MICROBIOLOGICAL PROFILE OF SPONTANEOUS BACTERIAL PERITONITIS IN PATIENTS WITH LIVER CIRRHOSIS, A CROSS SECTIONAL HOSPITAL BASED STUDY IN SOUTH – INDIA

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ABSTRACT

Introduction: Spontaneous bacterial peritonitis (SBP) is one of the leading causes of morbidity and mortality in patients with cirrhosis. Spontaneous Bacterial Peritonitis is defined as the infection of ascitic fluid without any primary source of infection such as intra-abdominal pathology or perforation of intestine or viscus. Aims and Objectives: The aim of present study is to determine the microbial agents responsible for SBP and the pattern of antibiotic sensitivity. Material and Methods: This Cross sectional hospital based study, was conducted in a tertiary care referral centre over a period of one year from March 2016 – April 2017, after obtaining approval from institutional ethical committee and consent from the patients. 198 ascitis fluid samples from clinically suspected cases of SBP were included in the study. Gram staining & Ascitic fluid culture was done in all patients using Bactec method and antibiotic sensitivity was assessed by disk diffusion technique. Microbiologic profile and antibiotic sensitivity pattern was recorded in all patients. Results: Out of 198 clinically suspected cases of SBP, 76 (38.38 %) had ascitic fluid polymorphonuclear cells (PMN) count ≥ 250/mm3. Among 76 cases, 31 (40.7 %) cases were culture positive and 45 (59.2 %) cases were culture-negative neutrocytic ascites. From 31 culture-positive cases, E. coli was the most common isolated organism followed by Klebsiella Pneumoniae & Enterobacter. Isolated organisms were E Coli in 11 (35.4%), Klebsiella Pneumoniae 7 (22.5%), Enterobacter 5 (16.1%), Pseudomonas aeruginosa 3 (9.6%), Acinetobacter and Enterococcus in 2 (6.4%) cases each. Staphylococcus aureus was isolated from 1 (3.2%) cases. Of the 31 cultures only 2 (6.4%) were due to ESBL producing organisms. One patient with E.coli and one with Pseudomonas infection were
resistant to Cephalosporines, Quinolones and Piperacillin Tazobactum, but sensitive to Imipenem and Meropenem. One patient had infection with Methicillin resistant staphylococcus sensitive to vancomycin, teicoplanin and Linezolid. **Conclusion:** Gram negative enteric pathogens remain the major cause of SBP in Liver Cirrhosis. Third generation cephalosporins and quinolones are still effective in treating SBP.

**KEYWORDS:** E coli, Spontaneous bacterial peritonitis, Ascitic fluid culture, Cirrhosis.

**INTRODUCTION**
Spontaneous bacterial peritonitis (SBP) is the most frequent and life-threatening infection in patients with liver cirrhosis, requiring prompt recognition and treatment. It is defined by the presence of ≥ 250 poly morphonuclear cells (PMN)/mm³ in ascites in the absence of an intra-abdominal source of infection or malignancy. It is the most common bacterial infection in cirrhosis, accounting for 10%–30% of all reported bacterial infections in the patients admitted to hospital.[1-3] In outpatients without symptoms, the prevalence is low (3.5%[4] or lower[5,6]), but in the nosocomial setting, the prevalence increases, ranging from 8% to 36%.[7,8] SBP is diagnosed when (a) the ascitic fluid culture grows pathogenic bacteria (almost always pure growth of a single type of organism), (b) the ascitic fluid neutrophils count is ≥250 cells/mm³, and (c) there is no evidence of surgically treatable intra-abdominal sources of infection. In-hospital mortality for the first episode of SBP ranges from 10% to 50%, depending on various risk factors.[9] One-year mortality after a first episode of SBP has been reported to be 31% and 93%.[10]

**AIMS AND OBJECTIVES**
We conducted this study with the aim to isolate the various bacteriological agents from ascitic fluid from clinically suspected cases of SBP and to determine their antibiotic sensitivity pattern.

**MATERIAL AND METHODS**
This Cross sectional hospital based study, was conducted in department of Gastroenterology and Hepatology, Medical Trust Hospital Kochi – Kerala, South India, a tertiary care referral centre over a period of one year from March 2016 – April 2017, after obtaining approval from institutional ethical committee and consent from the patients. 198 ascitis fluid samples from clinically suspected cases of SBP were included in the study. Gram staining & Ascitic fluid culture was done in all patients using Bactec method and antibiotic sensitivity was
assessed by disk diffusion technique. Microbiologic profile and antibiotic sensitivity pattern was recorded in all patients.

**OBSERVATION AND RESULTS**

Out of 198 clinically suspected cases of SBP, 76 (38.38%) had ascitic fluid polymorphonuclear cells (PMN) count ≥ 250/mm³. Among 76 cases, 31 (40.7%) cases were culture positive and 45 (59.2%) cases were culture-negative neutrocytic ascites (**TABLE 3**). From 31 culture-positive cases, E. coli was the most common isolated organism followed by Klebsiella Pneumoniae & Enterobacter. Isolated organisms were E Coli in 11 (35.4%), Klebsiella Pneumoniae 7 (22.5%), Enterobacter 5 (16.1%), Pseudomonas aeruginosa 3 (9.6%), Acinetobacter and Enterococcus in 2 (6.4%) cases each. Staphylococcus aureus was isolated from 1 (3.2%) cases (**TABLE 2**). Majority of patients were in age group of 40-59 years (54.8%) followed by ≥ 60 years (41.9%). Majority of them were Males (83.87), compared to females (16.13), (**TABLE 1**).

**Table. 1: Age and gender distribution of Culture Positive SBP patients.**

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-39</td>
<td>1</td>
<td>3.8</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>40-59</td>
<td>15</td>
<td>57.69</td>
<td>2</td>
<td>40</td>
<td>17</td>
<td>54.8</td>
</tr>
<tr>
<td>≥60</td>
<td>10</td>
<td>38.46</td>
<td>3</td>
<td>60</td>
<td>13</td>
<td>41.9</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>83.87</td>
<td>5</td>
<td>16.13</td>
<td>31</td>
<td>100 %</td>
</tr>
</tbody>
</table>

**Table. 2: Microorganisms isolated from ascitic fluid culture.**

<table>
<thead>
<tr>
<th>Organism</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>E Coli</td>
<td>11</td>
<td>35.4</td>
</tr>
<tr>
<td>Klebsella</td>
<td>7</td>
<td>22.5</td>
</tr>
<tr>
<td>Enterobacter</td>
<td>5</td>
<td>16.1</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td>3</td>
<td>9.6</td>
</tr>
<tr>
<td>Acinetobacter</td>
<td>2</td>
<td>6.4</td>
</tr>
<tr>
<td>Staph aureus</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Enterococcus fecalis</td>
<td>2</td>
<td>6.4</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Table. 3: Number of SBP Cases diagnosed.**

<table>
<thead>
<tr>
<th>Total Number of SBP cases diagnosed.</th>
<th>Culture + SBP</th>
<th>CNNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
<td>31</td>
<td>45</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Out of 198 clinically suspected cases of SBP, 76 (38.38%) had SBP. Among 76 cases, 31 (40.7%) cases were culture positive and 45 (59.2%) cases were culture-negative neutrocytic
ascites (TABLE 3). Out of 31 culture positive cases, there was 26 males (83.87%) and 5 females (16.13%). This high male gender predominance was due to increased risk of alcohol consumption, smoking habits, which were commonly prevalent among them. Rimland D etal,[11,12] have reported similar male predominance in SBP.

In our study, out of the 31 patients with culture + SBP, 17(54.8%) patients were in the age group of 40-59 years followed by ≥ 60 years (TABLE 1). Hoefs JC, etal.[13] has reported the similar age group 41-60 years distribution in SBP and explained that older patients had low complement level and also had low phagocytic activity in ascitic fluid, which leads to increased survival of migrated enteric organisms from intestine. Also, majority of patients with SPB were cirrhotic patients with low complement level in ascitic fluid.

In our study, majority of isolated organisms were aerobic Gram Negative Bacilli (GNB), mainly enteric Gram negative organisms and among them, Escherichia coli (35.4%) was the most common isolate followed by Klebsiella pneumoniae (22.5%), Enterobacter (16.1%), Pseudomonas aeruginosa (9.6%) and Acinetobacter in (6.4%). Among the Gram Positive Cocci (GPC), Enterococcus in (6.4%) cases and Staphylococcus aureus was isolated from (3.2%) cases (TABLE 2). This correlates with Rim land et al.[12] Weinstein et al.[14] and Hoefs etal.[13]

Majority of Gran negative bacteria were sensitive to cephalosporin and quinolones except One patient with E.coli and one with Pseudomonas infection were resistant to Cephalosporines, Quinolones and Piperacillin Tazobactum, but sensitive to Imipenem and Meropenem. One patient had infection with Methicillin resistant staphylococcus sensitive to vancomycin, teicoplanin and Linezolid. Mirnejad et al., (15) have reported similar results in his study, where majority of patients (85%) were sensitive to third generation cephalosporins and quinolones. Appropriate use of selective intestinal decontamination with antibiotics in patients with ascites and also strict follow up of empirical therapy will prevent the severity of SBP.

CONCLUSIONS

SBP is a fatal complication of patients with chronic liver disease with ascites, if untreated it can lead to death. Most episodes of SBP were caused by gram-negative bacteria with Escherichia coli being the most common organism isolated in 35.4% of positive ascitic fluid cultures. SBP, if diagnosed early, can be treated with high success rate; thus, ascitic fluid
laboratory analysis including culture of all suspected patients will help in improving prognosis of the patients.

CONFLICT OF INTEREST
The author disclose no conflicts.

REFERENCES


