Section: Internal Medicine

Original Research Article

PREVALENCE OF SPONTANEOUS BACTERIAL PERITONITIS AND ITS CLINICO-MICROBIOLOGICAL PROFILE AMONG PATIENTS WITH CHRONIC LIVER DISEASE

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ABSTRACT

Background: The objective is to find out the prevalence and analyze the Clinico-microbiological profile, identify predictors of complications, intensive care unit (ICU) admission, and in hospital mortality in patients with SBP at a tertiary care center in Kerala.

Materials and Methods: This descriptive cross-sectional study involved 90 patients diagnosed with SBP after applying diagnostic criteria among a total of 250 patients with cirrhosis with ascites. Clinical features, microbiological results, and laboratory parameters were systematically collected. Statistical analysis was conducted using descriptive methods, Chi-square tests, and Mann-Whitney U tests.

Results: The prevalence of SBP among studied patients was found to be 36%. The mean patient age was 55.97 years; 92.2% were male, and 98.9% had a history of alcohol consumption. Predominant symptoms were abdominal distension (91.1%), abdominal pain (72.2%), and fever (67.8%). Altered mental status (25.6%) significantly predicted complications ($p < 0.001$) and ICU admission ($p = 0.027$). Elevated ascitic fluid total cell count significantly correlated with mortality ($p < 0.001$) and ICU admission ($p = 0.004$). Increased INR levels ($p = 0.010$) and elevated bilirubin ($p = 0.036$) were associated with adverse outcomes. Child-Pugh classification significantly predicted mortality ($p = 0.037$). Culture positivity was low (13.3%), emphasizing reliance on empirical antibiotic therapy.

Conclusion: The prevalence of SBP among chronic liver disease patients with ascites was 36%. Altered mental status, ascitic fluid total count, INR, bilirubin, and Child-Pugh scores are key predictors of poor outcomes in SBP patients. As seen in previous studies ,no significant association between presence of multiple comorbidities or low ascitic fluid albumin with outcome in SBP patients. These findings underscore the importance of timely diagnosis, close monitoring, and proactive management strategies to improve patient survival and outcomes.

Keywords: Spontaneous bacterial peritonitis, hepatic encephalopathy, bacterascites, cirrhosis, Child-Pugh score.

INTRODUCTION

Spontaneous bacterial peritonitis is a common severe complication of ascites characterised by spontaneous infection of ascitic fluid without an intraabdominal source. Bacterial translocation is the presumed mechanism for development of SBP, with gut flora traversing the intestine into mesenteric lymph nodes leading to bacteraemia and seeding of the ascitic fluid. The diagnosis of SBP is made when the fluid sample has an absolute neutrophil count >250/micro litre. Patients with ascites may present with fever, altered mental status, elevated white cell count, abdominal pain or discomfort or they may present

without any of these features. Prophylaxis against SBP is recommended in patients who present with variceal haemorrhage, and in patients who have had an episode of SBP and recovered. Two variants of SBP i.e. Culture Negative Neutrocytic Ascites (CNNA) and Bacterascites (BA) have been described based on the ascitic fluid analysis (cell count and culture) results. CNNA has a negative culture with a higher neutrophil count (i.e. > 250/cmm) while in bacterascites, ascites fluid culture is positive but neutrophil count is < 250/cmm.[1]

Gram negative aerobic bacteria from the family of enterobacteriaceae are reported as the predominant cause of SBP. The occurrence of SBP in the natural history of cirrhosis marks an important event and is associated with a reduction in overall survival. Furthermore, the occurrence of an index event of SBP leads to a 70% increased risk of SBP recurrence at one year.SBP is a common complication of cirrhosis and is associated with severe sequelae, including death in up to 20% of cases.[2] An appropriate diagnosis and correct treatment are paramount in SBP management, as untreated patient mortality is much higher and approaches 50%.[3] Treatment should be started immediately with ceftriaxone 2 gm i/v 12 hourly, or piperacillin/tazobactam. Recurrence of SBP can be reduced with quinolones prophylaxis. In cirrhotic patients with past treatment of SBP chances of recurrence can be reduced with norfloxacin 400 mg/day.[4] Renal dysfunction has been shown to be an independent predictor of mortality in patients with SBP. Albumin is felt to reduce the risk of renal impairment by improving effective intravascular volume, and by helping to bind pro- inflammatory molecules. Following a single episode of SBP, patients should have long-term antibiotic prophylaxis and be considered for liver transplantation.[5]

We should restrict use of prophylactic antibiotics only to those patients of ascites who are at greatest risk of SBP. These include patients with upper gastrointestinal haemorrhage, high bilirubin and low ascitic fluid protein concentration. In cirrhotic patients without a past history of SBP and with a high ascites protein content (i.e. >10 g/l), long-term prophylactic administration of antibiotics is not necessary since the risk of SBP in these patients is negligible, provided adequate prophylaxis is administered if and when gastrointestinal haemorrhage develops in the course of the disease.

MATERIALS AND METHODS

Source of data: Study was conducted in patients admitted in general medicine department of government medical college, Kozhikode as inpatients.

A. Study Design: Descriptive study – Cross sectional study
B. Study Period: 12 months-april 2024 to march 2025
C. Place of study: Government Medical College, Kozhikode.
D. Sample size: 90

Inclusion Criteria

All chronic liver disease patients with ascites and ascitic fluid neutrophil count >250/cmm.

Exclusion Criteria

Those with surgical peritonitis, tuberculous peritonitis and carcinomatous peritonitis.

Sample Size: A cross sectional study conducted at People's college of medical sciences and research centre (PCMS) Bhanpur, Bhopal concluded that the prevalence of SBP in cirrhosis with ascites is 34.14%. Taking absolute precision as 10,

N= 1.96 2 pq/d2
p= prevalence =34.14
q=100-p= 65.86
d=Allowable error = 10
Sample size = 1.96 2 *34.14*65.86/102 = 86.38 So a study sample of 90 was taken

Outcome Methods: Cirrhosis of the liver is to be confirmed by ultrasound and biochemical reports. History and clinical examination were recorded as per a predefined proforma designed for the study with special focus on symptoms, presenting complaints, significant past history regarding alcohol intake and alternative medicine intake. In these patients after sterile precautions ascitic fluid samples were collected and 10 ml of the sample was sent for biochemical and cytological analysis. Simultaneously a blood sample in a plain bottle was sent to the biochemistry lab for serum albumin estimation for SAAG calculation. 10 ml of ascitic fluid was collected in a sterile container and sent to the microbiology lab for culture and sensitivity. Relevant biochemical radiological and microbiological findings will be documented. Outcomes recorded on short term as duration of hospital stay, the need for intensive care unit admission, development of other complications including hepatorenal syndrome or hepatic encephalopathy, death or discharge. Child Pugh score was calculated and patients were grouped divided into 3 classes A, B and C.

Statistical Analysis: All the data collected were coded and entered in Microsoft Excel sheet which was re- checked and analysed using SPSS statistical software version 22. Quantitative variables were summarised using mean and standard deviation. Categorical variables were represented using frequency and percentage. Normality of the variables checked using the Shapiro-Wilk test and the data visualization of the data distribution presented with bar charts and pie charts. The correlation between variables checked using the Pearson correlation coefficient. The mean comparison between different groups have done using the one-way Anova.

RESULTS

Among 250 patients with CLD and ascites 90 patients had spontaneous bacterial peritonitis. In the present study of 90 patients the mean age was 55.97 years with a standard deviation of 9.452 years.

Table 1: distribution of age in the study population

	N	Minimum	Maximum	Mean	Std. Deviation
Age	90	38	82	55.97	9.452

Table 2: Symptoms and Clinical Presentation of the study participants with frequency and percentage

Symptoms	Frequency	Percent
Asymptomatic	2	2.2
Fever	61	67.8
Abdominal distension	82	91.1
Abdominal pain	65	72.2
Altered mental status	23	25.6
UGI bleed	11	12.2
Reduced urine output	16	17.8

Nearly all patients were symptomatic and most common symptoms were abdominal distention [91%], abdominal pain [72%] and fever [67%].

Table 3: Comorbidities of the study population

	Frequency	Percent
No Comorbidities	14	15.6
DM	13	14.4
HTN	13	14.4
CVA	4	4.4
CAD	4	4.4
CKD	10	11.1
COPD	3	3.3
MULTIPLE COMORBIDITIES	29	32.2

Nearly one-third (32.2%) of patients had multiple comorbidities, with diabetes, hypertension, and CKD being the most common individual conditions. Only 15.6% had no comorbidities, indicating a predominantly high-risk population.

Table 4: Past history and risk factors of the study population

Risk factors	Frequency	Percentage
H/o SBP	7	7.8
Alcohol intake	89	98.9
CAM intake	14	15.6

A striking 98.9% of patients reported alcohol intake, suggesting a strong association with the disease or study population characteristics. History of Spontaneous Bacterial Peritonitis (SBP) was seen in 7.8%, while CAM (complementary and alternative medicine) intake was reported by 15.6%.

Table 5: Clinical signs in the study population

	Frequency	Percent
Tender abdomen	64	71.1
Fever	61	67.8
Altered mental status	44	48.8
Tachycardia	77	85.6

A majority of patients had clinical signs of tachycardia (85.6%) followed by abdominal tenderness (71.1%)

Table 6: Laboratory Investigations of the study population

	Minimum	Maximum	Mean	Std. Deviation
HB	5	12.3	9.38	1.458
Creatinine	0.2	10	1.8	1.74
INR	.700	5.000	1.69378	.626540
AF TC	342	15000	2193.62	2563.789
AF Albumin	0.3	2.5	1.006	0.444

The laboratory data reveals anemia (mean Hb 9.38 g/dL), mild renal dysfunction (mean creatinine 1.8 mg/dL), and coagulopathy (mean INR 1.69) in some patients. The ascitic fluid total counts vary widely (standard deviation 2563.789) with low mean ascitic fluid albumin (1.006 g/dL).

Table 7: Hematological parameters of study population

	Frequency	Percent
TLC		
<4000	17	18.9
4000-11000	22	24.4
>11000	51	56.7

PLT		
<1.5L	53	58.9
1.5L-4L	37	41.1
SERUM Na		
<135	45	50.0
135-145	44	48.9
>145	1	1.1
Total BR		
<2	20	22.2
2-3	44	48.9
>3	26	28.9
Albumin		
<2.8	47	52.2
2.8-3.5	43	47.8
INR		
< 1.7	46	51.1
1.7-2.3	35	38.9
>2.3	9	10

Leukocytosis (>11,000) was observed in over half the patients (56.7%). Thrombocytopenia (<1.5L) and hyponatremia (<135 mEq/L) were common, seen in 58.9% and 50% respectively. Elevated total bilirubin (>2 mg/dL) was noted in 77.8%. Coagulopathy (INR >1.7) was present in nearly half the cases.

Table 8: Ascitic fluid characteristics of the study population

AF Albumin		
<1	10	11.1
1-2	69	76.7
>2	11	12.2
SAAG		
<1.1	15	16.7
>1.1	75	83.3
CULTURE		
No	78	86.7
Yes	12	13.3

The majority of patients (83.3%) had a SAAG >1.1 and ascitic fluid culture was positive in only 13.3% of cases.

Disease Severity and Outcomes

Table 9: Duration of hospital stay of the study population

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Duration of hospital	90	5	18	10.52	2.931

The mean hospital stay was 10.52 days (range 5–18 days), indicating moderate variability in duration among the study population.

In the study population of 90 patients ,51 (56.67 %) patients developed some complication

Most common complication seen in our study population was hepatic encephalopathy (49.4%) followed by HRS/AKI (30.9%)

In the study population of 90 patients ,39 (43.33 %) was admitted to intensive care unit.

In the of study of 90 participants 25 (27.78%) patients expired.

Comparison with the outcome variables

Table 10: Comparison of outcome (Death/Discharge) with Symptoms & comorbidities

Chi-Square Test		**Death/ discharge**		**P Value**
		Death 25(27.8%)	**Discharge 65(72.2%)**	
Fever	NO	7(28%)	22(33.8%)	0.959
	YES	18(72%)	43(66.2%)	
Altered mental status	NO	20(80%)	47(72.3%)	0.592
	YES	5(20%)	18(27.7%)	
UGI bleed	NO	21(84%)	58(89.2%)	0.490
	YES	4(16%)	7(10.8%)	
Comorbidity	No Comorbidities	2(8%)	12(18.5%)	0.756
	DM	5(20%)	8(12.3%)	
	HTN	4(16%)	9(13.8%)	
	CVA	1(4%)	3(4.6%)	
	CAD	1(4%)	3(4.6%)	
	CKD	2(8%)	8(12.3%)	
	COPD	0(0%)	3(4.6%)	
	Multiple comorbidities	10(40%)	19(29.2%)	

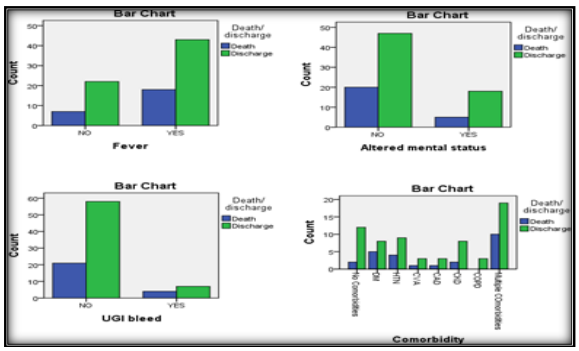

Figure 1: Comparison of outcome in terms of death or discharge with fever, altered mental status, total bilirubin and presence of comorbidities

Most patients with fever were discharged. Patients with altered mental status had higher mortality. Mortality was higher among patients with multiple comorbidities, especially those with CKD, COPD, and CAD.

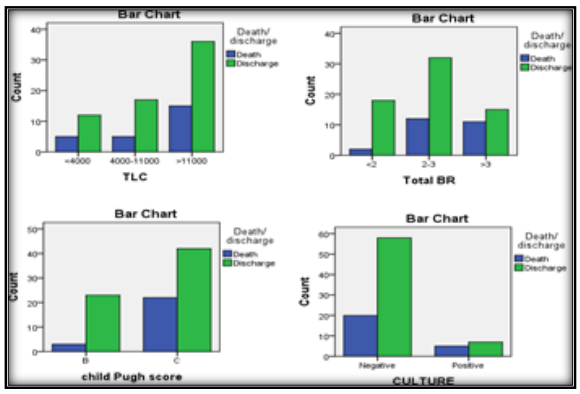

Figure 2: comparison of outcome in terms of death or discharge with TLC, total BR, Child pugh score and culture positivity

Higher total leukocyte count (TLC >11000), elevated bilirubin (>3), Child-Pugh C, and culture positivity are seen more in the people expired.

Table 11: Comparison of outcome (Death/Discharge) with Laboratory Parameters

Chi-Square Test		Death/ discharge		P Value
		Death 25(27.8%)	Discharge 65(72.2%)	
TLC	<4000	5(20%)	12(18.5%)	0.855
	4000-11000	5(20%)	17(26.2%)	
	>11000	15(60%)	36(55.4%)	
Total BR	<2	2(8%)	18(27.7%)	0.058
	2-3	12(48%)	32(49.2%)	
	>3	11(44%)	15(23.1%)	
Child Pugh score	B	3(12%)	23(35.4%)	0.037*
	C	22(88%)	42(64.6%)	
CULTURE	NO	20(80%)	58(89.2%)	0.249
	YES	5(20%)	7(10.8%)	

There is statistically significant association between Child-Pugh score and death/discharge status ($p < 0.05$). Only the Child-Pugh score shows a statistically significant association with outcomes.

Table 12: comparison of death and discharge with creatinine, INR, AF TC and AF albumin

Mann Whitney U Test	Death/ discharge	Mean	SD	Minimum	Maximum	P Value
Creatinine	Death	1.44	0.810	0.7	3.6	0.458
	Discharge	1.94	1.97	0.2	10	
INR	Death	1.77	0.499	1	3	0.295
	Discharge	1.66	0.67	0.7	5	
Ascitic fluid total count	Death	3819.68	3316.37	508	15000	<0.001*
	Discharge	1568.22	1893.70	342	14000	
Ascitic fluid albumin	Death	1.06	0.464	0.6	2.1	0.660
	Discharge	0.983	0.438	0.3	2.5	

Only ascitic fluid total count shows statistically significant difference between outcome.

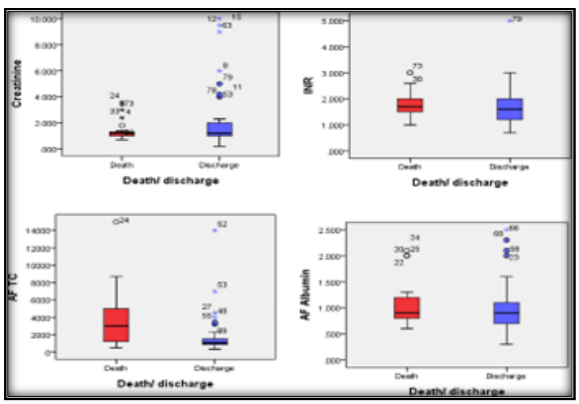

Figure 3: Comparison of death and discharge with creatinine, INR, AF TC and AF albumin

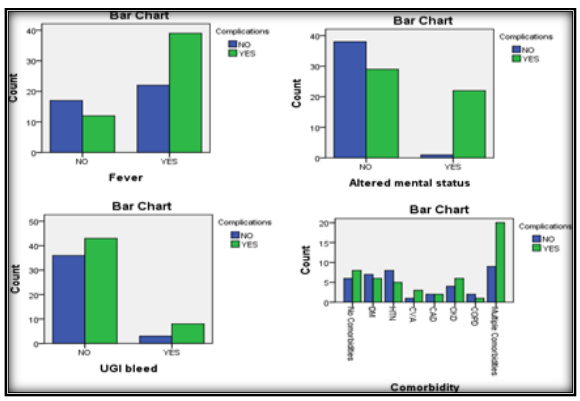

Figure 4: Comparison of development of complications with symptoms and comorbidities

Patients who died had higher ascitic fluid total cell count and lower ascitic fluid albumin, serum creatinine and INR did not show marked difference between groups

In the study population patients with fever, altered mental status, UGI bleed, and multiple comorbidities developed more complications

Table 13: Comparison of development of complications with Symptoms and comorbidities

Chi-Square Test		Complications		P Value
		NO 39(43.3%)	YES 51(56.7%)	
Fever	NO	17(43.6%)	12(23.5%)	0.068
	YES	22(56.4%)	39(76.5%)	
Altered mental status	NO	38(97.4%)	29(56.9%)	<0.001*
	YES	1(2.6%)	22(43.1%)	
UGI bleed	NO	36(92.3%)	43(84.3%)	0.251
	YES	3(7.7%)	8(15.7%)	
Comorbidity	No Comorbidities	6(15.4%)	8(15.7%)	0.604
	DM	7(17.9%)	6(11.8%)	
	HTN	8(20.5%)	5(9.8%)	
	CVA	1(2.6%)	3(5.9%)	
	CAD	2(5.1%)	2(3.9%)	
	CKD	4(10.3%)	6(11.8%)	
	COPD	2(5.1%)	1(2%)	
	Multiple Comorbidities	9(23.1%)	20(39.2%)	

Altered mental status is the only variable significantly associated with complications ($p < 0.001$)

Table 14: comparison of development of complications with TLC,total BR,child pugh score and culture positivity

Chi-Square Test		Complications		P Value
		NO 39(43.3%)	YES 51(56.7%)	
TLC	<4000	7(17.9%)	10(19.6%)	0.236
	4000- 11000	13(33.3%)	9(17.6%)	
	>11000	19(48.7%)	32(62.7%)	
Total BR	<2	9(23.1%)	11(21.6%)	0.036*
	2-3	24(61.5%)	20(39.2%)	
	>3	6(15.4%)	20(39.2%)	
Child Pugh score	B	13(33.3%)	13(25.5%)	0.485
	C	26(66.7%)	38(74.5%)	
CULTURE	NO	36(92.3%)	42(82.4%)	0.219
	YES	3(7.7%)	9(17.6%)	

Total Bilirubin is significantly associated with complications ($p = 0.036$)

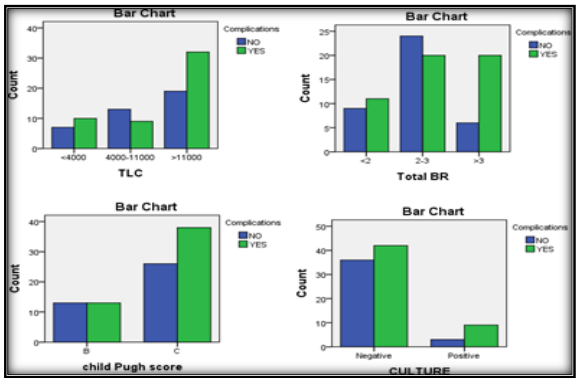

Figure 5: Comparison of development of complication with TLC, total BR, child pugh score and culture positivity

Complications were more frequent with high TLC (>11000), elevated bilirubin (>3), higher Child-Pugh score (C), and positive blood cultures.

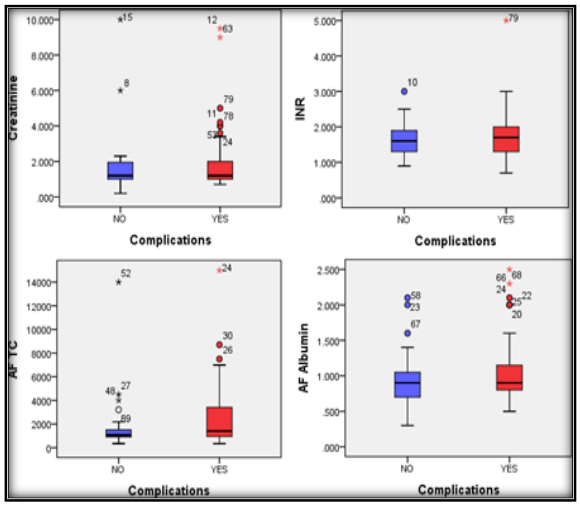

Figure 6: Comparison of development of complications with creatinine, INR, ascitic fluid TC, ascitic fluid albumin

Table 15: Comparison of development of complications with creatinine, INR, ascitic fluid TC, ascitic fluid albumin Mann Whitney U Test

	Comp	Mean	SD	Minimum	Maximum	P Value
Creatinine	No	1.656	1.651	0.2	10	0.768
	Yes	1.913	1.814	0.7	9.5	
INR	No	1.62	0.45	0.9	3	0.554
	Yes	1.74	0.72	0.7	5	

AF TC	No	1656.18	2201.77	349	14000	0.052
	Yes	2604.61	2760.08	342	15000	
AF Albumin	No	0.933	0.413	0.3	2.1	0.298
	Yes	1.062	0.463	0.5	2.5	

No variables showing significant association between outcome variable.

Table 16: Comparison of ICU Admission with symptoms and comorbidities

Chi-Square Test		ICU admission		P Value
		NO 51(56.7%)	YES 39(43.3%)	
Fever	NO	18(35.3%)	11(28.2%)	0.504
	YES	33(64.7%)	28(71.8%)	
Altered mental status	NO	33(64.7%)	34(87.2%)	0.027*
	YES	18(35.3%)	5(12.8%)	
UGI bleed	NO	44(86.3%)	35(89.7%)	0.619
	YES	7(13.7%)	4(10.3%)	
Comorbidity	No Comorbidities	10(19.6%)	4(10.3%)	0.710
	DM	8(15.7%)	5(12.8%)	
	HTN	7(13.7%)	6(15.4%)	
	CVA	3(5.9%)	1(2.6%)	
	CAD	1(2%)	3(7.7%)	
	CKD	6(11.8%)	4(10.3%)	
	COPD	1(2%)	2(5.1%)	
	MULTIPLE COMORBIDITIES	15(29.4%)	14(35.9%)	

Altered mental status has statistically significant association with ICU admission.

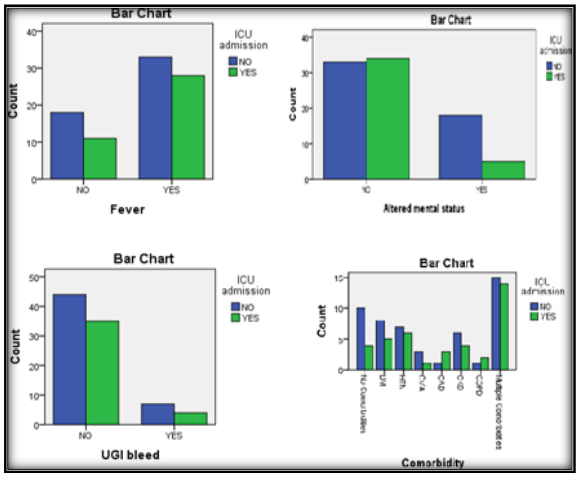

Figure 7: Comparison of icu admission with symptoms and comorbidity ICU admissions were more frequent in patients with altered mental status and multiple comorbidities, while fever and UGI bleed showed less clear association with ICU requirement

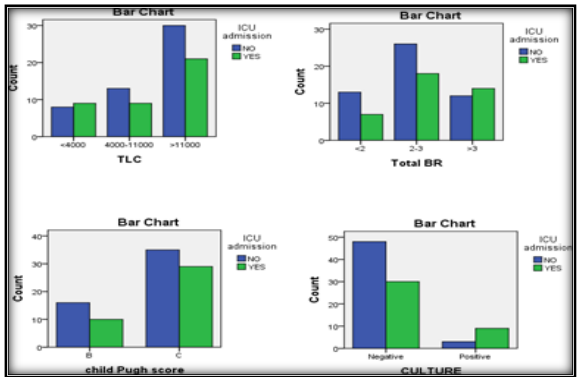

Figure 8: Comparison of ICU admission with Laboratory Parameters

ICU admissions were more common in patients with high TLC (>11000), elevated bilirubin (>3), higher Child-Pugh score (C), and positive blood cultures, indicating more severe illness requiring intensive care.

Table 17: Comparison of ICU Admission with Laboratory Parameters

		ICU admission		Total
		NO 51(56.7%)	YES 39(43.3%)	
TLC	<4000	8(15.7%)	9(23.1%)	0.679
	4000-11000	13(25.5%)	9(23.1%)	
	>11000	30(58.8%)	21(53.8%)	
Total BR	<2	13(25.5%)	7(17.9%)	0.418
	2-3	26(51%)	18(46.2%)	
	>3	12(23.5%)	14(35.9%)	
CULTURE	NO	48(94.1%)	30(76.9%	0.027*
	YES	3(5.9%)	9(23.1%)	

Culture positivity has statistically significant association with ICU admission

Table 18: Comparison of ICU admission with creatinine, INR, ascitic fluid TC, ascitic fluid albumin. Mann Whitney U Test

	ICU admission	Mean	SD	Minimum	Maximum	P Value
Creatinine	NO	1.95	2.11	0.3	10	0.692
	YES	1.60	1.07	0.2	6	
INR	NO	1.6	0.713	0.7	5	0.010*
	YES	1.81	0.471	1	3	
AF TC	NO	1398.24	1088.61	342	6000	0.004*

	YES	3233.74	3446.15	411	15000	
AF Albumin	NO	1	0.399	0.3	2.3	0.403
	YES	1.015	0.502	0.4	2.5	

Both INR and AFTC has statistically significant association with ICU admission

Table 19: Correlation Between AFTC and Duration of Hospital Stay

	Mean	Std. Deviation	Correlation	P Value
AF TC	2193.62	2563.789	0.072	0.503
Duration of hospital	10.52	2.931		

There is a positive correlation between ascitic fluid total count and duration of hospital stay but not significant. E coli is the most common isolate (5 cases) followed by acinetobacter (3 cases)

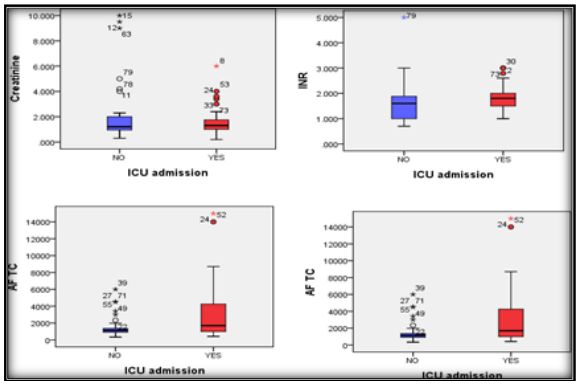

Figure 9: Comparison of ICU admission with creatinine, INR, ascitic fluid TC, ascitic fluid albumin

DISCUSSION

Spontaneous bacterial peritonitis (SBP) remains one of the most serious and common infections in patients with cirrhosis and ascites, often associated with poor prognosis and high mortality. In this descriptive observational study conducted at a tertiary care center in Kerala, we analyzed prevalence of spontaneous bacterial peritonitis, the clinical, microbiological, and laboratory profile of patients with SBP and sought to identify predictors of adverse outcomes, including complications, ICU admission, and mortality.[6]

The prevalence of SBP was found to be 36%. The mean age of patients was 55.97 years, and the majority were male (92.2%), reflecting the demographic distribution seen in other Indian studies. Alcohol was the predominant underlying etiology, reported in 98.9% of patients, consistent with previous data highlighting alcohol as a leading cause of cirrhosis in the Indian population.[7]

The most common presenting symptom was abdominal distension (91.1%), followed by abdominal pain (72.2%) and fever (67.8%). Altered mental status, an important sign of hepatic encephalopathy, was observed in 25.6% of patients and showed a statistically significant association with complications ($p < 0.001$) and ICU admission ($p = 0.027$), highlighting its role as a potential marker of disease severity.

Laboratory parameters revealed that an elevated ascitic fluid total count (AF TC) was significantly associated with both death ($p < 0.001$) and ICU admission ($p = 0.004$). Similarly, higher INR values were significantly associated with ICU admission ($p = 0.010$), and total bilirubin levels correlated with complications ($p = 0.036$), indicating hepatic dysfunction as a strong predictor of poor outcomes. Among clinical scoring systems, the Child-Pugh score showed a significant association with mortality ($p = 0.037$), with most patients in class C experiencing worse outcomes. These findings are in line with earlier studies that have identified Child-Pugh class and MELD scores as important prognostic indicators in SBP.[8]

Interestingly, positive ascitic fluid culture was observed in only 13.3% of patients, which aligns with previous literature describing a high prevalence of culture-negative neutrocytic ascites (CNNA) in SBP cases. However, culture positivity was significantly associated with ICU admission ($p = 0.027$), suggesting that microbiologically confirmed infections may denote more severe disease.

Overall, the study reinforces the importance of early recognition of altered mental status, elevated AF TC, high INR, and total bilirubin as predictors of poor outcomes in SBP. Prompt diagnosis and aggressive management remain critical to reducing morbidity and mortality.

A study on patients with spontaneous bacterial peritonitis conducted in Central India affirmed SBP as a critical complication in cirrhotic patients with ascites, with a notably high prevalence 0f 34.14% comparable to our study where we got a prevalence of 36%. The Central India study reported a significantly high SBP incidence of 54%, whereas this study documented culture positivity in 13.3% and CNNA as the predominant variant suggesting a higher clinical prevalence despite lower culture yield. Alcoholic cirrhosis emerged as the leading etiology in both populations—accounting for 54% in the Central India study and a striking 98.9% in this study. Common clinical features such as abdominal pain, distension, and fever were consistent across studies, with altered mental status being a significant predictor of ICU admission and complications in this study ($p < 0.001$). While Escherichia coli and Staphylococcus aureus were the predominant pathogens in the Central India study, this study also identified E. coli as a frequent isolate, but emphasized the low culture positivity and the importance of empirical treatment.

Additionally, both studies highlight the limitations of ascitic fluid protein as a predictive marker and agree on the role of elevated bilirubin and INR in predicting

adverse outcomes. The Central India study underscores the role of proton pump inhibitors and irrational antibiotic use in SBP pathogenesis, while this study focuses more on prognostic markers like Child-Pugh score, ascitic fluid total count, and the need for ICU admission, thereby adding depth to the understanding of SBP severity and outcomes.

Another study from Kerala, conducted in Kottayam medical college highlights the significant burden of spontaneous bacterial peritonitis (SBP) among patients with chronic liver disease, particularly in males with alcohol-related cirrhosis. In the Kottayam study, 91% of patients were male and 72% had alcohol-induced cirrhosis, while the comparative study reported an even higher prevalence of alcohol as the etiology (98.9%) and 92.2% male predominance.[9] The majority of patients in both studies were classified as Child-Turcotte-Pugh (CTP) Class C, correlating with poor outcomes. While the Kottayam study emphasized microbiological findings, noting Escherichia coli (16%) and Klebsiella spp. (8%) as common pathogens with significant multidrug (5%) and extensively drug-resistant (3%) isolates, this study reported a lower culture positivity (13.3%) but found that culture positivity was significantly associated with ICU admission ($p = 0.027$). Both studies observed a high prevalence of culture-negative neutrocytic ascites, underscoring diagnostic challenges. Notably, the Kottayam study documented that 21% had prior antibiotic exposure and 19% developed SBP despite prophylaxis, indicating emerging resistance patterns and the need for tailored antibiotic strategies. Our study contributed detailed clinical correlates, identifying altered mental status as a significant predictor of complications ($p < 0.001$) and ICU admission ($p = 0.027$), along with elevated ascitic fluid total count, INR, and bilirubin levels as markers of poor prognosis.

CONCLUSION

Spontaneous bacterial peritonitis (SBP) remains a significant and potentially fatal complication in patients with liver cirrhosis and ascites. In this study SBP was found to have a prevalence of about 36%. In this study, altered mental status, elevated ascitic fluid total cell count, raised INR, increased bilirubin levels, and higher Child-Pugh scores were identified as significant predictors of adverse outcomes, including ICU admission, complications, and mortality.

Despite a low ascitic fluid culture positivity rate, the consistent clinical and laboratory patterns highlight the importance of early recognition and empiric antibiotic therapy. The findings reinforce the utility of simple bedside clinical evaluation and routine biochemical parameters in prognostic stratification.

Timely diagnosis, vigilant monitoring, and proactive management of high-risk patients can significantly improve outcomes and reduce SBP-associated mortality. These insights advocate for stringent adherence to diagnostic protocols and may inform future risk-based therapeutic strategies in cirrhotic patients with ascites.

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