

Original Research Article

# Study on Ascitic Fluid Culture and Antimicrobial Sensitivity Profile in Cirrhotic Patients admitted in a Medical College Hospital

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## Abstract

**Background:** Spontaneous bacterial peritonitis is a fatal complication of liver cirrhosis. Ascitic fluid culture is positive in half of the cases.

**Materials and methods:** The present cross-sectional study was conducted upon the patients admitted in Medicine ward of VIMS, Pawapuri. Bacterial examination of ascitic fluid, culture and antibiotic sensitivity was done.

**Results:** 47.2% of SBP cases were culture positive. E. coli (46.2%), Klebsiella (26.9%), Acinetobacter (7.7%) and Pseudomonas aeruginosa (3.8%) were the common organisms isolated.

**Conclusion:** As half of SBP cases have positive culture, ascitic fluid culture and antibiotic sensitivity testing is essential in such cases.

## Key words

Antibiotic sensitivity, Ascitic fluid, Culture, Microbiology, Spontaneous bacterial peritonitis.

## **Introduction**

Spontaneous bacterial peritonitis (SBP) is the bacterial infection of peritoneal cavity without any obvious source and with positive culture of peritoneal fluid or neutrophil count more than 250 ml cells per ml [1]. It is of three types. It can be either classical type in which ascitic fluid culture is positive and neutrophil count is more than 250 cells per ml. The second variant is known as culture negative neutrocytic ascites in which neutrophil count is above 250 cells per ml but ascitic fluid culture is negative. Third variant is known as Bacterascites in which ascitic fluid culture is positive but neutrophil count is less than 250 cells per ml [2].

It carries high mortality rate to the extent of 10 to 15% in the first episode and is one of the poor prognostic factors in liver cirrhosis. Further episodes of SBP increase mortality to up to 30-90% [3]. Early diagnosis and treatment by antibiotics reduces the mortality rate to 20% [4]. Hence, it is very important to timely diagnose cases of SBP and manage it properly. Culture and antimicrobial sensitivity of ascitic fluid has been researched by various authors and the isolated organism as well as effective antibiotic varies from place to place. Such study has not been conducted in this area and hence, this research was proposed.

## **Aim and objectives**

The present study was conducted to assess the clinical presentation, microbiological profile and antimicrobial sensitivity of organisms cultured from ascitic fluid of spontaneous bacterial peritonitis cases suffering from cirrhosis of liver.

## **Materials and methods**

The present study was descriptive cross-sectional in nature conducted in the department of microbiology of a medical college hospital. The study population included patients' above 18 years of age admitted in Medicine ward of VIMS, Pawapuri during the study period and suffering ascites due to cirrhosis of liver. Patients having ascites due to cardiac, renal, tubercular or

neoplastic causes were excluded from the study. A total of 55 cases fulfilling the selection criteria were included in the study.

Spontaneous bacterial peritonitis was diagnosed if a.) Ascitic fluid polymorphonuclear cell count was  $> 250$  cells/  $\mu\text{L}$  along with positive ascitic fluid culture and there was no apparent local source of infection. OR b.) If ascitic fluid culture was negative and polymorphonuclear cell count was  $>500$  cells/  $\mu\text{L}$  and no antibiotics were received in last three weeks, a diagnosis of culture negative neutrocytic ascites was made. OR c.) If ascitic fluid culture was positive for a single organism and polymorphonuclear cell count  $<250$  cells/ $\mu\text{L}$ .

Patients were informed about the study and verbal consent was taken. Detailed history and clinical examination was done for all the patients. Ascitic fluid was collected by tapping at the bedside in blood culture bottle aseptically using proper precautions to ensure a sterile collection. Bacterial examination and antibiotic sensitivity tests were carried out by standard microbiological techniques.

Data was entered in Microsoft Excel 2007 and analyzed using SPSS v 16.0. Categorical variables were described as frequency and percentage and numbers as mean and SD. Appropriate tests were done to calculate statistical significance. p-value of less than 0.05 was considered as statistically significant.

## **Results and Discussion**

**Table - 1** shows the different types of spontaneous bacterial peritonitis seen in cases of liver cirrhosis. Most common type of SBP seen was Culture Negative neutrocytic ascites (52.7%) followed by Classic spontaneous bacterial peritonitis (41.8%). Bacterascites was seen in 5.5% cases.

**Table - 2** shows various pathogens isolated from the ascitic fluid. 26 cases were culture positive (47.2%). Among the positive cultures, E. coli

was isolated in 46.2% cases, Klebsiella in 26.9%, Acinetobacter in 7.7% and Pseudomonas aeruginosa in 3.8% (**Chart - 1**).

Vancomycin and Linezolid (100%).The gram negative organisms were sensitive to Imipenem (100%), Cefotaxime (69.6%) and Ciprofloxacin (86.9%).

Antimicrobial sensitivity tests showed that the gram positive organisms were sensitive to

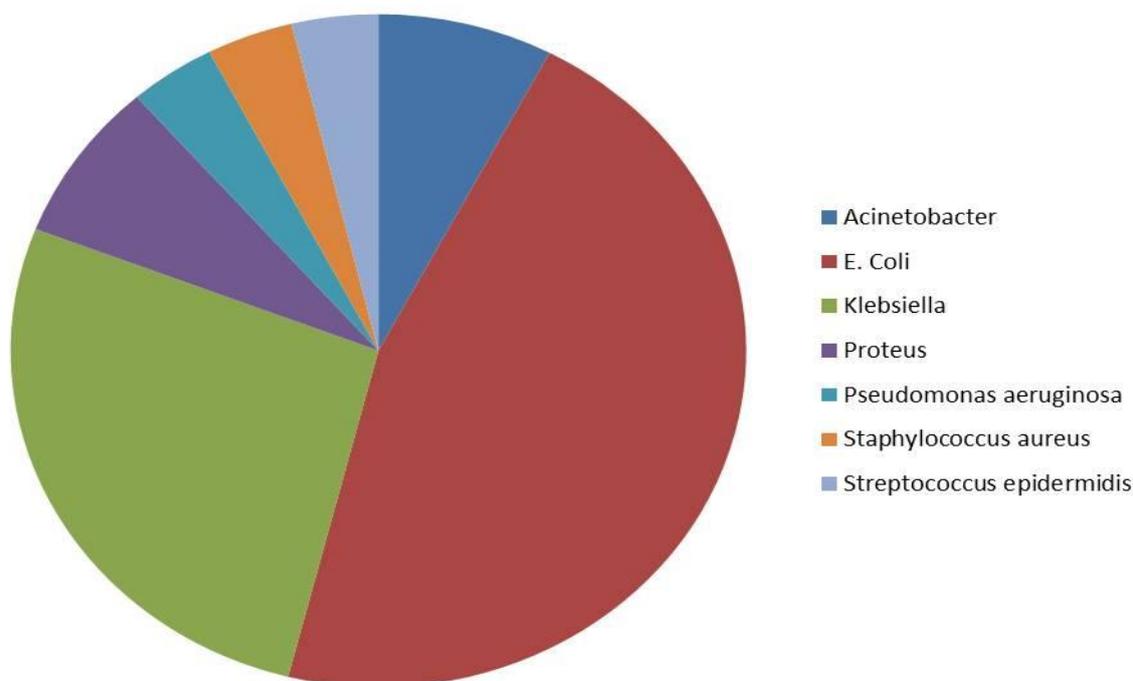
**Table – 1:** showing type of spontaneous bacterial peritonitis (n=55).

| Type of SBP                               | Frequency | %    | 95% CI    |
|---|-----------|------|-----------|
| Classic spontaneous bacterial peritonitis | 23        | 41.8 | 28.8-54.8 |
| Culture Negative neutrocytic ascites      | 29        | 52.7 | 39.5-65.9 |
| Bacterascites                             | 3         | 5.5  | -0.5-11.5 |
| Total                                     | 55        | 100  | -         |

**Table – 2:** showing frequency of isolation of various pathogens.

| Organism isolated         | Frequency | %    | 95% CI    |
|---------------------------|-----------|------|-----------|
| Acinetobacter             | 2         | 7.7  | -2.5-17.9 |
| <i>E. Coli</i>            | 12        | 46.2 | 27-65.4   |
| <i>Klebsiella</i>         | 7         | 26.9 | 9.9-43.9  |
| Proteus                   | 2         | 7.7  | -2.5-17.9 |
| Pseudomonas aeruginosa    | 1         | 3.8  | -3.5-11.1 |
| Staphylococcus aureus     | 1         | 3.8  | -3.5-11.1 |
| Streptococcus epidermidis | 1         | 3.8  | -3.5-11.1 |
| Total                     | 26        | 100  | -         |

**Chart -1 showing the organisms isolated**



Gadekar, et al. [5] in Maharashtra found that all patients had  $>250$  polymorphonuclear cells/ $\mu\text{L}$  and 80% patients had  $>500$  polymorphonuclear cells/ $\mu\text{L}$  in ascitic fluid. 46.7% cases of SBP were culture positive and 53.3% were culture negative. Gram staining of ascitic fluid was positive in one case. Commonest microorganism isolated was *E. coli* followed by *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Staphylococcus aureus*. Mane, et al. [6] in Maharashtra found that 51% cases of SBP had ascitic fluid polymorphonuclear cells (PMN) count  $\geq 250/\text{mm}^3$ . 23% cases were culture positive and 28% were culture-negative neutrocytic ascites. *E. coli* was isolated from 13% cases; *Klebsiella* spp. from 6%, *Acinetobacter* from 2% cases, *Pseudomonas aeruginosa* and *Proteus* each from 1% cases. All isolates were sensitive to ceftriaxone and cefotaxime.

Roy, et al. [7] in Assam found that 35.7% cases of SBP had ascitic fluid polymorph nuclear count (PMN)  $\geq 250/\text{cmm}$ . *Escherichia coli* was isolated in 46.2% of culture positive cases, *Klebsiella pneumoniae* in 23%, *Staphylococcus aureus* and *Enterococcus faecalis* each in 15.4% cases. The gram negative isolates were 100% sensitive for Imipenem followed by Ciprofloxacin (88.9%) and Cefotaxime (77.8%). Gram positive isolates were 100% sensitive to Linezolid and Vancomycin.

Chawla, et al. [8] observed in Punjab that the most common organism isolated was *Escherichia coli* (40%) followed by Coagulase negative *Staphylococci*, *Klebsiella pneumonia* and *Acinetobacter*. 94.7% gram negative isolates were sensitive to tigecycline and 92.1% to colistin. All the gram positive organisms were sensitive to vancomycin & linezolid. Another study done in Punjab by Harchand, et al. [9] revealed that most common isolate was *Escherichia coli* (68.1%). Gram negative isolates (77.3%) were more common than gram-positive isolates (22.7%). Prevalence of MDR and XDR isolates were high.

It is thus evident that the microbiological profile of SBP cases is similar to other areas. The antibiotic sensitivity pattern is different in this study and also varies from patient to patient. Hence, ascitic fluid culture and antibiotic sensitivity testing is essential in such cases [10, 11, 12].

## Conclusion

About half of the cases of SBP were culture positive (47.2%). The common organisms isolated were *E. coli* (46.2%), *Klebsiella* (26.9%), *Acinetobacter* (7.7%) and *Pseudomonas aeruginosa* (3.8%). For gram positive isolates, Linezolid & Vancomycin and for the gram negative isolates, Imipenem was the most sensitive antibiotic. Ascitic fluid culture must be done for cases of SBP.

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