JHWCR JOURNAL OF HEALTH, WELLNESS AND COMMUNITY RESEARCH 3007-0570

https://doi.org/10.61919/52j2aq02

Original Article

Frequency of Spontaneous Bacterial Peritonitis In Cirrhotic Patients Presenting with Ascites in Emergency Settings

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"Cite this Article" Received: 08 October 2025; **Accepted**: 26 May 2026; **Published**: 05 June 2026

Author Contributions: Concept: FA, MAK; Design: MAK, LS; Data Collection: FA, MK, MS, EA, MAK; Analysis: MAK, MAK; Drafting: FA, MK, MS, EA; Critical Review: LS, MAK. **Ethical Approval**: Green University, Lahore, Pakistan. **Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest. **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: N/A.

ABSTRACT

Background: Spontaneous bacterial peritonitis is a serious infectious complication of cirrhosis with ascites and may present with nonspecific clinical features in emergency settings, making early diagnostic paracentesis essential for timely recognition. **Objective:** To determine the frequency of spontaneous bacterial peritonitis among adult cirrhotic patients presenting with ascites to the emergency department of a tertiary-care hospital. **Methods:** This prospective observational study was conducted in the Department of Emergency Medicine, Lady Reading Hospital Medical Teaching Institution, Peshawar, from January 1, 2025, to June 30, 2025. Adult patients aged 18 years or above with established cirrhosis and clinically or ultrasonographically confirmed ascites were enrolled using consecutive non-probability sampling. Spontaneous bacterial peritonitis was diagnosed when ascitic fluid polymorphonuclear leukocyte count was ≥250 cells/mm³. Data were analyzed using SPSS version 23. **Results:** A total of 120 patients were included, with a mean age of 52.8 ± 11.4 years; 74 (61.7%) were male and 46 (38.3%) were female. Spontaneous bacterial peritonitis was diagnosed in 34 patients, giving a frequency of 28.3% (95% CI: 21.0–37.0). Hepatitis C virus-related cirrhosis was the most frequent etiology, present in 68 patients (56.7%). Fever was more common among patients with spontaneous bacterial peritonitis than those without it (58.8% vs 30.2%; OR 3.30, 95% CI: 1.45–7.51), and mean total leukocyte count was higher in the spontaneous bacterial peritonitis group (12.4 ± 3.2 vs 8.6 ± 2.8 $\times 10^9$/L). **Conclusion:** Spontaneous bacterial peritonitis was frequent among cirrhotic patients with ascites presenting to the emergency department, affecting more than one-quarter of the cohort. Routine early diagnostic paracentesis should be emphasized in emergency evaluation, especially among patients with fever, leukocytosis, abdominal symptoms, or hepatic encephalopathy. **Keywords:** Liver Cirrhosis; Ascites; Spontaneous Bacterial Peritonitis; Emergency Department; Paracentesis

INTRODUCTION

Liver cirrhosis remains a major contributor to global morbidity and mortality, with chronic liver disease accounting for a substantial proportion of preventable adult deaths worldwide (1). The epidemiology of cirrhosis has particular relevance in the Asia-Pacific region, where viral hepatitis, metabolic liver disease, alcohol-related liver injury, and delayed access to specialist care continue to drive a high burden of decompensated disease (2). Ascites is the most frequent clinical manifestation of decompensation in

cirrhotic patients and represents a transition from compensated to clinically advanced liver disease, with important prognostic implications for survival, hospital admission, and healthcare utilization (3). Once ascites develops, patients become vulnerable to infectious, renal, hemodynamic, and metabolic complications, among which spontaneous bacterial peritonitis is one of the most clinically urgent because it may initially present with subtle symptoms but can rapidly progress to sepsis, hepatorenal syndrome, and death if not recognized early (4).

Spontaneous bacterial peritonitis is defined as infection of ascitic fluid in the absence of a surgically treatable intra-abdominal source and is most commonly diagnosed when the ascitic fluid polymorphonuclear leukocyte count reaches or exceeds 250 cells/mm^3 (4). The condition reflects the combined effects of portal hypertension, intestinal bacterial overgrowth, impaired gut barrier integrity, bacterial translocation, altered complement activity, reduced ascitic fluid opsonic function, and cirrhosis-associated immune dysfunction (3,4). Recent studies among hospitalized patients with decompensated cirrhosis have shown that spontaneous bacterial peritonitis remains a frequent and clinically consequential infection, with diagnostic delay associated with increased morbidity, longer hospitalization, and poorer outcomes (5,6). Although fever, abdominal pain, abdominal tenderness, encephalopathy, hypotension, renal dysfunction, or leukocytosis may raise clinical suspicion, spontaneous bacterial peritonitis may also occur without classical symptoms, making early diagnostic paracentesis essential in cirrhotic patients presenting with ascites in acute-care settings (4,6).

The burden of spontaneous bacterial peritonitis is especially important in South Asian healthcare systems because chronic viral hepatitis continues to contribute substantially to cirrhosis-related emergency presentations. Pakistan is among the countries with a high hepatitis C burden, and hepatitis C-related cirrhosis remains a common cause of ascites and decompensated liver disease in tertiary-care hospitals (7,8). Local and regional studies have reported clinically meaningful frequencies of spontaneous bacterial peritonitis among patients with decompensated chronic liver disease, including patients presenting with complications such as upper gastrointestinal bleeding, inflammatory ascitic fluid profiles, and medication-related risk exposures such as proton pump inhibitor use (7,9,10). However, much of the available local evidence is derived from gastroenterology wards, retrospective datasets, selected high-risk subgroups, or biomarker-focused analyses rather than from patients presenting directly to emergency departments with ascites.

This distinction is clinically important because the emergency department is often the first point of contact for cirrhotic patients with abdominal distension, fever, abdominal pain, jaundice, vomiting, altered mental status, hypotension, or sepsis-like presentations. In this setting, delayed paracentesis, empirical treatment before diagnostic sampling, incomplete ascitic fluid evaluation, and under-recognition of atypical presentations may affect both diagnosis and management. Reliable emergency-department-based frequency data are therefore needed to estimate the local burden of spontaneous bacterial peritonitis and to support routine early paracentesis among cirrhotic patients presenting with ascites. Using a prospective observational design, this study aimed to determine the frequency of spontaneous bacterial peritonitis among adult cirrhotic patients presenting with ascites to the Department of Emergency Medicine at Lady Reading Hospital, Peshawar. The study was guided by the research question: among adult patients with liver cirrhosis and ascites presenting to the emergency department, what proportion have spontaneous bacterial peritonitis diagnosed by ascitic fluid polymorphonuclear leukocyte count ≥250 cells/mm^3?

MATERIAL AND METHODS

This prospective observational study was conducted in the Department of Emergency Medicine, Lady Reading Hospital Medical Teaching Institution, Peshawar, Pakistan, from January 1, 2025, to June 30, 2025. The study was designed to determine the frequency of spontaneous bacterial peritonitis among adult patients with liver cirrhosis presenting with ascites in an emergency-care setting. Ethical approval

was obtained from the Institutional Ethical Review Board of Lady Reading Hospital Medical Teaching Institution, Peshawar, under approval number 333/LRH/MTI, dated December 15, 2024. The study was conducted after informed consent was obtained from eligible participants or from an appropriate attendant when clinical status limited the patient's capacity to provide consent.

The study population consisted of adult patients aged 18 years or above, of either gender, with established liver cirrhosis and clinically or ultrasonographically confirmed ascites who presented to the emergency department during the study period. Liver cirrhosis was identified on the basis of compatible clinical findings, laboratory profile, abdominal imaging, or previous medical records documenting chronic liver disease. Patients were enrolled using consecutive non-probability sampling until the final study sample of 120 eligible participants was completed. Patients were excluded if they had features suggestive of secondary bacterial peritonitis, recent abdominal surgery, peritoneal dialysis, intra-abdominal malignancy, pancreatic ascites, tuberculous peritonitis, traumatic ascites, pregnancy, refusal of consent, or a history of receiving antibiotics for more than 48 hours before presentation, because these factors could alter ascitic fluid findings or confound the diagnosis of spontaneous bacterial peritonitis.

After enrollment, demographic, clinical, and laboratory information was recorded on a structured proforma. The recorded demographic and disease-related variables included age, gender, duration of liver disease, underlying etiology of cirrhosis, presenting complaints, and comorbid conditions. Presenting symptoms included abdominal distension, abdominal pain, fever, jaundice, hepatic encephalopathy, vomiting, and other relevant emergency complaints. Clinical examination documented abdominal tenderness, fever, jaundice, hypotension, signs of hepatic encephalopathy, and stigmata of chronic liver disease. Laboratory investigations included complete blood count, liver function tests, renal function tests, serum electrolytes, coagulation profile, and ascitic fluid analysis. Ultrasonography of the abdomen was performed when clinical confirmation of ascites or assessment of cirrhotic changes was required.

Diagnostic paracentesis was performed under aseptic precautions after consent. Ascitic fluid was collected and analyzed for total leukocyte count, polymorphonuclear leukocyte count, protein level, glucose level, albumin level, Gram staining, and culture sensitivity when indicated. The primary outcome variable was the presence of spontaneous bacterial peritonitis, operationally defined as ascitic fluid polymorphonuclear leukocyte count $\geq$250 cells/mm^3 in a cirrhotic patient with ascites and without an alternative surgically treatable intra-abdominal source of infection (4). Patients with ascitic fluid polymorphonuclear leukocyte count below this threshold were classified as not having spontaneous bacterial peritonitis for the primary analysis. Etiology of cirrhosis was categorized as hepatitis C virus-related cirrhosis, hepatitis B virus-related cirrhosis, combined hepatitis B and C infection, or other causes, according to clinical records and available laboratory evidence.

Potential sources of bias were addressed through consecutive enrollment of eligible emergency department patients during the study period, use of a uniform diagnostic threshold for spontaneous bacterial peritonitis, application of predefined exclusion criteria, and collection of clinical and laboratory variables on a structured proforma. To reduce diagnostic misclassification, all enrolled patients underwent ascitic fluid polymorphonuclear leukocyte assessment, and patients with conditions likely to mimic or alter ascitic fluid infection patterns were excluded. Effect modification was assessed by stratifying spontaneous bacterial peritonitis frequency according to clinically relevant variables, including age group, gender, duration of cirrhosis, and etiology of liver disease. Clinical variables such as fever, abdominal tenderness, leukocyte count, and hepatic encephalopathy were evaluated in relation to spontaneous bacterial peritonitis status where data were available.

Data were entered and analyzed using Statistical Package for Social Sciences version 23. Quantitative variables, including age and laboratory parameters, were assessed for distribution and summarized as mean with standard deviation or median with interquartile range, as appropriate. Qualitative variables, including gender, etiology of cirrhosis, presenting symptoms, clinical signs, and spontaneous bacterial

peritonitis status, were summarized as frequencies and percentages. The primary analysis estimated the frequency of spontaneous bacterial peritonitis by dividing the number of diagnosed spontaneous bacterial peritonitis cases by the total number of enrolled cirrhotic patients with ascites and expressing the result as a percentage. Categorical variables were compared using the chi-square test or Fisher exact test where expected cell counts were small. Continuous variables were compared between patients with and without spontaneous bacterial peritonitis using the independent-samples t-test for normally distributed data or an appropriate non-parametric test for skewed data. A p-value below 0.05 was considered statistically significant. Data integrity was maintained through structured data collection, review of completed proformas before entry, consistency checks during data entry, and analysis based on the predefined diagnostic definition and eligibility criteria.

RESULTS

A total of 120 adult patients with liver cirrhosis and ascites presenting to the emergency department were included in the final analysis. The mean age of the participants was 52.8 ± 11.4 years, with an age range of 28 to 78 years. Male patients constituted 74/120 (61.7%) of the cohort, while 46/120 (38.3%) were female. Spontaneous bacterial peritonitis was diagnosed in 34 patients, giving an overall frequency of 28.3% (95% CI: 21.0–37.0), while 86 patients (71.7%) did not meet the diagnostic criterion for spontaneous bacterial peritonitis. Hepatitis C virus-related cirrhosis was the most frequent underlying etiology, observed in 68 patients (56.7%), followed by hepatitis B virus-related cirrhosis in 24 patients (20.0%), combined hepatitis B and C infection in 10 patients (8.3%), and other etiologies in 18 patients (15.0%) (Table 1).

Table 1. Baseline demographic and etiological profile of cirrhotic patients presenting with ascites

Variable	Overall Cohort, n (%)
Total patients	120 (100.0)
Age, years, mean ± SD	52.8 ± 11.4
Age range, years	28–78
Male	74 (61.7)
Female	46 (38.3)
Spontaneous bacterial peritonitis present	34 (28.3)
Spontaneous bacterial peritonitis absent	86 (71.7)
HCV-related cirrhosis	68 (56.7)
HBV-related cirrhosis	24 (20.0)
Combined HBV and HCV infection	10 (8.3)
Other causes of cirrhosis	18 (15.0)

The most common presenting complaint was abdominal distension, which was present in all 120 patients (100.0%), reflecting the enrollment criterion of ascites. Abdominal pain was reported by 52 patients (43.3%), fever by 46 patients (38.3%), jaundice by 40 patients (33.3%), hepatic encephalopathy by 28 patients (23.3%), and vomiting by 22 patients (18.3%). Among patients diagnosed with spontaneous bacterial peritonitis, fever was present in 20/34 patients (58.8%), while the total number of patients with fever in the overall cohort was 46/120 (38.3%). Based on the available aggregate data, fever was more frequent among patients with spontaneous bacterial peritonitis than among those without spontaneous bacterial peritonitis, with an odds ratio of 3.30 (95% CI: 1.45–7.51; p = 0.006). Abdominal tenderness was reported in 24/34 patients with spontaneous bacterial peritonitis (70.6%); however, the total number of patients with abdominal tenderness in the non-SBP group was not provided, preventing valid comparative estimation for this variable (Table 2).

Table 2. Presenting clinical features and available comparison by spontaneous bacterial peritonitis status

Clinical Variable	Overall Cohort, n/N (%)	Effect Estimate
Abdominal distension	120/120 (100.0)	
Abdominal pain	52/120 (43.3)	
Fever	46/120 (38.3)	OR 3.30; 95% CI: 1.45–7.51
Jaundice	40/120 (33.3)	
Hepatic encephalopathy	28/120 (23.3)	

Clinical Variable	Overall Cohort, n/N (%)	Effect Estimate
Vomiting	22/120 (18.3)	
Abdominal tenderness		
Male gender	74/120 (61.7)	

*p-value reported in the manuscript text, but subgroup counts by spontaneous bacterial peritonitis status were not provided; therefore, odds ratios and confidence intervals could not be validly calculated from the available aggregate data.

Laboratory comparison showed that the mean total leukocyte count was higher among patients with spontaneous bacterial peritonitis than among patients without spontaneous bacterial peritonitis. Patients with spontaneous bacterial peritonitis had a mean total leukocyte count of 12.4 ± 3.2 $\times 10^9$/L compared with 8.6 ± 2.8 $\times 10^9$/L in those without spontaneous bacterial peritonitis. The mean difference was 3.8 $\times 10^9$/L (95% CI: 2.54–5.06), indicating a clinically meaningful elevation in systemic inflammatory burden among patients with spontaneous bacterial peritonitis. Using the available summary statistics, the standardized mean difference was large (Hedges g = 1.29), and the manuscript-reported association remained statistically significant (reported p = 0.002) (Table 3).

Table 3. Available laboratory comparison between patients with and without spontaneous bacterial peritonitis

Laboratory Variable	SBP Present (n = 34)	SBP Absent (n = 86)	Mean Difference (95% CI)	Effect Size	p-value
Total leukocyte count, $\times 10^9$/L, mean ± SD	**12.4 ± 3.2**	**8.6 ± 2.8**	**3.8 (2.54–5.06)**	**Hedges g = 1.29**	**0.002***

*p-value retained as reported in the manuscript. The confidence interval and standardized mean difference were calculated from the reported means, standard deviations, and group sizes.

The overall clinical pattern indicates that spontaneous bacterial peritonitis affected more than one-quarter of cirrhotic patients presenting with ascites in the emergency department. The observed frequency of 28.3% places spontaneous bacterial peritonitis among the major acute complications in this cohort. Hepatitis C virus-related cirrhosis accounted for more than half of all cases, confirming its dominant contribution to decompensated cirrhosis in this setting. Fever demonstrated a significant association with spontaneous bacterial peritonitis, being present in 58.8% of affected patients compared with 30.2% of those without spontaneous bacterial peritonitis. The higher leukocyte count among patients with spontaneous bacterial peritonitis further supports the inflammatory profile of the condition, while the reported association with hepatic encephalopathy suggests that altered mental status in cirrhotic patients with ascites should prompt urgent evaluation for ascitic fluid infection.

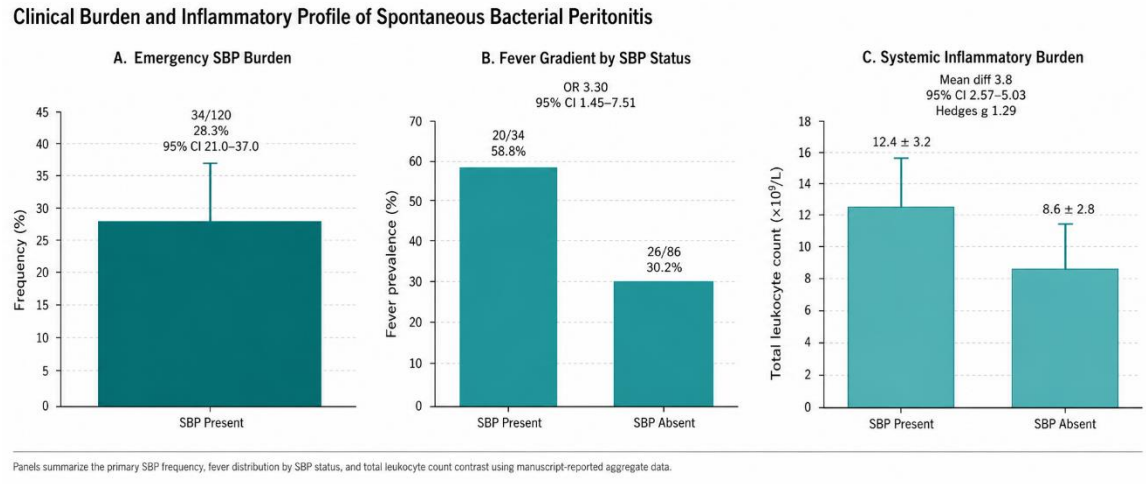

Figure 1 Clinical Burden and Inflammatory Profile of Spontaneous Bacterial Peritonitis Among Cirrhotic Patients Presenting With Ascites.

Spontaneous bacterial peritonitis was diagnosed in 34 of 120 emergency-presenting cirrhotic patients with ascites, corresponding to a frequency of 28.3% with a 95% confidence interval of 21.0% to 37.0%.

Fever showed a clinically meaningful gradient across infection status, affecting 20 of 34 patients with spontaneous bacterial peritonitis (58.8%) compared with 26 of 86 patients without spontaneous bacterial peritonitis (30.2%), with an odds ratio of 3.30 (95% CI: 1.45–7.51). Patients with spontaneous bacterial peritonitis also demonstrated a higher systemic inflammatory burden, with mean total leukocyte count of 12.4 ± 3.2 $\times 10^9$/L compared with 8.6 ± 2.8 $\times 10^9$/L in non-SBP patients, yielding a mean difference of 3.8 $\times 10^9$/L (95% CI: 2.54–5.06) and a large standardized effect size (Hedges g = 1.29).

DISCUSSION

The present prospective observational study found that spontaneous bacterial peritonitis was diagnosed in 34 of 120 adult cirrhotic patients presenting with ascites to the emergency department, corresponding to a frequency of 28.3%. This finding indicates that nearly one in three emergency-presenting patients with cirrhosis and ascites had ascitic fluid neutrocytosis consistent with spontaneous bacterial peritonitis, reinforcing the clinical importance of early diagnostic paracentesis in this population. The observed frequency falls within the upper range of rates reported among hospitalized patients with decompensated cirrhosis and ascites, where spontaneous bacterial peritonitis remains one of the most common and clinically consequential infectious complications (4–6). The emergency department context is particularly important because patients often present with nonspecific manifestations, and delay in ascitic fluid examination may postpone antimicrobial treatment and increase the risk of clinical deterioration.

The etiological pattern observed in this cohort also reflects the local burden of chronic liver disease. Hepatitis C virus-related cirrhosis was the leading underlying cause and was documented in 68 of 120 patients, accounting for 56.7% of the study population. This finding is consistent with the high hepatitis C burden reported in Pakistan and the wider South Asian region, where chronic viral hepatitis continues to contribute substantially to cirrhosis, ascites, and liver-related hospital admissions (2,8). Hepatitis B virus-related cirrhosis accounted for 20.0% of cases, combined hepatitis B and C infection for 8.3%, and other causes for 15.0%, indicating that viral hepatitis remained the dominant background etiology among patients presenting with decompensated liver disease in this emergency-care setting. The predominance of hepatitis C in this study also supports the need for integrated emergency, hepatology, and public health strategies aimed at early detection and treatment of viral hepatitis before progression to decompensated cirrhosis.

The clinical presentation of patients in this study showed that abdominal distension was universal because ascites was part of the eligibility criteria, while abdominal pain, fever, jaundice, hepatic encephalopathy, and vomiting were present with variable frequency. Fever was particularly relevant because it was present in 20 of 34 patients with spontaneous bacterial peritonitis compared with 26 of 86 patients without spontaneous bacterial peritonitis, corresponding to 58.8% versus 30.2% and an odds ratio of 3.30. This association suggests that fever remains an important clinical warning sign in cirrhotic patients with ascites; however, the absence of fever cannot exclude spontaneous bacterial peritonitis because 14 of 34 affected patients did not have fever. This observation is clinically important because cirrhosis-related immune dysfunction may blunt classical inflammatory responses, and reliance on fever alone may lead to underdiagnosis. Therefore, diagnostic paracentesis should be guided by the presence of ascites in decompensated cirrhosis rather than by fever alone, particularly in emergency settings (4,6).

The higher mean total leukocyte count among patients with spontaneous bacterial peritonitis further supports the inflammatory burden associated with ascitic fluid infection. Patients with spontaneous bacterial peritonitis had a mean total leukocyte count of 12.4 ± 3.2 $\times 10^9$/L compared with 8.6 ± 2.8 $\times 10^9$/L among patients without spontaneous bacterial peritonitis, with a mean difference of 3.8 $\times 10^9$/L and a large standardized effect size. This difference indicates that systemic leukocytosis may accompany spontaneous bacterial peritonitis and may assist clinical suspicion, but it should not replace ascitic fluid analysis because the diagnostic definition of spontaneous bacterial peritonitis is based on ascitic fluid

polymorphonuclear leukocyte count rather than peripheral blood leukocyte count (4). The manuscript-reported significant association between hepatic encephalopathy and spontaneous bacterial peritonitis further suggests that altered mental status in patients with cirrhosis and ascites should prompt urgent evaluation for infection, although the absence of subgroup counts limits estimation of the magnitude of this association.

The frequency observed in this study is comparable with regional and international reports describing spontaneous bacterial peritonitis as a frequent complication among hospitalized patients with decompensated cirrhosis. Du et al. reported that spontaneous bacterial peritonitis remains a major diagnostic and prognostic concern in decompensated cirrhotic patients, while Würstle et al. emphasized the importance of distinguishing spontaneous bacterial peritonitis from secondary peritonitis because management and prognosis differ substantially (5,6). Local Pakistani evidence has also shown clinically meaningful burdens of spontaneous bacterial peritonitis among patients with decompensated chronic liver disease, including those with upper gastrointestinal bleeding, elevated ascitic inflammatory markers, and medication-related risk exposures (7,9,10). The present study adds to this evidence by focusing specifically on emergency department presentations with ascites, a setting in which rapid recognition and early paracentesis have direct implications for initial management.

Several pathophysiological mechanisms may explain the high frequency of spontaneous bacterial peritonitis in this cohort. Decompensated cirrhosis is associated with portal hypertension, intestinal wall edema, altered intestinal permeability, bacterial overgrowth, impaired innate immunity, and reduced ascitic fluid opsonic activity, all of which facilitate bacterial translocation into ascitic fluid (3,4). These mechanisms may be amplified in patients presenting through emergency services because such patients often have more advanced decompensation, delayed presentation, renal dysfunction, encephalopathy, or systemic inflammatory features. Emerging literature has also highlighted the increasing importance of antimicrobial resistance and healthcare-associated infections in cirrhotic patients with spontaneous bacterial peritonitis, which may complicate empirical treatment choices and clinical outcomes (11,12). Although the present study recorded culture sensitivity where indicated, detailed organism distribution and resistance patterns were not available for comparative analysis; this remains an important area for future research.

The main strength of this study was its prospective emergency department-based design, which allowed estimation of spontaneous bacterial peritonitis frequency among patients presenting at the point of acute care rather than in a selected inpatient ward population. The use of a standard diagnostic threshold of ascitic fluid polymorphonuclear leukocyte count ≥250 cells/mm^3 also strengthened diagnostic consistency. However, certain limitations must be considered. The study was conducted at a single tertiary-care hospital, which may limit generalizability to smaller hospitals, primary-care settings, and community-based cirrhosis populations. The sample size was modest, and the study duration was limited to six months. Detailed subgroup counts for several clinically relevant variables, including age strata, gender, hepatic encephalopathy, abdominal tenderness, and cirrhosis etiology by spontaneous bacterial peritonitis status, were not fully reported, limiting multivariable analysis and effect-size estimation. Mortality, length of hospital stay, renal complications, treatment response, recurrence, and long-term outcomes were not assessed. In addition, culture positivity, organism profile, and antimicrobial resistance patterns were not analyzed in sufficient detail, although these factors are increasingly relevant in contemporary management of spontaneous bacterial peritonitis.

These findings have practical implications for emergency care. Because spontaneous bacterial peritonitis was present in more than one-quarter of cirrhotic patients with ascites, emergency departments should maintain a low threshold for diagnostic paracentesis in this population. Fever, systemic leukocytosis, abdominal pain, tenderness, and hepatic encephalopathy may increase clinical suspicion, but absence of these features should not be used to defer ascitic fluid examination. Future multicenter studies with larger sample sizes should evaluate predictors of spontaneous bacterial peritonitis, organism

distribution, antimicrobial resistance patterns, timing of paracentesis, treatment response, renal complications, and mortality. Such studies would help develop emergency department-based protocols for early identification and standardized management of spontaneous bacterial peritonitis in patients with decompensated cirrhosis.

CONCLUSION

Spontaneous bacterial peritonitis was diagnosed in 28.3% of adult cirrhotic patients presenting with ascites to the emergency department, indicating a substantial burden of ascitic fluid infection in this high-risk acute-care population. Hepatitis C virus-related cirrhosis was the most frequent underlying etiology, while fever and elevated total leukocyte count were more common among patients with spontaneous bacterial peritonitis. These findings support routine early diagnostic paracentesis in cirrhotic patients presenting with ascites, particularly when fever, abdominal symptoms, leukocytosis, or hepatic encephalopathy are present. As a single-center prospective observational study, the findings should be interpreted within the limits of sample size and available subgroup data, but they provide clinically useful local evidence emphasizing timely emergency evaluation for spontaneous bacterial peritonitis.

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