STUDY THE RELATION BETWEEN SERUM SODIUM AND THE MODEL FOR END-STAGE LIVER DISEASE SCORE IN PATIENTS WITH LIVER CIRRHOSIS

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Abstract

Background: The aim of the study was to evaluate the prevalence of hyponatremia in liver cirrhosis and the correlation between serum sodium and the Model for End-Stage Liver Disease (MELD) score in patients with liver cirrhosis.

Methods: We prospectively collected data of 200 patients of chronic liver disease hospitalized in medical and surgical gastroenterology department of Geetanjali medical college, Udaipur.

Results: Serum sodium values were strongly associated with severity of cirrhosis, assessed by child Pugh class and MELD score. There was significant relationship between serum sodium, renal function (as assessed by serum creatinine)

Conclusion: Hyponatremia is a common problem in liver cirrhosis, especially advanced cirrhosis. The study showed that there is an association between hyponatremia and the presence of certain complications of liver cirrhosis. Also hyponatremia was associated with a higher severity of cirrhosis assessed by MELD scores.

Keywords: hyponatremia, Liver cirrhosis, MELD score

Introduction

Liver cirrhosis has a high morbidity and mortality, which is the 14th most common cause of death all over the world and the 4th in central Europe. It leads to 1.03 million deaths per year in the world,¹ and 170,000 deaths per year in Europe.² The prevalence of liver cirrhosis may be underestimated, because patients at the early phase of liver cirrhosis are often asymptomatic, and most of patients with liver cirrhosis are admitted due to its related complications. The 1-year mortality of liver cirrhosis varies greatly from 1% to 57% according to the complications.³ It is necessary to use the prognostic models to identify high-risk patients.

Intractable ascites, severe hyponatremia, and decreased arterial pressure are clinical findings seen in patients with advanced cirrhosis. These conditions occur as a result of high serum levels of renin/aldosterone owing to portal hypertension, a decreased vascular response to vasoactive drugs, and a reduced solute-free water clearance.⁴ According to several recent studies, hyponatremia occurring as a result of a reduced solute-free water clearance was a key prognostic factor in patients with liver cirrhosis when hyponatremia was incorporated into the MELD score.⁵ Hyponatremia is a common abnormal finding in approximately 57% of hospitalized patients with chronic liver disease and in 40% of outpatients with liver disease.⁶ we conducted this study to evaluate the prevalence of hyponatremia, to examine whether serum sodium levels correlate with the presence and severity of cirrhotic complications, and to estimate survival rates in patients hospitalized with complications due to liver cirrhosis.

Material and Method

We prospectively collected data of 200 patients of chronic liver disease hospitalized in medical and surgical gastroenterology department of Geetanjali medical college, Udaipur.

Patients were included according to following criteria

1) Chronic liver disease is diagnosed, by combination of clinical, biochemical and ultrasonographic findings or histology

2) Presence of ascites determined by Ultrasonography or paracentesis

Data collected was analyzed for various parameters which included demographic features, etiology, severity, and duration of cirrhosis. Severity assessed using the child pugh score and model for end stage liver disease score. Duration of cirrhosis was estimated in years since diagnosis. Patients taking diuretic were classified based on type and number of diuretic they were taking. Other parameters which were studied were: spontaneous bacterial peritonitis(SBP), gastrointestinal bleed,

hepatic encephalopathy (HE) and hepatorenal syndrome (HRS). Lab parameters studied included : complete blood count, prothrombin time/international normalized ratio, liver function test including serum bilirubin, transaminases, serum alkaline phosphatase, total protein, albumin, globulin, albumin/ globulin ratio, serum creatinine, blood urea, serum sodium, serum potassium. Ascitic fluid analysis was done to rule out spontaneous bacterial peritonitis

Data Analysis:

Data was recorded as per Performa. The data analysis was computer based; SPSS-22 was used for analysis. For

categoric variables chi-square test was used. For continuous variables independent samples's *t*-test was used. *p*-value <0.05 was considered as significant.

Results

Table 1: General characteristics

Mean age		55.32±11.26 Yrs
Male : female		45:155
Duration of cirrhosis		2.047±0.84 Yrs
Etiology	Alcohol	118(59.00%)
	HBV	32(16.00%)
	HCV	6(3.00%)
	NASH	14(7.00%)
	Others	30(15.00%)
Child pugh class	A	12(6.00%)
	B	88(44.00%)
	C	100(50.00%)
Serum sodium		133.46±7.12
MELD score		15.6±5.23

Mean age of patients was 55.8±11.6 years and consisted of 155 men (77.50%) and 45 women (22.50%). Causative factors for liver cirrhosis included chronic hepatitis B (88 cases, 44.00%), chronic hepatitis C (6 cases, 3.00%), alcoholic liver disease (118 cases, 59.00%), and other diseases (30 cases, 15.00%). The mean MELD score, 15.6±5.23; and mean serum sodium concentration, 133.46±7.12 mmol/L.

Table 2: Characteristics of cases according to biochemical parameters and severity of cirrhosis

Serum Sodium meq/l		B. UREA (mg/dl)	S, CREAT (mg/dl)	S, Na (meq/l)	CTP	MELD
less130 (N=80)	Mean	63.48	1.72	126.89	11.41	22.01
	SD	45.36	1.09	3.46	1.91	8.16
131 to135 (N=23)	Mean	43.56	1.28	132.68	10.18	17.24
	SD	30.18	0.56	1.32	2.14	5.98
more135 (N=97)	Mean	33.65	1.10	138.46	9.68	15.23
	SD	19.42	0.28	2.84	2.18	6.09
Total (N=200)	Mean	45.68	1.40	132.84	10.46	18.32
	SD	36.58	0.78	6.48	2.24	8.12
P Value LS		<0.001	<0.001	<0.001	<0.001	<0.001

Serum sodium values were strongly associated with severity of cirrhosis, assessed by child Pugh class and MELD score. There was significant relationship between serum sodium, renal function (as assessed by serum creatinine)

Discussion

The current study is an attempt to study the relationship between serum sodium concentration in patients of advanced chronic liver disease and its relationship with the occurrence of various decompensation events. Study has revealed that a large proportion of patients of advanced chronic liver disease have abnormal serum sodium levels. In our cohort almost one half of patients with advanced liver disease had values of serum sodium values below normal range (≤ 135 meq/l). Low serum sodium has not shown any association with age, sex or etiology of chronic liver disease

but were more frequent in patients with advanced parenchymal liver failure.

Similar results were obtained by other studies. These studies were conducted on randomly chosen decompensated cirrhotic patients only. In the study conducted by Angeli *et al.*⁷ on 997 patients with liver cirrhosis having ascites, the prevalence of hyponatremia was 49.4%. In the study by Kim *et al.*⁸ conducted on 188 cirrhotic patients with ascites the prevalence of hyponatremia was 47.9%. In the study by Shaikh *et al.*⁹ conducted on 217 cirrhotic ascitic patients the prevalence of hyponatremia was 51.6%. Khalil *et al.*¹⁰ showed a prevalence of hyponatremia of 65.5% among 200 decompensated cirrhotic patients.

The prevalence of hyponatremia in our study may be slightly higher than that seen in most of the above-mentioned studies. That is because our study focused on

certain complications that may have an association with hyponatremia unlike other studies that were conducted on randomly chosen decompensated cirrhotic patients.

Conclusion

Hyponatremia is a common problem in liver cirrhosis, especially advanced cirrhosis. The study showed that there is an association between hyponatremia and the presence of certain complications of liver cirrhosis. Also hyponatremia was associated with a higher severity of cirrhosis assessed by MELD scores.

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