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Analysis of Microbiological profile of Patients with Spontaneous Bacterial Peritonitis

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ABSTRACT

Background: Spontaneous bacterial peritonitis (SBP) is a severe complication in patients with cirrhosis and ascites. The 1-year probability of developing SBP for a cirrhotic patient with ascites is approximately 10%, but it is significantly increased in specific subgroups of high-risk patients, namely those who have survived a previous episode, those with low ascitic fluid protein levels. This study was conducted to assess the Microbiological profile of patient with spontaneous bacterial peritonitis.

Materials and Methods: This study comprised of 30 subjects with spontaneous bacterial peritonitis. The subjects were informed about the procedure and were asked for consent. The subjects with the disease as well as those who were willing to take part in the study had been included in the trail, the subjects who were not willing to participate were excluded from the trial. The specimens were collected form the subjects and were cultured using McConkey agar. The demographic details as well as the microbiological profile of the subjects had been recorded. Statistical analysis was conducted using SPSS software.

Results: In this study of 30 subjects, 16 were males and 14 were females. E. coli was the most common microorganism found in 12 subjects, followed by Klebsiella pneumoniae in 9 subjects. Enterococcus faecium and Staphylococcus aureus were seen in 5 and 4 cases, respectively.

Conclusion: The most common isolated organism in subjects having spontaneous bacterial peritonitis was found to be E. coli.

KEYWORDS: Spontaneous Bacterial Peritonitis, Microbiology, McConkey agar, E. coli.

INTRODUCTION

The Spontaneous bacterial peritonitis (SBP) is a severe complication in patients with cirrhosis and ascites.[1] The 1-year probability of developing SBP for a cirrhotic patient with ascites is approximately 10%, but it is significantly increased in specific subgroups of high-risk patients, namely those who have survived a previous episode, those with low ascitic fluid protein levels and those with gastrointestinal haemorrhage.[2-5] The in-hospital mortality rate associated with SBP is 20–30% and is mostly related to the development of renal impairment.[6-8] Moreover, survival expectancy for those who recover is short, the 6-month probability of survival being 40–50%.[9,10] SBP is most often caused by intestinal organisms that translocate through the mucosal barrier to the mesenteric lymph nodes, enter the bloodstream and reach the ascitic fluid.[11] The most frequent organisms causing SBP are Gram-negative bacilli of the Enterobacteriaceae family, particularly Escherichia coli, which is isolated from 50–70% of bacteriologically documented episodes.[12,13] Antibiotic prophylaxis in patients with cirrhosis is intended to selectively decontaminate the GI tract in order to decrease the risk of SBP. With the advent of resistant organisms associated with prophylaxis, therapy should be reserved only for patients at highest risk of SBP. The three patient populations for whom prophylaxis might be indicated include those with a history of SBP, those presenting with an upper GI hemorrhage, and those with a low total protein level in ascitic fluid.[6-9] This study was conducted to assess the Microbiological profile of patient with spontaneous bacterial peritonitis.

MATERIALS AND METHODS

This study conducted at department of microbiology, Major S.D. Singh Medical College & Hospital, Farrukhabad, UP (India) comprised of 30 subjects with spontaneous bacterial peritonitis. The subjects were informed about the procedure and were asked for consent. The subjects with the disease as well as those who were willing to take part in the study had been included in the trail, the subjects who were not willing to participate were excluded from the trial. The specimens were collected form the subjects and were cultured using McConkey agar. The demographic details as well as the microbiological profile of the subjects had been recorded.

Table 1: Gender-wise distribution of subjects

Gender	Number of subjects	Percentage
Males	16	53.3%
Females	14	46.6%
Total	30	100%

Table 2: Microbiological profile

Organism	Number of subjects	Percentage
E. coli	12	40%
Klebsiella pneumoniae	09	30%
Enterococcus faecium	05	16.6%
Staphylococcus aureus	04	13.3%
Total	30	100%

RESULTS

In this study of 30 subjects, 16 were males and 14 were females. E. coli was the most common microorganism found in 12 subjects, followed by Klebsiella pneumoniae in 9 subjects. Enterococcus faecium and Staphylococcus aureus were seen in 5 and 4 cases, respectively.

DISCUSSION

Spontaneous bacterial peritonitis (SBP) is a frequent complication in patients with chronic liver disease and ascites. SBP is defined as the infection of ascitic fluid without a contiguous source of intra-abdominal infection (eg, intra-abdominal abscesses, intestinal perforation) and in the absence of intra-abdominal focus of inflammation; cholecystitis or acute pancreatitis (Rimola et al 2000). SBP is one of the most frequent and life-threatening complications of patients with cirrhosis. Mortality rates have stayed constant in spite of the development of new antibiotic treatments and early diagnosis of SBP infection (Fernandez et al 2002). In their study, Singh and colleagues (2003) described the mortality rate of SBP in two different cohorts over a ten-year period and did not find any difference between the cohorts. The in-hospital mortality rate can reach 30% in spite of infection control measures; mortality being generally due to complications such as acute variceal bleeding, development of the hepatorenal syndrome, or progressive liver failure.[10- 13] Hence; the study was conducted to assess the Microbiological profile of patient with spontaneous bacterial peritonitis.

In this study of 30 subjects, 16 were males and 14 were females. E. coli was the most common microorganism found in 12 subjects, followed by Klebsiella pneumoniae in 9 subjects. Enterococcus faecium and Staphylococcus aureus were seen in 5 and 4 cases, respectively. Ariza X et al (2013)[14] conducted a retrospective observational study of 194 episodes of positive ascitic and/or blood culture SBP in 159 patients with liver cirrhosis (2001–2009). Parameters associated with PMN count in ascitic fluid at diagnosis were evaluated. The multivariate analysis (model 1) showed that a virulent etiology of the infection [coefficient 3.941 (95% confidence interval (95 CI): 0.421–7.461)] and the model for end-stage liver disease (MELD) score [coefficient 0.196 (95 CI: 0.007–0.384)] were positively associated with the PMN count in ascites, while a nosocomial acquisition was inversely associated [coefficient –3.546 (95 CI: –6.855 – –0.238)]. A nonsignificant trend toward higher PMN count was found in GNB versus GPC, but there were differences between groups of microorganisms: pyogenic streptococci [median (p25–p75): 3211 (1615–8004)], Enterobacteriaceae [2958 (917–7690)], Vibrionaceae [9215 (375–17280)], nonfermenting GNB [1384 (565–3865)], viridans group streptococci [1044 (503–2354)] and enterococci [1050 (476–4655)](p = 0.005). No clear cut-offs of ascitic PMN count predicting a particular etiology could be calculated out of these data. In cirrhotic patients with SBP, the causing microorganism, the place of acquisition of the infection and the host liver condition were the main factors determining PMN count

in ascitic fluid. Third-generation cephalosporin resistance was associated with low PMN count probably because this group included bacteria with inherent low virulence.

The study by Tsung PC et al (2013)[15] enrolled 95 liver cirrhosis patients diagnosed with SBP. The laboratory findings of their serum and ascitic fluid were examined and the characteristics of the isolated microorganisms in their peritoneal fluid were analyzed. The proportion of patients with culture-positive SBP was 41.1%, and 47 microorganisms were isolated from the ascitic fluid. The proportions of cultured bacteria that were Gram negative and Gram positive were 57.4% and 40.4%, respectively. The proportions of Escherichia coli, Klebsiella species, and Streptococcus species were 25.5%, 19.1%, and 19.1%, respectively. Enterococcus species represented 12.8% of the microorganisms cultured. The overall survival rates at 6, 12, and 24 months were 44.5%, 37.4%, and 32.2%, respectively. There was no relationship between the bacterial factors and the survival rate in SBP. Multivariate analysis revealed that the presence of hepatocellular carcinoma (HCC; P=0.001), higher serum bilirubin levels (≥3 mg/dL, P=0.002), a prolonged serum prothrombin time (i.e., international normalized ratio >2.3, P<0.001), renal dysfunction (creatinine >1.3 mg/dL, P<0.001), and lower glucose levels in the ascitic fluid (<50 mg/dL, P<0.001) were independent predictive factors of overall survival rate. HCC, higher serum bilirubin levels, a prolonged serum prothrombin time, renal dysfunction, and lower ascitic glucose levels are associated with higher mortality rates in cirrhotic patients with SBP.

CONCLUSION

The most common isolated organism in subjects having spontaneous bacterial peritonitis was found to be E. coli.

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