



CLINICO-BACTERIOLOGICAL PROFILE OF CIRRHOTIC PATIENTS WITH BACTERIAL INFECTIONS – A CROSS SECTIONAL STUDY

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ABSTRACT **INTRODUCTION** Bacterial infections are common in patients with cirrhosis. Patients with cirrhosis are immunocompromised making them prone for infections. Knowledge about the clinical and bacteriological profile of infections will help the clinician to diagnose and treat these patients more effectively. We conducted this study to identify the most common bacterial infections affecting patients with liver cirrhosis and their clinic-bacteriological profile. **METHODS** All patients with cirrhosis admitted with fever, neutrophilic leukocytosis and/ or elevated C reactive protein or procalcitonin were included in this prospective observational study. Detailed history, clinical examination findings, and investigation reports were collected, and data was analyzed. **RESULTS** Among the 193 patients included in the study, the most common infection was Urinary Tract Infection (UTI) which was present in 72 patients (37.3%). Other infections which were reported in the study included SBP (27.5%), Pneumonia (24.9%), and Cellulitis (16.6%). The most common symptoms at presentation was dysuria and lower abdominal pain (37.3%), cough (24.4%), painful abdominal distension (21.8) and painful leg edema (16.6%). 45 cultures yielded positive results. The most common bacteria isolated was E coli (16 patients) followed by Staphylococcus (12 patients). Other organisms isolated were Pseudomonas (5 patients), Klebsiella (5 patients), Enterobacter (4 patients) and Streptococcus (3 patients). E coli (12 of 17) in urinary cultures, Staphylococcus (7 of 12) in blood cultures, Klebsiella (3 of 7) ascitic fluid cultures, Staphylococcus and Streptococcus (3 each of 8) sputum cultures and Staphylococcus in Pus culture were the commonest bacteria isolated. **CONCLUSIONS** The most prevalent infection in cirrhosis is UTI, followed by SBP, Pneumonia and cellulitis. The commonest organism causing UTI in our patients was E coli, SBP was Klebsiella, and pneumonia was Staphylococcus and streptococcus. Prompt recognition and treatment of bacterial infections in cirrhosis would result in better outcome.

KEYWORDS :

INTRODUCTION

Liver cirrhosis is a leading cause of death worldwide. The risk of death is 4.7 times higher in patients with compensated cirrhosis, and 9.7 times higher in those with decompensated cirrhosis, compared to general population [1]. Bacterial infections are common in patients with cirrhosis. Patients with cirrhosis are immunocompromised making them prone for infections. The most common infections reported in cirrhosis include Spontaneous Bacterial Peritonitis (SBP), Urinary Tract Infection (UTI), Pneumonia, Bacteremia and Cellulitis [2]. Resistant infections are also increasingly being reported in cirrhotic patients [3]. Infections often predispose to complications like hepatorenal syndrome, liver failure, shock and death. Though most of the bacterial infections are caused by gram-negative bacteria, the incidence of gram-positive bacteria is increasing recently, which has been attributed to increasing invasive procedures and antibiotic prophylaxis (norfloxacin) in patient with cirrhosis [3], [4]. Knowledge about the clinical and bacteriological profile of infections will help the clinician to diagnose and treat these patients more effectively.

We conducted this study to (i) identify the most common bacterial infections affecting patients with liver cirrhosis (ii) to identify the clinical profile of patients with infection; and (iii) to identify the causative bacteria.

MATERIALS AND METHODS

After getting institutional ethics committee clearance, all patients with cirrhosis admitted with fever, neutrophilic leukocytosis and/ or elevated C reactive protein or procalcitonin were included in this prospective observational study. Detailed history and clinical examination to identify the focus of infection was conducted. The diagnosis of spontaneous bacterial peritonitis was made if ascitic fluid showed more than in ascitic fluid 250 neutrophils/ cmm and exclusion of other secondary causes of peritonitis. Ascitic fluid cultures were sent after direct bedside inoculation into culture bottle. The diagnosis of urinary tract infection was made if clinical symptoms (dysuria or

increased frequency), >10 pus cells/ High power field (hpF) in urinalysis, and/or positive urine culture (>10⁵ colony forming units (CFU)/ml). The presence of clinical symptoms and signs (cough, expectoration, pulmonary sounds), patchy alveolar opacities in chest X-ray, and/or positive bacteriologic exam (sputum) was considered as diagnostic of pneumonia. If patient showed fever, local skin signs (redness, warmth and tenderness) and/or positive cultures of wound secretion, it was diagnosed as cellulitis. Necessary investigations including ascitic fluid, blood, urine and pus cultures were sent and the data obtained were coded and entered into Microsoft Excel spread sheet. Patients with infections other than bacterial infections were excluded. Statistical analysis was done using statistical Package for Social sciences (SPSS) version 23.

RESULTS

193 patients with cirrhosis admitted with various bacterial infections were included in this study. Mean age of patients included in the study was 63.4 years. Largest subset of patients belonged to the age group 61- 70 years (55.4%) followed by the age group 51 – 60 years (33.7%). 108 (56%) patients were males. Etiology of cirrhosis in our patients were alcohol (52.3 %), Nonalcoholic steatohepatitis (42.5 %), viral hepatitis (4.1 %) and autoimmune (1.0 %). The mean Model for end stage liver disease (MELD) score in our patients was 14.9 +/- 3.9.

The most common symptoms at presentation was dysuria and lower abdominal pain (37.3%), cough (24.4%), abdominal distension and pain (21.8) and leg pain and swelling (16.6%) [Fig 1]. Among the 193 patients included in the study, the most common infection was Urinary Tract Infection (UTI) which was present in 72 patients (37.3%). Other infections which were reported in the study included SBP (27.5%), Pneumonia (24.9%), and Cellulitis (16.6%). Of the 53 patients with SBP, 11 patients also had an additional focus of infection (UTI in 8 patients and pneumonia in 3 patients).

Of the total 211 samples sent, 45 cultures yielded positive results. Of

these, 17 samples were from urine, 12 samples from blood, 8 from sputum, 7 from ascitic fluid and 1 from pus from a leg ulcer. The most common bacteria isolated was E coli (16 patients) followed by Staphylococcus (12 patients). Other organisms isolated were Pseudomonas (5 patients), Klebsiella (5 patients), Enterobacter (4 patients) and Streptococcus (3 patients).

E coli (12 patients), Klebsiella (2 patients) and Enterobacter (3 patients) were the bacteria identified from urinary cultures. Bacteria isolated from blood were Staphylococcus (7 patients), Pseudomonas (3 patients) and E coli (2 patients). Ascitic fluid cultures grew mainly E coli (2 patients), Klebsiella (3 patients), Enterobacter (1 patient) and Staphylococcus (1 patient). Sputum samples in 8 patients yielded positive cultures of Staphylococcus (3 patients), Streptococcus (3 patients) and Pseudomonas (2 patients). Pus culture of a patient showed Staphylococcus [Fig 4].

FIGURES

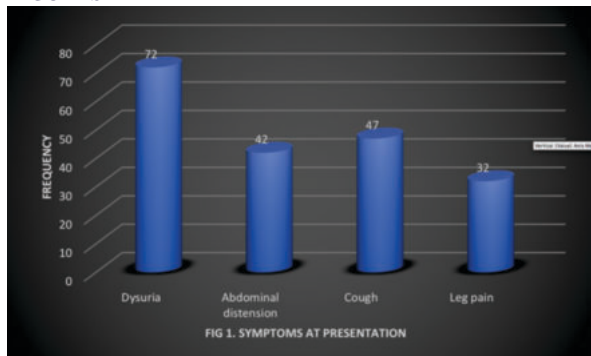


Fig 1. Clinical symptoms at presentation of patients with bacterial infections

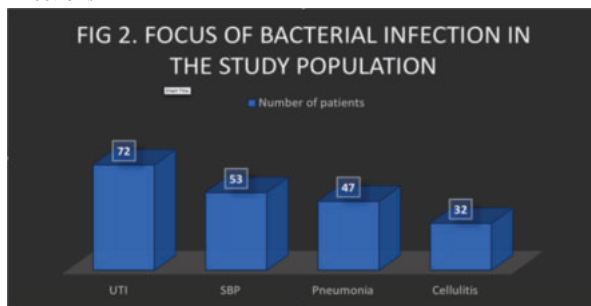


Fig 2. Focus of bacterial infection in the study population

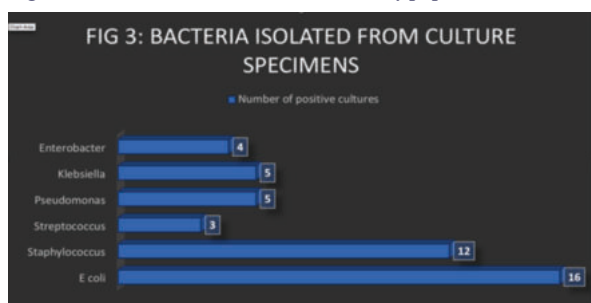


Fig 3: Bacteria isolated from culture specimens

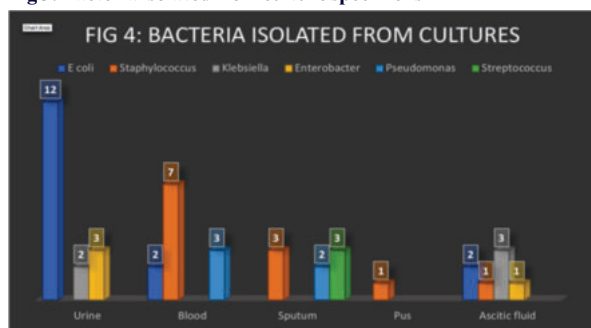


Fig 4. Specimen wise bacteria grown in cultures

DISCUSSION

In our study of 193 patients having liver cirrhosis with bacterial infection, the mean age was 63.4 years. Median age reported in the study by Strauss E et al was 53 years [5] and by Preda CM et al was 54.2 years [6]. Males were the predominant group in our study (56%) which is similar to most other studies [6, 7, 8]. Some earlier studies have shown that, even in the presence of a bacterial infection some patients may be asymptomatic. However, this could not be assessed, since only patients presenting with fever were included in the study.

The most common infection in our study was Urinary Tract Infection (37.3%), followed by SBP (27.5%), Pneumonia (24.9%) and Cellulitis (16.6%) in the decreasing order of prevalence. Most of the published studies also show spontaneous bacterial peritonitis (SBP) (25%-31%) and urinary tract infection (UTI) (20%-25%) as the most common infections, followed by pneumonia (15%-21%), bacteraemia (12%), and soft tissue infection (11%) [2,3]. It is interesting to note that, in the studies published before the year 2000 showed very high prevalence of SBP (31 – 54 %) [6, 7, 8]. However, most of the later studies which used the standard definition for diagnosis of SBP, report a lower prevalence of SBP (8-33%), and higher rate of bloodstream infection and pneumonia [9, 10, 11, 12, 13, 14].

Among 45 cultures obtained from 193 samples, the most common isolated organism is E coli (35.6%). The second being Staphylococcus (26.7%). The commonest organism causing UTI in our patients was E coli, SBP was Klebsiella, and pneumonia was Staphylococcus and streptococcus. Commonest organism isolated from blood was staphylococcus. Gram-negative bacteria like E. coli and K. pneumoniae have been found to be the most common causes of SBP [18, 19]. But recent studies indicate a shift from Gram-negative bacteria to Gram-positive cocci [20, 21, 22, 23, 24] and increasing occurrence of drug resistance. However, our results show that Gram-negative bacteria remain the main etiological agents of SBP in our patients and that E. coli was its most common cause.

Similar to our study, most studies have shown that, as in non-cirrhotic individuals, the common pathogens causing urinary tract infection are gram-negative bacilli and coagulase-negative staphylococcus [3, 25, 26, 27]. Gram positive cocci are the predominant causes of pneumonia (Streptococcus pneumoniae) and procedure-associated bacteraemia (Staphylococcus aureus) among patients with cirrhosis in the published literature [4, 28]. Our results were also similar. Recent studies have shown increasing prevalence of multidrug resistant organisms causing infections in patients with cirrhosis. However our number of positive cultures were small to come to an effective conclusion.

Our study had some important limitations as well. Only symptomatic patients were included in the study. Since cirrhotic patients with infections may be asymptomatic, the actual number of infections may be more than what is recorded in the study. Presentation with symptoms other than fever were not included in the study. Hence patients with gastrointestinal bleeding developing infections after admission were not included. Only relevant cultures were sent depending on the symptoms and hence some cases of bacteraemia could have been missed.

CONCLUSION

Bacterial infections are an important cause of hospital admissions in patients with cirrhosis. The most prevalent infection in cirrhosis is UTI, followed by SBP, Pneumonia and cellulitis. SBP is decreasing in prevalence compared to the past. The reason may be effective prophylaxis. The commonest organism causing UTI in our patients was E coli, SBP was Klebsiella, and pneumonia was Staphylococcus and streptococcus. The commonest organism isolated from blood was staphylococcus. Prompt recognition and treatment of bacterial infections in cirrhosis would result in better outcome

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