



BACTERIOLOGICAL PROFILE IN PATIENT OF CHRONIC LIVER DISEASE WITH SUSPECTED SPONTANEOUS BACTERIAL PERITONITIS IN CENTRAL INDIA

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ABSTRACT

BACKGROUND: Spontaneous bacterial peritonitis (SBP) is the most common complication and a leading cause of mortality in patient of Chronic liver disease (CLD). Due to high mortality related to SBP it is important to have an early diagnosis and the proper empirical treatment. Intestinal origin gram negative bacteria are the most commonly involved isolates, however recently there has been shift toward the gram positive isolates and growth of extended spectrum β -lactamase (ESBL) producing strains. Hence this study was done with the aim of finding the bacteriological profile in CLD patient with suspected SBP.

METHODS: This is a prospective study conducted in Tertiary hospital of central India. All the patient with suspected SBP were screen and diagnostic ascitic fluid was collected under aseptic condition. Patient with AF PMN count more than 250 mm³ were enrolled under study and 20ml of ascitic fluid was sent in BACTEC blood culture bottles to the microbiology lab.

RESULTS: 130 ascitic fluid samples showed PMN count >250/mm³ and there sample was sent for ascitic fluid culture before antibiotic was initiate. Study showed male predominance. Among 130 samples, 79 (60.8%) samples were culture negative neutrocytic ascites, 40 samples (30.7%) mono bacterial growth and 11 (8.5%) showed poly-bacterial growth.

Most of the samples had gram negative predominance i.e. 47 samples (92.2%), however 4 samples (7.8%) showed gram positive bacterial growth. Among Gram negatives most common isolated organism were *E.coli* and *Klebsiella* (16 each). Also, these gram negatives isolates showed high resistance against first line empirical therapy which include third generation cephalosporin. Even two culture showing growth of *E.coli* were found to be colistin resistant.

CONCLUSION: This study concluded that gram negative intestinal bacteria are the most commonly associated with SBP. But few sample also showed gram positive growth. As it was clear there are increasing growth of gram positive in this study as well as cited by other studies, along with development of resistant species of gram negatives it is important to revise the empirical therapy of SBP and to initiate treatment as soon as possible to prevent the mortality.

KEYWORDS : Spontaneous Bacterial Peritonitis, Chronic liver disease, Bacteriological Profile

INTRODUCTION

Spontaneous bacterial peritonitis is defined as ascitic fluid infection associated with the polymorphonuclear count in AF as more than equal to 250/mm³ and a positive bacterial culture, in the absence of a surgically treatable intra abdominal source of infection.¹ Infections are reported to be the leading cause of mortality in patients with cirrhosis. Globally, the prevalence of bacterial infections in cirrhosis ranges from 33% to 47%.² Cirrhotics are more prone to develop bacterial infections because of factors like portal hypertension and creation of portosystemic shunts which causes the diversion of blood that is normally detoxified by the liver. Impaired phagocytosis by the neutrophils, dysregulated RES (reticuloendothelial system) and Bacterial overgrowth and translocation.³

Most commonly isolated bacteria are of intestinal origin especially *E. coli*.

In the early 1970's, the term Spontaneous Bacterial Peritonitis was coined by Harold Conn^{4,5}. Other variants of ascitic fluid infections includes-

Culture Negative Neutrocytic Ascites (CNNA)- CNNA is defined as ascitic fluid infection with polymorphonuclear count in AF as more than equal to 250/mm³ but negative bacterial culture, in the absence of a surgically treatable intraabdominal source of infection.

Secondary bacterial peritonitis – This condition is diagnosed with as ascitic fluid infection associated with the

polymorphonuclear count in AF as more than equal to 250/mm³ and a positive bacterial culture, in the presence of a surgically treatable intraabdominal source of infection. Secondary bacterial peritonitis is not differentiated from Spontaneous bacterial peritonitis on the grounds of clinical signs and symptoms; however, ascitic fluid analysis is helpful in this regard. The AF in secondary peritonitis usually meet any two of the following criteria : a total protein content of > 1g/dL, a glucose level of <50mg/dL, and a LDH level of >225u/mL (or higher than the upper limit of normal for serum). The diagnosis of secondary peritonitis must be made early so that surgical correction is done on time and death is avoided.

Mono-microbial nonneutrocytic bacterascites (MNB)- This variant is characterized by PMN count of less than 250 but the positive single isolate of bacteria on culture. The clinical course of MNB depends on the presence or absence of associated clinical symptoms. The mortality and morbidity rates of patient, with clinical signs and symptoms suggestive of infection along of MNB, is similar to those for patients with SBP or CNNA. However asymptomatic MNB patients the colonization resolves usually even without any antibiotic therapy.

Poly-microbial bacterascites - Poly-microbial bacterascites is diagnosed by PMN count of <250/mm³ and the positive culture with more than one type of bacterial isolates. This variant usually results from inappropriate and multiple punctures of intestines done during paracentesis. However, it is rare event occurring in around 1/ 1000 paracentesis. If AF protein

concentration is >1g/dL and the opsonic activity of the fluid is adequate, this colonization resolves spontaneously.¹

Major factors involved in the pathogenesis of SBP include – gut microbiota dysfunction⁶, intestinal barrier dysfunction, a genetic predisposition to bacterial infections⁷ and immune dysfunction⁸. Once bacteraemia is established, a secondary colonization of Ascites occurs. However, whether infection of ascitic fluid develops or not depends on the antimicrobial activity of ascites. Therefore, SBP only appears in patients whose ascitic fluid bacterial killing capacity is impaired. This fact indicates that SBP recurrence is not only a frequent event in cirrhosis, but also significantly contributes to the poor prognosis of these patients. The most commonly isolated organisms during bleeding are aerobic gram negative bacilli of enteric origin which can include *Escherichia coli*, *Klebsiella spp*, *Enterococcus* and *Pseudomonas spp*.¹⁰ Bacteraemia, spontaneous bacterial peritonitis (SBP) and urinary tract infections were clinical infections most commonly reported in association with the above mentioned organisms.

As per current recommendation , first line antibiotics for SBP are third generation cephalosporin (cefotaxime / ceftriaxone) having more than 80% resolution rate¹¹.

However, recently there is increase in extended spectrum β-lactamase (ESBL) producing strains and emergence of gram positive cocci as new infective agent of SBP (Methicillin resistant *Staphylococcus aureus* MRSA) which is questionable to efficacy of current recommendation.

As there is limited study in central India about the current spectrum of bacterial isolates . We conducted the prospective study in the tertiary center Hamidia hospital in patient of chronic liver disease suspected of SBP.

METHODS

This study was conducted in the department of Medicine, GMC and associated Hamidia hospital after approval of institutional ethical committee. CLD patient with suspected SBP were selected and after written consent they were enrolled for the study.

Total of 432 patients were screened and their diagnostic paracentesis was done at admission. Among them patient whose AF PMN count was more than 250/mm³ were selected and ascitic fluid sample was sent for cultures and sensitivity.

10ml for ascitic fluid was collected with sterile precautions in BacTec Blood culture bottle along with blood cultures and was sent to microbiology lab.

Total of 130 patients were selected , among which 51 samples showed positive growth in AF.

Statistical analysis was done by chi-square test. The mean and standard deviation for all the observations were calculated using SPSS. Data were analyzed using IBM SPSS statistics v.22.0. P-values less than 0.05 were considered statistically significant

RESULTS

Routine ascitic fluid analysis was sent for 432 patients . SBP was diagnosed in 130 patients. Among them 79 (60.8%) samples were CNNA, 40 samples (30.7%) mono-bacterial growth and 11 (8.5%) showed poly-bacterial growth (fig 1).

Most of the samples had gram negative predominance i.e. 47 samples (92.2%), however 4 samples(7.8%) showed gram positive bacterial growth.

SBP microbiological profile as per study is detailed in the table below.

Most common isolated in this study was *Escherichia coli* and *Klebsiella pneumoniae* (16 each). one sample showed growth of *Streptotrophomonas maltophilia* (Table 2). Gram positive cocci includes *Staphylococcus spp* as found in 3 samples.(table 2& fig. 2)

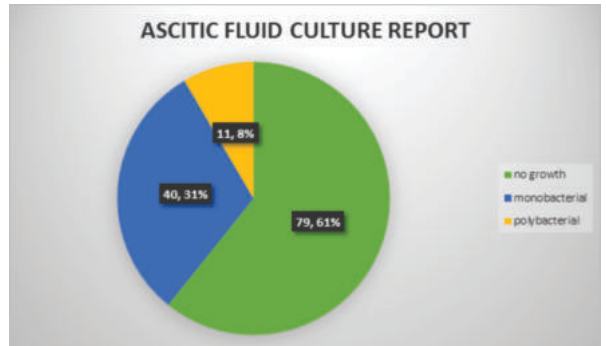


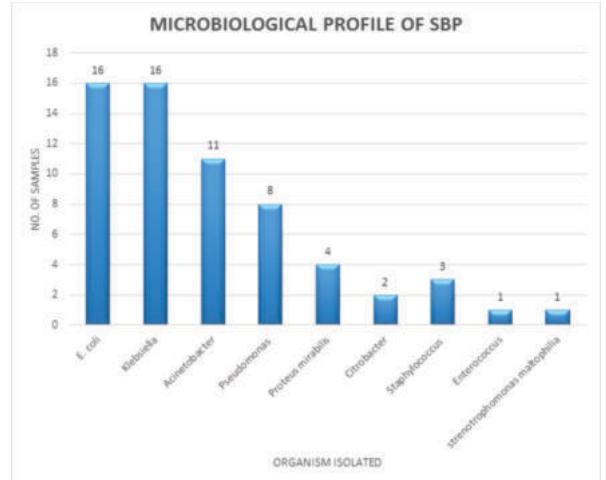
Figure 1. Ascitic fluid culture report

Table 1. Isolates of bacteria on culture

Organism	Frequency	Percent	
	Gram Positive	4	7.8%
Gram Negative	47	92.2%	

Table.2- SBP Microbiological profile

Organism Isolated	Frequency	Percent
<i>E coli</i>	16	31.4%
<i>Klebsiella pneumoniae</i>	16	31.4%
<i>Acinetobacter</i>	11	21.5%
<i>Pseudomonas aeruginosa</i>	8	15.7%
<i>Proteus mirabilis</i>	4	7.8%
<i>Citrobacter</i>	2	3.9%
<i>Staphylococcus spp</i>	3	5.8%
<i>Enterococcus</i>	1	1.9%
<i>Streptotrophomonas maltophilia</i>	1	1.9%



DISCUSION

This study was conducted to find the current bacteriological profile in patient of SBP in central India. As many studies in recent past concluded the change in bacteriological spectrum and the antibiotic susceptibility, We tried to find the recent trends and to help clinicians regarding the choice of empirical antibiotics that needed to be changed as per common isolates. Most of the sample were CNNA ,79 samples (60.8%) f/b classical SBP. Similar results were cited by studies like Piyush et al¹¹. The most commonly isolated organisms include intestinal gram negative bacteria in this study 47 samples (92.2%). Similar results were concluded by Piyush et al¹¹, Bibi

et al¹², Syed et al¹³ and Chawala et al¹⁴. Among total of 53 samples, 4 samples showed gram positive cocci. The presence of gram positive could be due to antibiotic usage, however our study could find any such correlation.

Table 2 describes in detail the strain of isolated bacteria. Most common strain isolated were *E.coli* and *Klebsiella spp.* (16 each) followed by *Acinetobacter* (11) and *Pseudomonas spp.* (8). In our study one rare gram negative *Streptococcus maltophilia* was also isolated.

As per recent guidelines, third generation cephalosporin are considered as first line therapy for SBP patients and fluoroquinolones and piperacillin tazobactam are considered as second line therapy.¹⁵

This study help to find the current trend of bacteriological profile along with the antibiotic sensitivity testing to help physician to decide the appropriate therapy of choosing the most effective antibiotic. As per our study high resistance was observed against commonly used third generation cephalosporin (Ceftriaxone / Cefotaxime). Among commonly used cephalosporin only Cefoperzaone - sulbactam showed more than 50% sensitivity against gram negative microorganisms. In this study 58.3% sensitivity was observed, whereas 100% resistance against ceftazolin, 85.7% against ceftazidime, 82.5% against ceftriaxone were seen. This makes cefoperazone sulbactam a good choice to be used as first line empirical therapy of SBP. Other antibiotics which showed high sensitivity against gram negatives include Aztreonam (58.3% sensitive) and Colistin (97.7% sensitive). seeing the increased resistance against higher classes of antibiotics, it is important to treat SBP as soon as possible as per the ascitic fluid culture sensitivity report. Ascitic fluid should be collected before administration of antibiotics. Correct and early treatment of SBP is of utmost importance to save the life of patient.

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