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Clinic bacteriological Profile of Spontaneous Bacterial Peritonitis in Cirrhosis- A Cross Sectional Study Conducted in a Tertiary Care Centre in Thrissur.

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ABSTRACT

INTRODUCTION: Cirrhosis is a chronic disease of the liver which shows destruction and degeneration of the hepatic parenchymal cells .There is diffuse increase in connective tissue which leads to disorganization of the lobular architecture of liver. Ascites is the pathological accumulation of excessive fluid in the peritoneal cavity which is a main feature of liver failure and is a landmark in the progression to a decompensated phase. Spontaneous bacterial peritonitis is a common complication in patients diagnosed with liver cirrhosis with ascites. Early understanding of the clinico-bacteriological profile is important to start empirical antibiotics and other supportive measures to prevent acute renal failure and mortality. This study aims at understanding the clinico-bacteriological profile of SBP in patients with cirrhosis.

OBJECTIVES

1.To find out the prevalence of spontaneous bacterial peritonitis in cirrhotic patients.
2.To identify the association of SBP with clinical parameters (clinical presentation ,investigations)
3.To identify the organisms causing spontaneous bacterial peritonitis along with their drug sensitivity.

METHODOLOGY: This is a descriptional cross sectional study. The age, gender, clinical features, child-pugh score ,serum bilirubin, serum albumin, ascitic fluid cytology ,ascitic fluid culture and sensitivity ,SAAG ,ascitic fluid protein ,cause of cirrhosis are included. History of the patient is noted and the patient is clinically examined. On diagnosing liver cirrhosis with features of spontaneous bacterial peritonitis ,paracentesis is performed and the fluid is sent to cytology and microbiology for analysis. The report is collected and persued to define a clinico-bacteriological profile of the patient.

RESULTS:95 patients with cirrhosis and ascites were studied. 70.5% of the study population were aged between 40-60 years. 89.5% of patients were males and 10.5% were females. Major cause for cirrhosis in the study population was ethanol(76.8%).Abdominal distension (57.9%)was the most common clinical feature followed by fever(21.1%). 24.2% of patient were diabetic. In the study group 84.2% belonged to Child-Pugh class C.77.9% had bilirubin level >4mg/dl and 88.4% had albumin level below 3.5. The prevalence of SBP was 53.7% in the study population out of which only 7.4 % become culture positive. The most common organism isolated was E Coli sensitive to 3rd generation cephalosporins and Piperazillin Tazobactam (4 out of 7),1 MDR E coli,followed by Klebsiella(2 out of 7) The prevalence of SBP was significantly higher in patients with bilirubin >4mg/dl,ascitic fluid protein<1.5g and SAAG score >2.

CONCLUSION: Prevalence of SBP in the study population was 53.7%,out of which only 13.7 had culture positivity. E .Coli sensitive to 3rd generation cephalosporins were isolated in common(9.7%) followed by Klebsiella species.
Bilirubin>4, ascitic fluid albumin level <1.5g and SAAG >2 are significantly related to SBP.

Key words: Cirrhosis, Ascites, Ascitic fluid, SBP

I. INTRODUCTION

Cirrhosis is a chronic disease of the liver which shows destruction and regeneration of the hepatic parenchymal cells occurring hand in hand. There is diffuse increase in connective tissue which leads to disorganization of the lobular architecture of the liver.(1) 1-2 percent of all the cases attending Indian hospitals are due to chronic liver disease alone. The most common cause for chronic liver disease remains to be Hepatitis B infection whereas alcoholism is the fore runner in case of liver cirrhosis(2).

The natural history of the disease progresses from a compensated to a decompensated phase. Ascites is derived from the word “askos” which means wine bag or sac(3). Ascites, the pathologic accumulation excessive fluid in the peritoneal cavity is a main feature of liver failure and is a landmark in the progression to a

International Journal Dental and Medical Sciences Research
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decompensated phase.(4) The ascites develops in the setting of portal hypertension comprising 85% of all cases due to significant volume and hormonal disregulation(3). The continued process of inflammation, necrosis and collagen deposition/regeneration transforms the liver from a low resistance system to a high resistance system. This leads to an increased pressure in the portal vein leading to portal hypertension- portal pressure more than 6 mmHg. This causes increased resistance to the flow and thereby causing accumulating of the vasodilators in the splanchnic system. This leads to under perfusion of the renal system and hence activates the renin angiotensin aldosterone pathway leading to fluid and water retention. This along with hypoalbuminemia alters the starlings forces and hence leads to fluid leakage from the intravascular compartment.(3)

Spontaneous bacterial peritonitis is an infection of the ascetic fluid without a definitive intaraabdominal source that can be surgically treated. 10 to 25 percent of the patients with ascites develops spontaneous bacterial peritonitis in 1 year(5). The earlier theory that the infection is due to transmigration of the gut microbes no more stands good(6). SBP is believed as a result of multiple factors such as prolonged bacteremia secondary to compromised host defenses, intrahepatic shunting of colonized blood and defective bactericidal activities in the ascitic fluid.(7)High serum bilirubin level and low ascetic fluid protein < 1gm/dl concentrations are seen to independent factors for SBP(8). Ascitic protein concentration is believed to correlate closely with the antibacterial and opsonic activity in the ascetic fluid. The cirrhotic ascites is deficient in complement, fibronectin and immunoglobulins.(7)

SBP can manifest as a relatively insidious asymptomatic colonization or it can quickly develop into a sepsis syndrome with high fatality. They may present with fever, altered mentation, abdominal pain and tenderness, GI bleed, nausea or vomiting(9). Some reports even show as many as 30 percent of the patients with paracentesis proven SBP may be completely asymptomatic(7).

All suspected cases undergo paracentesis and ascetic fluid analysis for cytology, ascetic fluid protein and culture. Routine urine cultures are also done because organism infecting the urine has the potential to infect the ascetic fluid(7).

Table I Subsets of Ascitic Fluid Infections

	PMNs	Cultures
Spontaneous bacterial peritonitis	≥ 250 cells/mL	Positive
Culture-negative neutrocytic ascites	≥ 500 cells/mL	Negative
Monomicrobial non-neutrocytic bacterascites	< 250 cells/mL	Positive

Figure 1(5,10)

The most common organism isolated from the culture are Escherichia coli (46%), followed by streptococcus and group D streptococci (30%) and Klebsiella pneumoniae (9%). Anaerobes appear rarely presumably due to the high oxygen content in the ascetic fluid.(10)

Rimola et al demonstrated that cefotaxim at a dose of 2gm every 12 hours was effective in treating SBP(11). A repeat diagnostic paracentesis was done after 48 hours of therapy and a decrease of at least 25% in the PMN should be attained. If not, treatment is considered failure and second line of antibiotics should be given(5). Aztreonam, aminoglycosides, amoxicillin-clavulanic acid or fluroquinolones are considered second line. The antibiotics are to be tapered according to the culture results available.(10) If no response is noted in 48 hours a potential resistant pathogen such as MRSA or an ESBL producing organism need to be considered and vancomycin or alternative therapy should be initiated. The duration of therapy should at least be 5 days.(5)

Acute renal failure is the important predictor of death in patients with SBP. Maintaining adequate intravascular fluid volume is paramount in the management(12). Albumin may be required when serum bilirubin is more than 4 mg/dl , serum creatinine is more than 1 mg/dl and blood urea nitrogen is above 30 mg/dl(5).

Antibiotic prophylaxis is intended to decontaminate the GI tract in order to decrease the

International Journal Dental and Medical Sciences Research
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incidence of SBP. The three main group who benefit from antibiotic prophylaxis are

Patients who had an episode of SBP. This is because these patients have a recurrence rate of 40 to 70 percent in one year and a one year mortality rate of 50 to 70 percent(13)

Patients who present with upper GI bleed. The incidence of infection in these patients are approximately 45 % and the presence of infection leads to failure of control of bleeding and high rate of re bleeding(14).

For those patients with low ascetic fluid protein level(5).

Studies by Fernandez et al, Terg and colleagues suggested antibiotic prophylaxis with norfloxacin 400 mg daily(14,15).

II. MATERIALS AND METHODS

This Cross sectional study was conducted in the inpatient wards of Department of General Medicine, Government Medical College Thrissur.Study population consisted of all patients admitted to the department of medicine in a tertiary centre hospital who are diagnosed with chronic liver disease and symptoms suggestive of spontaneous bacterial peritonitis. The patients were sampled sequentially during the period from January 1, 2021 and October 1, 2022. The inclusion criteria for the study were

i. Patients above the age of 20
ii. Patients with symptoms suggestive of spontaneous bacterial peritonitis.
iii. Patients with chronic liver disease & ascites diagnosed based on clinical examination , endoscopy or ultrasound.

And the exclusion criteria was

i. Patients who leave the study due to any reasons.
ii. Patients who are having ascites due to non cirrhotic causes.

Consecutive sampling was done and sample size was calculated using the formula 4pq/d2 which was 95.Study variables were age, sex of the patient, Clinical profile including presence of fever, abdominal distention, jaundice, fever, hematemesis, malena, the cause of liver cirrhosis, the liver function tests, Child Pugh score, diabetic status, , microbiological profile of the ascitic fluid and ascitic fluid cytology and protein content are considered as variables. History of the patient noted and the patient is clinically examined. Necessary investigations done. On diagnosing liver cirrhosis with features suggestive of spontaneous bacterial peritonitis, paracentesis is performed and the fluid is sent to cytology and microbiology for analysis. The reports are collected and perused to define a clinicobacteriological profile of the patients.After assimilation of the data, it will be entered into an Excel Spreadsheet and then analyzed using the SPSS software. Odds ratio will be calculated for each parameter assessed. Chi square test will be applied to find out the significance of the variable and outcome. A P value less than 0.05 will be considered significant.There was no added financial Burden to the patient.Study was started after the approval Of Human Ethics Committe.

III. RESULTS

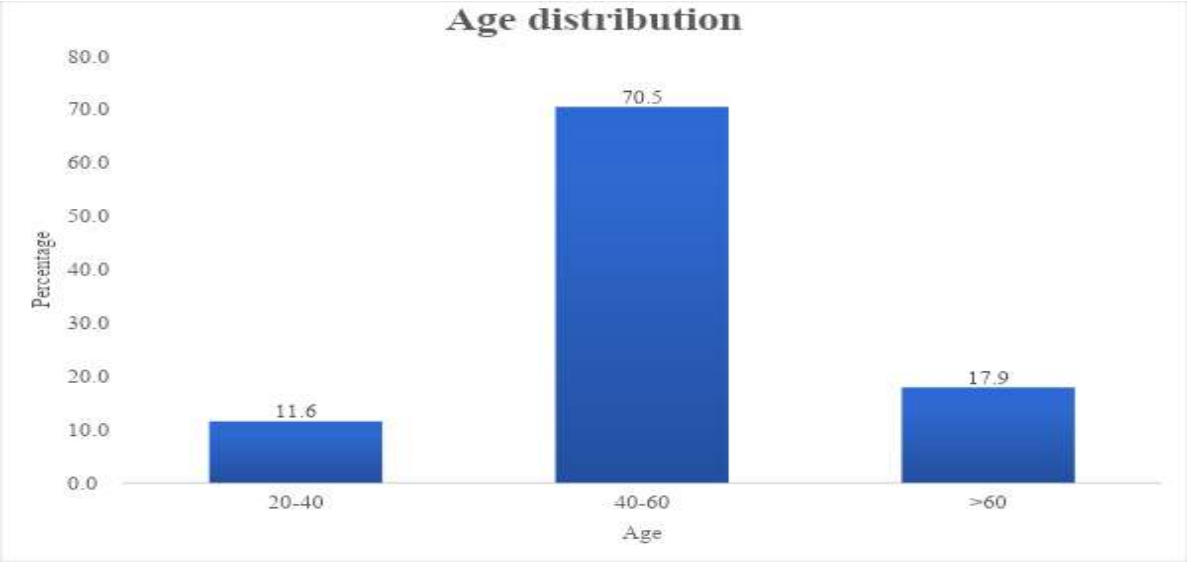

Figure-1: Simple bar diagram of age

International Journal Dental and Medical Sciences Research
Volume 5, Issue 6, Nov-Dec 2023 pp 105-116 www.ijdmsrjournal.com ISSN: 2582-6018

In our study, 11 (11.6%) participants were in the age group of 20-40 years, 70% were between 40-60 years and 17 (17.9%) were aged above 60 years.

Out of 95 participants, 85 (89.5%) participants were male and 10 (10.5%) were female.

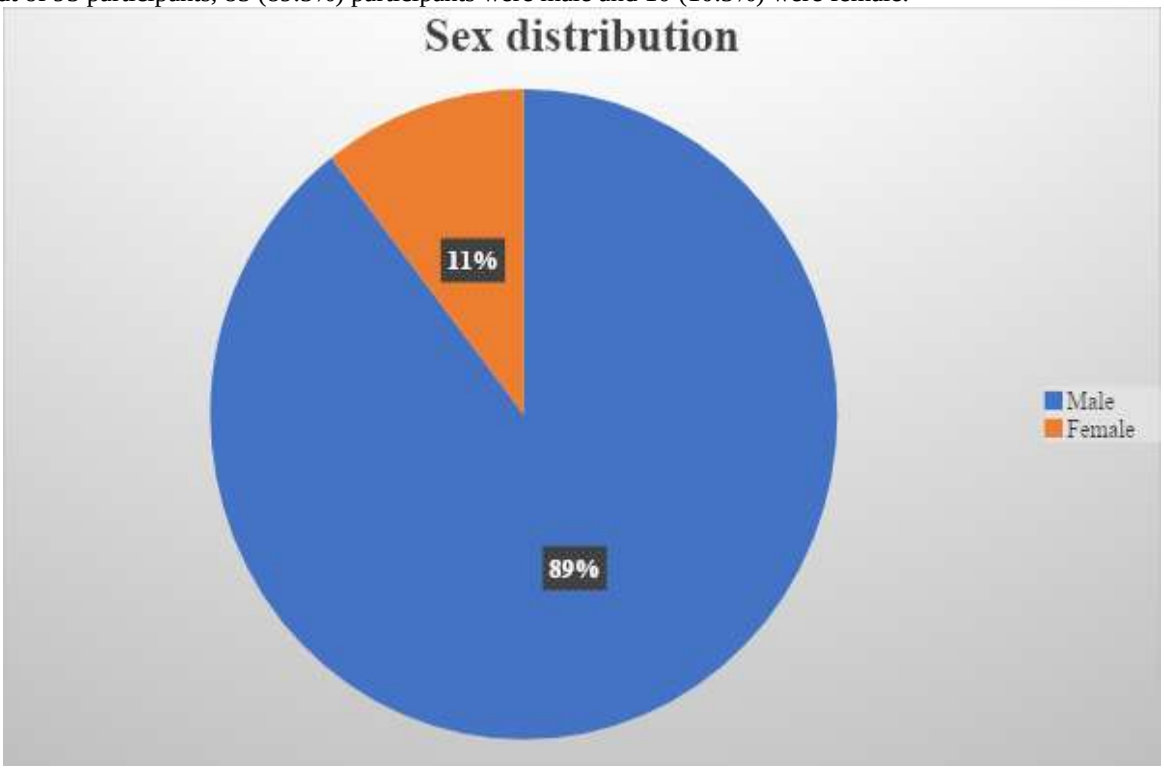

Figure-2: Pie diagram of Sex

In our study, abdominal distension was the most common clinical feature 55 (57.9%), followed by fever 20 (21.1%), jaundice 12 (12.6%), hematemesis 6 (6.3%) and Malena 2 (2.1%).

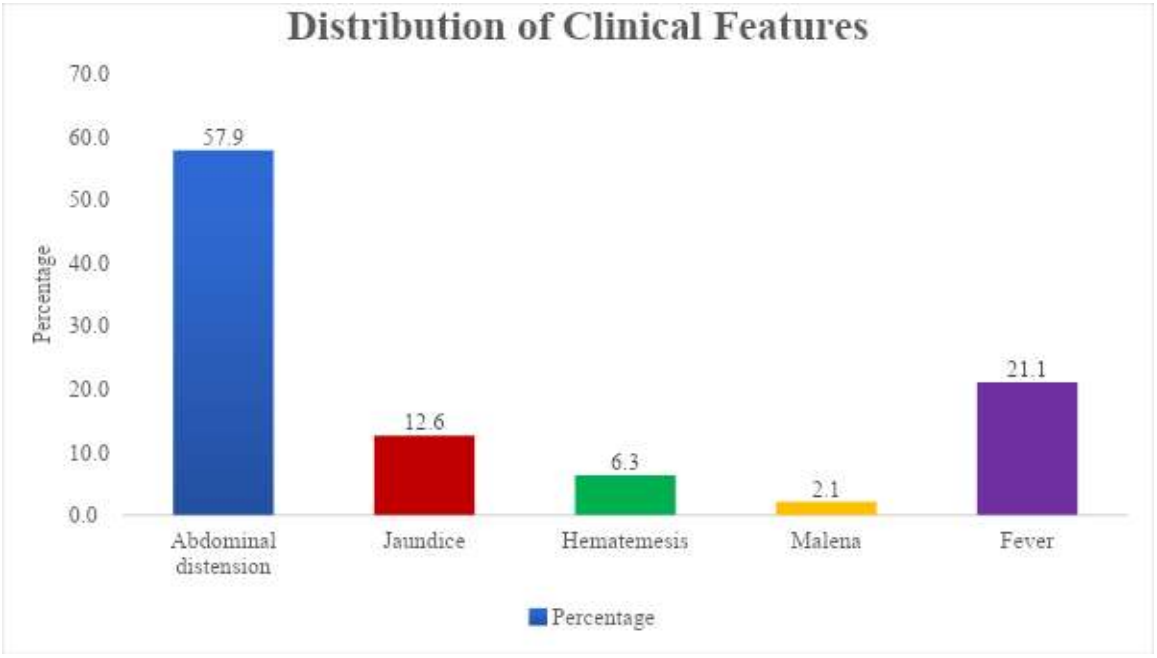

Figure-3: Simple bar diagram of clinical features

In our study, 23 (24.2%) participants had diabetic.

International Journal Dental and Medical Sciences Research
Volume 5, Issue 6, Nov-Dec 2023 pp 105-116 www.ijdmsrjournal.com ISSN: 2582-6018

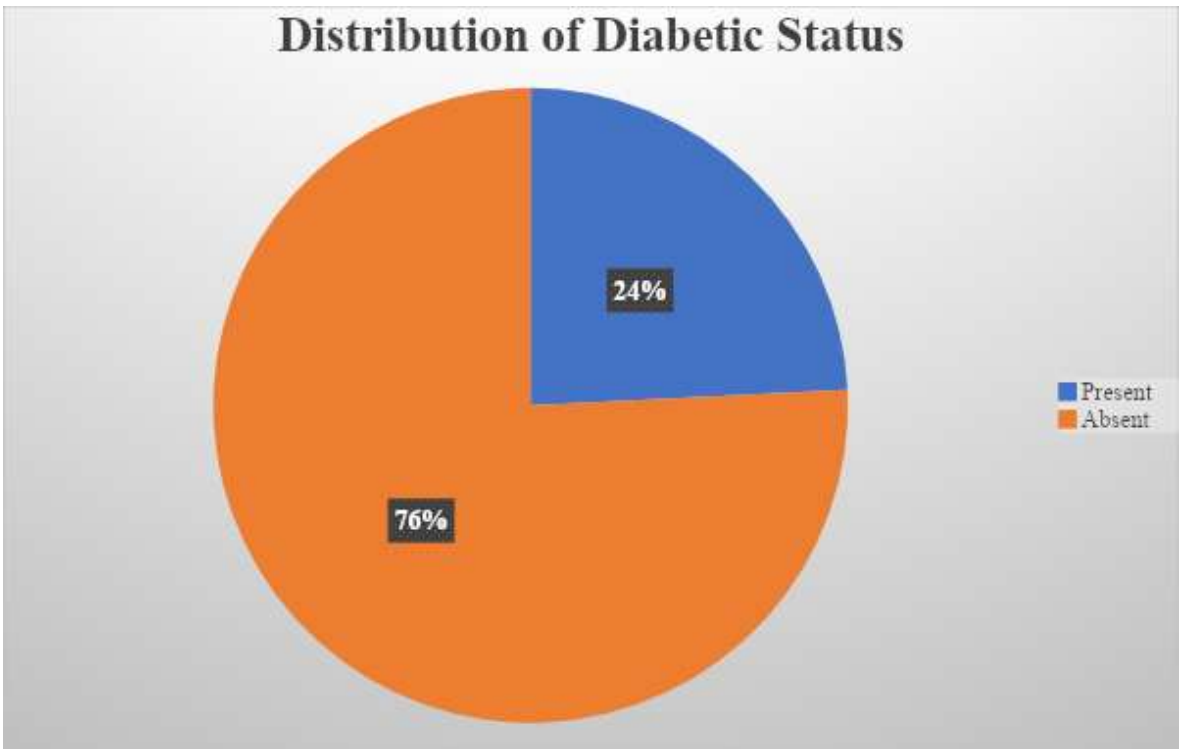

Figure-4: Pie diagram of Diabetic Status

In our study, 80 (84.2%) participants were belonged to Child-Pugh grade C and 15 (15.8%) were belonged to Child-Pugh grade B.

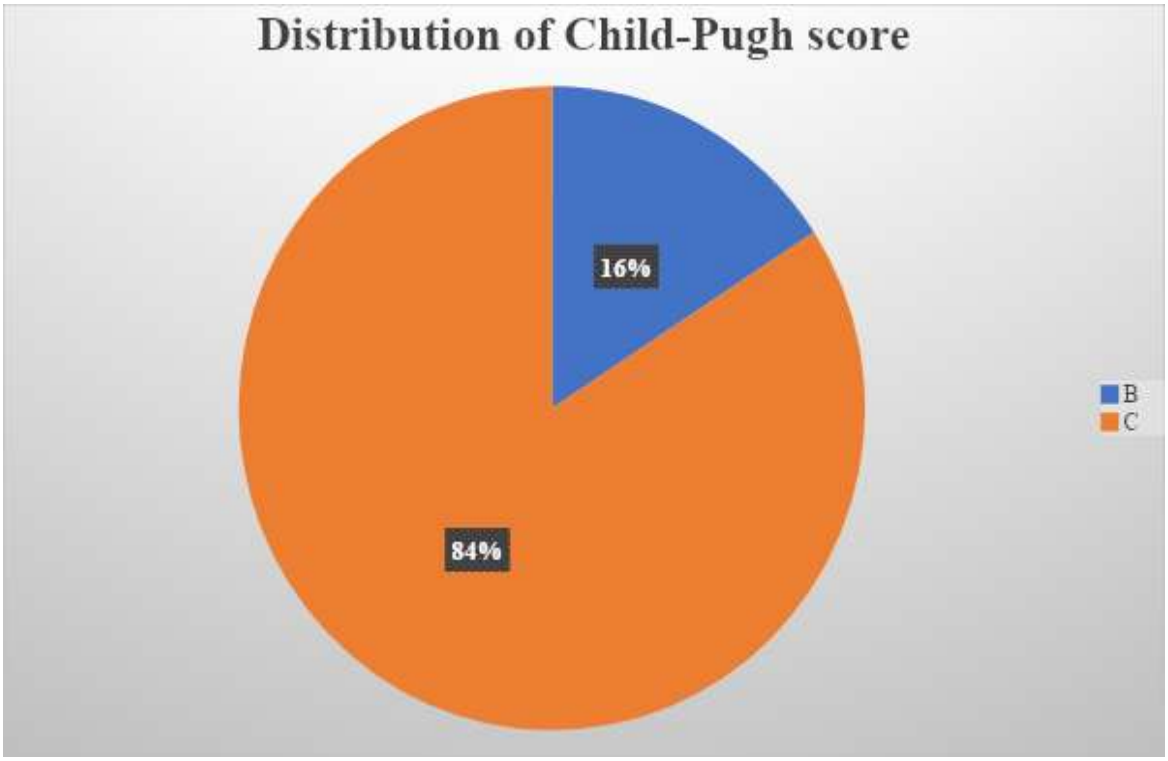

Figure-5: Pie diagram of Chid-Pugh score

In our study, 21 (22.1%) participants were belonged to bilirubin <4 and 74 (77.9%) were belonged to >4.

International Journal Dental and Medical Sciences Research
Volume 5, Issue 6, Nov-Dec 2023 pp 105-116 www.ijdmsrjournal.com ISSN: 2582-6018

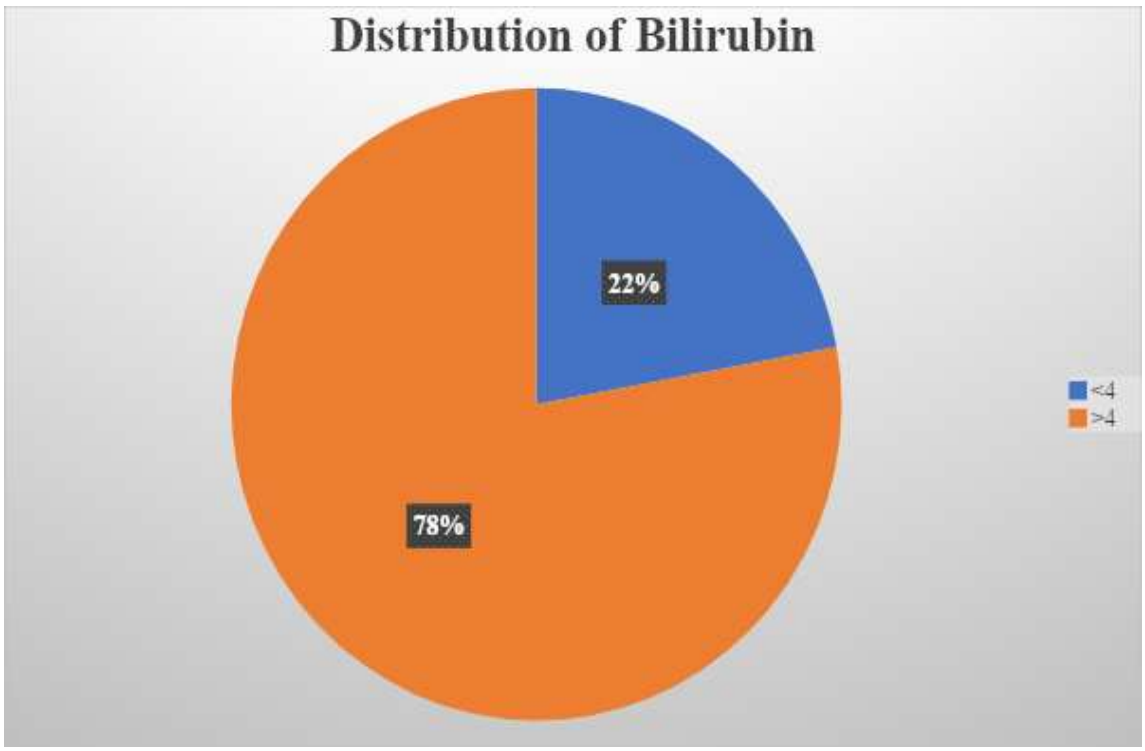

Figure-6: Pie diagram of Bilirubin

In our study, 11 (11.6%) participants were belonged to albumin >3.5 and 84 (88.4%) were belonged to albumin <3.5.

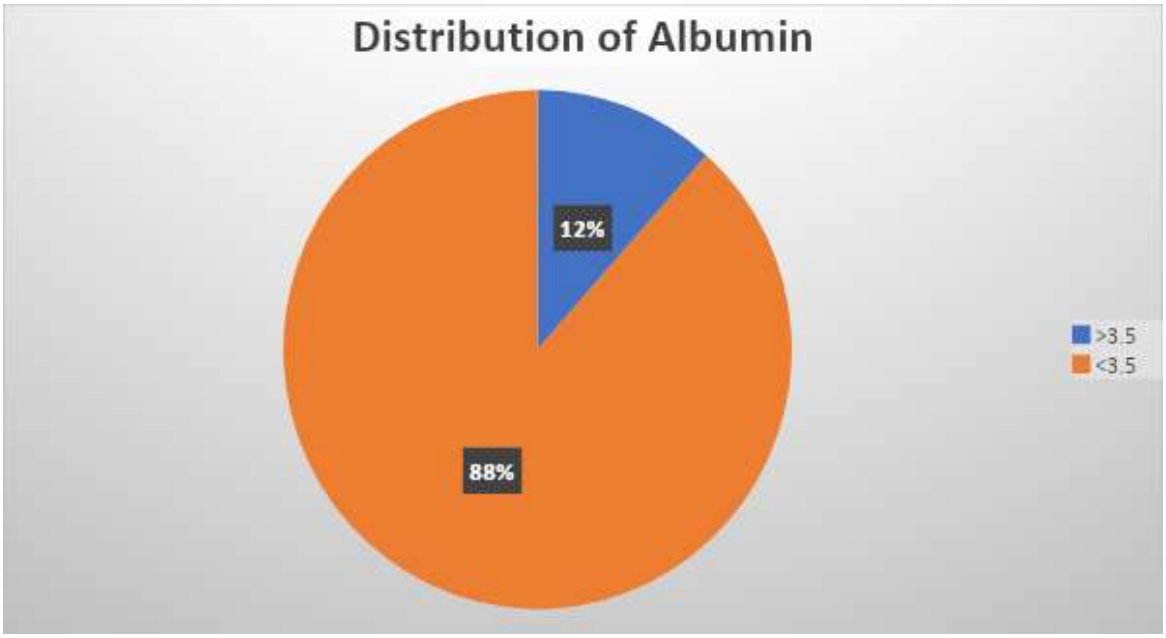

Figure-7: Pie diagram of Albumin

In our study, the prevalence of spontaneous bacterial peritonitis was 51 (53.7%).

International Journal Dental and Medical Sciences Research
Volume 5, Issue 6, Nov-Dec 2023 pp 105-116 www.ijdmsrjournal.com ISSN: 2582-6018

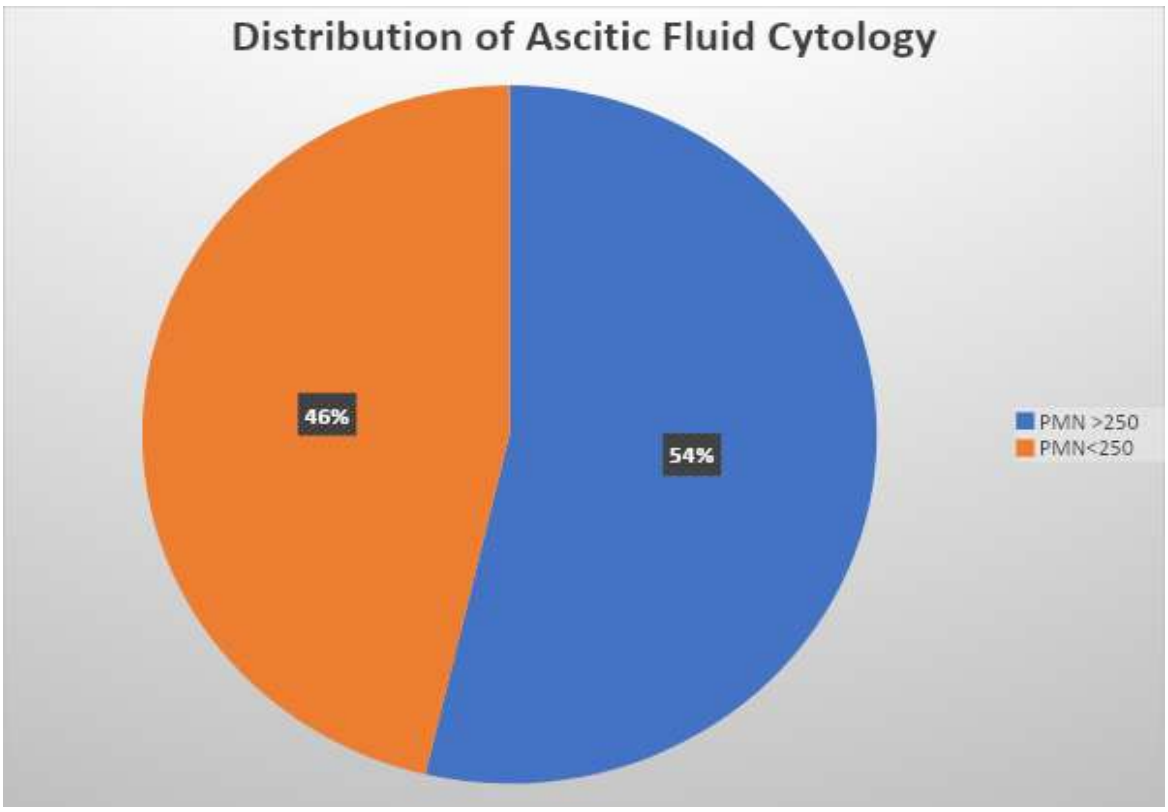

Figure-8:Pie diagram of Ascitic Fluid Cytology

In our study, 32 (33.7%) participants ascitic fluid protein value was >1.5gm and 63 (66.3%) participants with ascitic fluid protein <1.5 gm.

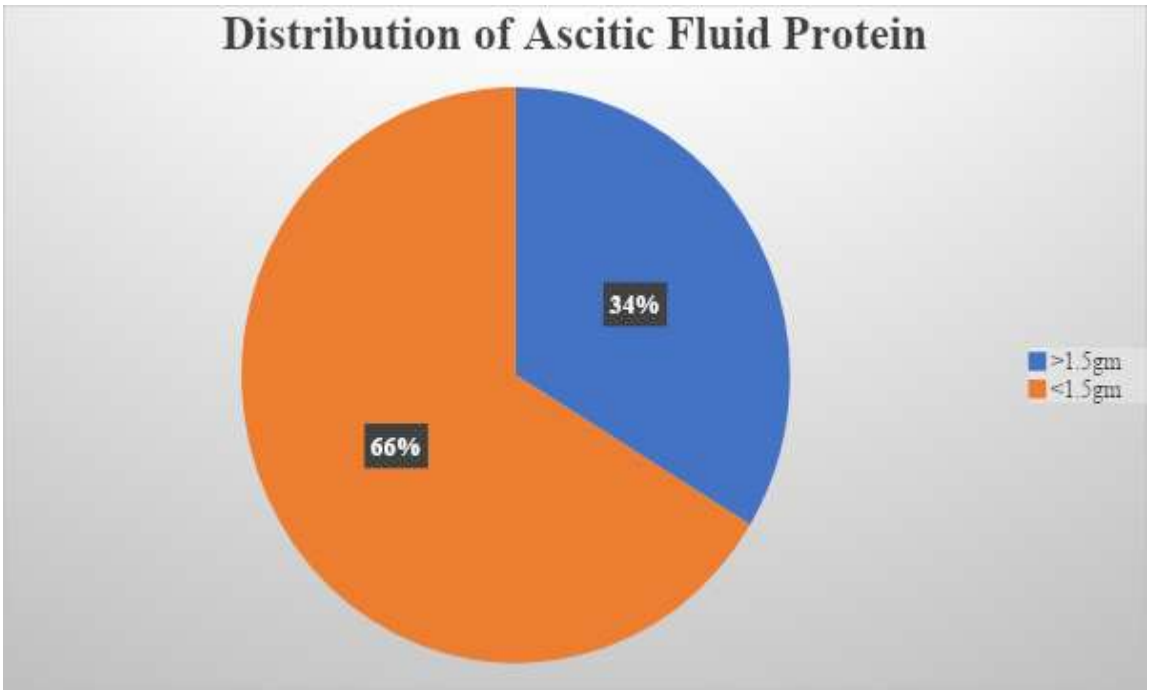

Figure-9Pie diagram of ascitic fluid protein

In our study, 55 (57.9%) participants with SAAG >2 and 40 (42.1%) participants with SAAG score <2.

International Journal Dental and Medical Sciences Research
Volume 5, Issue 6, Nov-Dec 2023 pp 105-116 www.ijdmsrjournal.com ISSN: 2582-6018

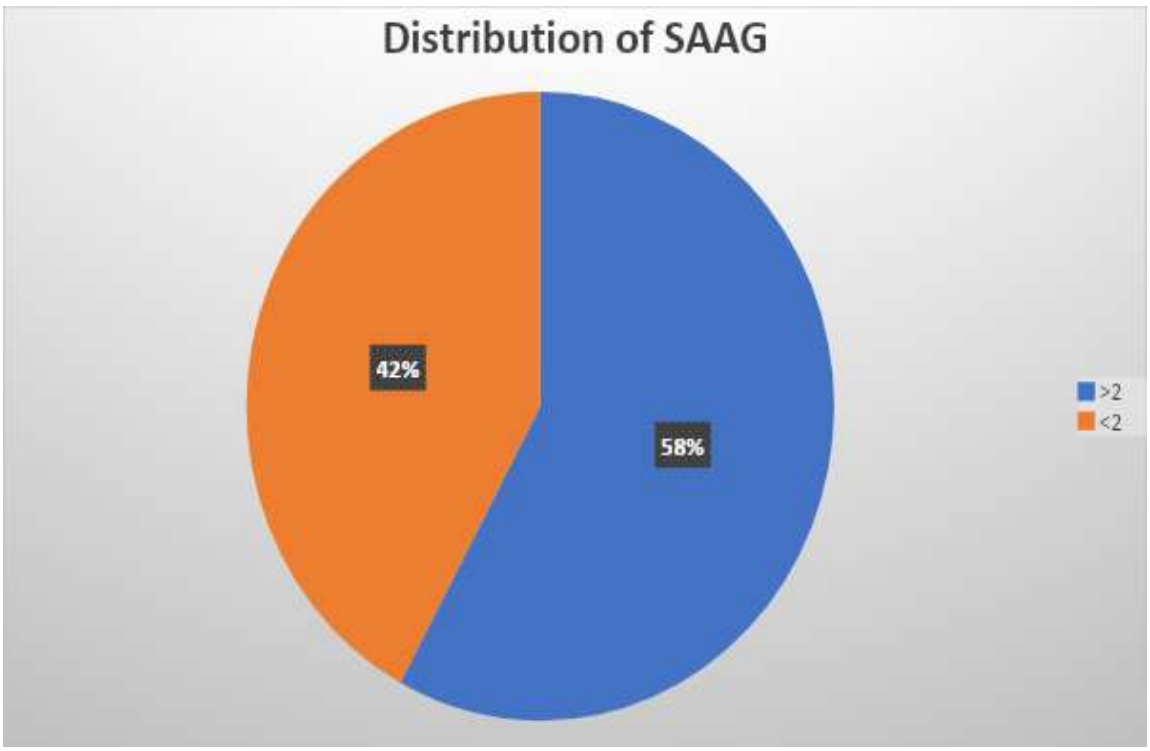

Figure-10: Pie diagram of SAAG

In our study, 7 (7.4%) participants ascitic fluid culture sensitivity was positive and 88 (92.6%) were negative.

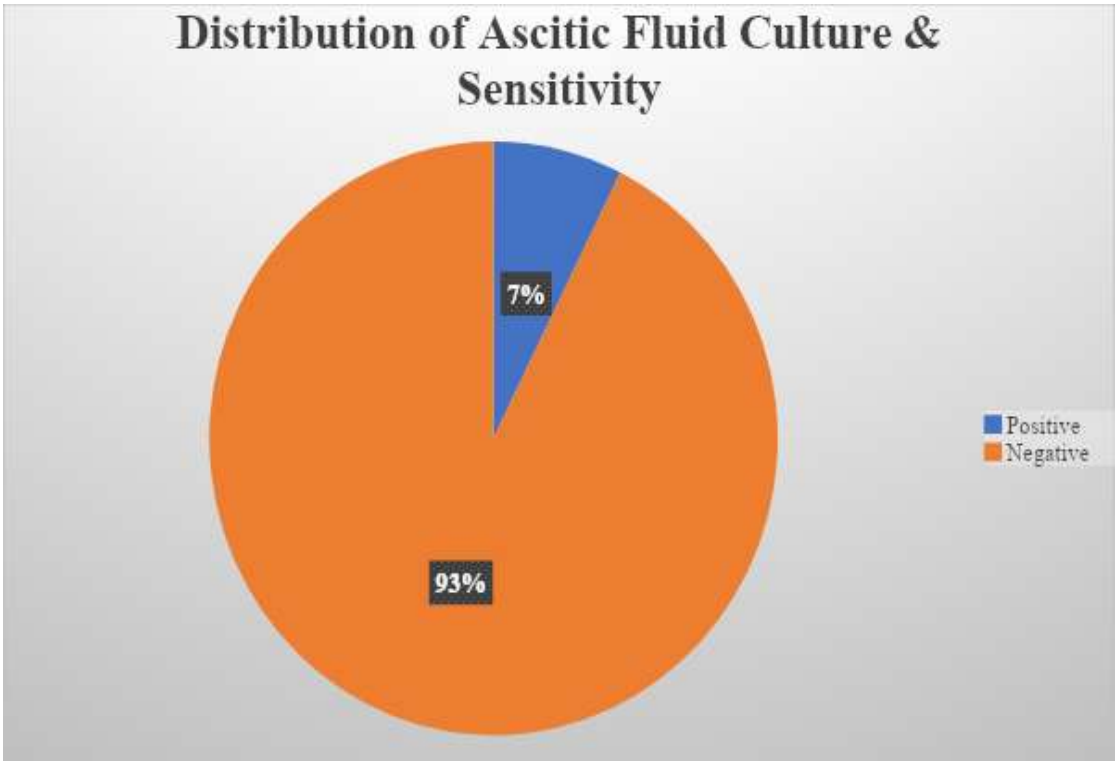

Figure-11: Pie diagram of Ascitic Fluid culture and sensitivity

International Journal Dental and Medical Sciences Research
Volume 5, Issue 6, Nov-Dec 2023 pp 105-116 www.ijdmsrjournal.com ISSN: 2582-6018

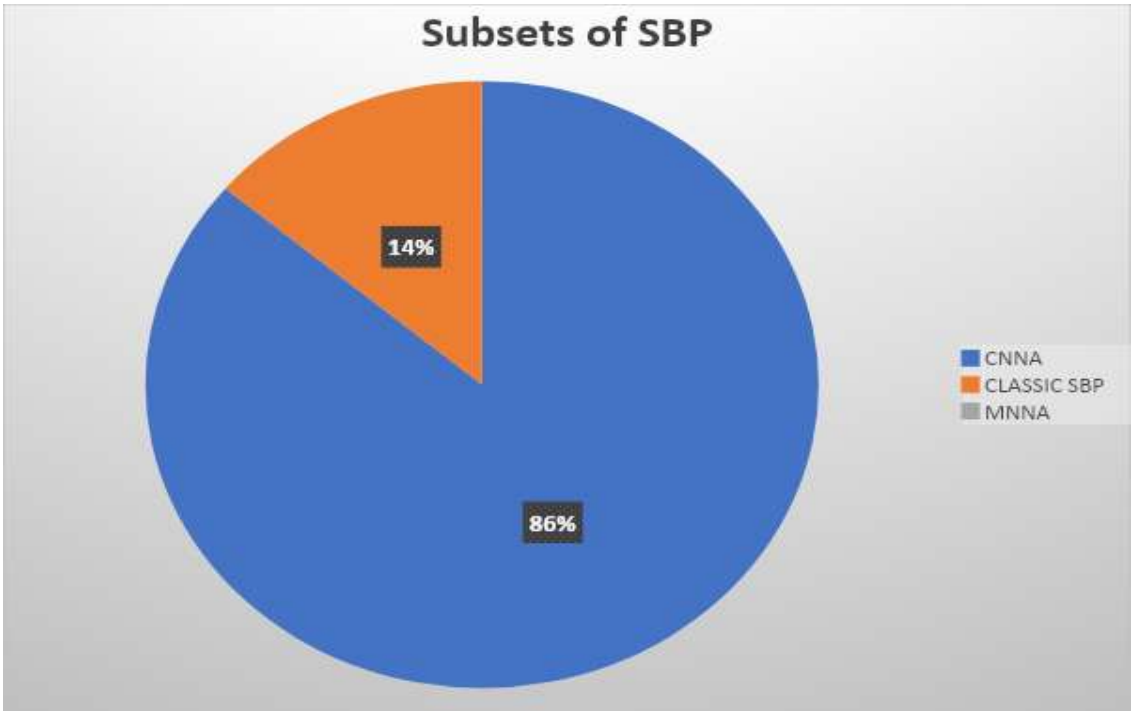

Fig 12:Out of the ascitic fluid cytology positive cases,86.2% were culture negative neutrocytic ascites and 13.8% cases were classic SBP(culture positive).

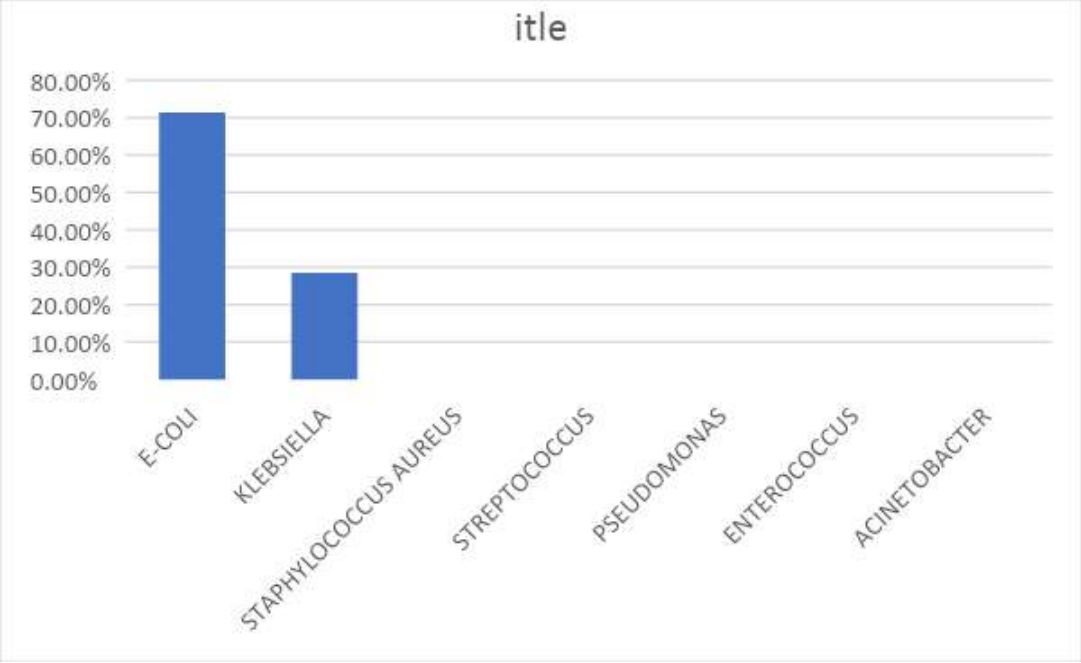

Fig 13 Isolated organisms in SBP patients.

In our study, the most common cause of cirrhosis was ethanol 73 (76.8%), followed by NAFLD 15 (15.8%) and others 7 (7.4%).

International Journal Dental and Medical Sciences Research
Volume 5, Issue 6, Nov-Dec 2023 pp 105-116 www.ijdmsrjournal.com ISSN: 2582-6018

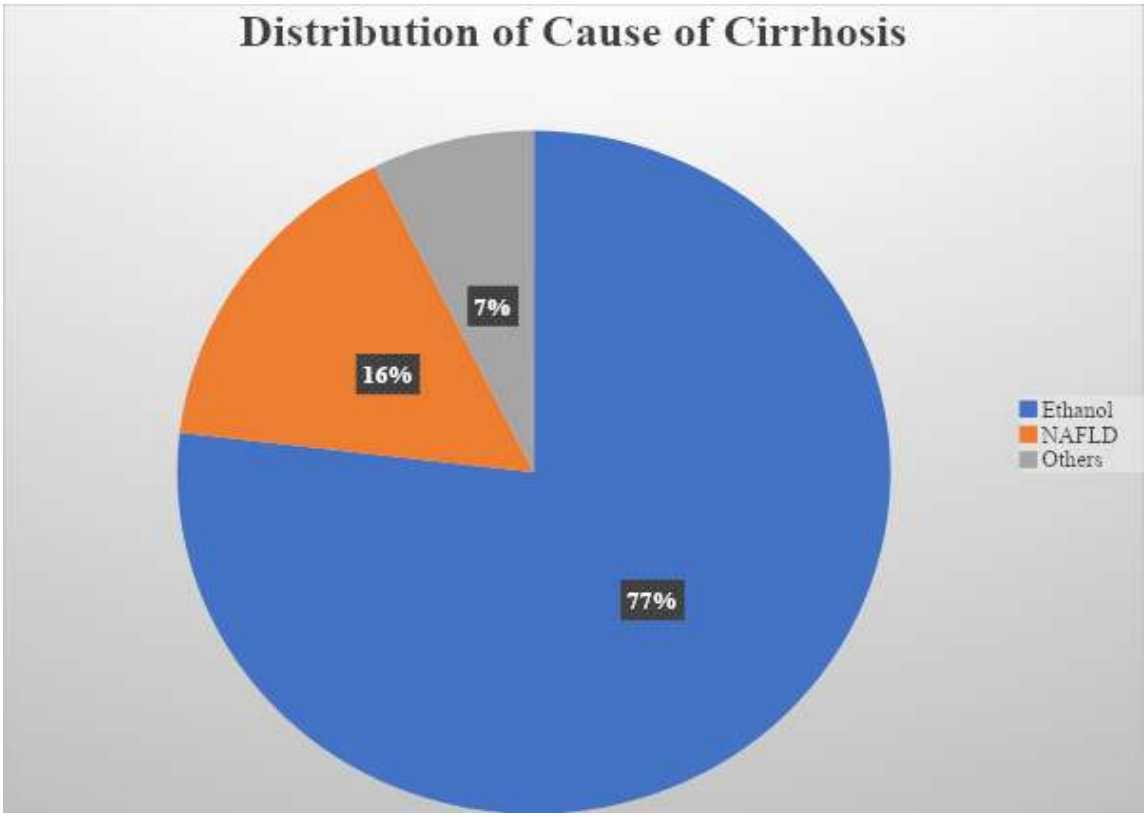

Figure-14: Pie diagram of cause of cirrhosis

Table-1: Association of study variables with Ascitic Fluid Cytology

Variables	Ascitic Fluid Cytology				χ^2 Value	p Value
	PMN >250		PMN <250			
	n	%	n	%		
Age						
20-40 (n=11)	7	63.6	4	36.4	0.851	0.653
40-60 (n=67)	34	50.7	33	49.3		
>60 (n=17)	10	58.8	7	41.2		
Sex						
Male (n=85)	45	52.9	40	47.1	0.008	0.930
Female (n=10)	6	60.0	4	40.0		
Diabetic Status						
Absent (n=72)	36	50.0	36	50.0	1.623	0.203
Present (n=23)	15	65.2	8	34.8		
Child-Pugh Score						
B (n=15)	5	33.3	10	66.7	2.967	0.085
C (n=80)	46	57.5	34	42.5		
Bilirubin						
<4 (n=21)	5	23.8	16	76.2	9.667	0.002
>4 (n=74)	46	62.2	28	37.8		
Albumin						
>3.5 (n=11)	3	27.3	8	72.7	3.490	0.062
<3.5 (n=84)	48	57.1	36	42.9		

International Journal Dental and Medical Sciences Research
Volume 5, Issue 6, Nov-Dec 2023 pp 105-116 www.ijdmsrjournal.com ISSN: 2582-6018

The study variables age, sex, diabetic status, child-pugh grade, bilirubin and albumin were associated with spontaneous bacterial peritonitis. Only bilirubin was statistically associated with spontaneous bacterial peritonitis (p=0.002). The prevalence of spontaneous bacterial peritonitis was significantly higher in participant with bilirubin >4 (62.2%) compared to bilirubin <4 (23.8%).

Table-2:Association of Ascitic Fluid Protein, SAAG and Cause of Cirrhosis with Ascitic Fluid Cytology

Variables	Ascitic Fluid Cytology				χ^2 Value	p Value
	PMN >250		PMN <250			
	n	%	n	%		
Ascitic Fluid Protein						
>1.5gm (n=32)	3	9.4	29	90.6	38.102	<0.001
<1.5gm (n=63)	48	76.2	15	23.8		
SAAG						
>2 (n=55)	41	74.5	14	25.5	22.863	<0.001
<2 (n=40)	10	25.0	30	75.0		
Cause of Cirrhosis						
Ethanol (n=73)	40	54.8	33	45.2	0.367	0.832
NAFLD (n=15)	7	46.7	8	53.3		
Others (n=7)	4	57.1	3	42.9		

The spontaneous bacterial peritonitis was significantly higher in ascitic fluid protein < 1.5 gm (76.2%) compared to >1.5gm (9.4%). The spontaneous bacterial peritonitis was significantly higher in SAAG score >2 (74.5%) compared to <2 (25.0%). There is no association between cause of cirrhosis and ascitic fluid cytology.

IV. DISCUSSION

The present study was conducted in a small group of population(n=95).The clinical and bacteriological profile of SBP among cirrhotic patients were studied during the specified study period.

The prevalence of SBP among the study participants was 53.7%,out of which only 10% was culture positive. Out of the 51 cases of SBP ,86.2% was CNNA and 13.8% was classic SBP. The common organism isolated from the 13.8% culture positive classic spontaneous bacterial peritonitis was E-coli(5 out of 7) sensitive to 3rd generation cephalosporins and Piperacillin Tazobactam followed by Klebsiella species(2 out o 7).The study conducted by Purohit et al, was also showing E - Coli as the common cause for SBP in culture positive cases followed by Klebsiella.

Majority of the study population belonged to the age group between 40-60years(70.5%).85 participants were male and 10 were female. Male to female ratio was 8.5.In our study, abdominal distension was the most common clinical presentation followed by fever, jaundice, hematemesis and malena. Among the study participants only 24% were diabetic. Most common etiology for cirrhosis in the study group was alcoholism .A study conducted by Harchand et al, was also showing alcoholism as major etiology and abdominal distension as the major clinical manifestation(1). In

Major proportion of the study population belonged to Child-Pugh class C .77.9% of the participants had serum bilirubin level >4mg/dl and 88.4% of them had serum albumin level <3.5 g/dl. Serum bilirubin level >4 mg/dl was statistically associated with SBP. As per the study of Alaniz et al, important predictors for the development as well as recurrence of SBP in cirrhotic patients includes high serum bilirubin(above2.5mg/dL) and a low ascitic fluid protein concentration(less than 1 gm/d)(5)According to Bandy SM et al. 70% of SBP occurs in Child-Pugh class C.

In our study 33.7% of the participants had ascitic fluid protein value >1.5g and 63% had <1.5g.SAAG was calculated using serum albumin and ascitic fluid albumin levels.57.9% had SAAG value above 2 and 42.1 % had SAAG value <2.

The study variables age, sex ,diabetic status, Child-Pugh score, bilirubin and albumin are

associated with SBP. Only bilirubin was statistically significant (p=0.002).The prevalence of SBP was significantly higher in participants with bilirubin >4mg/dl as compared to <4mg/dl. SBP was significantly higher in ascitic fluid protein <1.5g(76.2%) compared to >1.5g(9.4%).SAAG and SBP are also significantly associated. SBP was significantly higher in participant with SAAG score >2(74.5% as compared to SAAG score <2.

V. CONCLUSION

Prevalence of SBP in the study population was 53.7%,out of which only 13.7 had culture positivity. E .Coli sensitive to 3rd generation cephalosporins and Piperacillin Tazobactam were isolated in common(9.7%) followed by Klebsiella species.

Bilirubin>4, ascitic fluid albumin level <1.5g and SAAG >2 are significantly related to SBP.

VI. ACKNOWLEDGEMENT

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BIBLIOGRAPHY

[1]. Harchand P, Gupta V, Ahluwalia G, Chhina RS. Clinical and Bacteriological Profile of Spontaneous Bacterial Peritonitis in Cirrhotic Patients. :6.

[2]. Mukherjee PS, Vishnubhatla S, Amarapurkar DN, Das K, Sood A, Chawla YK, et al. Etiology and mode of presentation of chronic liver diseases in India: A multi centric study. PLoS ONE [Internet]. 2017 Oct 26 [cited 2021 Jan 21];12(10). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5658106/

[3]. Moore CM, Van Thiel DH. Cirrhotic ascites review: Pathophysiology, diagnosis and management. World J Hepatol. 2013 May 27;5(5):251–63.

[4]. Coe G-APC. Ascites in patients with cirrhosis. :3.

[5]. Alaniz C, Regal RE. Spontaneous Bacterial Peritonitis. :7.

[6]. Runyon BA, Hoefs JC. Culture-negative neutrocytic ascites: a variant of spontaneous bacterial peritonitis. Hepatol Baltim Md. 1984 Dec;4(6):1209–11.

[7]. Runyon BA. Patients with deficient ascitic fluid opsonic activity are predisposed to spontaneous bacterial peritonitis. Hepatol Baltim Md. 1988 Jun;8(3):632–5.

[8]. Andreu M. Risk factors for spontaneous bacterial peritonitis in cirrhotic patients with ascites. 1993;6.

[9]. Hoefs J, Canawatfi H, Montgomerie J. Spontaneous Bacterial Peritonitis. :9.

[10]. Bhuva M, Ganger D, Jensen D. Spontaneous Bacterial Peritonitis: An Update on Evaluation, Management, and Prevention. :7.

[11]. Rimola A, Salmerón JM, Clemente G, Rodrigo L, Obrador A, Miranda ML, et al. Two different dosages of cefotaxime in the treatment of spontaneous bacterial peritonitis in cirrhosis: results of a prospective, randomized, multicenter study. Hepatol Baltim Md. 1995 Mar;21(3):674–9.

[12]. Pau S, Miquel N, Vicente A, Xavier A, Ramon P, Luis R-A, et al. Effect of Intravenous Albumin on Renal Impairment and Mortality in Patients with Cirrhosis and Spontaneous Bacterial Peritonitis. N Engl J Med. 1999;7.

[13]. Ghassemi S, Garcia-Tsao G. Prevention and treatment of infections in patients with cirrhosis. :17.

[14]. Fernández J, Navasa M, Planas R, Montoliu S, Monfort D, Soriano G, et al. Primary Prophylaxis of Spontaneous Bacterial Peritonitis Delays Hepatorenal Syndrome and Improves Survival in Cirrhosis. Gastroenterology. 2007 Sep;133(3):818–24.

[15]. Generali JA, Cada DJ. Ciprofloxacin: Spontaneous Bacterial Peritonitis (Prevention). 2015;50:3.