

## Frequency of Hyponatremia in Patients with Hepatic Encephalopathy at a tertiary care hospital

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### ABSTRACT

**Background:** Hyponatremia can happen in cirrhosis, usually in later stages of liver failure. It had been associated with high mortality. Cirrhotic patients can have various abnormalities of serum sodium levels that can be high or low. The major cause of a dilutional hyponatremia can be due to improper handling of sodium in the kidney tubules leading to activation of renin-angiotensin system and leading to low circulatory volume.

**Aim:** To find frequency of hyponatremia in patients with hepatic encephalopathy at a Jinnah hospital.

**Methods:** This descriptive cross-sectional study was done in Jinnah Hospital, Lahore. Total 115 cases according to the inclusion/exclusion criteria were registered.. Blood samples (5ml venous) were collected for measurement of serum sodium levels and sent to the hospital laboratory. The frequency of hyponatremia in patients with hepatic encephalopathy was noted, all this information was recorded by the researcher himself on a proforma.

**Results:** 24(20.87%) having age of 20-45 years whereas 91(79.13%) were having age of 46-70 years, 52.02+9.65 years was calculated as mean+sd, 64(55.65%) were male and 51(44.35%) were females, frequency of hyponatremia in patients with hepatic encephalopathy was recorded as 62(53.91%).

**Conclusion:** It was determined that the frequency of hyponatremia is significantly high in patients with hepatic encephalopathy at a tertiary care hospital.

**Keywords:** Hepatic encephalopathy, hyponatremia, frequency

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### INTRODUCTION

Hepatic encephalopathy (HE) manifests as a broad range of complex cognitive disturbance occur because of liver damage.<sup>1</sup> HE has been reported in cirrhotic patients with 8% rise annually. It remains a serious complication of liver cirrhosis<sup>2</sup>. There are various precipitants of hepatic encephalopathy like constipation occurring in 231(78.1%) patients, followed by esophageal variceal bleed and infections in 47(14.8%) and 38(12.1%) individuals.<sup>3</sup> The presence of hyponatremia suggests third spacing as a result of compromise of liver synthetic functions. It had been evident that there re increase chances to develop HE and electroencephalographic abnormalities in the presence of hyponatremia and sometimes refractory to treatment with lactulose. The process that leads to precipitation of HE as a result of hyponatremia is not fully known, but it has been postulated that it leads to swelling of astrocyte as a result of osmotic gradient between extracellular fluid compartment<sup>4</sup>. Samiullah Shaikh and others recorded that 21/112(18.75%) hepatic encephalopathic had hyponatremia<sup>5</sup>. Another recent local study reported the frequency to be in 57.9% of the cases<sup>5</sup>. The rationale of this study is that a significant difference exists in local studies, however the results of the current study will clarify

the above variation in our targeted population and to record the exact frequency, as a large majority of patients are not diagnosed or remain undiagnosed for hyponatremia among these cases, the results of the study would also be helpful for timely management of the morbidity.

### MATERIALS AND METHODS

Our descriptive cross-sectional study done at Jinnah Hospital, Lahore after approval from the Institutional Ethical Committee. One hundred and fifteen patients who have attended the medical emergency department for the symptoms of hepatic encephalopathy were enrolled for the study. Consent was taken in written from each patient by discussing clearly the objectives of the study and recorded in a preformed designed proforma regarding disease duration and symptoms. Patients who had been on treatment for ascites, hepatocellular carcinoma and hyponatremia were excluded. Informed consent was taken from each patient. Each patient underwent peripheral venous puncture and blood samples of 5 mL was taken and send for estimation for serum sodium levels. The frequency of hyponatremia in these patients was noted, all this information was recorded by the researcher himself on a pre-designed proforma and data was analyzed by SPSS-16. Mean and standard deviation was calculated for quantitative variable like age, duration of liver disease and serum sodium. Frequencies and percentages were

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calculated for qualitative variables. Stratification for age, gender, duration and stage of disease was recorded to address the effect modifiers.

**RESULTS**

Out of total of 115 cases, age distribution shows that 24(20.87%) were between 20-45 years of age while 91(79.13%) were between 46-70 years of age, mean+sd was calculated as 52.02±9.65 years. (Table No. 1) Gender distribution shows that 64(55.65%) were male and 51(44.35%) were females (Table 2). Mean duration of disease was recorded as 10.18±3.45 months. (Table No. 3) Mean serum sodium levels were recorded as 132.42±24.61meq/l (Table No. 4) Frequency of stage of disease was recorded as 17(14.78%) had grade 1, 36(31.30%) had grade 2, 24(20.87%) had grade 3 while 38(33.05%) had grade 4. (Table. 5) Frequency of hyponatremia in patients with hepatic encephalopathy was recorded as 62(53.91%) whereas 53(46.09%) had no findings of the morbidity (Fig. 1) After stratification data for age, gender, duration and stage of disease, chi-square test was applied to see the significance. P value <0.05 was considered as significant (Table 6-8)

Fig. 1: Frequency of hyponatremia in patients with hepatic encephalopathy (n=115)

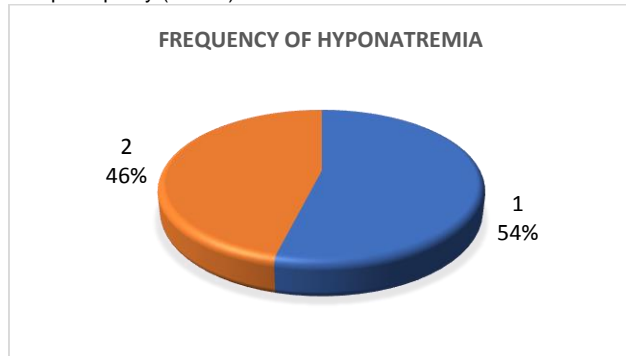


Table 1: Age distribution (n=115)

Age (years)	n	%age
20-45	24	20.87
46-70	91	79.13
Total	115	100
Mean±SD	52.02±9.65	

Table 2: Gender distribution (n=115)

Gender	n	%age
Male	64	55.65
Female	51	44.35
Total	115	100

Table 3: Mean duration of disease (n=115)

Duration of disease(months)	Mean	SD
	10.18	3.45

Table 4: Mean serum sodium (n=115)

Serum sodium (meq/l)	Mean	SD
	132.41	24.60

Table 5: Frequency of stage of disease (n=115)

Stage of disease	n	%age
Grade 1	17	14.78
Grade 2	36	31.30
Grade 3	24	20.87
Grade 4	38	33.05
Total	115	100

Table 6: Stratification for frequency of hyponatremia with regards to age (n=115)

Age (years)	Hyponatremia	
	Yes	No
20-45	11	13
46-70	51	40

P value 0.37

Table 7: Stratification for frequency of hyponatremia with regards to gender (n=115)

Gender	Hyponatremia	
	Yes	No
Male	34	64
Female	28	51

P value 0.92

Table 8: Stratification for frequency of hyponatremia with regards to duration of disease (n=115)

Duration of disease (months)	Hyponatremia	
	Yes	No
1-6	12	9
>6	50	44

P value 0.74

**DISCUSSION**

Hyponatremia is a frequent complication in liver failure, that occurs as a result of fibrosis and results in deaths and increased number of hospital admissions that happened because of complications. The sodium levels can be variable in liver disease, mainly exacerbated by third spacing resulting from the activation of renin-angiotensin system. The rationale of the study was that a significant difference exists in local studies, however the results of the current study will clarify the above variation in our targeted population and also record the exact frequency, as a large majority of patients are not diagnosed or remain undiagnosed for hyponatremia among these cases, the results of the study would also be helpful for timely management of the morbidity. In this study, out of 115 cases, 24(20.87%) were of 20-45 years while 91(79.13%) were between 46-70 years of age, mean+sd was calculated as 52.02±9.65 years, 64(55.65%) were male and 51(44.35%) were females. Frequency of hyponatremia in patients with hepatic encephalopathy was recorded as 62(53.91%). We compared our results with a previous study by Samiullah Shaikh et al, in which they reported 18.75% hepatic encephalopathic patients had hyponatremia<sup>5</sup>. These findings are not in agreement with our results while another recent local study reported these findings in 57.9% of the cases<sup>6</sup>. These findings are consistent with our study.

Another local study<sup>6</sup> by Muhammad Omar Qureshi and others assessed the frequency of hyponatremia in the

patients admitted to tertiary care hospital from the effects of liver fibrosis in the form of hepatic encephalopathy, he reported that 30.7% patients having serum sodium levels of less than 130 meq/l. in fact the severity of hyponatremia is associated with complications like ascites, cirrhosis and encephalopathy. Kim et al. found that the prevalence of hyponatremia (serum sodium  $\leq$ 135 meq/L) in people with cirrhosis of the liver was 47.9%.<sup>8</sup> In our study, hyponatremia was associated with increased incidence of hepatic encephalopathy in cases who also had decompensated liver cirrhosis. Jenq and his colleague found that hyponatremia exacerbates astrocyte swelling due to differences in osmolality between the intracellular and the extracellular compartments, so, when a patient has cirrhosis, hyponatremia is associated with an increased likelihood of hepatic encephalopathy.<sup>9</sup> By promoting swelling of the astrocyte, hyponatremia becomes a major risk for the development of encephalopathy, especially with the background of diuretic treatments, transjugular intrahepatic porto-systemic shunts and /or concomitant bacterial infections. Also, the hypotonicity of the fluid in extracellular compartment due to low sodium levels enhances the osmotic effect induced by glutamine, leading to increase in cell swelling and edema. Thus, hyponatremia augments the effects of altered ammonia levels on central nervous system in the patients with end-stage liver disease.<sup>10</sup> Guevara et al. concluded that dilutional hyponatremia is correlated directly with the incidence of hepatic encephalopathy and is predictive of its subsequent development<sup>11</sup>.

## CONCLUSION

We concluded that the frequency of hyponatremia is significant in cases with hepatic encephalopathy presenting to a tertiary care hospital.

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