Section: General Medicine

Original Research Article

SERUM SODIUM LEVELS AS A POOR PROGNOSTIC FACTOR IN CHRONIC LIVER DISEASE: A RETROSPECTIVE STUDY

Received : 09/05/2025
Received in revised form : 03/07/2025
Accepted : 24/07/2025

Keywords:
Chronic liver disease and serum sodium levels

Corresponding Author:
Dr.M. Atchin Naidu,
Email: munny1907@gmail.com

DOI: 10.47009/jamp.2025.7.4.286

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (4); 1513-1515

K. Anantha Kumari[1], M. Atchin Naidu[2]

[1] Associate Professor, Department of General Medicine, Government Medical College, Ongole, Andhra Pradesh, India.
[2] Associate Professor, Department of General Medicine, Government Medical College, Ongole, Andhra Pradesh, India

ABSTRACT

Background: Cirrhosis of the liver is often associated with electrolyte abnormalities mainly sodium levels. Various mechanisms occurring due to the cirrhosis leads to hypervolemichyponatremia. **Materials and Methods:** This retrospective study is conducted in the Department of General Medicine, Government Medical College and Government General Hospital, Ongole. Patients admitted in Medical wards and Medical ICU from December 2024 to December 2023 fulfilling the inclusion criteria are included in the study. Data is analyzed using SPSS IBM version 26.0. **Result:** A total of 60 patients were studied with their serum sodium levels over a course of 1 year from December 2024 to December 2023 (Table 1). Out of them 32 (53%) were males and 28 (46%) were females. A total of seven patients had elevated serum sodium levels, forty three patients had low serum sodium levels and ten of them had normal serum sodium levels. Out of the three subgroups, the patients with low serum sodium levels have the highest risk of mortality rate. **Conclusion:** Serum Sodium levels have a correlation with the mortality of the patients with Chronic liver disease with decreased sodium levels having the highest mortality levels when compared with increased and normal sodium levels. Mortality is also higher with males as compared to females in the patients with decreased sodium levels.

INTRODUCTION

Cirrhosis with portal hypertension is a major contributing factor to hypervolemichyponatremia, a common electrolyte disturbance in patients with chronic liver disease.[1]Hyponatremia in cirrhosis arises due to compromised effective central blood volume, triggered by reflex splanchnic vasodilation, which activates compensatory mechanisms such as vasoconstriction and anti-natriuretic processes.[2] These lead to an imbalance where free water retention exceeds sodium retention, resulting in dilutionalhyponatremia.[3] This condition is relatively common, occurring in approximately 50% of hospitalized patients with cirrhosis and 40% of cirrhotic outpatients.[4] The coexistence of hyponatremia in cirrhosis is clinically significant and associated with a higher Child-Pugh score, massive ascites, hepatorenal syndrome, hepatic encephalopathy, and spontaneous bacterial peritonitis. Hyponatremia is associated with increased mortality in cirrhotic patients when compared to those with normal serum sodium levels.[5-7] Recent research indicates that hyponatremia is a significant predictive factor in chronic liver disease. Additionally, patients with hyponatremia have poorer survival rates compared to those without it.[8] While there has been substantial research on the role of serum sodium levels in the progression of severe liver disease, results have been variable. There remain limited data correlating serum sodium levels with the development of cirrhosis complications. This study aimed to explore the relationship between serum sodium levels and liver cirrhosis, in terms of disease severity and complications. Specifically, this study is aimed to determine the association between serum sodium levels and liver cirrhosis severity. Furthermore, we investigated the correlation between hyponatremia and the development of cirrhotic complications.

Aims and Objectives

Primary Objectives

1. To correlate the serum sodium with child pugh score at the time of admission and successive

ISSN (O): 2687-5365; ISSN (P): 2753-6556

values of seum sodium and Child Pugh score at day 3,7 and 14
2. To identify the etiology and mode of presentation of chronic liver diseases

MATERIALS AND METHODS

This retrospective study is conducted in the Department of General Medicine, Government Medical College and Government General Hospital, Ongole. Patients admitted in Medical wards and Medical ICU from December 2024 to December 2023 fulfilling the inclusion criteria are included in the study.

Inclusion Criteria: Patients aged 18 years and older and those clinically diagnosed with liver cirrhosis based on clinical features, laboratory investigations, and imaging findings. Only patients with a stable hemodynamic status upon admission are included in the study.

Exclusion Criteria: Exclusion criteria included patients with heart failure, chronic kidney disease, those on thiazide diuretics, pregnant women, and patients with severe nonhepatic comorbidities (such as active malignancies or sepsis).

Sampling Method: Convenience sampling

Methods: The diagnosis of liver cirrhosis is based on a combination of clinical features (jaundice, ascites, and signs of portal hypertension), liver function tests (e.g., hyperbilirubinemia, hypoalbuminemia, and prolonged prothrombin time), and ultrasonographic findings (e.g., shrunken liver and surface nodularity). Upon admission, patients' serum sodium levels are measured and correlated with their Child-Pugh score to assess the severity of liver disease. Additionally, the presence of cirrhotic complications such as ascites, hepatorenal syndrome, and hepatic encephalopathy will noted from the case records. The patient's Child Pugh score is calculated at the time of admission. Serum sodium values and Child Pugh scores of day 7 and day 14 are obtained from the case records. In case of death/discharge before 14 days, the values are obtained from the day of death/discharge.

Table 1

Factor	1 point	2 points	3 points
Total bilirubin (µmol/L)	<34	34–50	>50
Serum albumin (g/L)	>35	28–35	<28
PT INR	<1.7	1.71–2.30	>2.30
Ascites	None	Mild	Moderate to Severe
Hepatic encephalopathy	None	Grade I–II (or suppressed with medication)	Grade III–IV (or refractory)

Statistical analysis: Data is analyzed using SPSS IBM version 26.0. Continuous variables (e.g., age) are assessed for normality, and descriptive measures such as mean, standard deviation, and range are calculated for the normally distributed data. Comparisons between subgroups is performed using t-tests or one-way ANOVA as appropriate. Categorical data is presented as frequency and percentage values, and comparisons are tested using the paired t-test.

RESULTS

A total of 60 patients were studied with their serum sodium levels over a course of 1 year from December 2024 to December 2023 (Table 1). Out of them 32 (53%) were males and 28 (46%) were females. A total of seven patients had elevated serum sodium levels, forty three patients had low serum sodium levels and ten of them had normal serum sodium levels. Patients with low serum sodium levels have seen to have highest mortality with around 8 (13%) patients when compared with the other groups (Table 2). Among the patients with low serum sodium levels, males (13%) have found to have the higher mortality when compared to females (10%). In people with increased sodium levels, normal sodium levels mortality was found to be similar in both males and females.

Table 2

S.Na+ Levels	Male	Female	Total
Increase	4(6%)	3(2%)	7(11%)
Decrease	22(36%)	21(35%)	43(71%)
Normal	6(10%)	4(6.6%)	10(16.6%)
Total	32(53%)	28(46%)	60(100%)

Table 3

Mortality Rate			
S.Na+ Levels	**Male**	**Female**	**Total**
Increase	2(3%)	2(3%)	4(6%)
Decrease	5(8%)	3(5%)	8(13%)
Normal	1(1.6%)	1(1.6%)	2(3.3%)
Total	8(13%)	6(10%)	14(23.3%)

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

The most common aetiology for liver cirrhosis in our study group is Alcohol induced liver cirrhosis, with the most common presentation being Ascites, with findings similar to the study from Singh, et al.[9]

The prevalence of hyponatremia in patients with altered serum sodium levels is around 71%. Of the three subgroups of altered sodium levels hyponatremia is the most common and is the most associated with complications (35%).

The most common cause of hyponatremia in patients with CLD is due to inadequate solute free water excretion leading to increased ADH production leading to the obvious hyponatremia.

These altered sodium levels are also often associated with abnormal potassium and magnesium levels also, in which Hypokalemia and Hypomagnesemia are also co prevalent with hyponatremia.

Abnormal sodium levels are also associated with changes in the MELD score, with lower serum sodium levels having a higher MELD score which is similar to that of the observation by Kim, et al.[10]

Of the three subgroups of varying sodium levels, hyponatremia is the most associated with complications like Hepatorenal Syndrome similar to the result observed by Shaikh, et al.[11]

Lower serum sodium levels are also associated with increasing CTP score and this result was in accordance with study done by Quereshi, et al.[12]

CONCLUSION

Serum Sodium levels have a correlation with the mortality of the patients with chronic liver disease with decreased sodium levels having the highest mortality levels when compared with increased and normal sodium levels. Mortality is also higher with males as compared to females in the patients with decreased sodium levels.

REFERENCES

1. Raj K, Mehta AK. A Cross-sectional Observational Study of Clinical Significance of Serum Sodium Levels in Liver Cirrhosis. Int J Sci Res 2022;11:65-67. https://doi.org/10.36106/ijsr.
2. John S, Thuluvath PJ. Hyponatremia in cirrhosis: pathophysiology and management. World J Gastroenterol 2015;21:3197–205. https://doi.org/10.3748/wjg.v21.i11.3197.
3. Janičko M, Dražilová S, Gazda J, Tomáš M, Kučera M, Šuchová Ž, et al. Clinical significance and management of hyponatremia in liver cirrhosis. Gastroenterol Insights 2023;14:446–62. https://doi.org/10.3390/gastroent14040033.
4. Nareddy SR, Aroor AR, Bhat A. Clinical Significance of Serum Sodium Levels in Liver Cirrhosis: A Cross-sectional Observational Study. J ClinDiag Res 2020;14: 23-26. https://doi.org/10.7860/JCDR/2020/46798.14225.
5. Mohanty A, Garcia-Tsao G. Hyponatremia and hepatorenal syndrome. GastroenterolHepatol (N Y) 2015;11:220–9. https://pubmed.ncbi.nlm.nih.gov/27099594/
6. Oeltzschner G, Butz M, Wickrath F, Wittsack H-J, Schnitzler A. Covert hepatic encephalopathy: elevated total glutathione and absence of brain water content changes. Metab Brain Dis 2015;31:517–27. https://doi.org/10.1007/s11011-015-9760-3.
7. Angeli P, Wong F, Watson H, Ginès P, CAPPS Investigators. Hyponatremia in cirrhosis: Results of a patient population survey. Hepatology 2006;44:1535–42. https://doi.org/10.1002/hep.21412.
8. Chaudhary RD, Sah KK, Chaudhary RP. Dysnatremia in patients with chronic liver disease: a cross-sectional observational study. Int J Adv Med 2022;9:995. https://doi.org/10.18203/2349-3933.ijam20222395.
9. Singh Y — Study of electrolyte disturbance in chronic liver disease patients attending a hospital in Kumaon region. Journal of Family Medicine and Primary care; 11(8): 4479-82
10. Kim J H, Lee J S, Mao Y — Magnesium and Liver disease. Ann Transl Med 2019; 7(20): 578
11. Shaikh S — Frequency of hyponatremia and its influence on liver cirrhosis-related complications. J Pak Med Assoc 2010; 60(2): 116-120
12. Qureshi Mohammad — correlation kfhyponatremia with Hepatic Encephalopathy and severity of liver disease. Journal of the College of physicians and surgeons Pakistan; 24: 135-137.

ISSN (O): 2687-5365; ISSN (P): 2753-6556