Prevalence and Short Term Outcome of Spontaneous Bacterial Peritonitis of Known Chronic Liver Disease Patients

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Abstract

Spontaneous bacterial peritonitis (SBP) is an infection of ascitic fluid occurring in the absence of a contiguous source of infection characterized by symptoms of fever, abdominal pain, rebound tenderness, encephalopathy. It may develope in hospitalized patients and mortality rate is significantly high. To determine the prevalence of SBP in chronic liver disease with ascites and to establish that SBP is the cause of higher mortality than non SBP, a prospective longitudinal study was carried out in patients attending in the inpatient Department of Gastroenterology of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorder Hospital(BIRDEM), Bangabandhu Sheikh Mujib Medical University(BSMMU), Dhaka Medical College Hospital(DMCH), Dhaka from March 2010 to September 2010. Among the 60 patients the most common age group was the 46-55 years. In physical finding below average body build was found in 48 (80.0%) cases. Malnutrition was found in 48(80.0%) cases. Per abdominal finding liver was not palpable in 54 (90.0%) cases. Shifting dullness was found in 59 (98.3%) cases. Fluid thrill was detected in 57 (95.0%) cases. It was found that SBP were developed in 11(18.3%) cases and remaining 49(81.7%) case were non SBP, which were higher than SBP. Organism of culture of ascitic fluid in SBP patients (n=11) were E. coli and Pseudomoas spp found in 2(18.2%) cases, the rest 6(54.5%) cases shows no growth. Among 11 SBP patients improvement occurred in 5(45.5%) cases and the rest 6(54.5%) cases died p value <.001. SBP is medical emergency, prompt management and prophylactic antibiotics are essential to reduce mortality.

Keywords: Spontaneous Bacterial Peritonitis, Chronic Liver Disease, Prevalence

Introduction

Spontaneous bacterial peritonitis (SBP) is an infection of ascitic fluid occurring in the absence of a contiguous source of infection (eg. Intestinal perforation, interabdominal abscess) characterized by symptoms of fever, abdominal pain, rebound tenderness, encephalopathy[1].

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Between 10 and 30% of patients with cirrhosis develop SBP[2], which carries hospital mortality rate ranging from 30 to 50 %[3]. The risk of SBP recurrence is 70 % at 1st year[4].

The presence of at least 250 polymorphonuclear cells per cubic millimeter of ascitic fluid is diagnostic of this condition. Aerobic gram-negative bacteria, primarily Escherichia coli, are the most common isolates, although the frequency of episodes caused by gram-positive bacteria has recently increased[4].

Spontaneous bacterial peritonitis (SBP) is particularly frequent if the cirrhosis is severely decompensated. It is most characteristic infectious complication of cirrhosis. The occurrences of SBP are independent of the aetiology of liver diseases. The aim of the present study is to evaluate the prevalence and outcome of SBP patients with cirrhotic ascites.

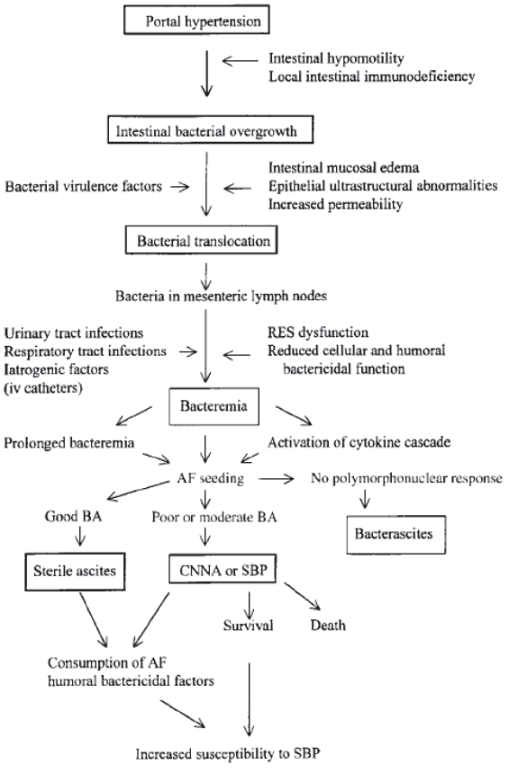

Figure 1. Mechanisms that may be involved in the pathogenesis of spontaneous bacterial peritonitis5. AF=ascitic fluid; BA=bacteri cidal activity; CNNA=culture-negative neutrocytic ascites; RES=reticuloendothelial system; SBP=spontaneous bacterial peritonitis

Materials and Methods

Type of Study

This was a prospective longitudinal study.

Place of Study

This study was carried out in patients attending in the inpatient Department of Gastroenterology of BIRDEM Hospital, Bangabandhu Sheikh Mujib Medical University, Dhaka Medical College Hospital, Dhaka. This study was done from March 2010 to September 2010 for a period of 6 months. Study population were all ascitic patient admitted in defined period in the Department of Gastroenterology, BIRDEM Hospital, Bangabandhu Sheikh Mujib Medical University, Dhaka Medical College Hospital, Dhaka.

Sample size determination

Sample Size was determined by Prevalence of SBP in Bangladesh is not known. In India it is 37% 6. Due to use of prophylactic and gut sterilizer (quinolone), reduces the incidence of SBP dramatically.

Sample size: $n = \frac{Z^2 \times pq}{d^2}$

Here z = 1.96, p= 0.37, q = 1-p) d (if degree of accuracy 0.05) from the formula, calculated sample size =358 (n), if population size 10,000. In BIRDEM & Other above mentioned hospital we have 4 cases per week and 96 cases per 6 Months (N). In that case sample size would be

$$nf = \frac{n}{1+\frac{n}{N}} = \frac{185}{1+\frac{185}{96}} = 63$$

So, a total number of 60 patients were taken as case of this study.

The sampling technique was purposive sampling method and consecutive hospital admission during define period. This purposive sampling was used as per inclusion and exclusion criteria.

Selection Criteria of Subjects

Inclusion Criteria

- Diagnosed case of chronic liver disease with ascites
- Patients not having any antibiotic within 2 weeks prior to hospital admission

Exclusion Criteria

Patients having following clinical condition were excluded from this study-

- Acutely ill patients.
- Patient who had taken any antibiotic within 2 weeks prior admission in ward
- Surgically treatable conditions (perforation of hollow viscous; appendicular lump; abscess).
- Patients or attendants unwilling to take part in the study
- Patients with congestive cardiac failure, nephrotic syndrome, peritoneal tuberculosis, abdominal malignancy.

Data Collection Procedure

Study procedure was followed under aseptic precaution. 20 ml of ascitic fluid was drawn by 20 cc disposable syringe from right or left flank or midline of abdomen. 10 ml ascitic fluid was taken in a heparinized tube to prevent clotting and examined within 1 hour for cell count. The remaining 10 ml was inoculated in blood culture bottle containing tryptica soya broth (100ml) which was previously prepared.

Data was collected by using patient's information sheet which included clinical features, laboratory investigation that included routine ascitic fluid-tests, ascitic fluid culture, blood test–prothrombin time, serum billirubin, platelet count and serum creatinine, complete blood count.

Data were collected by investigator himself. Information was collected by taking medical history and clinical examination. Permission was taken from the concerned departments and informed written consent of each patient was taken in a consent form before collecting data.

Data analysis procedure

All data were recorded systematically in preformed data collection form and quantitative data was expressed as mean and standard deviation and qualitative data was expressed as frequency distribution and percentage. Statistical analysis was performed by using SPSS (Statistical Package for Social Sciences) for windows version 15. Probability value <0.05 was considered as level of significance.

Ethical clearance

Prior to the commencement of this study, the thesis protocol was approved by the local ethical review committee of Diabetic Association of Bangladesh (BADAS). And informed written consent was taken from each patient.

Results

A total number of 60 patients of both sexes presented with ascites and admitted in the Department of Gastroenterology BIRDEM hospital, Bangabandhu Sheik Mujib Medical University, Dhaka Medical College Hospital, Dhaka were enrolled in this study.

Among the 60 patients the most common age group was the 46-55 years .The mean age of the study population was 49.78 ±15.22 with a range of 16-80 years. Among the study population the overall male and female ratio was 2.5: 1.

Etiology of hepatitis viruses among study population Hepatitis B, Hepatitis C and Non B-Non C were found in 45 (75%) cases, 13(21.7%) cases and 2(3.3%) cases respectively. Co-morbid conditions diabetes mellitus was found in 13 (21.7%) cases and chronic renal failure was found in 3 (5.0%) cases. Past history among the study population, jaundice was found in 53 (88.3%) cases, abdominal swelling was found in 56 (93.3%) cases, abdominal pain was found in 43(71.7%) cases, disorientation was found in 49 (81.7%) cases, blood vomiting was found in 25 (41.7%) cases, bleeding per rectum was found in 16 (26.7%) cases, black tarry stool was found in 43(71.7%) cases.

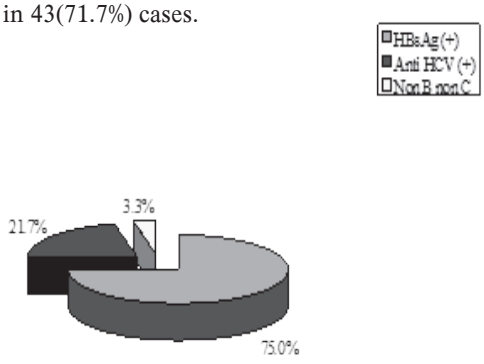

Figure 2. Pie chart of etiology of chronic liver disease among study population (n=60)

Patients were admitted in hospital with these clinical features. Fever was found among 47 (78.3%) cases, abdominal pain was reported in 51(85.0%) cases, abdominal tenderness was found in 46(76.7%) cases, altered mentation was found in 40 (66.7%) cases, and abdominal swelling was recorded in 41 (68.3%) cases.

Table 1. Physical finding among the study population (n=60)

Physical findings	Frequency	Percentage (%)
Body build		
Average	12	20.0
Below average	48	80.0
Nutrition		
Malnutrition	48	80.0
Normal	12	20.0
Anaemia		
Mild	17	28.3
Moderate	23	38.3
Severe	20	33.3
Stigma of CLD		
Gynocomastia	25	41.66
Testicular atropy	20	33.33
Spider	9	15.0
Venous engorgement	6	10.0
Clubbing	22	36.7
Edema	21	35.0
Echymosis	19	31.7
Flapping tremor	34	56.7

Physical finding among the study population was shown that below average body build was found in 48 (80.0%) cases. Malnutrition was more common and was found in 48(80.0%) cases, moderate anaemia was seen in 23(38.3%) case and severe anaemia was seen in 20 (33.3%).Stigma of CLD - gynocomastia was found in 25 (41.66%) cases, testicular atrophy was found in 20(33.33%) cases, clubbing was found in 22(36.7%) cases. Edema was found in 21 (35.0%) cases. Flapping tremor was found in 34 (56.7%) cases. Spider nevae, venous engorgment , echymosis was also found .

Table 2. Per abdominal finding among the study population (n=60)

Per abdominal finding	Frequency	Percentage (%)
Abdominal swelling		
Mild	2	3.3
Moderate	40	66.7
Tense	18	30.0
Liver		
Palpable	6	10.0
Non palpable	54	90.0
Shifting dullness	59	98.3
Fluid thrill	57	95.0

Regarding per abdominal finding moderate abdominal swelling was seen 40 (66.7%) cases and tense abdominal swelling was seen 18 (30.0%) cases. Mostly liver was non palpable in 54 (90.0%) cases. Shifting dullness was found in 59 (98.3%) cases. Fluid thrill was detected in 57 (95.0%) cases.

Table 3. Laboratory investigation in SBP and non SBP patients (n=60)

Laboratory investigation	SBP (n=11)	Non SBP (n=49)
S. billirubin (mg/dl)	4.18 ± 1.69	4.32 ± 3.76
S. albumin (g/l)	2.48 ± 0.47	2.59 ± 0.68
ALT(iu/l)	89.64 ± 83.90	87.65 ± 79.73
Prothrombin time(sec)	26.31 ± 6.32	21.48 ± 5.30
Plateletcount(/mm3)	21178.98± 4983.27	32854.55± 26754.3
S. creatinine(mg/dl)	1.51 ± 0.23	1.22 ± 0.34
Hb (gm/dl)	8.24+.10	9.04 ± .51
TC(/mm3)	13915.4 ± 8810.85	12794.5 ± 9739.05
Neutrophil %	77.36 ± 8.83	75.46 ± 14.75
Lymphocyte%	16.27 ± 6.90	19.44 ± 14.23
Monocyte%	3.36 ± 1.21	3.04 ± 2.53
Eosinophil%	2.73 ± 2.15	1.97 ± 1.40

Data was expressed as Mean ± SD.

Table 4. Prevalence of SBP among the study population (n=60)

Total study subjects	SBP	Percentage of SBP	95% CI
60	11	18.3%	8.54-28.12

CI- Confidence interval

Among 60 ascitic patients SBP were developed in 11(18.3%) cases and remaining 49(81.7%) case were non SBP, which were higher than SBP.

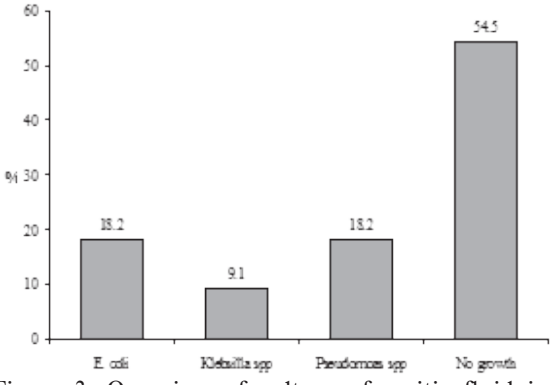

Figure 3. Organism of culture of ascitic fluid in SBP patients (n=11)

E. coli and Pseudomonas spp were found in 2(18.2%) cases in each. Only 1(9.1%) Klebsilla spp was found among the study population. The rest 6(54.5%) cases showed no growth.

Table 5. Mortality in SBP and non SBP patients (n=60)

Mortality	SBP (n=11)	Non SBP (n=49)	p value*
Dead	6 (54.5)	4 (8.2)	
Improved	5 (45.5)	45 (91.8)	.001
Total	11 (100.0)	49 (100.0)	

*Fisher's Exact test was done to measure the level of significance.

Among 11 SBP patients improvement occurred in 5(45.5%) cases and the rest 6(54.5%) cases died.

Discussion

Spontaneous bacterial peritonitis (SBP) is a lethal complication of chronic liver disease[1] and is diagnosed when the ascitic fluid culture shows growth of a monomicrobial Gram negative organism, ascitic fluid neutrophils count ≥ 250 cells /mm^3 and without evidence of surgically treatable intra abdominal conditions[1].

The prevalence of SBP in the community ranges from 5% to10%[7] and in hospitalized patient from 10% to30%[8]. Even with intensive treatment, hospital mortality is still between 10% and 30%[9]. Factors associated with poor outcome include hepatic encephalopathy, high serum bilirubin, gastrointestinal bleeding and renal failure[8]. SBP is due to translocation of bacteria from gut to peritonium and related to low protein levels and impaired opsonic activity in ascitic fluid1.

A total number of 60 patients of both sexes presented with ascites and admitted in the Department of Gastroenterology BIRDEM Hospital, Bangabandhu Sheik Mujib Medical University and Dhaka Medical College Hospital, Dhaka were enrolled in the study. Among the 60 patients the most common age group was the 46-55 years which was 25.0% followed by 56-65 years, 36-45 years, >65 years, 26-35 years and less than or equal to 25 years which were 23.3% , 18.3% ,13.3%, 11.7%and 8.3% respectively. Similar result was found and reported that the higher age group were more vulnearable to SBP, due to more chance of infection to those patients[10]. Another study also showed that middle age group was the most common age group[11].

Among the study population male was predominant. The overall male and female ratio was 2.5: 1. Similar result was reported and mentioned that 69.6% were males and 30.4% were female[11].

In this study Hepatitis B, Hepatitis C and Non B-Non C was 45(75%), 13 (21.7%) and 2(3.3%) respectively and a similar result also were reported [11].

In this present study co-morbid condition DM was present in 13(21.7%) and CRF was 3 (5.0%). In a study[4] the mortality rate was 100% when associated with progressive renal impairment, 31% when associated with steady renal impairment, and only 7% in those without renal impairment. Filik and Unal[11] were reported a similar result.

According to past history it was found that jaundice was present in 53 (88.3%) cases; abdominal swelling was 56 (93.3%); abdominal pain was 43(71.7%); disorientation was 49(81.7%). Similar result was reported[9] and added that the clinical manifestations of SBP are subtle. In this study it was found that blood vomiting was 25(41.7%); bleeding per rectum 16(26.7%); black tarry stool was 43(71.7%). Similar result was reported in another study[11].

In this study presenting chief complains were seen as fever was found among 47(78.3%) cases, similar result was reported and mentioned that fever caused by SBP is differentiated from that of alcoholic hepatitis[4]. Abdominal pain was reported 51(85.0%) cases; abdominal tenderness was present in 46(76.7%) cases. Similar result was reported that abdominal pain can be continuous and is different from tense ascites[2,11]. Altered mentation was 40(66.7%); abdominal swelling was 41(68.3%); nausea or vomiting was 23(38.3%); blood vomiting was 24(40.0%); bleeding per rectum was 10(16.7%); black tarry stool was 24(40.0%); respiratory infection was 19(31.7%), shortness of breathing was 29(48.3%); only 3(5.0%) was asymptomatic. From another study, similar result were shown and added that all spontaneous bacterial peritonitis were symptomatic[11].

According to physical finding, maximum body build 48(80.0%) was below average; most of the respondents 48 (80.0%) were malnourished and all the cases anaemia common. In stigma of chronic liver disease, gynocomastia was present in 25 (41.66%) cases; testicular atropy was 20(33.33%); spider nevae was 9(15.0%); venous engorgment was 6(10.0%); clubbing was 22(36.7%); edema was 21(35.0%); echymosis was 19(31.7%); flapping tremor was 34(56.7%). The most frequently encountered

symptoms and signs are fever 69%, abdominal pain 59%, signs of hepatic encephalopathy, abdominal tenderness, ileus, shock and hypothermia[12].

In per abdominal finding abdominal swelling was more in moderate and tense abdomen than mild and most of the cases 54(90%) liver was non palpable. Shifting dullness was found 59(98.3%) cases. Fluid thrill was 57(95.0%). From a study[13] it is found that at physical examination, patients with ascites and SBP do not have a rigid abdomen because the ascitic fluid in great amounts prevents the contraction between the peritoneal membranes.

Laboratory investigation was done in both SBP and nonSBP, there was no significant difference between two groups. It was mentioned that a serum total bilirubin level (mg/dl) of 2.5 mg/dL is an independent predictive factor of SBP[14]. A direct correlation between total protein level, complement components, and opsonic activity explains that an asitic fluid total protein level of <1 g/di is a risk factor for the development of asitic fluid infection[15]. It was reported that patients with cirrhosis have coagulation disturbances which was consistant with this study[14]. Similar laboratory findings were reported and mentioned that the factors associated with poor outcome include hepatic encephalopathy, high levels of serum bilirubin, and gastrointestinal bleeding[8].

Ascitic fluid was cultured of SBP patients and were found E. coli and Pseudomoas spp in 2(18.2%) cases in each. Only 1(9.1%) Klebsilla spp was found among the study population. The rest 6(54.5%) cases shows no growth. Organisms that cause SBP is Gram negative as because of its predominance in gut flora. similar result was found that an increased frequency of the SBP episodes produced by Gram negative bacteria has been ascertained[12] and also reported that more than 60% of SBP episodes are caused by Gram negative enteric bacteria which is consistant with this study and added that Escherichia coli and Klebsiella pneumoniae are the organisms isolated most frequently which was similar to this study[14].

Limitations of the Study

There are some limitations in this study. Some are mentioned below:

1. Sample size was small

2. It was a non randomized sampling method

3. The study and follow up period was short in comparison to other series.

In conclusion, SBP is common in chronic liver disease with ascites. Clinical feature and biochemical marker are almost same in SBP and non-SBP. The most common bacteria that isolated from SBP patients are the E coli, Klebsilla species and Pseudomonas species. After development of SBP mortality is high for that SBP is a medical emergency, prompt management and prophylactic antibiotics is essential to reduce mortality.

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