Study On Ascitic Fluid Complement3 Level In Cirrhotic Patients With Spontaneous Bacterial Peritonitis And Without Spontaneous Bacterial Peritonitis

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Citation

G Mustafa, M Alam, M Khan, K Alam, S Rahman, N Ahmad, S Ahmed. *Study On Ascitic Fluid Complement3 Level In Cirrhotic Patients With Spontaneous Bacterial Peritonitis And Without Spontaneous Bacterial Peritonitis*. The Internet Journal of Gastroenterology. 2006 Volume 6 Number 1.

Abstract

Background: Ascitic fluid Complement 3 is important factor to offer local defence against infection of ascitic fluid. Hepatic synthesis of Complement3 and it's concentration in ascitic fluid is reduced in patients with advanced cirrhosis. The study aimed to assess Complement3 in ascitic fluid in patients with Spontaneous Bacterial Peritonitis and without Spontaneous Bacterial Peritonitis and identify cirrhotics at risk of developing Spontaneous Bacterial Peritonitis.

Methods: A prospective case-control study done to compare the ascitic fluid Complement3 level in patients with Spontaneous Bacterial Peritonitis (case-group) and without Spontaneous Bacterial Peritonitis (control-group). Ascitic fluid Complement3 was estimated in 15 patients with Spontaneous Bacterial Peritonitis (case) and another 15 patients without Spontaneous Bacterial Peritonitis (control).

Results: Ascitic fluid Complement3 level was 7.3± 4.3 mg/dl in patients with Spontaneous Bacterial Peritonitis and 16.4 ± 11.3 mg/dl in patients without developing Spontaneous Bacterial Peritonitis.

Conclusion: Ascitic fluid Complement3 is significantly (P=0.009) reduced in cirrhotics who develop Spontaneous Bacterial Peritonitis.

INTRODUCTION

Spontaneous bacterial peritonitis (SBP) is a serious infection that occurs frequently in patients with advanced cirrhosis. This condition has been defined as the infection of a previously sterile ascitic fluid, without any apparent intra abdominal source of infection.[1] Diagnosis of SBP is based on ascitic fluid neutrophil count of ≥250/Cmm (and/or leucocyte count of ≥500/Cmm).[2] In the past, it was associated with a high mortality rate.[3] Prevalence of SBP is as high as 18% in cirrhotic patients with ascites and mortality associated with the complication ranges from 40 – 70 %.[4] During 1970s, mortality in patients hospitalized for SBP was 80 -90%. Since then, there has been an explosion of information about SBP that has improved awareness of the condition .[5] Occurrence of SBP depends on the local immune response of the ascitic fluid.[6] Ascitic fluid Complement3 (C3) concentration and opsonic activities are important protective factors against SBP. Liver is the main site of synthesis of complement components; C3 is the main component of complement system.[7] The C3 component of complement tends to be reduced in cirrhosis.[8] Patients with reduced ascitic fluid C3 concentration and reduced opsonic activities have been shown to be predisposed to SBP.[9,10]

Adequate laboratory parameters are lacking to detect patients at risk of developing SBP. The study was designed with the aim of assessing the correlation of ascitic fluid C3 concentration with the development of SBP; thereby to serve as a parameter for selecting those at risk of developing this complication.

PATIENTS AND METHODS

It was a prospective case-control study to compare the level of ascitic fluid C3 concentration in cirrhotic patients with SBP (case) and without SBP (control) and to observe the

ascitic fluid C3 level that correlates with the development of SBP.

The study was carried out in the Department of Hepatology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh during the period of July 2003 to June 2005. In one group (controls) 14 consecutive admitted patients and one out door patient (n=15) of established cirrhosis with ascites were included in the study. Included patients had no existing evidence or past history of SBP.

In another group (cases) 15 consecutive patients with cirrhotic ascites were included who were admitted with SBP or developed SBP during hospital stay period.

Patients with hepatocellular carcinoma, grade IV encephalopathy, diabetes mellitus, secondary causes of intrabdominal sepsis (ascitic fluid protein >2.5 g/dl) and previous episode of SBP were excluded.

At the initial phase, a standard questionnaire was designed to record the detail data of patients who served as the study population.

A thorough clinical and laboratory evaluation was done and the patients were categorised as per Child – Pugh class.[11]

About 30 ml of ascitic fluid was collected from each patient following standard aseptic technique; when needed the help of ultrasound guidance was taken.

Ascitic fluid C3 level was estimated by liquid-phase immunoprecipitation assay by Turbidometry done by TURBOX-plus automatic analyser.

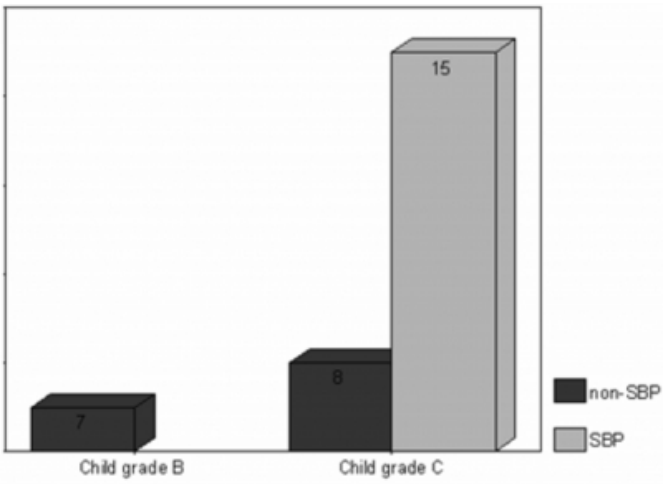
For culture, about 10 ml of ascitic fluid was immediately inoculated into TRIPTIC SOY BROTH medium containing bottle at the bedside.

Data of cirrhotic ascites patients with SBP and without SBP were collected as per specified variables. Comparative analysis of data of the two groups was made through standard statistical methods. All the data were processed and analysed by computerized SPSS programme. Significance of the test was tested by unpaired “t” test and “x2” test. A ‘P' value of < 0.05 was taken as statistically significant.

RESULTS

All the patients in the SBP (case) group and eight patients in the Non-SBP group were in Child's grade “C”. Seven patients in the Non-SBP (control) group were in the Child's grade “B” (Graph-1).

Figure 1



Graph-1 Shows Child's grade in the study groups.

Included patients had the age range of 18 to 68 years. Three patients in the SBP (case) group and one patient in the Non-SBP (control) were female; others in the study group were male (Table-1).

Figure 2

Table 1: Shows demographic data of the study groups

Parameter		Study groups		t-value	P-value
		Control	Case		
Age (Mean± SD)		40±12	43±14	0.71	0.483
		Study groups		X^2 value	P-value
		Control	Case		
Sex	Male	14	12	1.154	0.283
	Female	1	3		

	Study groups	No.
Occupation	Businessmen	15
	Service-holder	06
	Farmer	04
	House-wife	03
	Physician	01
	Jobless	01

Eight patients in the Non-SBP (control) group and ten patients in the SBP (case) group were positive for HBsAg. One patient in the SBP (case) group and none in the Non SBP (control) group were positive for Anti-HCV. Eleven patients were negative for viral markers.

Mean ascitic fluid total protein was 1.5 g (± 0.5g)/dl in the Non-SBP (control) group and 1.1g (± 0.3g)/dl in the SBP (case) group.

Figure 3

Table 2: Shows biochemical and haematological parameters in ascitic fluid.

Parameter	Study groups		t-value	P-value
	Control	Case		
Ascitic fluid protein	1.5±0.5	1.1±0.3	2.911	0.008
Ascitic fluid C3	16.4±11.3	7.3 ± 4.3	2.920	0.009
Ascitic fluid WBC	152±145	2260±2023	4.001	0.001
Ascitic fluid Neutrophil	56±46	1261±1073	4.343	0.001

Mean ascitic fluid C3 level was 16.4(± 11.3) mg/dl in the Non-SBP (control) group and 7.3(± 4.3) mg/dl in the SBP (case) group (Table-2).

Five SBP (case) patients (33.33%) and no Non-SBP (control) patients were culture positive. Of culture positive cases, 4 (80%) were positive for Escherichia coli and 1 (20%) was positive for Streptococcus faecalis. Anaerobic culture was not done.

DISCUSSION

Spontaneous bacterial peritonitis is a severe and frequent complication of cirrhosis of liver with a high mortality rate. Recent investigations have shown that cirrhotic patients with low ascitic fluid C3 and low ascitic fluid total protein are more predisposed to spontaneous bacterial peritonitis.[12]

In this study, C3 concentration of 7.3± 4.3 mg/dl was found in the ascitic fluid of patients who developed spontaneous bacterial peritonitis and 16.4±11.3 mg/dl was found in the ascitic fluid of those who did not develop SBP. The difference of C3 concentration between the SBP and Non-SBP group is highly significant statistically (P=0.009).

The above finding is consistent with the finding of Such J et al[13] who studied 33 cirrhotic patients prospectively, seven of whom had one or more episodes of spontaneous bacterial peritonitis. C3 level in the ascitic fluid of patients who developed spontaneous bacterial peritonitis (9.0±2.67 mg/dl) was significantly lower than C3 level in the ascitic fluid of those who did not develop SBP (18.26±8.11 mg/dl).

Ascitic fluid with a C3 concentration of <13mg/dl possesses a very poor humoral defence system and is very susceptible to infection.4

The ascitic fluid protein level was less than 2 g / dl in those cases who developed SBP than in the control group who did not develop SBP- as shown in a study by Mordechai Rabinovitz et al[14] where they studied 14 consecutive patients who developed SBP and 14 other patients who did not develop SBP. In the present study, ascitic fluid protein was 1.1±0.3 g/dl in the cases of SBP and 1.5± 0.5 g/dl in the control (Non-SBP) group. The difference of findings between the two groups is highly significant (P=0.008). This finding is corroborative for the previous study.

Bulent Y et al[15] studied 13 patients with SBP with a mean age of 51.56± 10.45 years with chronic liver disease (CLD) due to hepatitis B (9 cases) or hepatitis C (4 cases).

According to Child Pugh classification, 8 cases were of grade “C” and 5 cases were of grade “B”. The study showed positive culture in 76.9% cases which included Escherichia coli in 7 patients (70% of culture positive cases) and Enterococci in 3 (30% of culture positive cases). In the present study, mean age of SBP patients was 43±14 years. They were patients of CLD due to hepatitis B in ten patients and hepatitis C in one patient. In other four cases the cause of CLD was cryptogenic. All the patients in cases of SBP were in Child's grade “C” whereas in control (Non-SBP) group 8 patients were in grade “C” and 7 patients were in grade “B”. Culture was positive in 33.3% of cases of SBP which included Escherichia coli in 4 patients (80% of culture positive cases) and Streptococcus faecalis in 1 patient (20% of culture positive cases). Culture positivity is lower in this study.

In conclusion, ascitic fluid C3 level is significantly reduced in Bangladeshi cirrhotic ascites patients who develop spontaneous bacterial peritonitis. Prompt antibiotic therapy can be considered in cirrhotic patients with low ascitic fluid C3 level as a prophylactic measure against SBP. But, as the study was limited by a small sample size, we recommend further study to determine a level of ascitic fluid C3 which can predict the development of SBP.

ACKNOWLEDGEMENT

We thank all the patients used for the study. The authors also thank the staffs of Hepatology and Microbiology & Immunology departments for their cooperation.

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