

# Frequency of Hyponatremia in patients of Chronic Liver Disease

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## ABSTRACT

**Background:** Chronic liver disease (CLD) is occurring very common in Pakistan. As liver got diseased, it do not work properly and cause different nutritional and electrolytes imbalance in body of the patients. So we planned this study to find the variation in sodium level in CLD patients.

**Aim:** To assess the frequency of hyponatremia in patients of chronic liver disease

**Study design:** Cross sectional study.

**Setting:** Department of Medicine, Mayo Hospital, Lahore, six months duration.

**Methodology:** 150 cases of CLD were selected through OPD. Blood sample was obtained and level of sodium was tested and hyponatremia was noted. SPSS v.20 was used to analyses the data. Frequency and percentage was calculated for hyponatremia.

**Results:** The mean age of the patients was 46.31±15.82 years. There were 54% males and 46% females. Mean duration of CLD was 5.76±2.79years. Child-Pugh grade A was noticed in 34%, grade B in 30.7% and grade C in 35.3%. The mean sodium level 142.71±15.54mmol/L. Hyponatremia was present in 33.3% cases. Mild hyponatremia was observed in 24(48%) cases, moderate hyponatremia in 25(50%) and severe hyponatremia in 1(2%) patients. Hyponatremia was present in 25.5% Child-Pugh class A, 39.1% in Child-Pugh class B and 35.8% in Child-Pugh class C. The difference was insignificant (P>0.05).

**Conclusion:** The frequency of hyponatremia in CLD patients was high.

**Keywords:** Chronic liver disease, Hyponatremia, Sodium level, Child-Pugh score

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## INTRODUCTION

Chronic liver disease (CLD) is clinico-pathologically defined disease.<sup>1</sup> Symptoms of CLD depend on severity of deterioration inside the liver. In early stages, there are usually no symptoms and can be diagnosed by some particular laboratory tests including liver function tests and abdomen ultrasound. But, CLD, which is already progressed, can be detected by altered state of mind, severe hyperbilirubinemia, coagulopathy and many other conditions<sup>2</sup>. CLD is a very common cause of admissions in local hospitals<sup>3</sup>.

Around 30% CLD patients die because of hepatic encephalopathy<sup>4</sup>. The clinical course of CLD patients is more often complicated due to intensification of abnormalities of renal function and electrolytes imbalance.<sup>5</sup> Inside patients' body disturbance of water is main indication of advance stage. This disturbance of water is associated with presence of ascites and is described by progression of dilutional hyponatremia, which is a common complication and consequence of CLD<sup>5,6</sup>. It has been indicated that hyponatremia can be a prognostic factor for CLD patients<sup>7</sup>. In healthy individuals, sodium concentration is sustained properly stable, in

spite of significant deviations in daily fluid intake, by homeostatic mechanisms which persuade alterations in renal water management<sup>8,9</sup>.

Hyponatremia frequently occur in patients of CLD. It usually occurs at advanced stage of CLD and is concomitant to many other complications including hepatic encephalopathy.<sup>10, 11</sup> Decreased sodium concentration in blood is a common verdict, being the most common electrolyte imbalance in these cases. Certainly, nearly 20% of patients have sodium <130mmol/L<sup>12</sup>. Decreased renal sodium control, because of renal hypo-perfusion and elevated arginine-vasopressin secretion subordinate to reduced effective volemia owing to peripheral arterial vasodilation represent the main mechanisms leading to dilutional hyponatremia<sup>12,13</sup>.

The objective of the study was to to assess the frequency of hyponatremia in patients of chronic liver disease

## MATERIAL AND METHODS

This cross sectional study was conducted in the Department of Mayo Hospital, Lahore from July 2016 to June 2017. Sample size 150 cases was calculated with 95%confidence level, 6.5%margin of error and taking hyponatremia percentage i.e., 20% in CLD patients. Sampling Technique: Simple random sampling technique was used. Patients aged 16–70 years of either gender with CLD were included.

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Patients with valvular heart disease, patients restricted to salt were not included. One hundred and fifty patients fulfilling the inclusion criteria were selected through OPD. Informed consent was obtained. Demographics were also recorded. Then blood sample will be obtained by using 5cc BD syringe. All samples were stored in sterile containers and sent to the laboratory of the hospital for assessment of sodium level. Reports were obtained and sodium level was noted. If sodium level was <135mmol/L, then hyponatremia was labeled. Patients with hyponatremia were managed as per hospital protocol.

The collected information was analyzed through SPSS 21. For age, duration of CLD and sodium level, mean±SD were calculated. Frequency and percentage was calculated for sex, Child-Pugh class and hyponatremia. Hyponatremia was compared with Child-Pugh class and chi square test was applied. P-value≤0.05 was considered as significant.

**RESULTS**

The mean age of the patients was 46.31±15.82 years. There were 54% males and 46% females. Mean duration of CLD was 5.76±2.79years. Child-Pugh grade A was noticed in 34%, grade B in 30.7% and grade C in 35.3% (Table 1).

The mean sodium level 142.71±15.54mmol/L. Hyponatremia was present in 33.3% cases. Mild hyponatremia was observed in 24(48%) cases, moderate hyponatremia in 25(50%) and severe hyponatremia in 1(2%) patients (Table 2).

Table 1: characteristics of patients

n	150
Age (Years)	46.31±15.82
Gender (m/f)	81(54%) / 69(46%)
Duration of CLD	5.76±2.79
Child-Pugh class	
A	51 (34%)
B	46 (30.7%)
C	53 (35.3%)

Table 2: Laboratory investigations

Sodium level	142.71±15.54
Hyponatremia	
Yes	50(33.3%)
No	100(66.7%)
Mild (124-134)	24(48%)
Moderate (116-124)	25(50%)
Severe (<116)	1(2%)

In patients of Child-Pugh class A, hyponatremia was present in 25.5% patients. In patients of Child-Pugh class B, hyponatremia was present in 39.1% patients. In patients of Child-Pugh class C, hyponatremia was

present in 35.8% patients. The difference was insignificant (P>0.05) (Table 3).

Table 3: Comparison of hyponatremia in Child-Pugh class

Child-Pugh class	Hyponatremia		Total
	Yes	No	
Class A	13(25.5%)	38(74.5%)	51(34%)
Class B	18(39.1%)	28(60.9%)	46(30.7%)
Class C	19(35.8%)	34(64.2%)	53(35.3%)
Total	50(33.3%)	100(66.7%)	150(100%)

\*p = 0.323 (Insignificant)

**DISCUSSION**

Hyponatremia is a common complication of advanced cirrhosis associated with impaired renal capacity to eradicate solute-free water, which causes retention of water which is unequal to retention of sodium, consequently decrease the sodium levels and hypo-osmolality. Hyponatremia is the prognostic factor for high morbidity & mortality rates in CLD patients<sup>14,17</sup>.

The previous studies are also evident that hyponatremia can affect brain functioning and develops hepatic encephalopathy. Hyponatremia can also acts as a risk factor for liver transplantation as it is concomitant to the high number of complications and decreased short-term survival after liver transplant. The existing standard of care, based on fluid restriction is insufficient<sup>14</sup>.

The mean age of the patients was 46.31±15.82 years. There were 54% males and 46% females. Mean duration of CLD was 5.76±2.79years. Child-Pugh grade A was noticed in 34%, grade B in 30.7% and grade C in 35.3%. The mean sodium level 142.71±15.54mmol/L. Hyponatremia was present in 33.3% cases. Mild hyponatremia was observed in 24(48%) cases, moderate hyponatremia in 25(50%) and severe hyponatremia in 1(2%) patients. Hyponatremia was present in 25.5% Child-Pugh class A, 39.1% in Child-Pugh class B and 35.8% in Child-Pugh class C. The difference was insignificant (P>0.05).

One study conducted in Jamshoro / Hyderabad, the frequency of hyponatremia was 51.6% in patients of liver cirrhosis. Mild, moderate and severe hyponatremia in 48.4%, 24.9% and 26.7% liver cirrhosis patients<sup>7</sup>. In one more study conducted in Karachi, the frequency of hyponatremia was 46%<sup>18</sup>. In a study, conducted in Hyderabad and Mirpur Khas, the frequency of hyponatremia was 60%, which was almost doubled as found in our study. In the same study, 25% had mild, 20% had moderate while 15% patients had severe hyponatremia.<sup>3</sup> One more study in Hyderabad showed the frequency of hyponatremia as 70% in patients of liver cirrhosis.<sup>19</sup> In another study conducted in Multan, mean sodium level was 133.93±3.8mmol/L and hyponatremia was present in

48.4% patients of liver cirrhosis<sup>20</sup>. The frequency of hyponatremia was quite high in CLD patients in Sindh ethnicity as compared to Punjab ethnicity. But one study conducted in Rawalpindi, the frequency was also high i.e., 59.46%<sup>21</sup>.

In an international study, the prevalence of hyponatremia in patients with cirrhosis was about 30%<sup>22</sup>. In a study conducted in Bangladesh, 30% of cirrhotic patient had hyponatremia and there was no association of hyponatremia with Child Pugh score ( $p > 0.05$ )<sup>23</sup>.

## CONCLUSION

Results of our study concluded that the frequency of hyponatremia in CLD patients was high. Now, on the basis of these results, we recommend the regular screening of CLD patients for sodium levels in blood to prevent hyponatremia which may cause altered state of mind of patients and develop hazardous consequences.

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