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Original Article

Frequency of Asymptomatic Spontaneous Bacterial Peritonitis in Patients of Chronic Liver Disease with Ascites

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Abstract

Objective: This research aimed to quantify the prevalence of asymptomatic spontaneous bacterial peritonitis in individuals with chronic liver disease and ascites.

Methods: The study was conducted in the department of Medicine, Arif memorial teaching hospital, Lahore. The study was carried out over 6 months' period from 01-06-2022 to 30-11-2022. Total 174 patients of either gender with chronic liver disease with ascites were included in the study. Spontaneous bacterial peritonitis was defined as ascitic fluid examination consistent with Total white cell count > 500/mm3 or neutrophils > 250/mm3 and a positive culture (>105 colonies) in the absence of fever (temp. >99 F), abdominal pain and tenderness.

Results: 174 patients were included in our study population. Eight (4.6%) patients were aged 31-40 years, 68 (43.7%) were aged 40-50 years and 98 (56.3%) had age > 50 years. 58 patients (33.3%) were male and remaining 116 patients (66.7%) were female. 46 patients (26.4%) had spontaneous bacterial peritonitis

Conclusion: Patients with chronic liver illness and ascites have a significant prevalence of asymptomatic spontaneous bacterial peritonitis, with our analysis putting the number at 26.4%.

Key Words: Spontaneous bacterial peritonitis, Chronic liver disease, Ascites

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Introduction

In 2017, the incidence of chronic liver disease (CLD) was calculated as 1.5 billion persons suffering from CLD, worldwide. The causes identified were 60% secondary to NAFLD, HBV (29%), and 9% due to HCV. The incidence of liver cirrhosis in Asian countries was estimated as 16.5 per 100,000 in East Asia to as high as 23.6 per 100,000 in the region of Southeast Asia.[1]

Patients with chronic liver disease often get infected. One of the most prevalent illnesses is called spontaneous bacterial peritonitis (SBP).[2] Gastroesophageal variceal hemorrhage, serum bilirubin >3 mg/dl, serum sodium 130 or less, ascitic fluid protein less than 1.5 g/dl, serum creatinine greater than 1.2mg/dl, blood urea nitrogen 25 mg/dl, and perhaps the use of a proton pump inhibitor are all risk factors for the development of SBP.[3] Acute bacterial peritonitis occurs when bacteria invade the ascitic fluid and cause an infection. Bacterial translocation from the intestine or other hollow organ lumen is the pathophysiological mechanism behind the development of spontaneous bacterial peritonitis. The most common organisms implicated are enteric organisms.[4] When a patient has liver cirrhosis and ascites, it is always possible that they have developed spontaneous bacterial peritonitis.[5] Abdominal discomfort, fever, and/or altered mental state are suggestive symptoms, while some individuals are asymptomatic and the infection is diagnosed during paracentesis after hospitalization for a different reason, such as hematemesis and melena or hepatic encephalopathy.[4] At Abbasi shaheed hospital in Karachi, Pakistan, an estimated 13% of individuals with chronic liver impairment and ascites exhibited asymptomatic spontaneous bacterial peritonitis.[6]

There are several potential consequences for cirrhotic patients, and their life expectancy may be significantly shortened as a result. In 2010, cirrhosis was the eighth largest cause of death in America, responsible for over 49,500 people's passing.[7] In addition, cirrhosis is a risk factor for liver cancer, which claimed an additional 19,500 lives. A total of 66,007 fatalities were attributed to liver illness in 2008, with an additional 18,175 attributable to hepatobiliary cancer, according to a research that utilized information from the CDC's National Death Index and the Rochester Epidemiology Project.[8] In the past, cirrhosis was divided into micro-nodular, macro-nodular, and mixed based on their morphology Alcohol, hemochromatosis, cholestatic causes of cirrhosis, and hepatic venous outflow restriction were formerly thought to be the root causes of micro-nodular cirrhosis, which is defined by nodules less than 3 mm in diameter.[9] Nodules bigger than 3 millimeters in diameter are considered to be macro-nodular cirrhosis, which was formerly thought to be caused by persistent viral hepatitis.

Chronic viral hepatitis (hepatitis B and C), alcoholic liver disease, hemochromatosis, and nonalcoholic fatty liver disease are all prominent causes of cirrhosis in industrialized states. Less common causes of cirrhosis are occurrence of digestive and autoimmune disorder i.e. Celiac disease, Wilson disease, Auto-immune hepatitis, dearth of Alpha-1 antitrypsin, Primary sclerosing cholangitis (PSC), Primary biliary cirrhosis (PBC), secondary biliary cirrhosis.[10]

According to a meta-analysis, the indicators like discriminant score of Bonacini cirrhosis more than 7, average count of platelet less than 160,000/mm^3, presence of ascites (likelihood ratio [LR] 7.2), and spider angiomata (LR 4.3), best speculate cirrhosis in persons with confirmed or suspected liver disease.[11] Though abdominal imaging is routinely performed on patients with a cirrhosis suspicion, radiographic imaging alone is neither sensitive or specific enough to detect cirrhosis. The results need to be interpreted in the context of other indicators of cirrhosis, such as those found in a physical examination or laboratory tests. Abdominal imaging may detect hepatocellular carcinoma and other cirrhosis symptoms outside of the liver, such ascites, varices, splenomegaly, and hepatic or portal vein thrombosis.[12] Because of its convenience, cheap cost, lack of exposure to intravenous contrast or radiation, and ability to offer information on the liver's morphology and blood flow within the portal circulation, abdominal ultrasound is often the first radiologic scan performed.[13]

Cirrhosis evaluations often include the use of ultrasonography. It does little harm to the patient, is generally accepted, can be obtained without much difficulty, and yields useful data. If cirrhosis has progressed, the liver may be abnormally tiny and nodular in appearance. Cirrhosis is characterized by the presence of surface nodules and enhanced echogenicity with irregularly shaped patches, although hepatic steatosis shares these characteristics. The right lobe shrinks while the caudate or left lobe becomes larger. Researchers have tried to use the caudate-to-right lobe width ratio as an ultrasonographic criteria for cirrhosis diagnosis. The sensitivity, however, is low.[14] One research found that high-resolution ultrasound was 91% sensitive and 94% specific for diagnosing cirrhosis in individuals who received liver biopsies.[15]

Screening for hepatocellular cancer and portal hypertension may also be accomplished using ultrasonography. Since ultrasonographic appearances of benign and malignant nodules might be identical, the detection of nodules requires additional study. When Doppler imaging is performed on the portal circulation, findings of portal hypertension include an enlarged portal vein, the existence of collateral veins, and a reduction in flow. Splenomegaly, ascites, and portal vein thrombosis are other conditions that may be detected by ultrasonography.[16] It is not common practice to utilize CT for cirrhosis diagnosis and staging. It's comparable to ultrasonography in terms of the data it gives, but it exposes patients to more radiation and contrast. Hepatic nodularity, right lobe atrophy and hypertrophy of the caudate or left lobes, ascites, and varices are all features on CT that are suggestive of cirrhosis but not definitive. While CT portal phase imaging may show that the portal vein is patent, it cannot reveal the direction of blood flow.[17]

The significance of magnetic resonance imaging (MRI) in the diagnosis of cirrhosis remains debatable. Although magnetic resonance imaging (MRI) has been hailed as a potentially game-changing tool in the evaluation of cirrhotic patients, its widespread application has been hampered by factors including its high cost, some patients' intolerance of the examination, and the availability of alternative methods of gathering the same data.[18] One study found a link between cirrhosis severity and MRI findings, suggesting that the technique is useful for diagnosis. Among the various degrees of Child-Pugh cirrhosis, a research indicated that an MRI grading system had a sensitivity and specificity of 93% and 82%, respectively, for identifying grade A cirrhosis.[19] Iron excess may be detected by MRI, and the concentration of iron in the liver can be estimated. Ultrasound is not as sensitive as magnetic resonance angiography (MRA) in detecting portal vein thrombosis and other cirrhosis problems. In contrast to CT portal phase imaging, MRA can quantify portal vein blood flow and pinpoint its direction.[20]

The liver becomes stiffer as scarring worsens. Many techniques have been developed to measure hepatic stiffness.[21] Diagnosing cirrhosis may be aided by radio-

nuclide testing. Reticular endothelial cells are responsible for the proper uptake of 99mTc Sulphur colloid. The absorption of 99mTc Sulphur colloid by the liver may be variable in cirrhotic individuals, with higher uptake by the spleen and bone marrow. While these results are promising, their sensitivity and specificity in establishing a cirrhosis diagnosis are unclear at this time. Due to the prevalence of alternative imaging methods, this examination is seldom used in clinical settings.[22] Examination of an explanted liver, either at autopsy or after a liver transplant, is the gold standard for identifying cirrhosis, since the complete liver's architecture can be assessed. Liver biopsies, performed either percutaneously, via transjugular approach, laparoscopically, or with radiological guidance of a fine-needle biopsy, are the gold standard for diagnosing cirrhosis in the clinic. The biopsy procedure will be tailored to the specific clinical situation. Depending on the technique used and the size and quantity of specimens taken, a liver biopsy may have a sensitivity anywhere from 80% to 100% for detecting cirrhosis.[23]

Methods

It was a cross-sectional study which was conducted at department of Medicine Arif Memorial Teaching Hospital Lahore, Pakistan. The study was carried out over a period of 6 months from 01-06-2022 to 30-11-2022.

174 patients of either sex with chronic liver disease with ascites were included in the study using non-probability consecutive sampling technique after fulfilment of inclusion and exclusion criteria. The data was collected through a questionnaire. Sample size was calculated using the WHO software for sample size determination in health studies. The sample size was calculated at 5% level of significance and 5% margin of error and taking expected frequency of asymptomatic bacterial peritonitis at 13%.

Both male and female patients of chronic liver disease diagnosed at least 6 months ago having ages between 18-60 years and any of Child-Pugh class A, B or C were included in study. Patients having signs/symptoms of spontaneous bacterial peritonitis i.e., fever (temp. >99 F), abdominal pain and tenderness, evidence of secondary bacterial peritonitis and patients not able to consent were excluded from the study.

The data was analyzed by using SPSS version 25. Categorical variables were described as frequencies and percentages i.e. gender, child-Pugh class. Quantitative variables were described as mean and standard deviation i.e. age, duration of chronic liver disease. The outcome variable was stratified by gender, age, Child-Pugh classification of chronic liver disease and serum bilirubin.

Post stratification Chi-squire test was used at 5% level of significance to know differences by gender, age, and aetiology and Child-Pugh classification of chronic liver disease.

Results

174 patients were included in our study population. 8(4.6%) patients had age 31-40 years, 68 (43.7%) had 40-50 years and 98 (56.3%) had age > 50 years (Table 1). 58 patients (33.3%) were male and remaining 116 patients (66.7%) were female. 46 patients (26.4%) had spontaneous bacterial peritonitis (Table 2). When study population was distributed along with aetiology of chronic liver disease, 170 patients (97.7%) had chronic hepatitis C and 4 patients (2.3%) had chronic hepatitis B (Table 3). 48 patients (27.6%) were using PPIs and none of them were on SBP prophylaxis. When we cross tabulated child class and serum bilirubin with SBP and used Pearson's Chi Square test, it showed significant results (p= 0.000 and 0.037) that describes an unequal distribution between child class groups and serum bilirubin values regarding spontaneous bacterial peritonitis (Table 4 and 5). On cross tabulating spontaneous bacterial peri-

Table 1: *(Age distribution)*

	Frequency	Percent
31-40	8	4.6
41-50	68	39.1
> 50	98	56.3
Total	174	100.0

Table 2: *(Frequency of SBP)*

	Frequency	Percent
Yes	46	26.4
No	128	73.6
Total	174	100.0

Table 3: *Distribution of sample population by aetiology of CLD*

	Frequency	Percent
Chronic hepatitis C	170	97.7
Chronic hepatitis B	4	2.3
Total	174	100.0

Table 4: *P value is 0.000, which is significant*

Cross-table child class and SBP

			SBP		Total
			Yes	No	
Child class	Child class B	Count	0	58	58
		Expected Count	15.3	42.7	58.0
	Child class C	Count	46	70	116
		Expected Count	30.7	85.3	116.0
	Total	Count	46	128	174
		Expected Count	46.0	128.0	174.0

Table 5: *P value is 0.037, which is significant*

Cross-table Serum Bilirubin and SBP

			SBP		Total
			Yes	No	
Bilirubin serum	<2	Count	6	42	48
		Expected Count	12.7	35.3	48.0
	2-3	Count	6	13	19
		Expected Count	5.0	14.0	19.0
	>3	Count	34	73	107
		Expected Count	28.3	78.7	107.0
Total		Count	46	128	174
		Expected Count	46.0	128.0	174.0

tonitis with gender, age, aetiology of chronic liver disease, serum sodium, serum creatinine and ascitic fluid protein results came up statistically in-significant.

Discussion

Spontaneous bacterial peritonitis is very common in patients of chronic liver disease with ascites and most of the time it is asymptomatic. It is often reported in literature, however, studies regarding frequency of spontaneous bacterial peritonitis are scarce. There is a lack of information on the global and regional levels on the prevalence of asymptomatic spontaneous bacterial peritonitis in patients with chronic liver disease and ascites. In addition, hepato-renal syndrome can be precipitated by the occurrence of spontaneous bacterial peritonitis, which is a highly dangerous complication in decompensated chronic liver disease. Consequently, it has a more significant bearing on the prognosis of chronic liver disease. This research aimed to determine how common cases of spontaneous bacterial peritonitis were among individuals with chronic liver disease and ascites.[24]

In our investigation, we found that 26.4% of the 174 patients with chronic liver disease and ascites developed asymptomatic spontaneous bacterial peritonitis. This finding suggests that asymptomatic spontaneous bacterial peritonitis is rather common in individuals with chronic liver disease and ascites 25. 8 (4.6%) patients had age 31-40 years, 68 (43.7%) had 40-50 years and 98(56.3%) had age > 50 years. 58 patients (33.3%) were male and remaining 116 patients (66.7%) were female. When study population was distributed along with etiology of chronic liver disease, 170 patients (97.7%) had chronic hepatitis C and 4 patients (2.3%) had chronic hepatitis B. 48 patients (27.6%) were using PPIs and none of them were on SBP prophylaxis. When we cross tabulated child class and serum bilirubin with SBP and used Pearson chi square test, it showed significant results (p=0.000 and 0.037) that describes an unequal distribution between child class groups and serum bilirubin values regarding spontaneous bacterial peritonitis. On cross tabulating spontaneous bacterial peritonitis with gender, age, etiology of chronic liver disease, serum sodium, serum creatinine and ascitic fluid protein results came up statistically insignificant.[26]

Our results showed higher frequency of asymptomatic spontaneous bacterial peritonitis as compared with the available previous studies. In a study conducted at Abbasi Shaheed hospital Karachi reported frequency of asymptomatic spontaneous bacterial peritonitis was 13%.[27] Another study was conducted at Military Hospital, Rawalpindi, Pakistan. The frequency of asymptomatic spontaneous bacterial peritonitis was found to be 5% in that study which is much lower compared to our study.[28]

In another research conducted[29], it was concluded that the incidence of asymptomatic spontaneous bacterial peritonitis varies from 7 to 30%. This value is very similar to the value calculated in our study.[30]

Another study conducted 31 in 2016 on the patients visiting PTCL medical center Lahore and/or Medical special ward Services hospital concluded that 9.3 % patients were found to be having asymptomatic spontaneous bacterial peritonitis. This is a far lower percentage than our results. Another study conducted 32 concluded that the incidence of spontaneous bacterial peritonitis was found to be 3.5 % which is also quite less than our calculated value. It may be because of poor disease awareness amongst the general population, resulting in higher incidence of associated complications like spontaneous bacterial peritonitis.[33]

Limitations of current study include it being a single centre study and a smaller sample size compared to the previous studies. Despite this, our study points to the high frequency of asymptomatic spontaneous bacterial peritonitis. Patients with chronic liver illness and ascites may be at risk for developing asymptomatic, spontaneous bacterial peritonitis, although further research is needed to determine this.

Conclusion

Patients with chronic liver illness and ascites had a significant prevalence (26.4%) of asymptomatic spontaneous bacterial peritonitis. All patients of chronic liver disease with ascites admitted in hospital for any reason should be screened for spontaneous bacterial peritonitis.

Conflict of Interest: *None*

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