



## A STUDY ON CORRELATION OF HYPONATREMIA WITH SEVERITY OF HEPATIC ENCEPHALOPATHY IN ELDERLY

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### ABSTRACT

#### Introduction

Hepatic encephalopathy - a life threatening complication of cirrhosis of liver.

Occurs in more than 1/3rd of cirrhosis patients

Hyponatremia may pose a second osmotic hit causing cerebral edema and astrocyte swelling.

- Study design: Prospective hospital based, observational, case series study.
- Study site: MGM Hospital Kamothe, Navi Mumbai, Geriatric Medicine.
- Study duration: 1 year

#### Methodology

- Data collected from 55 out of total 62 patients after informed consent. Data collected in case records proforma. Statistical analysis for significance using Freeman – Halton extension of Fisher's exact test. Correlation of data by Spearman's rank correlation coefficient.

#### Results

- 18 (32.7%) had normal serum sodium, 22 (40%) had mild hyponatremia and 15 (27.2%) had significant hyponatremia
- 11.1% of patients with normal serum sodium had severe HE, 22.7% of patients with mild hyponatremia had severe HE, 46.7% of significant hyponatremia patients had severe HE.

#### Conclusion

- Lower levels of sodium should be seen as an independent risk factor for Hepatic encephalopathy and treated with V2 receptor antagonists along with treatment for encephalopathy.

**KEYWORDS :** Hyponatremia, Hepatic Encephalopathy, Elderly, Case Series

### INTRODUCTION-

Hepatic encephalopathy is a life-threatening complication of cirrhosis of liver. Occurs in more than 1/3rd of cirrhosis patients. Hepatic encephalopathy is divided into 4 Grades (West Haven classification), of which grades 1-2 has 30 day mortality of 8%.<sup>1</sup>, grades 3-4 has 30 day mortality of 38%.<sup>1</sup>, no HE has a 30 day mortality of 7%.<sup>1</sup>. Hepatic encephalopathy is a serious complication of chronic liver disease and is broadly defined as alteration in mental status and cognitive function occurring in presence of liver failure. Gut derived neurotoxins that are not removed by liver because of vascular shunting and decreased hepatic mass reach the brain and cause the symptoms known as hepatic encephalopathy. Ammonia levels are typically elevated but correlation between severity of liver disease and height of ammonia levels is often poor. Abnormalities in renal function and electrolytes levels are common in cirrhosis with hyponatremia (<135meq/l) present in more than half of patients. Hyponatremia is a major confounding factor in pathophysiology of hepatic encephalopathy. In patient with acute on chronic liver failure and it could be difficult to differentiate between hepatic and hyponatremic encephalopathy. In a recent study done in Dudley, England, showed sodium levels < 130meq/l were associated with higher morbidity and mortality rate. Moreover, patients with lower levels of sodium had higher grades of hepatic encephalopathy.

### METHODS AND MATERIALS

Study design: Prospective hospital based, observational, case series study.

Study duration: 1 year

Study site: MGM Hospital Kamothe, Navi Mumbai, Geriatric Medicine.

Study population: Patients above 60 years with cirrhosis of liver of any cause and in Hepatic encephalopathy.

Sample size: 55

This prospective case series included 55 consecutive patients presenting with hepatic encephalopathy admitted to geriatric medicine department at MGM hospital kamothe from October 2022 to august 2023 . All admitted patients who were above 60 years with established cirrhosis of any etiology and in hepatic encephalopathy were included in study. Cirrhosis was confirmed by clinical and biochemical and ultrasonography findings. The hepatic encephalopathy was graded according to west haven classification into 4 grades. Grade 1 and 2 were taken as mild and moderate hepatic encephalopathy, while Grade 3 and 4 were taken as severe hepatic encephalopathy. Patients were divided into 3 groups according to serum sodium as follows levels >135meq/l (normal), between 130 and 135 meq/l (mild), <130meq/l (significant) hyponatremia.

Data collected from 55 patients after informed consent. Data was collected in case records proforma. Statistical analysis for significance was done using Freeman – Halton extension of Fisher's exact test. Correlation of data by Spearman's rank correlation coefficient.

### RESULTS

Out of 55 patients, 42 (76.4%) were male and 13 (23.6%) were female. 18 (32.7%) had normal serum sodium, 22 (40%) had mild hyponatremia and 15 (27.2%) had significant hyponatremia. 12 (21.8%) patients had grade 1 HE, 29 (52.7%) had grade 2 HE, 14 (25.5%) had grade 3-4 HE. 11.1% of patients with normal serum sodium had severe HE, 22.7% of patients with mild hyponatremia had severe HE, 46.7% of significant hyponatremia patients had severe HE.

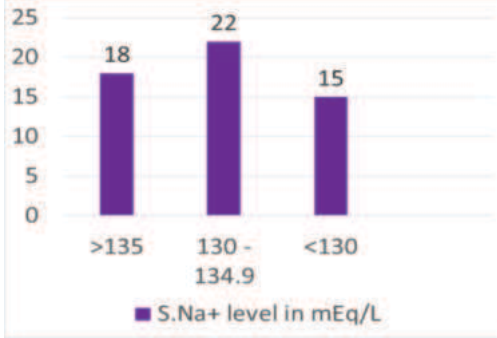


Figure 1: Showing number of patients in relation to level of serum sodium (in meq/l)

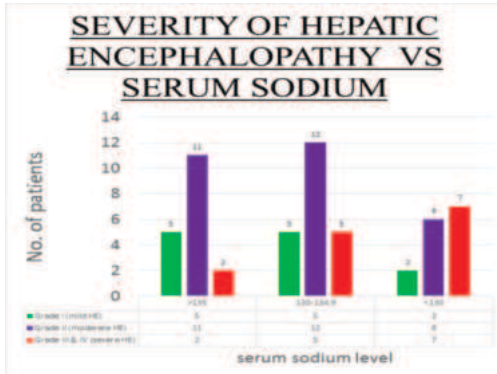
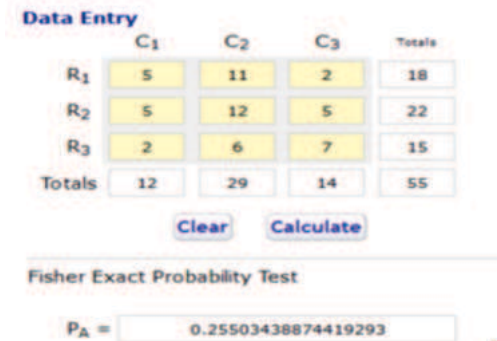


Figure 2: showing distribution of patients with hepatic encephalopathy vs serum sodium level



Spearman's Rank coefficient = 0.27883

	Grade 1-2	Grade 3-4	Marginal Row Totals
Normal Na	18	12	30
Hyponatremia	12	14	26
Marginal Column Totals	30	26	56 (Grand Total)

The Fisher exact test statistic value is 0.0469. The result is significant at p < .05.

Tests of significance and correlation: Freeman-Halton extension of Fisher exact test give a p value of 0.255 (>0.05) which indicates insufficient evidence to conclude there is statistically significant association between severity of hyponatremia and HE.

However, excluding patients with mild hyponatremia and comparing only those with normal serum sodium and severe hyponatremia gave a statistically significant association at p < 0.05

Spearman's rank coefficient gives R = 0.2779, indicates there is relatively weak positive correlation between level of serum Na+ and grade of HE.

**DISCUSSION**

Cirrhosis of liver is a common cause of delirium in inpatients. Decreased hepatocellular function, gut dysbiosis, portosystemic shunting leads to increased blood ammonia

which further leads to astrocyte dysfunction leading to hepatic encephalopathy.

Hyponatremia may be present in more than half of cases of cirrhosis of liver.<sup>2</sup> Main cause is diuretic use. The condition of cirrhosis in itself is associated with hyponatremia. The mechanism is thought to be due to reduced effective circulating blood volume due to splanchnic and systemic vasodilation, leading to dilutional hyponatremia.

Hyponatremia may pose a second osmotic hit causing cerebral edema and astrocyte swelling.<sup>6</sup>

Hyponatremia is common in hospitalised patients and much more so in cirrhosis of liver with incidence between 29.80% - 57%.<sup>3-5</sup> In this study the incidence was 67%.

Thus lower levels of serum sodium (<130mEq/L) may correlate with higher grades of hepatic encephalopathy as shown in similar studies from Monica Guevara et al<sup>7</sup> and Qureshi MO et al.<sup>4</sup> which showed statistically significant correlation at p < 0.05 and p < 0.001 respectively.

In this study significant hyponatremia (<130mEq/L) showed correlation with severe HE (grade 3-4) at p < 0.05. however mild hyponatremia did not show significant association with severe HE in this study at p = 0.255.

Mild dilutional hyponatremia is a consequence of natural progression of cirrhosis with ascites. But in cases of severe hyponatremia it may be responsible for progression to more severe grades of encephalopathy.

**CONCLUSION**

Hyponatremia is common in cirrhosis of liver with hepatic encephalopathy and Lower levels of sodium should be seen as an independent risk factor for Hepatic encephalopathy and treated with V2 receptor antagonists along with treatment for encephalopathy. Prompt correction of serum sodium is required in case of severe hyponatremia.

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