Section: General Medicine

Original Research Article

HYPONATREMIA AS A PROGNOSTIC FACTOR AMONG PATIENTS WITH ALCOHOLIC LIVER CIRRHOSIS

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ABSTRACT

Background: Liver is responsible for metabolism, immunity, digestion, detoxification and storage of vitamins and also helps in cholesterol homeostasis. Hyponatremia is seen in about 15-30% of the hospitalized patients and the term hyponatremia is defined as serum sodium levels less than 135 meq/l. Hyponatremia in liver cirrhosis is due to excessive renal retention of water relative to sodium and increased release of arginine vasopressin. It is associated with increased mortality, morbidity and may lead to hepatic encephalopathy.

Materials and Methods: A hospital based observational study was used and our study sample were 100 patients clinically diagnosed as with alcohol induced cirrhosis of liver. Detailed history of their symptoms, duration of alcohol consumption and other relevant data was collected and necessary investigations were conducted.

Results: The mean duration of alcohol consumption noted was 15.67 ± 5.36 years and hyponatremia (<130meq/L) was seen in 36% and as the duration of alcohol consumption increased, there was a significant fall in serum sodium levels. Sodium levels were significantly lower among those who presented with altered sensorium. Bilirubin values were significantly deranged and also coagulation profile was affected with elongated PT and INR.

Conclusion: Hyponatremia (<130meq/L) was prevalent in 36% of the cases during admission time and positively associated with longer duration of alcoholism. Also, hyponatremia was significantly associated with increased risk of complication of liver cirrhosis

Keywords: Hyponatremia, Alcoholic Liver cirrhosis, Child-Turcotte-Pugh score, Liver cirrhosis.

INTRODUCTION

Liver is responsible for many functions which help in metabolism, immunity, digestion, detoxification and storage of vitamins. It accounts for 2% of the total body weight, is responsible for storage of fat-soluble vitamins, helps in cholesterol homeostasis, storage of iron and copper. It also has a major role in haematology with protein and clotting factor synthesis, in breakdown of haemoglobin into unconjugated bilirubin and conjugates it.[1] Hyponatremia is seen in about 15-30% of hospitalised patients and is defined as serum sodium levels less than 135meq/l. Hyponatremia can be of pseudo hyponatremia or true hyponatremia.[2]

About 2 million deaths occur worldwide due to liver disease and about 1.16 million deaths are due to liver cirrhosis.[3] Hyponatremia is seen among patients with cirrhosis of liver and portal hypertension. It occurs due to various factors related to cirrhosis of liver and portal hypertension, the most prominent is due to increased release of arginine vasopressin.[4] Hyponatremia is an electrolyte imbalance seen especially among patients with advanced liver disease and is associated with worsening the clinical outcome.[5] In liver cirrhosis, hyponatremia is defined as serum sodium levels less than 130 meq/l.[6]

Liver cirrhosis with hyponatremia is associated with increased mortality and morbidity, also hyponatremia may affect brain function leading to hepatic encephalopathy.[7] It is challenging to treat subjects of hyponatremia in cirrhosis as the conventional therapy of hyponatremia incudes restriction of fluid and loop diuretics. Drugs that selectively antagonize

effect of arginine vasopressin on the V2 receptors in kidney tubules helps in treatment of hyponatremia, but are not used in cirrhosis patients due to increased risk of hepatic failure and mortality.[6] Alcohol is one of the major contributors for cirrhosis of liver and hyponatremia is quite common findings in cirrhosis of liver. So, we have tried to establish if hyponatremia could be used as a prognostic marker among patients with alcoholic liver cirrhosis.

MATERIALS AND METHODS

A hospital based observational study was used and our study sample were 100 patients clinically diagnosed as with alcohol induced cirrhosis of liver who presented to the OPDs in the department of General Medicine at Chikmagalur Institute of Medical Sciences. After the participants met inclusion and exclusion criteria, they were enrolled in our study based on simple random sampling technique and written informed consent was sought. Detailed history of their symptoms, duration of alcohol consumption and other relevant data was collected and necessary investigations were conducted.

RESULTS

The mean age of our patients with liver cirrhosis was 56.22 ± 12.35 years with predominant males (88%) with more than two third of them belonging to lower socio-economic status and from rural areas. Most common presenting symptom was pedal oedema (98%), followed by jaundice (92%), abdominal distension (90%), breathlessness (32%), haematemesis (28%) altered sensorium (13%) and seizures (3%) (Graph 1). Mean duration of alcohol consumption was 15.67 ± 5.36 years and liver function test variables and clotting factors were deranged. [Table 1] Serum sodium levels were deranged with hyponatremia seen among 36% of them at admission and continued to be lower during subsequent follow-ups (Table 2). As the duration of alcohol consumption increased there was significant decline in serum sodium levels. [Figure 2]

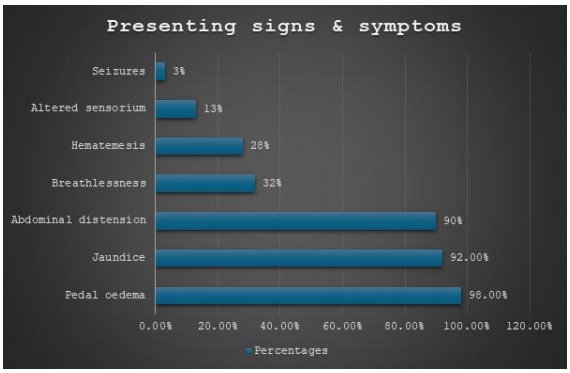

Figure 1: Presenting signs and symptoms

Table 1: Liver function test and clotting factors findings

Sl. No	Liver Function tests	Mean	SD
01	Total bilirubin (mg/dl)	7.65	4.96
02	Direct bilirubin (mg/dl)	3.92	2.05
03	Total protein (mg/dl)	6.58	1.01
04	Albumin (g/dl)	2.46	0.98
05	AST (U/L)	67.25	19.32
06	ALT (U/L)	71.28	15.32
07	ALP (U/L)	139.21	31.52
08	PT	29.28	11.92
09	INR	2.06	0.80

Table 2: Serum sodium levels

Sl. No	Time of evaluation	Serum sodium levels	
		Mean	SD
01	At admission	131.45	11.28
02	At 6 hours	133.21	9.38
03	At 24 hours	130.28	10.65
04	At 3rd day	132.56	9.28
05	At 7th day	130.28	10.21
06	At 1 month follow-up	130.01	11.25
07	At 3-month follow-up	129.32	10.56
08	At 6-month follow-up	127.56	8.21
ANOVA test p value: **0.0026 *** (Statistically significant at p value <0.05)			

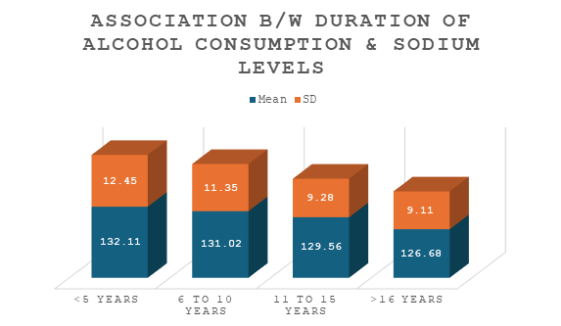

Figure 2: Association between duration of alcoholism and hyponatremia

DISCUSSION

Hyponatremia is common in patients with liver diseases and especially among patients diagnosed with liver cirrhosis, serum sodium abnormalities are quite common. Reddy D K, et al, reported that 90% of their patients were males and mean age of their patients was 46.10 ± 10.55 years, which was slightly lower compared to our findings.8 As per findings by Kim JH, et al, 70% of their patients were males and mean age of the patients was 55.80 ± 11.60 years, whose findings were similar to that of ours.[9] Shaikh S, et al, stated that 65% were males and mean age was 46.80 ± 13 years.[10] Similarly, Gupta GK, et al, reported that 79% of their patients were males and mean age of the patients was 43.58 ± 13.09 years, which was quite lower compared to that of ours.[11] Baron D, et al reported that in their study CNS symptoms (altered sensorium) was seen in 46% of the patients and 14% of them had CNS symptoms due to hyponatremia, which was quite similar compared to our study.[12]

In our study liver function test was deranged with elevated total bilirubin levels being 7.65 ± 4.96 mg/dl and direct bilirubin 3.92 ± 2.05 mg/dl. Coagulation profile was prolonged in our study with mean PT 29.28 ± 11.92 and mean INR was 2.06 ± 0.80. Tea Restuccia et al., on the effect of dilutional hyponatremia on brain organic osmolytes and water content in patients with cirrhosis. According to the study dilutional hyponatremia in cirrhosis is associated with remarkable reduction in brain organic osmolytes that probably reflect compensatory osmoregulatory mechanism against cell swelling triggered by combination of high intracellular glutamine and low extracellular osmolality. This is relevant to the pathogenesis of encephalopathy in subjects with hyponatremia.[13] Gines P, et al. revealed hyponatremia in cirrhosis was due to absorption of water from distal tubules which causes dilution of intravascular volume that results in dilutional hyponatremia.[14]

Table 3: Comparison of prevalence of hyponatremia

Sl. No	Study	Prevalence of hyponatremia
01	Our study	36% (<130meq/L)
02	Reddy DK, et al.[8]	53% (<135meq/L)
03	Shaikh S, et al.[10]	26.70% (<130meq/L)
04	Gupta GK, et al.[11]	40.30% (<130meq/L)

Table 4: Comparison of complications across studies

Sl. No	Study	Complications
01	Our study	90% had ascites, 83% portal hypertension, 28% had hepatic encephalopathy, 12% coagulopathy, 28% had GI bleeding.
02	Reddy DK, et al[8]	100% had ascites, 89% portal hypertension, 30% had hepatic encephalopathy, 14% had hepatorenal syndrome, 3% had coagulopathy, 18% had GI bleeding.
03	Kim JH, et al[9]	80.30% had ascites, 31.90% had hepatic encephalopathy, 3.2% had hepatorenal syndrome.
04	Shaikh S, et al[10]	100% had ascites, 13% had hepatic encephalopathy.
05	Gupta GK, et al.[11]	88% had ascites, 20% had hepatic encephalopathy, 21% had hepatorenal syndrome,9.5% had GI bleeding.

CONCLUSION

Hyponatremia (<130meq/L) was prevalent in 36% of the cases during admission time and positively associated with longer duration of alcoholism. Jaundice, abdominal distension, pain abdomen, altered sensorium were most common presenting symptoms. Hyperbilirubinemia, hypoproteinemia and hypoalbuminemia were noted. Also, hyponatremia was significantly associated with increased risk of complication of liver cirrhosis.

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