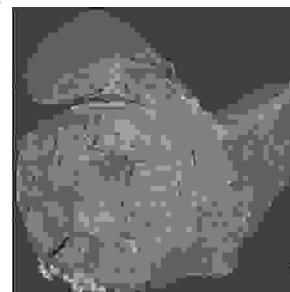


ORIGINAL

PROF-944

SPONTANEOUS BACTERIAL PERITONITIS

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ABSTRACT... drimran@yahoo.com. **Objective:** To evaluate the prevalence, diagnostic criteria and microbial spectrum of spontaneous bacterial peritonitis (SBP) and its variants in cirrhotic patients with ascites. **Design:** A hospital based prospective study carried out in cirrhotic patients with ascites. **Place and duration of Study:** The study was conducted in the Department of Medicine Military Hospital Rawalpindi during October 2000 to March 2002. **Subject and Methods:** One hundred and eighty consecutive patients of cirrhotic liver between the ages of 20-65 years presenting with ascites reporting to outdoor patient department of Military Hospital Rawalpindi were included in the study. The diagnosis of cirrhosis was made on history, clinical examination and the ultrasonographic findings. These patients were subjected to ascites fluid tap and the patients were divided into SBP and non-SBP groups in the light of results of ascitic fluid routine examination and culture. The SBP group was further categorized into culture positive SBP, culture negative neutrocytic ascites (CNNA) and bacterascites (BA) on the basis of culture results and total leukocyte count, absolute polymorphonuclear leukocyte count per cubic mm of ascitic fluid. **Results:** The study included 144 males and 36 females having cirrhosis with ascites. The mean age of these patients was 52.32 ± 7.87 years. On the basis of routine examination and culture of tapped ascitic fluid from these cases 57 of 180 (31.66%) patients were diagnosed to have SBP or its variants. In addition to classic SBP in 18 (31.58%) patients, its variants namely culture negative neutrocytic ascites and bacterascites were detected in 37 (64.92%) and two (3.5%) cases respectively. *E. coli* was the most frequently cultured organism. It was isolated in 12 cases of SBP (60%). In 4 cases (20%) *Klebsiella* was cultured whereas *Proteus mirabilis* and *Streptococcus* were reported in two cases (10%) each. **Conclusion:** This study indicates that spontaneous bacterial peritonitis is common and potentially fatal complication in cirrhotic patients with ascites. *E. coli* is the most frequent offending organism.

Key words: Peritonitis, Liver Cirrhosis, Microbiology.

INTRODUCTION

Spontaneous bacterial peritonitis was first reported in 1893 by Chorrin and since then many sporadic cases have been documented¹. Patients with cirrhosis and ascites have a 10% annual risk of ascitic fluid infection. This infection may be spontaneous or may follow a previous paracentesis². The incidence of SBP in hospitalized patients with cirrhosis varies from 7-23% in the West^{3,4}. It is around 33% in Pakistan^{5,6}. Spontaneous bacterial peritonitis and its two variants namely cultured negative neutrocytic ascites (CNNA) AND bacteria (BA) are diagnosed on the basis of leukocyte count per cubic millimeter, absolute polymorphonuclear leukocyte (PMN) count in the routine examination of ascitic fluid along with the result of its bacterial culture^{7,8,9}. In classic SBP bacterial culture is positive along with a leukocyte of ≥ 500 per cubic millimeter or an absolute PMN count of ≥ 250 cells per cubic millimeter.⁶ whereas in CNNA the ascitic fluid culture is negative in the absence of antibiotic therapy; pancreatitis or evidence of intra abdominal surgically treatable source of infection and absolute PMN count is similar to that of classic SBP⁷. In non-neutrocytic bacteria, culture of ascitic fluid is positive but the leukocyte count per cubic millimeter is ≤ 500 and absolute PMN is ≤ 250 cells per cubic millimeter^{8,9}. Microbial spectrum in cases of SBP includes mainly the gram negative aerobic flora of the gut like E coli, Klebsiella pneumoniae and Proteus mirabilis^{10,11}. This study was undertaken to evaluate the prevalence, diagnostic criteria and microbial spectrum of SBP in our population so that cost effective management protocols could be devised with a view to reduce the morbidity and mortality of this frequent but often overlooked complication of cirrhosis liver.

SUBJECTS AND METHODS

One hundred and eighty consecutive patients of cirrhosis liver between the ages of 20 – 65 years presenting with ascites to Military Hospital Rawalpindi were admitted in the hospital. The diagnosis of cirrhosis was made on the basis of history, clinical examination and ultrasonographic findings. These patients were subjected to ascitic fluid tap. Ascitic fluid was sent to the laboratory of Army Medical College Rawalpindi for routine

examination which included colour, specific gravity, protein content, cell count, differential leukocyte count with the help of Leishman's stain and absolute polymorphonuclear count in the Neubar chamber. Gram stain was performed to identify any causative organisms and Zein-nelson staining was done to find any acid-fast bacilli 20ml of ascitic fluid was also sent for culture and sensitivity in blood culture bottle to increase the yield. Other tests like blood complete picture, urine routine examination, liver function test, serum urea and electrolytes, serology for Hepatitis B and C, blood culture and ultrasonography were also carried out simultaneously to exclude other treatable causes of infection. In patients where suspicion of malignancy was raised on ultrasonography, CT scan of the abdomen was carried out. Patients, whose ascitic fluid analysis revealed leukocyte count of ≤ 500 per cubic millimeter and absolute polymorphonuclear count of ≤ 250 cells per cubic millimeter with negative culture report, were placed in non-SBP group. Whereas remaining cases were labeled as having SBP and were further categorized into classic SBP, culture negative neutrocytic ascites and bacteria. Patients having positive culture report with leukocyte count of ≥ 500 per cubic millimeter and an absolute PMN count ≥ 250 cells per ml were labeled as having classic SBP. Patients showing negative culture report with leukocyte count of ≥ 500 per cubic millimeter and absolute PMN count of ≥ 250 cells cubic millimeter were placed in CNNA whereas patients with positive culture reports but with leukocyte count of ≤ 500 per cubic millimeter and absolute PMN of ≤ 250 cells per cubic millimeter were labeled as bacteria. Patients having neoplastic disorder, congestive cardiac failure and chronic renal failure were not included in the study. Patients with recent abdominal surgery, trauma or previous history of abdominal tuberculosis were also excluded from the study. It was also ensured that none of the patient included in this study had antibiotic therapy during last ten days.

STATISTICAL ANALYSIS

All values were expressed as mean \pm SD for continuous variables. The students T test and Mann-Whitney U test were used for the statistical analysis of the data. The

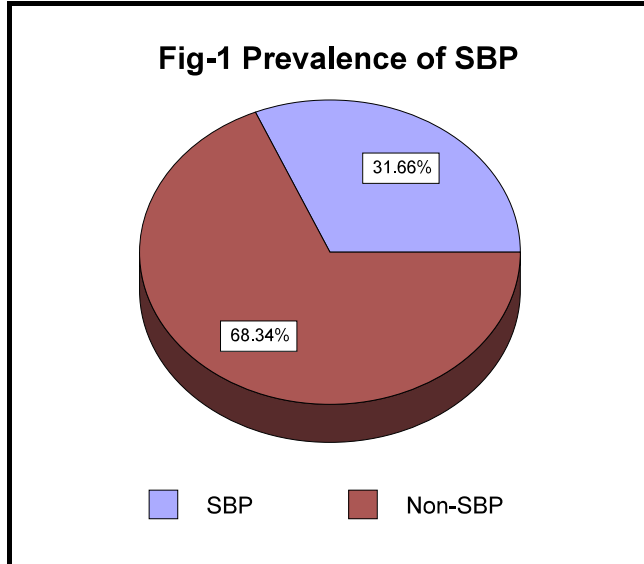
calculations were done with SPSS 8.0 (statistical package of social science, Chicago).

RESULTS

The age of patients included in the study varied from 20-65 years with a mean age of 52.32±7.87SD. Mean age of the patients having spontaneous bacterial peritonitis was 52.32±7.72 SD whereas mean age of patients in non-SBP group was 52.32±8.0SD. There was no statistical difference between the two groups. Out of one hundred and eighty patients, 144 patients (80%) were males and 36 patients (20%) female. Out of 57 cases of SBP 46 patients (80.7%) were males whereas 11 patients (19.3%) were females.

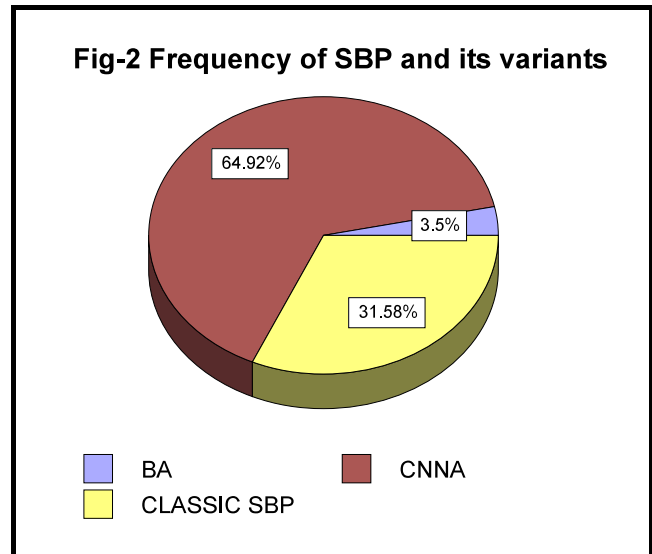
PREVALENCE OF SPONTANEOUS BACTERIAL PERITONITIS

57 of 180 patients (31.66%) with cirrhosis were diagnosed to have spontaneous bacterial peritonitis or its variants, culture negative neutrocytic ascites and bacteria (Fig-1).



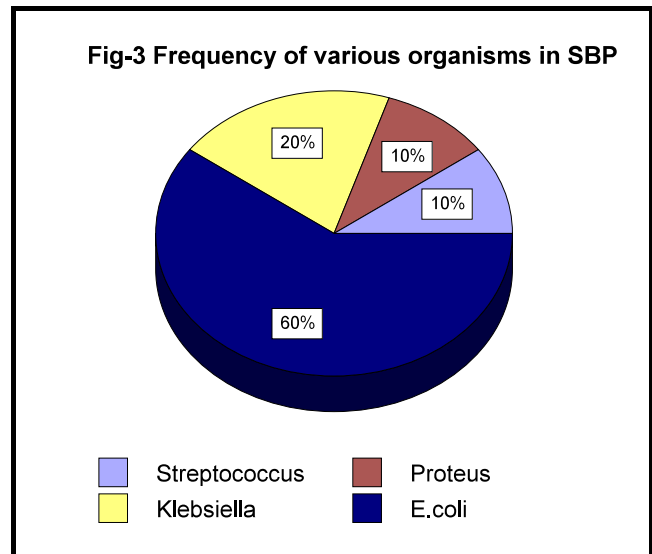
FREQUENCY OF THE VARIANTS OF SPONTANEOUS BACTERIAL PERITONITIS

Classic SBP was diagnosed in 18(n=57,31.58%) patients. Culture negative neutrocytic ascites was found in 37(n=57,64.92%) patients while bacteria was detected in two cases (n=57, 3.5%) (Fig-2).



MICROBIAL SPECTRUM IN SBP

20 cases of spontaneous bacterial peritonitis (n=57, 35%) revealed culture of various bacteria in their ascitic fluid. E coli was the most frequently cultured organism isolated in 12 cases (n=20, 60%), Klebsiella pneumoniae was cultured in 4 cases (n=20, 20%) and Proteus mirabilis and Streptococcus were cultured in two cases each (n=20, 10%) (Fig-3).



DISCUSSION

Spontaneous bacterial peritonitis is the spontaneous bacterial infection of the previously sterile ascitic fluid in

cirrhotic patients without any apparent surgically treatable intra abdominal source of infection¹². It is a common and potentially fatal complication of cirrhosis with ascites³. In our study prevalence of spontaneous bacterial peritonitis and its variants comes out to be 31.66%. Our figure correlates well with figures reported from other studies conducted in Pakistan i.e. 33% from Agha Khan University Hospital Karachi⁶, 32.9% from Rawalpindi General Hospital Rawalpindi⁵ and 32.2% from Chandka Medical College Hospital Larkana¹⁰. The reported prevalence from foreign countries varies from 7-25%^{3,4}. The factors contributing towards higher prevalence of SBP in Pakistan include poor hygienic conditions and high prevalence of infectious diseases in Pakistan as compared to foreign countries⁹.

SBP is treatable but requires early diagnosis, as most patients are asymptomatic². Diagnosis of SBP and its variants require routine examination of the ascitic fluid including leukocyte count per cubic millimeter and absolute PMN count per cubic millimeter along with its culture^{13, 14}. In our study classic SBP was diagnosed in 31.58% of patients whereas its variants CNNA and BA were diagnosed in 64.92% and 3.5% of the cases respectively. Rajput et al¹⁰ in a study conducted at Chandka Medical College Hospital Larkana found classic SBP in 34.5% of his patients whereas CNNA and BA were diagnosed in 62.1% and 3.4% of his cases respectively. These figures support our finding. In another study carried out by Iqbal et al⁵ at Rawalpindi Medical College reported classic SBP in 33.3% of his cases whereas CNNA was found in 66.7% of the cases. None of the patients in his study was diagnosed to have BA. This difference in the frequency of BA could be due to small number of patients in this study.

The microbial spectrum of SBP includes gram-negative aerobic flora of the gut and the common organisms isolated include *E. coli*, *Klebsiella pneumoniae* and *Proteus mirabilis*^{4,10,11}, however gram-positive cocci and anaerobic organisms have also been reported in 10-15% of the cases². In our study we isolated *E. coli* in 60% of the cases, *Klebsiella pneumoniae* in 20% of cases whereas *Proteus mirabilis* and streptococcus were cultured in 10% of the cases, these results are in the line

with the findings of other documented studies on microbial spectrum of SBP^{4,10,11}. Use of blood culture bottles instead of routinely used agar plates increases the positive culture yield of ascitic fluid and its sensitivity has been reported to be as high as 91%¹⁵. We used blood culture bottles for culture of ascitic fluid in our patients and successfully cultured bacteria in 20 out of 57 cases (35%), which correlates well with 37.9% positive culture yield reported by Rajput et al¹⁰ in his subjects by using blood culture bottles.

CONCLUSION

It is concluded from this study that spontaneous bacterial peritonitis and its variants is a commonly encountered complication of liver cirrhosis with ascites in Pakistan. This complication is treatable provided an early diagnosis is made. Use of blood culture bottles instead of usual agar plates increases the culture yield of ascitic fluid. *E. coli* is the most frequent offending organism in these cases. All cirrhotic patients with ascites must be closely watched for an early diagnosis of SBP so that it can be timely managed.

REFERENCES

1. Conn HO, Fessel M. **Spontaneous bacterial peritonitis in cirrhosis: variation on theme**. *Medicine* Baltimore 1971; 50: 161 – 97.
2. Prelicpean CC. **Spontaneous bacterial peritonitis- undervalued complication in liver cirrhosis**. *Rev Med Chir Soc Med Nat Iasi* 2001 Oct-Dec 105 (4): 682-4.
3. Ascites In: Sherlock S, Dooley J. **Diseases of the liver and biliary system**. 11 ed. Oxford, England: Blackwell Science, 2002: 127 – 46.
4. Fernandez J, Navasa M, Gomez J et al. **Bacterial Infections in cirrhosis: epidemiological changes with invasive procedures and norfloxacin prophylaxis**. *Hepatology* 2002; 35: 140–148.
5. Iqbal M, Jamal S, Rathore OI, Qureshi MA. **SBP in hospitalized chronic liver disease patients**. *JMMC* 1997; 1:2–5.
6. Jaffary W, Shah, Hamid S, **Spontaneous bacterial peritonitis**. *Specialists* 1992; 8: 33–8.
7. Ljubicic N, Spajic D, Vrkljan MM, Altabas V, Doko M,

- Zovak M, Gacina P, Mihatov S. **The value of ascitic fluid polymorphonuclear cell count determination during therapy of spontaneous bacterial peritonitis in patients with liver cirrhosis.** Hepatogastroenterology. 2000 Sep-Oct; 47(35): 1360-3.
8. Runyon BA. **Monomicrobial nonneutrocytic bacterascites: A variant of spontaneous bacterial peritonitis.** Hepatology 1990; 12:710.
 9. Runyon BA, Canawati HN, Hoefs JC. **Polymicrobial bacterascites. A unique entity in the spectrum of infected ascitic fluid.** Arch Intern Med 1986;146:2173.
 10. Rajput MR, Zuberi B F, Shaikh W M, Solangi GA, Shaikh SM, Shaikh GM. **Frequency, microbial spectrum, clinical and biochemical features of spontaneous bacterial peritonitis and its variants.** JCPSP 1999; 9(8): 347-50.
 11. O' Beirne JP, Foxton MR, Heneghan MA, Bhaskar ME, Gines P, Carderas A, Arroyo V. **Management of cirrhosis and Ascites.** N Engl J Med 2004; 351: 300 – 301.
 12. Strauss E, Caly WR. **Spontaneous bacterial peritonitis.** Rev Soc Med Trop. 2003 Nov – Dec, 36(6): 711-17.
 13. Rimola A et al. **Diagnosis, treatment, and prophylaxis of spontaneous bacterial peritonitis.** J. Heptol 2000; 20:142.
 14. Gines P, Cardenas A, Arroyo V, Rodes J. **Management of cirrhosis and Ascites.** N Engl J Med 2004; 350: 1646 – 1654.
 15. Runyon BA, Hoefs JC, **Culture Negative Neutrocytic ascites: a variant of SBP** Hepotal 1984; 6:1209-11.

**The stupid neither forgive nor forget;
The naive forgive and forget;
The wise forgive but do not forget;**

Thomas Szasz