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CLINICAL AND BACTERIOLOGICAL PROFILE OF PARTICIPANTS SUSPECTED OF SBP IN CHRONIC LIVER DISEASE COMING IN IGIMS EMERGENCY, PATNA- A RETROSPECTIVE CROSS-SECTIONAL STUDY.

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Abstract

Background

Chronic liver disease (CLD) affects individuals of all ages, sexes, geographical locations, and ethnicities worldwide. Although the rate of progression and clinical course may vary, various etiological factors contribute to a similar clinicopathological pathophysiology in CLD.

Objectives

This study aimed to determine the bacterial profile, laboratory parameters, and clinical presentation of spontaneous bacterial peritonitis (SBP) and assess how these factors influence the outcomes of patients with CLD.

Materials and Methods

This retrospective, cross-sectional, observational study was conducted at Indira Gandhi Institute of Medical Sciences (IGIMS), Patna, Bihar, India, over a period of 18 months. A total of 160 patients were enrolled in the study. Case records of patients aged 18 years and older, diagnosed with SBP, were retrieved from the hospital's electronic database and included in the study.

Results

Relevant gram-positive and gram-negative bacteria were identified in ascitic fluid and blood samples. Total leukocyte count, creatinine, bicarbonate, and direct bilirubin levels were found to be significantly associated with patient outcomes, including discharge against medical advice (DAMA), mortality, and successful discharge (p-value < 0.001). Among the patients, 16 (10%) had a history of SBP, and approximately 120 (75%) had not received antibiotics in the previous three months.

Conclusion

This study provides valuable insights into the clinical characteristics, laboratory findings, and bacterial profile of SBP in CLD patients. These findings highlight the importance of a multidisciplinary approach to SBP management and contribute to the growing body of knowledge on the condition.

Recommendations

The results of our investigation highlight the need for further research on geographical variations in the bacterial profile and clinical presentation of SBP, as well as the development of early diagnostic techniques and appropriate treatment plans.

Keywords- *Chronic liver disease (CLD), Bacterial infection, Clinical profile,* E. coli*, Outcomes.*
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Introduction

Chronic liver disease (CLD) affects people of all ages, sexes, geographical locations, and ethnicities worldwide. Although the rate of progression and clinical course may vary, various etiological factors contribute to a similar clinicopathological pathophysiology in CLD [1]. In India,

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the rising prevalence of obesity and alcohol consumption has been linked to a steady increase in CLD-related mortality [2].

After spontaneous bacterial peritonitis (SBP), the most common bacterial infections in individuals with cirrhosis include skin and soft tissue infections, urinary tract infections, pneumonia, and spontaneous bacteremia [3, 4]. Symptoms of liver decompensation, such as ascites progression, hepatic encephalopathy, gastrointestinal bleeding, and renal failure, may develop during or after an episode of SBP [5]. Reports indicate that 17.12% of cirrhotic patients worldwide develop SBP, with the prevalence of community-acquired SBP and healthcare-associated SBP being 6.05% and 11.11%, respectively [6]. In general, SBP outcomes in CLD patients are poor, with approximately 20% of cirrhotic patients dying in hospitals and a global SBP-related mortality rate exceeding 30.61% [5, 6].

Since ascitic fluid cultures predominantly yield gram-negative enteric bacteria, intestinal bacterial translocation is considered a major cause of SBP in cirrhotic patients. Increased intestinal permeability and infection susceptibility may also result from portal hypertension-induced structural abnormalities in the intestinal wall and weakened immunity [6].

Third-generation cephalosporins and other antibiotics are commonly used to treat SBP, depending on bacteriological findings. When sepsis or multidrug-resistant bacteria are detected in ascitic fluid, carbapenem administration is recommended. Additionally, intravenous albumin helps prevent complications such as hepatorenal syndrome and acute kidney injury [5].

To guide treatment, SBP patients should be routinely monitored for bacterial infections and their antibiogram. Prompt and effective management of SBP requires a comprehensive understanding of its characteristics, bacterial profiles, and other factors influencing patient outcomes. However, there are limited recent studies in India addressing these aspects. Therefore, a retrospective study was conducted to examine a large dataset of patient records to evaluate the outcomes of SBP in CLD patients. The objective was to determine the bacterial profile, laboratory parameters, and clinical presentation of SBP and assess how these factors influenced the clinical outcomes of patients with pre-existing CLD.

Methodology

Study Design

This retrospective, cross-sectional, observational study was conducted at the Department of Gastroenterology, Indira Gandhi Institute of Medical Sciences (IGIMS), Patna, Bihar, India, over a period of 18 months.

Study Population

A total of 160 patients were enrolled in the study. Case records of patients aged 18 years and older, diagnosed with SBP, were retrieved from the hospital's electronic database and included in the study. Patients presenting with fever, ascites, and abdominal pain, along with an elevated total white blood cell (WBC) count and more than 250 polymorphonuclear neutrophils in ascitic fluid, were considered to have confirmed SBP.

Data Collection

Demographic data, clinical features of SBP, causes of cirrhosis, and laboratory parameters—including complete blood count (CBC), international normalized ratio (INR), liver and renal function tests, and upper gastrointestinal (UGI) endoscopy findings—were collected. Clinical outcomes, such as discharge, death, and discharge against medical advice (DAMA), were also recorded and analyzed.

Study Procedure

The growth and pattern of bacteria in the blood and ascitic fluid cultures were used to evaluate the antibiotic sensitivity pattern.

Statistical Analysis

Data analysis was performed using SPSS version 24. Categorical data were presented as frequencies and percentages, while continuous data were expressed as mean ± standard deviation. The Kruskal-Wallis test was used to determine correlations between parameters across different patient groups. A p-value of less than 0.05 was considered statistically significant.

Results

The antibiotic sensitivity pattern and distribution of microorganisms isolated from ascitic fluid are summarized in Table 1. All relevant gram-positive and gram-negative bacteria were identified in both ascitic fluid and blood samples.

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Table 1. Patterns of Antibiotic Sensitivity and Distribution of Microorganisms Isolated from Ascitic Fluid

Type of Sample	Organism	n (%)
Ascitic Fluid	*E. coli*	12 (7.5%)
	E. coli - Amp C + carbapenemase-resistant	4 (2.5%)
	E. coli (extended spectrum ß-lactamases, ESBL)	4 (2.5%)
	Enterococcus	4 (2.5%)
	Klebsiella oxytoca - carbapenem-resistant	3 (1.87%)
	Klebsiella pneumoniae	2 (1.25%)
	Klebsiella pneumoniae - carbapenem-resistant	3 (1.87%)
	Klebsiella pneumoniae (ESBL-producing)	2 (1.25%)
	Klebsiella pneumoniae/Stenotrophomonas	3 (1.87%)
	Pseudomonas fluorescens and *Enterococcus faecium*	2 (1.25%)
	Sphingomonas paucimobilis	2 (1.25%)
	Staphylococcus aureus - methicillin-sensitive (MSSA)	1 (0.62%)
	Sterile	**94 (58.7%)**
	Stenotrophomonas and *Candida*	2 (1.25%)

Data were presented as n (%)

Table 2 depicts resistance patterns among gram-negative bacteria. Gram-negative bacteria were resistant to Ceftriaxone 02 (66.6%) mainly.

Table 2. Resistance Pattern Among Gram-Negative Bacteria (Non-Enterobacterales) (n=3)

Antibiotics	Resistant n (%)	Sensitive n (%)	Intermediate n (%)
Amoxicillin	00	3 (100)	--
Gentamicin	1 (33.33)	2 (66.66)	--
Ciprofloxacin	00	3 (100)	--
Imipenem	1 (33.33)	2 (66.66)	--
Ceftriaxone	2 (66.66)	1 (33.33)	--
Trimethoprim/Sulfamethoxazole	1 (33.33)	2 (66.66)	--
Meropenem	00	3 (100)	--
Piperacillin/Tazobactam	00	3 (100)	--

Data were presented as n (%)

Table 3 shows the resistance pattern among gram-negative bacteria. Gram-negative bacteria were mostly resistant to Ciprofloxacin 35 (94.5%), followed by Sulfamethoxazole 30 (81.08%), Tazobactam 27 (72.97%), and Gentamicin 26 (70.27%)

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Table 3. Resistance Pattern Among Gram-Negative Bacteria (Enterobacterales) (n=37)

Antibiotics	Resistant n (%)	Sensitive n (%)	Intermediate n (%)
Ampicillin	10	27	--
Gentamicin	26 (70.27)		--
Ciprofloxacin	35 (94.59)		--
Cefepime	6 (16.21)		--
Ceftriaxone	6 (16.21)		2 (5.4)
Trimethoprim/Sulfamethoxazole	30 (81.08)		2 (5.4)
Imipenem	16 (43.24)	21	--
Piperacillin/Tazobactam	27 (72.97)		--
Amoxicillin	10 (27.02)		--
Ertapenem	16 (43.24)	21	1 (2.7)
Meropenem	16 (43.24)	21	1 (2.7)
Amikacin	16 (43.24)		--
Colistin	00		--
Nitrofurantoin	16 (43.24)		--

Data were presented as n (%)

Table 4 shows the clinical characteristics of patients with SBP, including fever, abdominal distension, jaundice, hematemesis, melena, abdominal discomfort, vomiting, diarrhea, cough, and lower limb edema.

Table 4. Patients with spontaneous bacterial peritonitis and their clinical characteristics

Clinical Features	Values
Fever	35 (21.8%)
Abdomen distension	100 (62.5%)
Jaundice	50 (31.2%)
Hematemesis	12 (7.5%)
Melena	15 (9.3%)
Abdomen pain	70 (43.7%)
Vomiting	20 (12.5%)
Diarrhea	15 (9.3%)
Cough	18 (11.2%)
Swelling of the lower limbs	60 (37.5%)
Altered mental status	40 (25%)

Data were presented as n (%)

The correlation between laboratory markers and the clinical outcomes of SBP patients is displayed in Table 5. Total leukocyte count, creatinine, bicarbonate, and direct bilirubin were found to be significantly associated among DAMA, death, and discharged participants with a p-value <0.001.

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Table 5. Laboratory parameter correlation with SBP patients' clinical outcomes

Parameters	DAMA	Death	Discharge	p-value
Total leukocyte count	13,108±8166	15,844±13,575	9,498±7,101	**<0.001**
Hemoglobin	9.3±2	9.3±1.7	8.9±2.1	0.976
Platelet count	98,332±72,545	108,051±93,454	114,786±89,423	0.781
Creatinine	1.89±1.23	2.32±1.89	1.54±1.80	**<0.001**
Bicarbonate	29.5±51.1	16.8±4.7	20.5±4.0	**<0.001**
Sodium	131±8	131±6	136±5	0.458
Potassium	4.24±1.2	4.39±0.97	3.96±0.62	0.064
Direct bilirubin	6.7±5.4	6.4±6.3	4.4±4.6	**<0.05**
Indirect	1.9±1.1	2.3±1.7	1.7±1.2	0.056
SGOT	115±152	229±436	76±78	0.128
SGPT	72±152	110±254	48±82	0.485
ALP	176±170	129±65	136±62	0.652
GGT	41.4±37.3	46.1±66.5	46.5±40.2	0.493
Albumin	2.2±0.5	2.3±0.6	2.5±0.5	0.311
Globulin	3.5±0.9	5.1±10.2	3.5±1.0	0.190

Data were presented as mean±SD

P-value was considered significant at less than 0.05

Among the patients, 16 (10%) had a history of SBP, and approximately 120 (75%) had not received antibiotics in the previous three months. About 64 (40%) of the patients passed away, 20 (12.5%) were discharged against medical advice (DAMA), and 88 (55%) were discharged. All DAMA patients were in a moribund state. Table 6 presents the various outcomes observed among the participants.

Table 6. Outcomes Observed among Participants

Outcomes	N (%)
Administered with antibiotics in the past 3 months	120 (75%)
Prior History of SBP	16 (10%)
Discharged Patients	88 (55%)
DAMA	20 (12.5%)
Died Patients	64 (40%)

Discussion

The treatment of spontaneous bacterial peritonitis (SBP) in individuals with chronic liver disease (CLD) is challenging due to the presence of multidrug-resistant bacteria. Therefore, to develop effective treatment strategies that reduce mortality rates, it is essential to understand the bacteriological profile of SBP, its clinical and laboratory characteristics, and the factors influencing patient outcomes.

The study identified lower limb edema, abdominal pain, and abdominal distension as the most common symptoms of SBP in individuals with CLD. Additionally, jaundice and impaired mental status were frequently observed. These findings align with previous research, which has reported that impaired mental status and abdominal pain are typical manifestations of SBP, although many patients may remain asymptomatic [7, 8, 9].

In the present study, jaundice and impaired mental status significantly impacted clinical outcomes. Prior studies have similarly identified altered sensorium as a common feature of SBP and highlighted jaundice as an independent predictor of the condition [8, 10, 11].

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This investigation also revealed frequent abnormalities in several laboratory parameters, particularly those related to liver and kidney function. Notably, significant deviations in creatinine, bicarbonate, sodium, and potassium levels were observed, with aberrant creatinine and bicarbonate levels strongly influencing clinical outcomes. Renal impairment, including renal failure, is a well-documented complication of SBP [8].

Regarding the bacterial profile, our study found a higher prevalence of *Klebsiella pneumoniae* and *Escherichia coli* in both ascitic fluid and blood samples. This aligns with previous research indicating that Gram-negative bacteria are the primary causative agents of SBP [7, 10, 12, 13]. Additionally, multidrug-resistant strains such as MRSA, MRCoNS, ESBL-producing *E. coli* and *K. pneumoniae*, and MSSA were also identified, underscoring the importance of considering regional variations and antibiotic resistance patterns when managing SBP.

Conclusion

The study concluded that the clinical characteristics, laboratory findings, and bacterial profile of SBP in patients with CLD are better understood through this research. These findings highlight the importance of a multidisciplinary approach to managing SBP and contribute to the growing body of knowledge on the condition.

Recommendations

The results of our investigation highlight the need for further research on geographical variations in the bacterial profile and clinical presentation of SBP, as well as the development of early diagnostic techniques and appropriate treatment plans.

Limitations

A selection bias might have been introduced by the study's retrospective design. It was a single-center study as well. Robust data collection on clinical characteristics and associated outcomes necessitates a multicentric strategy. The patterns of antibiotic resistance in these patients were not investigated, despite the fact that our investigation was centered on bacterial identification. The identification of suitable treatment approaches depends on this.

List of Abbreviations

CLD- Chronic liver disease
SBP- Spontaneous bacterial peritonitis
WBC- White blood cell
CBC- Complete blood count
INR- international normalized ratio
UGI- Upper gastrointestinal
IGIMS- Indira Gandhi Institute of Medical Sciences
ESBL: Extended spectrum ß-lactamase,
MSSA: Methicillin-sensitive *Staphylococcus aureus,*
MRCoNS*:* Methicillin-resistant coagulase-negative *Staphylococci*

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No funding was obtained for the study.

Conflict of Interest

The authors have no conflicts of interest to declare.

Availability of Data

All data analyzed during this study are included in this published article

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