Original Article

Correlation of Serum Sodium with Severity of Hepatic Encephalopathy

Muhammad Arshad[1], Alia Banori[2] and Shah Zeb[3]

ABSTRACT

Objective: To study the correlation of serum sodium with severity of hepatic encephalopathy HE.
Study Design: Cross sectional (Correlational) study.
Place and Duration of Study: This study was conducted at Naseer Teaching Hospital Peshawar from October 2017 to September 2018.
Materials and Methods: This study was conducted on 408 patients who were observed by using - 0.1411 of correlation coefficient between serum sodium (S.Na)and HE 95% confidence level and 80% power of test. More over non probability consecutive sampling was used for sample collection. The patients were collected from medical ward of NTH. After taking informed consent, clinical data were collected on a proforma designed for study. S.Na was evaluated in all cases of both groups and results were tabulated.
Results: In this study mean age was 65 years with SD ± 0.315. Sixty-two percent patients were male and 38% patients were female. Mean S.Na (S.Na) level was 123 meq/L with SD ± 0.21. Five percent patients had severity of grade I, 39% patients had severity of grade II, 48% patients had severity of grade III and 8%o patients had severity of grade IV. Correlation of severity of HE with S.Na level was analyzed as all the 20 patients with severity of grade I had S.Na level ranged 131 -133 meq/L. All the 159 patients with severity of grade II had S.Na level ranged 126-130 meq/L. In 196 patients with severity of grade III, 45 patients had S.Na level ranged 126-130 meq/L while 151 patients had S.Na level ranged 120-125 meq/L whereas all the 33 patients with severity of grade V had S.Na level ranged 120-125 meq/L.
Conclusion: Hyponatremia was a common feature in patients with cirrhosis and its severity increased with the severity of liver disease. The existence of S.Na concentration <135 mmol/L was associated with greater frequency of HE. It was also noticed that mote severe the hyponatremia, greater will be the grade of HE.

Key Words: Hepatic encephalopathy, frequency, cirrhosis, spontaneous bacterial peritonitis

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INTRODUCTION

Cirrhosis is a serious and irreversible disease. It is a major cause of mortality and morbidity worldwide. Cirrhosis develops in about 10-20 years. The most common cause in Pakistan is viral hepatitis as compared to West where alcohol is more common.[1] Hepatic encephalopathy (HE) is neuropsychiatrie syndrome for which symptoms, manifested on a continuum, is deterioration in mental status, with psychomotor dysfunction, impaired memory, increase reaction time, poor concentration, disorientation, and in severe form coma[2] and may develop at an annual rate of 8% in cirrhotic patients in Far Eastern studies[3]. Cirrhosis-related expenses impact the family unit's daily functioning and medical adherence. A multidisciplinary approach to address this burden is required. [4] The clinical diagnosis is based on two types of symptoms: impaired mental status[5]and impaired neuromotor function.[2] Fluctuation in serum sodium level is a frequent complication of advanced cirrhosis.[6] Hyponatremia is a common finding in patients with decompensated cirrhosis due to an abnormal regulation of body fluid homeostasis.[7] Literature review suggested an association between S.Na concentration and hepatic encephalopathy that S.Na and serum ammonia concentrations have been the major determining factors for abnormal electroencephalographic findings in HE patients and S.Na acts as an independent risk factor for HE.[6,8] It has also been observed that low S.Na levels are a very common finding in patients with hepatorenal syndrome[9]. The present study is designed to determine the correlation between S.Na level and severity of hepatic encephalopathy. As mentioned above, the S.Na level is a strong predictor of severity of hepatic encephalopathy and also the literature suggested a bit variation in the correlation coefficient between S.Na level and severity of HE. This study will provide us

1. Department of Medicine, Naseer Teaching Hospital Peshawar.
2. Department of Pathology Scholar KMC, Peshawar.
3. Department of Medicine BKMC / MMC Mardan.

Correspondence: Muhammad Arshad, Associate Professor, Department of Medicine, Naseer Teaching Hospital Peshawar.
Contact No: 0333-9198254
Email: arshad_physician@yahoo.com

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with local statistics about the correlation of sodium level and HE.

MATERIALS AND METHODS

This study was conducted at Naseer Teaching Hospital Peshawar. Duration of the study was 1 year and the study design was cross sectional (Correlation) study in which a total of 408 patients were observed by using -0.1411 of correlation coefficient between S.Na and HE 95% confidence level and 80% power of test. More over non probability consecutive sampling was used for sample collection. Patients presenting within 24hr of onset of HE aged 18 years and above were included while Patients with concomitant chronic renal failure, patients with acute fulminant hepatitis, Patients having spontaneous bacterial peritonitis on admission were excluded. The above mentioned conditions act as confounders and had cause bias in the study results if not excluded. Data collected was entered in SPSS 16. Results were presented as tables and graphs.

RESULTS

In this study 408 patients were observed in which 126(31%) patients were in age ranged 40-50 years, 135(33%) patients were in age ranged 51-60 years and 147(36%) patients were in age ranged 61-70 years. Mean age was 65 years with SD ± 0.315. Two hundred fifty-three (62%) patients were male while 155(38%) patients were female. One hundred eighty-four (45%) patients had S.Na level ranged 120-125 meq/L, 204(50%) patients had S.Na level ranged 126-130 meq/L and 20(5%) patients had S.Na level ranged 131-133 meq/L.

Table No.1: Age Distribution (n=408)

Age	Frequency	Percentage
40-50 Years	125	31%
51-60 Years	135	33%
61-70 Years	147	36%
Total	408	100%

Table No.2: Gender Distribution (n=408)

Gender	Frequency	Percentage
Male	253	62%
Female	155	38%
Total	408	100%

Table No.3: S.Na Level (n=408)

S.NA Level (MEQ/L)	Frequency	Percentage
120-125	184	45%
126-130	204	50%
131-133	20	5%
Total	408	100%

Mean S.Na level was 123 with SD ± 0.21

Table No.4: Severity of Hepatic Encephalopathy (n=408)

Severity of Hepatic Encephalopathy	Frequency	Percentage
Grade I	20	5%
Grade II	159	39%
Grade III	196	48%
Grade IV	33	8%
Total	408	100%

Table No.5: Correlation of Severity of Hepatic Encephalopathy With S.Na Level (n=408)

		S.NA Level			
		120-125	126-130	131-133	Total
Severity of Hepatic Encephalo-pathy	Grade I	0	0	20	20
	Grade II	0	159	0	159
	Grade III	151	45	0	196
	Grade IV	33	0	0	33
	Total	184	204	20	408

Spearman's rank correlation coefficient was 2.28 P value was 0.0001

Mean S.Na level was 123 meq/L with SD ± 0.21. Severity of hepatic encephalopathy was measured in term of grades and was analyzed as 20(5%) patients had severity of grade I, 159(39%) patients had severity of grade II, 196(48%) patients had severity of grade III and 33(8%) patients had severity of grade IV. Correlation of severity of hepatic encephalopathy with S.Na level was analyzed as all the 20 patients with severity of grade I had S.Na level ranged 131-133 meq/L. All the 159 patients with severity of grade II had S.Na level ranged 126-130 meq/L. In 196 patients with severity of grade III, 45 patients had S.Na level ranged 126-130 meq/t. while 151 patients had S.Na level ranged 120-125 meq/L whereas all the 33 patients with severity of grade IV had S.Na level ranged 120-125.

DISCUSSION

In our study correlation of severity of hepatic encephalopathy with S.Na level was analyzed as all the 20 patients with severity of grade I had S.Na level ranged 131-133 meq/L. All the 159 patients with severity of grade II had S.Na level ranged 126-130 meq/L. In 196 patients with severity of grade III, 45 patients had S.Na level ranged 126-130 meq/L while 151 patients had S.Na level ranged 120-125 meq/L whereas all the 33 patients with severity of grade IV had S.Na level ranged 120-125 meq/L. Spearman's rank correlation coefficient was — 0.28. Similar results were found in a study done by Sanyal A et al [10] as he reported correlation between S.Na level and severity of HE is -0.5830. Montono LA et al[11] had reported

correlation of S.Na level and severity of HE as -0.14. S.Na predicts prognosis in cirrhosis and may improve the prognostic accuracy of the model for end stage liver disease (MELD) score, but the available information is limited[12].Saad M et al [13]had reported that patients with low S.Na tend to have more severe ascites (p = 0.001).Hepatic encephalopathy was more frequent in patients with S.Na <130meq/l (p= 0.001).In another study conducted by Cardenas et al [14] shows that more than one half (57.9%)of patients had values of S.Na concentration below the normal range (< 135meq/l) and 30.7%had values < 130meq/l. The frequency of S.Na <130mmol/L in these patients is in accordance with a study by Borroni et al.[15] who reported hyponatremia in 30%of cases. In a Pakistani study it was found to be 26.7%.[13] The prevalence of HE was greater (34.15%)as compared to other national and international studies. The patients with S.Na <130meq/l had a significantly greater frequency (64%) of HE. The relationship between hepatic encephalopathy and serum levels may be explained onthe basis of more severe liver failure among patients with S.Na <130 meq/l, and the possibility that the two events may be patho-physiological linked [16.] Low S.Na levels in patients with cirrhosis are associated with a remarkable reduction in the cerebral concentration of organic osmolytes that probably reflect compensatory osmoregulatory mechanisms against cell swelling.[17-20] A major advance in our ability to treat hyponatremia is the introduction and approval of aquaretics (vaptans) which are vasopressin V2-receptor antagonists.[21]. In a study with 156 patients hospitalized with liver cirrhosis, the prevalence of hyponatremia, based on a S.Na concentration≤130 mmol/L, was 29.8%, and hyponatremia was significantly correlated with infection and ascities[22]

CONCLUSION

Hyponatremia was a common feature in patients with cirrhosis and its severity increased with the severity of liver disease. The existence of S.Na concentration < 135 mmol/L was associated with greater frequency of hepatic encephalopathy. It was also noticed that more severe the hyponatremia, greater will be the grade of hepatic encephalopathy. Close monitoring of S.Na concentration should be performed in patients with cirrhosis in order to prevent the rapid development of cirrhosis related complications.

Author's Contribution:

Concept & Design of Study:	Muhammad Arshad
Drafting:	Alia Banori
Data Analysis:	Shah Zeb
Revisiting Critically:	Muhammad Arshad, Alia Banori
Final Approval of version:	Muhammad Arshad

Conflict of Interest: The study has no conflict of interest to declare by any author.

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