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ORIGINAL ARTICLE

Frequency and Outcome of Hepatorenal Syndrome in Decompensated Liver Cirrhosis

AHMED ADNAN[1], SHAHID BILAL[1], FAIQA MUBEEN[2], S. M. BAQUAR RAZA[3], GHULAM MUHAMMAD PHULL[4], NASIR JAMIL[5]
[1]*Department of Internal Medicine, Bahawal Victoria Hospital, Bahawalpur*
[2]*Department of Pathology, Muhammad College of Medicine, Peshawar*
[3]*Department of General Medicine, Karachi Medical and Dental College, Karachi*
[4]*Department of Physiology, Gambat Medical College, Gambat*
[5]*Department of Physiology, Liaquat College of Medicine and Dentistry, Darul Sehat Hospital, Karachi*
Correspondence to: Shahid Bilal, Email: Email: shahidbilal88@gmail.com

ABSTRACT

Background: Hepatorenal syndrome (HRS) is a severe complication of chronic liver disease characterized by progressive renal failure. Portal hypertension triggers splanchnic vasodilation, reducing effective blood flow, which in turn stimulates nitric oxide release. This vasodilation activates the renin-angiotensin-aldosterone system, leading to marked renal vasoconstriction and impaired kidney filtration, the hallmark of HRS. This study aimed to find out the frequency and outcome of hepatorenal syndrome in decompensated liver cirrhosis.

Methods: A descriptive, cross-sectional study was carried out at the department of medicine, Bahawal Victoria hospital, Bahawalpur from 30th May 2021 to 29th November 2021. Sample size of 96 was calculated by using OpenEpi calculator. A pre-formed questionnaire consisting of demographic data, ultrasound findings, laboratory reports and treatment outcome, was used. Laboratory parameters including bilirubin, prothrombin time, serum albumin, serum creatinine and 24-hour urinary protein were measured. The data was entered and analyzed by using the Statistical Package for Social Science (SPSS) version 23.

Results: Total of 96 participants were enrolled in the study, out of them 54.4% were from the age range of 20-40 years and majority were male (82.3%) as compared to their counterpart. About 58 (60.4%) participants reported that duration of disease was more than 1 year. Positive history of smoking was found in 57.3% participants while history of alcoholism was noted in 27.1% participants. Out of total 96 participants, the 17 (17.7%) participants were having hepatorenal syndrome. According to the Child-Pugh classification, the frequency of hepatorenal syndrome in Class A, B and C were 3 (2.12%), 8 (8.33%) and 6 (6.25%) respectively. All the participants responded to the treatment, the 29.4% participants were completely recovered, 47.1% were partially recovered while the mortality rate was 23.5%.

Conclusion: Current study concluded that the frequency of hepatorenal syndrome was 17.7% in patients of decompensated liver cirrhosis. According to the Child-Pugh classification, majority of HRS cases (8.33%) fall in Class B while the mortality rate was 23.5%.

Keywords: Hepatorenal syndrome, Decompensated liver cirrhosis, Child-Pugh classification

INTRODUCTION

Liver cirrhosis represents the advanced stage of chronic liver injury caused by persistent and repetitive damage to the liver tissue and architecture, ultimately leading to irreversible dysfunction. It is marked by the development of regenerative nodules, distortion of the normal hepatic structure, substitution of healthy hepatocytes with fibrotic tissue, and widespread bridging fibrosis. Globally, cirrhosis is associated with one of the highest mortality rates. In Pakistan, its burden is particularly high, mainly due to viral hepatitis infections, which are often linked to poor sanitation, unsafe food practices, and lack of awareness. Preventive measures such as vaccination, hygienic food handling, and improved public health education can reduce transmission[1,2].

Cirrhosis results in serious complications, including variceal bleeding (the leading cause of death), renal and hepatic failure, portal hypertension, and hepatic encephalopathy[3]. Hepatorenal syndrome (HRS) is a severe complication of chronic liver disease characterized by progressive renal failure[4]. Although the exact mechanism is unclear, it is believed to involve changes in renal circulation and autonomic regulation. Portal hypertension triggers splanchnic vasodilation, reducing effective blood flow, which in turn stimulates nitric oxide release[5]. This vasodilation activates the renin-angiotensin-aldosterone system, leading to marked renal vasoconstriction and impaired kidney filtration, the hallmark of HRS.

Two clinical types of HRS exist. Type 1 is an acute and rapidly progressive form, typically triggered by severe liver injury such as fulminant hepatitis, sepsis, or alcoholic hepatitis. It is characterized by a sudden decline in kidney function (a 50% reduction in creatinine clearance within two weeks) and has a very poor prognosis with a survival rate of only about 10%. Type 2 develops more gradually in patients with refractory ascites and is associated with slower renal deterioration over months, with an average survival of around six months[6,7].

The main risk factors identified include low mean arterial pressure (<80 mmHg), water overload, and reduced urinary sodium excretion (<5 mEq/L). Interestingly, markers of impaired liver function such as low serum albumin, prolonged prothrombin time, or raised bilirubin do not necessarily predict susceptibility to HRS. The syndrome is reported in approximately 10% of hospitalized cirrhotic patients with ascites. To establish the diagnosis, the International Ascites Club outlined major diagnostic criteria, which include: elevated serum creatinine (>1.5 mg/dL) or reduced creatinine clearance (<40 mL/min), absence of hypovolemia, shock, active infection, or nephrotoxic drug exposure, lack of improvement after diuretic withdrawal and plasma expansion, and proteinuria <500 mg/day without radiological evidence of obstructive uropathy[8].

Management of HRS focuses mainly on supportive care such as maintaining hemodynamic stability, antibiotic coverage, and renal replacement therapy when necessary. Liver transplantation remains the only definitive cure[6]. Experimental treatments including vasoconstrictor drugs (midodrine, octreotide) combined with albumin, have shown some promise in improving renal function, though they are mostly palliative[9]. This study aimed to find out the frequency and outcome of hepatorenal syndrome in decompensated liver cirrhosis.

MATERIAL AND METHODS

A descriptive, cross-sectional study was carried out at the department of medicine, Bahawal Victoria hospital, Bahawalpur from 30th May 2021 to 29th November 2021. Study got ethical approval from the ethical review board of concerned institute. Sample size of 96 cases had been calculated with 95% confidence level, 10% margin of error and taking expected frequency of hepatorenal syndrome in decompensated liver cirrhotic patients as 54.0% by using OpenEpi calculator. Non-probability, consecutive sampling technique was used. Patients with more than 14 years of age were included in the study after detailed clinical examination,

laboratory parameters and ultrasound. Those patients were excluded who were either developed hepatic encephalopathy, or taking drugs which could damage kidneys, or having severe infection, sepsis, hypovolemia or liver failure.

A pre-formed questionnaire consisting of demographic data, ultrasound findings, laboratory reports and treatment outcome, was used. Laboratory parameters including bilirubin, prothrombin time, serum albumin, serum creatinine and 24-hour urinary protein were measured. The treatment outcomes were recorded as no effect, completely recovered if the serum creatinine became less than 1.5 mg/dL along with reduction in proteinuria, partially recovered if the values of serum creatinine and proteinuria slightly decreased and the patient's death.

The data was entered and analyzed by using the Statistical Package for Social Science (SPSS) version 23. The numerical variables were presented as mean with standard deviation while the categorical variables were presented as frequencies and percentages.

RESULTS

Total of 96 participants were enrolled in the study, out of them 54.4% were from the age range of 20-40 years and majority were male (82.3%) as compared to their counterpart. About 58 (60.4%) participants reported that duration of disease was more than 1 year. Positive history of smoking was found in 57.3% participants while history of alcoholism was noted in 27.1% participants. Looking over the laboratory findings, the mean bilirubin was 3.1 ± 1.7 mg/dL, the prothrombin time was 20 ± 0.8 seconds while albumin and creatinine were 4.9 ± 1.1 g/dL and 1.9 ± 1.2 mg/dL respectively. Majority of participants (72.9%) were having creatinine between 0.6-1.4 mg/dL and the mean 24-hour urinary protein was 137.5 ± 29.6 mg/day. The characteristics of study participants are mentioned in Table 1. Out of total 96 participants, the 17 (17.7%) participants were having hepatorenal syndrome as presented in Figure 1.

Table 1: Characteristics of study participants

Variables	n=96 (%)
Age (years) 20-40 41-60	 52 (54.4%) 44 (45.6%)
Gender Male Female	 79 (82.3%) 17 (17.7%)
Duration of disease 6 months-1 year ≥1 year	 38 (39.6%) 58 (60.4%)
History of smoking	55 (57.3%)
History of alcoholism	26 (27.1%)
Bilirubin (mg/dL)	3.1 ± 1.7
Albumin (g/dL)	4.9 ± 1.1
Prothrombin time (sec)	20 ± 0.8
Creatinine (mg/dL) 0.6-1.4 mg/dL >1.4 mg/dL	1.9 ± 1.2 70 (72.9%) 26 (27.1%)
24-hour Urinary Proteins (mg/day)	137.5 ± 29.6

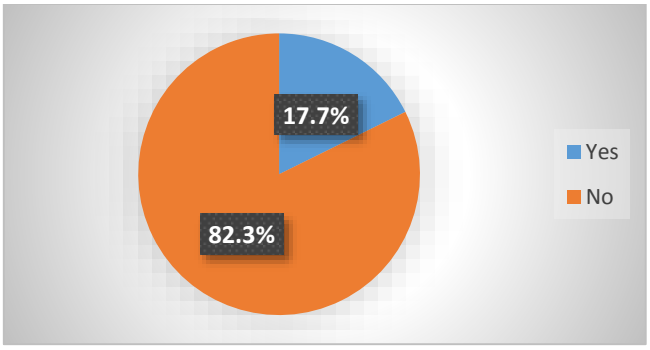

Figure 1: Distribution of cirrhotic patients with hepatorenal syndrome

The patients were distributed according to the Child-Pugh classification, out of 96 participants, the 11 (11.45%) were fall in Class A, 48 (50.01%) were from Class B and 37 participants were from Class C while the frequency of hepatorenal syndrome in Class A, B and C were 3 (2.12%), 8 (8.33%) and 6 (6.25%) respectively as shown in Figure 2.

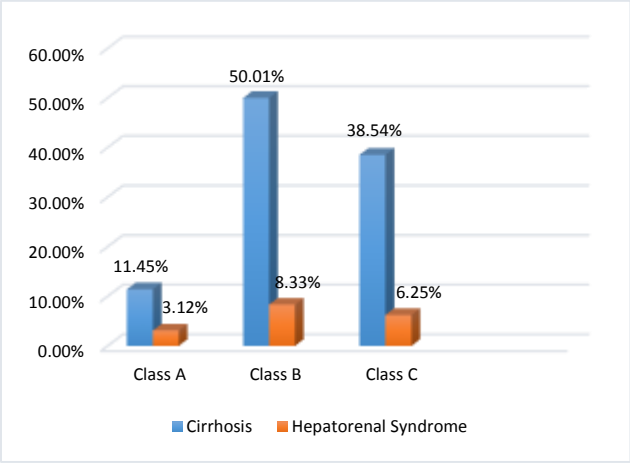

Figure 2: Distribution of patients according to Child-Pugh Classification

All the participants responded to the treatment, the 29.4% participants were completely recovered, 47.1% were partially recovered while the mortality rate was 23.5% as mentioned in Table 2.

Table 2: Outcome of patients with hepatorenal syndrome

Outcomes	n=17 (%)
Completely recovered	5 (29.4%)
Partially recovered	8 (47.1%)
Death	4 (23.5%)

DISCUSSION

Cirrhosis is emerging as a major global health concern, with mortality rates steadily increasing. Hepatitis B and C were identified as the main underlying causes of liver disease in 38.1% and 51.43% of patients, respectively, while 8.57% had co-infection[10,11]. Previous studies have shown variable prevalence rates, such as Fida S et al., who reported 24.26% hepatitis B, 30.88% hepatitis C, and 8.09% co-infection (7), Acute kidney injury is considered one of the most critical prognostic indicators in cirrhotic patients[12]. Individuals with cirrhosis are highly vulnerable to life-threatening complications, among which renal impairment is particularly common, especially in the presence of portal hypertension.

Approximately one-fifth of hospitalized patients with cirrhosis and renal impairment develop hepatorenal syndrome (HRS). In severe liver disease, HRS represents the final stage of progressive renal hypoperfusion and is linked with poor prognosis[13]. Multiple risk factors can precipitate HRS; however, its occurrence may be reduced through preventive strategies and timely medical care. Patients with type 2 HRS should be evaluated for TIPS or liver transplantation as it is linked to end-stage liver disease[14].

The present study was conducted to evaluate the prevalence and short-term outcomes of HRS in chronic liver disease. A total of 96 patients with cirrhosis were included, out of them 54.4% were from the age range of 20-40 years and majority were male (82.3%) as compared to their counterpart. Similar demographic patterns have been reported in other studies, where men predominate due to higher smoking and alcohol consumption rates in Pakistan[15,16]. The average disease duration was 5.46 years and 3.82 months, likewise current study reported that majority of participants (60.4%) had more than 1 year of disease duration. Looking over the

frequency of hepatorenal syndrome, the current study found 17.7% cases of HRS with cirrhosis. In comparison, Ullah I et al. reported an HRS frequency of 19.9%[17] while Seetlani NK et al. reported 15% frequency of HRS in cirrhotic patients from Karachi[16].

In the current study all the participants responded to the treatment, the 29.4% participants were completely recovered, 47.1% were partially recovered while the mortality rate was 23.5%. These findings are comparable with Khan S et al., where 26.7% of patients died[18]. In another study by Rey RM et al., 35% of HRS patients required hemodialysis, with 90% death rate within three months; liver transplantation was the only curative option for survivors (19). Wang H et al. observed improved renal function in 37.2% of patients treated with terlipressin and albumin, while another study reported 28% complete recovery[20].

A limitation of this study was its a single center study. A multi-center approach with a larger sample size would allow assessment of additional variables and provide more generalized conclusions.

CONCLUSION

Current study concluded that the frequency of hepatorenal syndrome was 17.7% in patients of decompensated liver cirrhosis. According to the Child-Pugh classification, majority of HRS cases (8.33%) fall in Class B followed by C and A (6.25% and 2.12% respectively). The mortality rate of HRS was 23.5%.

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