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Original Research Article

Frequency of Hyponatremia in Patients With Decompensated Chronic Liver Disease Presenting at Tertiary Care Hospital

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Abstract: *Hyponatremia is a frequent electrolyte disturbance in decompensated chronic liver disease and is linked with worse clinical outcomes. Local estimates help guide early detection and supportive management in tertiary-care settings.* ***Objective:*** *To determine the frequency of hyponatremia in patients with decompensated chronic liver disease presenting at tertiary care hospital.* ***Methods:*** *This study was conducted on 86 patients diagnosed with decompensated chronic liver disease, determined on abdominal ultrasound as coarse parenchymal echogenicity, irregular margins, and ascites, along with complaints such as Fever (>101°F or 38.3°C), abdominal pain (VAS > 3), and fatigue. Patients with flapping tremors and cardiac diseases were excluded. Hyponatremia was assessed in all patients, defined as serum sodium level < 130 mmol/L. SPSS 25 was used for analysis.* ***Results:*** *In the present study, the mean age of the patients was 53.06 ± 13.69 years, gender wise males were in majority 60 (69.8%). Mean serum sodium level was 134.51 ± 7.21 mmol/L. Hyponatremia was observed in 26 patients (30.2%).* ***Conclusion:*** *Hyponatremia is a significant complication in the patients with decompensated chronic liver disease, it was present in 30.2% patients.*

Keywords: Hyponatremia, decompensated chronic liver disease, cirrhosis, socioeconomic factors, prevalence, electrolyte imbalance.

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Introduction

Chronic liver disease (CLD) progressed as a consequence of a verities of long standing hepatic injuries ascending from the diverse fundamental causes. It is noticeable by the permanent replacement of normal liver tissue with fibrotic scar tissue which gradually damages the hepatic function. Most frequent etiologies behind the liver cirrhosis comprise of persistent viral infections including the hepatitis B and C and the metabolic toxicity linked to medications along with the autoimmune liver disorders. Such conditions endorse ongoing inflammation within the liver eventually accelerating the fibrotic variations (1-5).

As cirrhosis advances; patients may face the abrupt deterioration within the liver function. This stage is described by the clinical manifestations including the jaundice, hepatic encephalopathy and hepatorenal syndrome. Decompensated cirrhosis frequently necessitates hospital admission as well as represents a complex clinical challenge (6,7). It is related to the prolonged hospitalisation as well as an in-hospital mortality rate estimated in between 10%-20%. Early diagnosis and prompt effective treatment are consequently essential. The initial occurrence of complications are linked to poorer survival outcomes. Attaining the optimal management based upon obtaining a detailed medical history, execution of thorough physical assessment as well as the undertaking appropriate diagnostic investigations (8-10).

Renal function is often compromised among the individuals with CLD because of the reduced clearance of solute-free water as well as marked sodium retention. This pathophysiological disorder is narrowly related to the complications including refractory ascites and hyponatraemia all of which considerably increase mortality risk. Although numerous cirrhotic patients with hyponatraemia may continue asymptomatic, the disorder is relatively common. One study reported that hyponatraemia arose in approximately 33.1% of cases with the decompensated CLD (11-13).

Kidney's ability to excrete free water and maintain proper sodium balance when impairs, leads to the dilutional hyponatremia. There is no such kind of study is conducted in our local level. The goal of this study is to determine the frequency of hyponatremia in patients with decompensated CLD presenting at tertiary care hospital. The results of this study will highlight the careful monitoring, judicious use of diuretics and the use of specific pharmacological interventions to raise serum sodium levels will be the vital components for the effective treatment.

Methodology

This cross-sectional study was conducted in the department of general medicine, Saidu Group of Teaching Hospital, Swat [05-01-2025— 05-05-2025]. An ethical approval was obtained from the hospital's IRB prior commencing the study. A sample of 86 patients was selected for this study, using WHO sample size calculator taking previous proportion of hyponatremia in patients having decompensated chronic liver disease 33.1%,(13) margin of error 10% and confidence interval 95%. A non probability consecutive sampling technique was used.

Patients eligible for participation were 30 to 75 years old, both male and females, presenting with decompensated chronic liver disease, which was determined on the basis of all of the following abdominal ultrasound assessment, Coarse parenchymal echogenicity, irregular margins, and ascites were observed among patients with all of the following complaints, Fever (>101°F or 38.3°C), abdominal pain (VAS > 3), and fatigue. Patients with flapping tremors at the time of presentation and cardiac diseases were not included.

After taking proper written consent from the patients, demographic information including gender, age, BMI, marital status, occupation status, education status, socio economic background, and place of living was recorded. After medical assessment comorbid including diabetes, and hypertension were recorded. All subjects with decompensated chronic liver disease as per the operational definition were examined for Hyponatremia by conducting the blood test, diagnosis was based on serum sodium level < 130 mmol/L and complaints such as

nausea/vomiting, headache, confusion, and fatigue. All evaluations were performed under the supervision of a consultant with minimum 5 years of post-fellowship experience. A pre-designed proforma was used to record each patient detail.

The analysis was performed by using the SPSS 25 software. Mean + SD was calculated for age, serum sodium level, and BMI. Frequencies and percentages were calculated for gender, hyponatremia, diabetes, hypertension, marital status, occupation status, education status, socio economic background, and place of living. Hyponatremia was stratified by age, BMI, diabetes, hypertension, marital status, occupation status, education status, socio economic background, and place of living to address the effect modifiers. Post stratification chi-square or fisher's exact test was applied at 5% level of significance. Results were shown in the form of tables and chart.

Results

This study included 86 patients with decompensated chronic liver disease. The mean age of the patients in the present study was 53.06 ± 13.69 years. Their mean serum sodium level was 134.51 ± 7.21 mmol/L, while their mean BMI was 23.61 ± 2.12 kg/m².

Regarding the demographic characteristics, it was observed that male patients were more frequently presented with 60 (69.8%). In terms of education 49 patients (57.0%) were uneducated. The majority of the patients 53 patients (61.6%) were unemployed. Regarding the residence 45 (52.3%) patients resided in rural areas. Socioeconomic status showed that majority 44 patients (51.2%) were from the lower class and 29 (33.7%) from the middle class (Table 1).

Regarding the comorbidities, diabetes mellitus was present in 17 patients (19.8%) and hypertension was found in 23 cases (26.7%) (Table 2).

Hyponatremia was identified in 26 patients (30.2%) (Figure 1). Table 3 presents the stratification of hyponatremia with demographics and comorbidities.

Table 1: Demographics

Demographics		**n**	**%**
Gender	Male	60	69.8%
	Female	26	30.2%
Education status	Educated	37	43.0%
	Uneducated	49	57.0%
Occupation status	Employed	33	38.4%
	Unemployed	53	61.6%
Place of living	Urban	41	47.7%
	Rural	45	52.3%
Socioeconomic status	Lower class	44	51.2%
	Middle class	29	33.7%
	Upper class	13	15.1%
Marital status	Married	55	64%
	Unmarried	31	36%

Table 2: Comorbidities

Comorbidities		**n**	**%**
Diabetes	Yes	17	19.8%
	No	69	80.2%
Hypertension	Yes	23	26.7%
	No	63	73.3%

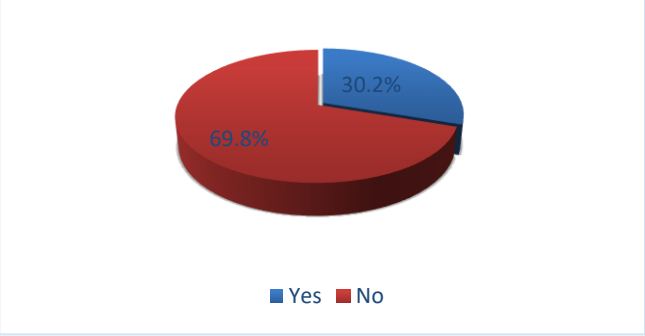

Figure 1: Frequency of Hyponatremia

Table 3: Stratification of hypornatremia with demographics and comorbidities

Demographics and comorbidities		**Hyponatremia**				
		Yes		**No**		
		n	**%**	**n**	**%**	
Age distribution (Years)	30 to 50	10	38.5%	30	50.0%	0.32
	> 50	16	61.5%	30	50.0%	
BMI (Kg/m^2)	18 to 24.9	19	73.1%	39	65.0%	0.46
	> 24.9	7	26.9%	21	35.0%	

Gender	Male	19	73.1%	41	68.3%	0.66
	Female	7	26.9%	19	31.7%	
Diabetes	Yes	5	19.2%	12	20.0%	0.93
	No	21	80.8%	48	80.0%	
Hypertension	Yes	10	38.5%	13	21.7%	0.10
	No	16	61.5%	47	78.3%	
Education status	Educated	10	38.5%	27	45.0%	0.57
	Uneducated	16	61.5%	33	55.0%	
Occupation status	Employed	9	34.6%	24	40.0%	0.63
	Unemployed	17	65.4%	36	60.0%	
Place of living	Urban	10	38.5%	31	51.7%	0.26
	Rural	16	61.5%	29	48.3%	
Socioeconomic status	Lower class	13	50.0%	31	51.7%	0.77
	Middle class	8	30.8%	21	35.0%	
	Upper class	5	19.2%	8	13.3%	
Marital status	Married	15	57.%	40	66.7%	0.42
	Unmarried	11	42.3%	20	33.3%	

Discussion

A consistent theme across several studies is the significant prevalence of hyponatremia, which is frequently associated with the severity of the underlying liver dysfunction. A study conducted in Peshawar identified hyponatremia in 36.9% of cirrhotic patients and demonstrated a statistically significant association with both the presence and severity of hepatic encephalopathy (HE), with correlation coefficients of 0.32 and 0.33 respectively.(14) This finding aligns with the pathophysiological understanding that hyponatremia can impair cerebral edema hence worsening neurological symptoms.(14) The relationship with disease severity is further validated by a study which reported that lower serum sodium levels were significantly associated with higher Model for End-Stage Liver Disease (MELD) and Child-Pugh scores, alongside increased mortality.(15) This positions hyponatremia not only as a complication but as a potent prognostic marker in decompensated cirrhosis.

The reported prevalence of hyponatremia demonstrates considerable variation, influenced largely by the diagnostic threshold applied and the specific patient population studied. A study from India reported a high prevalence of 75.0% when using a cut-off of ≤135 mmol/L, though this dropped to 52.0% with the more stringent ≤130 mmol/L criterion.(16) This contrasts with findings from Pakistan where hyponatremia (<135 mmol/L) was present in 33.3% of CLD patients.(17) Such discrepancies highlight the impact of operational definitions on epidemiological figures. Some studies found a strong link with Child-Pugh class others did not find a statistically significant association between hyponatremia and Child-Pugh classification, despite a noted trend.(15-16) This suggests that while hyponatremia is common in advanced disease its occurrence may be modulated by additional independent factors beyond the standard scoring systems.

A study identified younger age (21-45 years) and underweight status as significant risk factors for hyponatremia in patients with decompensated CLD.(18) This introduces an important dimension to the clinical profile suggesting that nutritional status and the measure of disease progression in younger patients may influence electrolyte homeostasis. The predominant aetiology of CLD also varies geographically with alcohol being the most common cause in studies from India and Dubai, while viral hepatitis plays a significant role in Pakistan.(14-16) This diversity in etiology may indirectly affect the presentation and management of hyponatremia.

The observed frequency of hyponatremia in the present study was 30.2%, which aligns with several local studies, Afridi et al. reported 36.9% frequency of hyponatremia in their study and Mumtaz et al. reported 33.3%, reinforcing the cohesion of this complication in Pakistani patient populations.(14,17) Mean of the patients in the present study was 53.06 ± 13.69 years and a male predominance (69.8%) was observed. The study showed a high proportion of patients with no education, unemployment, and rural residence and lower economic status. These findings underscore the significant socioeconomic burden associated with advanced liver disease in this region.

While previous studies have firmly established the clinical and prognostic significance of hyponatremia, the present study highlights that the patients affected by this complication often face considerable educational, occupational, and economic disadvantages. This intersection of clinical and social determinants of health suggests that effective management strategies must extend beyond medical therapy to address potential barriers to healthcare access, medication adherence and dietary modifications.

Conclusion

From the findings of the present study, it is concluded that hyponatremia is a significant complication of decompensated chronic liver disease, it was present in 30.2% patients. The study further found that majority of the patients presented with decompensated liver disease were from lower economic background and had no education. To improve patient care it is recommended that routine serum sodium monitoring must be integrated into the standard management protocol for all decompensated chronic liver disease patients along with support strategies that address both medical and socioeconomic needs.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate
Approved by the department concerned. (IRB)

Consent for publication
Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

AB (PGR)
Data Collection, Analysis, Manuscript drafting and Study Design,
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Conception of Study, Critical Input and final approval.

MA (PGR)
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Literature review and input.
IH (PGR),
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All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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