, Aller R, De Argila CM. Spontaneous bacterial peritonitis: clinical and microbiological study of 233 episodes. J Clini Gastroenterol. 1996 Dec 1;23(4):275-9.
13. Amarapurkar DN, Viswanathan N, Parikh SS, Kalro RH, Desai HG. Prevalence of spontaneous bacterial peritonitis. J Assoc Physicians India 1992;40(4):236-8.
14. Jain AP, Chandra LS, Gupta S, Gupta OP, Jajoo UN, Kalantri SP. Spontaneous bacterial peritonitis in liver cirrhosis with ascites. J Assoc Physicians India 1999;47(6):619-21.
15. Puri AS, Puri J, Ghoshal UC, Sharma BC, Saraswat VA, Ayyagari A, et al. Frequency, microbial spectrum and outcome of spontaneous bacterial peritonitis in north India. Ind J Gastroenterol: Official J Ind Society Gastroenterol. 1996 Jul;15(3):86-9.
16. Lata J, Fejfar T, Krechler T, Musil T, Husová L, Šenkyrík M, et al. Spontaneous bacterial peritonitis in the Czech Republic: prevalence and aetiology. Eur Gastroenterol Hepatol. 2003 Jul 1;15(7):739-43.
17. Patnaik S, Kundu TM, Mohapatra MK. Spontaneous bacterial peritonitis: A prospective study, J of Asso of physicians of India.1993;41(12):858.
18. Almadal TP, Skinhoj P. Spontaneous bacterial peritonitis - Incidence diagnosis and progenosis. Scand J Gastroenterol. 1987 Apr;22(3):295-300.
19. Mihas AA, Toussaint J, Hsu HS, Dotherow P, Achord JL. Spontaneous bacterial peritonitis in cirrhosis: clinical and laboratory features, survival and prognostic indicators. Hepato-gastroenterol. 1992 Dec;39(6):520-2.
20. Pelletier G, Lesur G, Ink O, Hagege H, Attali P, Buffet C, et al. Asymptomatic bacterascites: is its spontaneous bacterial peritonitis?. Hepatol. 1991 Jul;14(1):112-5.
21. Weinstein MP, Iannini PB, Stratton CW, Eickhoff TC. Spontaneous bacterial peritonitis: a review of 28 cases with emphasis on improved survival and factors influencing prognosis. Am J Med. 1978 Apr 1;64(4):592-8.
22. Dalmau D, Layrargues GP, Fenyves D, Willems B, Turgeon F, Turgeon P. Cefotaxime, desacetyl-cefotaxime, and bactericidal activity in spontaneous bacterial peritonitis. J Infectious Dis. 1999 Nov 1;180(5):1597-602.
23. Thanopoulou AC, Koskinas JS, Hadziyannis SJ. Spontaneous bacterial peritonitis (SBP): clinical, laboratory, and prognostic features: a single-center experience. Eur J Internal Med. 2002 May 1;13(3):194-8.

Cite this article as: Goel S, Pandey PT, Kumar A, Kumar N, Arora DK, Singh A. Clinico-bacteriological profile of spontaneous bacterial peritonitis in cirrhosis of liver with ascites. Int J Res Med Sci 2019;7:4256-60.