

ORIGINAL ARTICLE

Correlation of Serum Sodium Level with Severity of Hepatic Encephalopathy

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ABSTRACT

Introduction: One of the most serious complications of liver failure is the development of the condition known as hepatic encephalopathy (HE), which affects the personality, cognitive and motor functions of patients. The sodium level in serum in hepatic encephalopathy has been studied and has been found lower than the normal individual.

Objective: To find out the frequency of hyponatremia in patients with hepatic encephalopathy

Methodology: This Descriptive Cross-Sectional study was conducted at the Department of Medicine, Hayatabad Medical Complex, Peshawar from October 2020 to April 2021. In this study a total of 170 patients were observed to find out the frequency of hyponatremia in patients with hepatic encephalopathy.

Results: Based on grades of hyponatremia among 170 patients, Mild (130-134 mmol/L) was observed in 101(59.4%), Moderate: 125-129 mmol/L in 50(29.4%) and profound: < 125 mmol/L was observed in 19(11.2%) subjects. Hepatic encephalopathy was found in 91(53.5%) subjects while not found in 79(46.5 %) subjects.

Conclusion: Chronic liver disease is linked to abnormal serum sodium concentrations, according to our findings. The most prevalent anomaly in this research is hyponatremia. In comparison to individuals with blood sodium levels of greater than 136mEq/L, patients with serum sodium levels of less than 135mEq/L had a higher prevalence of encephalopathy. Patients with a serum sodium content less than 130 mEq/L are the most severely affected.

Key words: Hyponatremia; Hepatic encephalopathy; Serum sodium level

INTRODUCTION

Currently, the prevalence of hepatitis C virus is 11.55% in adult population ¹. In our culture, HCV is a prevalent source of liver cirrhosis transmission, as opposed to the western world, where alcohol is the leading cause of liver cirrhosis. One of the most serious complications of liver failure is the development of the condition known as hepatic encephalopathy (HE), which affects the personality, cognitive and motor functions of patients ². The precipitating factors for hepatic encephalopathy has been shown to be infection, gastrointestinal bleeding, electrolytes disorder, constipations, dehydrations etc ². The sodium level in serum in hepatic encephalopathy has been studied and has been found lower than the normal individual. In a previous study, the mean serum sodium level of HE patients was 129.59±7.11 mEq/L³ while in another study it was 123 ± 0.21mEq/L ⁴.

Lower serum sodium level has been shown to be associated with higher rate of hepatic encephalopathy ⁵. In a study it has been observed that 73.2% study subjects with HE were observed with hyponatremia ³. Another study showed that prevalence of hyponatremia was 46% in HE patients ⁶.

Serum sodium deficiency exacerbates the symptoms of ascites. Hepatic encephalopathy was more common in patients whose sodium levels were lower than 130 meq/l in their serum ⁷. Hepatic encephalopathy was seen in 43.1% of patients with serum sodium concentrations below 130, in 35.8% of those with serum sodium concentrations between 131 and 135 and in 24.4% of those with serum sodium

concentrations over 136 ⁸. Patients with blood sodium concentrations less than or equal to 130 mmol/L were more likely to have issues than those with serum sodium values more than or equal to 136 mmol/L ⁸.

Aim of this research was to assess the mean, sodium level in hepatic encephalopathy patient and to find the relation between the grades of hepatic encephalopathy and serum sodium level as there is no study available in our population. Result of our research can be used for proper evaluation and management of the hyponatremia patients with hepatic encephalopathy to decrease the severity and also the mortality of the patients.

MATERIALS AND METHODS

This Cross Sectional Study was carried out at the Department of Medicine, Mardan Medical Complex, Mardan from 26th October 2020 to 26th April 2021. By taking the frequency of hyponatremia as 46% ⁶ with 95% confidence interval and 7.5% margin of errors the sample size were 170 patients of hepatic encephalopathy. Inclusion criteria for our study includes all Liver cirrhosis patients of both the gender having age 35-65 years whereas the exclusion criteria includes patients who are having stroke as obvious from medical record, or other causes of uncousets like hyperosmolar diabetic coma (known diabetic by medical record and sugar level > 300m/dl) and patients with other causes impaired cerebral function like, senile dementia, chronic subdural hematoma. After approval from the ethical committee of the hospital patient presenting to the medical department of Mardan Medical Complex were

evaluated for sample selections. Written and verbal informed consent was taken from all the patients. Patient's age, sex, duration of hepatic encephalopathy, past history of admission for such condition (old/new hepatic encephalopathy) was noted. Patients were examined for the grade of HE. Under aseptic condition blood were taken and were sent to hospital laboratory for investigation of serum sodium level. After receiving the result patients were labeled as normal sodium, hyponatremia (mild, moderate and profound) as per operational decisions. All patients were managed as per hospital protocol. Data were collected by researcher himself on a designated proforma. Data were analyzed in a statistical analysis program (IBMSPSS.Version.23). Mean and standard deviation were calculated for numerical variables like age, duration of HE. Frequency and percentage were calculated for categorical variables like gender, grade of HE, status of hepatic encephalopathy (new/old) hyponatremia (yes/no) and severity of hyponatremia.

RESULTS

In our study, the number of patients in age group 30-40 years, 41-50 years, 51-60 years, 61-65 years were 7(4.1%) subjects, 33(19.4%) subjects, 66(38.8%) subjects and 64(37.6%) subjects respectively with the mean age (SD) 55 (3.87) years. Males were 140(82.4%) and female were 30(17.6%). (Table 1) First admission as HE among 170 patients was observed in 60(35.3%) subjects while it was not observed in 110(64.7%) subjects. (Figure 1) Based on grades of hyponatremia among 170 patients, Mild (130-134 mmol/L) was observed in 101(59.4%), Moderate: 125-129 mmol/L in 50(29.4%) and profound: < 125 mmol/L was observed in 19(11.2%) subjects. (Figure 2) Liver cirrhosis and HE was found in 91(53.5%) subjects while not found in 79(46.5 %) subjects. (Figure 3)

Table 1: Distribution of subjects based on age and gender

Parameter	Sub-category	Frequency (%)
Gender	Male	140 (82.4%)
	Female	30 (17.6%)
Age	30-40 Years	7(4.1%)
	41-50 Years	33 (19.4%)
	51-60 Years	66 (38.8%)
	61-65 Years	64 (37.6%)

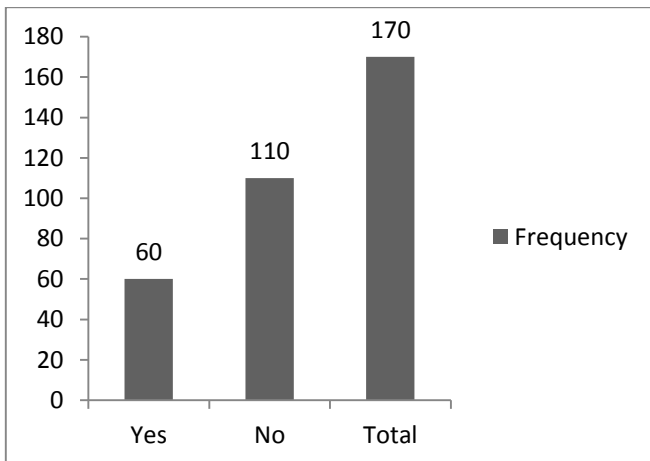


Figure 1: First admission as HE

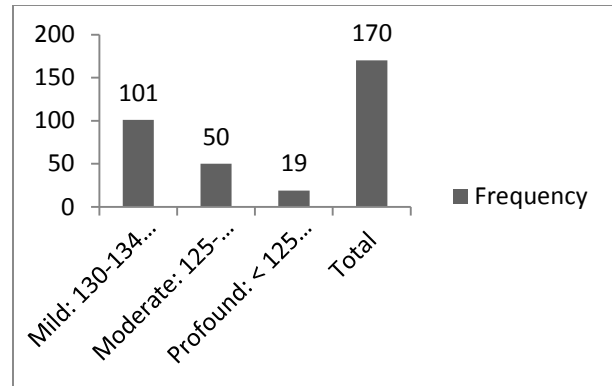


Figure 2: Grades of hyponatremia

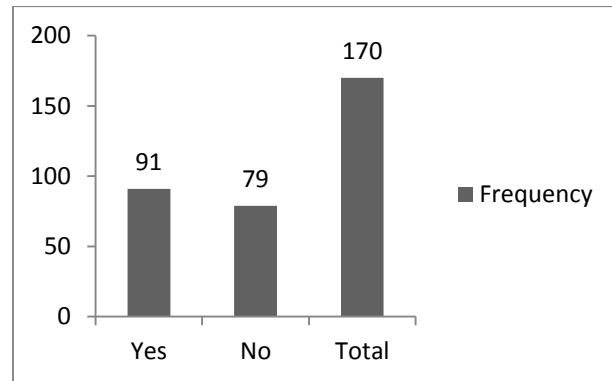


Figure 3: liver cirrhosis and HE

DISCUSSION

The normal serum sodium range of is necessary for cell homeostasis and proper function. Abnormal sodium levels may be caused by an imbalance in the control of total body water. Dysnatremia is a symptom of chronic liver disease (CLD), which is caused by a disruption in water balance⁹⁻¹². Dilutional hyponatremia is described as high sodium content along with a failure to match urine output to the quantity of water consumed.

In our study, Based on grades of hyponatremia among 170 patients, Mild (130-134 mmol/L) was observed in 101(59.4%), Moderate: 125-129 mmol/L in 50(29.4%) and profound: < 125 mmol/L was observed in 19(11.2%) subjects. A previous study done by Angeli et al. on 997 cirrhotic patients from South America, Asia, Europe and North America reported normal serum sodium level in 50.6%, 27.8% patients were observed having serum sodium range 135 mEq/L whereas 21.6% patients were observed in serum sodium range ≤130 mEq/L¹³. Another study done by Kim et al. on 188 cirrhotic patients from Korea reported normal serum sodium level in 52.1%, 20.8% patients were observed having serum sodium range 135 mEq/L whereas 27.1% patients were observed in serum sodium range ≤130 mEq/L¹⁴. A study done by Raj et al. on 100 cirrhotic patients reported that serum sodium levels was more than 136 mEq/L in 48% patients, 21% have between 131 and 135 mEq/L while in 31% patients serum sodium levels was ≤130 mEq/L¹⁵. Another study reported that a serum sodium level was ≤130 in patients with cirrhosis¹⁶. The findings of this investigation support the findings of the previous studies showing

decompensated liver disease is linked to aberrant serum sodium concentration. It also demonstrates that hyponatremia is the most prevalent anomaly, with blood sodium levels < 130 mEq/L in more than half of the patients. In our study HE was found in 91(53.5%) subjects while not found in 79(46.5 %) subjects. In accordance with our study, other studies reported comparable results ¹⁴⁻¹⁶.

CONCLUSION

Chronic liver disease is linked to abnormal serum sodium concentrations, according to our findings. The most prevalent anomaly in this research is hyponatremia. In comparison to individuals with blood sodium levels of greater than 136mEq/L, patients with serum sodium levels of less than 135mEq/L had a higher prevalence of encephalopathy. Patients with a serum sodium content less than 130mEq/L are the most severely affected.

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