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RESEARCH ARTICLE
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FREQUENCY AND STRATIFICATION OF HEPATORENAL SYNDROME IN CIRRHOTIC PATIENTS PRESENTING WITH ACUTE KIDNEY INJURY.

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Abstract

Background: Hepatorenal syndrome (HRS) is a serious and acute complication of cirrhosis that results in renal failure. It is commonly observed in patients with ascites and portal hypertension. Early detection and timely management are crucial for improving patient outcomes and preventing further progression of the condition.

Objectives: To determine the frequency of prevalence of HRS in cirrhotic patients with acute kidney injury and identify age and gender stratification.

Study Design: A descriptive cross-sectional study.

Durtion and Place of Study. Department of Gastroenterology, Ayub Teaching Hospital, Abbottabad, from March 17, 2022, to October 17, 2022

Methods: This was a descriptive cross-sectional study involving 87 patients with acute kidney injury due to cirrhosis. Physical exam, urinalysis, abdominal ultrasound, patient demographics, history and physical exam. The analysis of the data was conducted to identify the prevalence of HRS and stratify them according to gender and age.

Results: The average age of the patients was 47.9 years and the standard deviation was 9.4. Out of 87 patients, 18 (20.68) had been diagnosed with HRS. The gender stratification P-value was 0.387 with an age stratification P-value of 0.871 which does not show any significant differences in the occurrence of HRS depending on these parameters.

Conclusion: The incidence of hepatorenal syndrome is equal between male and female patients who have cirrhosis and no differences are found between the genders. It is crucial to identify patients early so as to enhance patient management and outcome.

Keywords: Hepatorenal syndrome, Cirrhosis, Acute kidney injury, Prevalence.

Introduction

Hepatorenal syndrome (HRS) is a severe and potentially lethal complication; it develops in patients with severe chronic liver disease, especially cirrhosis. It is defined by kidney damage that occurs without any other clear cause of kidney damage, such as nephrotoxic medicines or hypovolemia (1). HRS is usually observed in patients with ascites and portal hypertension and usually in the later stages of cirrhosis (2). Splanchnic vasodilation and decreased renal perfusion are known to trigger renal failure in HRS and appropriate management of HRS requires early identification and correct management of the condition. This is normally observed in patients with a lot of liver dysfunction, such as those who develop spontaneous bacterial peritonitis (SBP) or other infections (3). Despite the fact that the pathophysiology of HRS is yet to be fully uncovered, it is believed that abnormal circulatory responses and vasodilation in the splanchnic bed contributes a substantial amount to the condition in cirrhotic patients with acute kidney injury (AKI) (4). A number of studies have shown that occurrence of HRS differs with the degree of cirrhosis and occurrence of ascites (5). HRS is a highly mortal disease and this highlights the importance of early identification and treatment. In this respect, it is necessary to differentiate between HRS and other causes of AKI in cirrhosis, as these two situations differ in terms of management. Age and gender can play a significant role in defining the prevalence of HRS in cirrhotic patients. It has been indicated in some studies that HRS occurs more frequently in older patients with more severe liver disease, which may be explained by a reduction in renal reserve and more comorbidities (6). Moreover, the differences in gender pathogenesis and clinical manifestation of HRS are also of interest, and the study will find out the prevalence of HRS among cirrhotic patients with acute kidney injury and its stratification by gender and age. Knowledge of the effect these demographic variables will contribute to the improved identification of vulnerable populations as well as the development of treatment methods (8).

Methods

The present descriptive cross-sectional study was carried out at the Department of Gastroenterology, Ayub Teaching Hospital, Abbottabad, between March 17, 2022, to October 17, 2022. There were 87 cirrhotic patients who had acute kidney injury. Extensive patient histories, physical examination and tests, including urinalysis and ultrasound, were conducted. The albumin volume expansion was adopted to distinguish between hepatorenal syndrome and other causes of acute kidney injury. Demographic, comorbidity, and HRS status data were gathered and processed to establish the prevalence and stratification of HRS according to age group and gender.

Inclusion Criteria

This study included patients who are aged 18 years and above and have cirrhosis and are presenting with acute kidney injury. The clinical characteristics of liver dysfunction, including ascites or portal hypertension, were present in all participants who had appropriate investigations to exclude other causes of renal failure.

Exclusion Criteria

The study excluded patients with disorders that might resemble HRS such as patients who use nephrotoxic drugs, those who have chronic kidney disease, and other underlying renal pathologies. As well, active infections, malignancy, or unwilling patients were also not included in the study.

Ethical Approval Statement

The Institutional Review Board (IRB) of Ayub Teaching Hospital, Abbottabad approved this study. All of the participants received informed consent, and the research also followed the ethical requirements of conducting research with human subjects. The study had been conducted with the strict observation of patient confidentiality and privacy.

Results

This was a study involving 87 cirrhotic patients with acute kidney injury. The average age of the patients was 47.9 (SD = 9.4). A total of 54 (62.06) of the total patients were male and 33 (37.93) were female. Hepatorenal syndrome (HRS) was diagnosed in 18 patients (20.68) and not in 69 (79.31) patients. Gender stratification showed that 9 (10.34) male patients and 8 (9.19) female patients were affected by HRS. Gender stratification P-value was 0.387, which shown that there is no significant difference in the occurrence of HRS between the male and female gender. Age stratification showed that 1.14% of the patients in the 20-30 years group, 2.29% in 31-40 years group, 6.87% in 41-50 years group, and 9.19% in 51-60 years group had HRS. The age stratification P-value was 0.871 and indicated no significant age-related difference in HRS occurrence.

Table 1: Age Distribution (n=87)

Age Group	Frequency	Percentage
20-30 Years	3	3.4%
31-40 Years	8	9.1%
41-50 Years	36	41.3%
51-60 Years	40	45.9%
Total	**87**	**100%**

Table 2: Gender Distribution (n=87)

Gender	Frequency	Percentage
Male	54	62.06%
Female	33	37.93%

Table 3: Frequency and Percentages for HRS (n=87)

HRS Status	Frequency	Percentage
Yes	18	20.68%
No	69	79.31%

Table 4: Stratification of HRS by Gender (n=87)

Gender	HRS Status	Frequency	Percentage	P-value
Male	Yes	9	10.34%	0.387
	No	45	51.72%	
Female	Yes	8	9.19%	
	No	25	28.73%	

Discussion

This study aimed to determine the frequency of hepatorenal syndrome (HRS) among cirrhotic patients presenting with acute kidney injury (AKI) at Ayub Teaching Hospital,Abboattabad. Our findings revealed that 20.68% of the patients had HRS, which is consistent with recent studies conducted globally (9).A multicenter study by Patidar et al. (2023) reported that HRS accounted for 12% of AKI cases in hospitalized cirrhotic patients in the United States.[1] Similarly, a cohort study by Wong et al. (2025) found that 59.6% of patients with HRS had alcohol-related liver disease, and 95.5% had cirrhosis.[2] These findings underscore the significant burden of HRS in cirrhotic patients and highlight the need for early recognition and management (10,11).In our study, the mean age of patients was 47.9 years, with a standard deviation of 9.4 years. This is in line with the study by Patidar et al. (2023), which reported a median age of 62 years among patients with cirrhosis and AKI.[3] The higher mean age in their study could be attributed to differences in population demographics and healthcare access(12).Regarding gender distribution, our study found that 62.06% of patients were male, while 37.93% were female. This male predominance is consistent with findings from other studies, such as the one by Wong et al. (2025), which reported that 59.8% of patients with HRS had alcohol-related

liver disease (13). The higher incidence in males may be due to higher rates of alcohol consumption and other lifestyle factors.The stratification of HRS by age in our study did not reveal any significant differences, with a P-value of 0.871. This is similar to the findings of Patidar et al. (2023), who did not observe significant age-related differences in HRS occurrence.[3] However, other studies have suggested that older age may be a risk factor for HRS due to decreased renal reserve and increased comorbidities(14).In terms of management, our study utilized albumin infusion to differentiate HRS from other causes of AKI. This approach is supported by guidelines and studies, such as the one by Attieh et al. (2023), which reviewed new classifications, treatment recommendations, and diagnostic tools for AKI in cirrhotic patients (15).Additionally, the use of vasoconstrictors like terlipressin has been shown to improve renal function in patients with HRS (16).Furthermore, a study by Garcia-Tsao et al. (2020) emphasizes that early intervention with vasoconstrictors like terlipressin can significantly reduce mortality in patients with HRS and improve renal function(17).This aligns with our study's approach to early intervention and the use of albumin infusion, which has been demonstrated to stabilize circulatory function and support renal recovery(18).A recent study by Singh et al. (2021) noted that the identification of HRS is often delayed due to its similarity to other causes of AKI, such as acute tubular necrosis (ATN), which can complicate diagnosis and treatment(19).This highlights the importance of distinguishing HRS from other renal complications in cirrhosis, especially when the management approaches differ significantly(20).n conclusion, our study aligns with recent research in highlighting the prevalence of HRS among cirrhotic patients with AKI. The findings emphasize the importance of early diagnosis and appropriate management strategies, including the use of albumin infusion and vasoconstrictors, to improve patient outcomes(21,22).

Conclusion

This study confirms the high prevalence of hepatorenal syndrome (HRS) in cirrhotic patients with acute kidney injury (AKI). Early detection and appropriate management strategies, including albumin infusion and vasoconstrictors, are essential to improving patient outcomes. Further research is needed to refine diagnostic protocols and treatment approaches for HRS.

Limitations

The study was conducted at a single center, limiting its generalizability. The sample size was relatively small, and there may be potential biases in patient selection. Additionally, some patients might have had underlying comorbidities not fully accounted for, which could have influenced the prevalence of HRS in this cohort.

Future Findings

Future research should explore the long-term outcomes of patients with HRS treated with early interventions. Larger multicenter studies are necessary to assess the efficacy of various treatment regimens across diverse populations. Additionally, investigating the genetic and molecular mechanisms underlying HRS could offer new therapeutic targets and improve patient management strategies.

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Authors Contributions

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Final Approval of version: All Mentioned Authors Approved The Final Version.All authors contributed significantly to the study's conception, data collection, analysis,Manuscript writing, and final approval of the manuscript as per **ICMJE criteria.**

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