Scientific Research Publishing

Open Journal of Gastroenterology, 2025, 15(12), 766-773
https://www.scirp.org/journal/ojgas
ISSN Online: 2163-9469
ISSN Print: 2163-9450

Hyponatremia in Cirrhotic Patients in the Hepatology and Gastroenterology Department of Gabriel Touré University Hospital

Hourouma Sow[1*], Kadiatou Doumbia[1], Deborah Sanogo[2], Sara Ditio Diarra[1], Moussa Younoussa Dicko[1], Makansiré Tounkara[1], Anselme Konaté[1], Moussa Tiemoko Diarra[1], Moussa Youssoufa Maiga[1]

[1]Hepatogastroenterology Department, Gabriel Touré University Hospital, Bamako, Mali
[2]Hepatogastroenterology Department, Point G University Hospital, Bamako, Mali
Email: *sowhourouma@yahoo.fr

How to cite this paper: Sow, H., Doumbia, K., Sanogo, D., Diarra, S.D., Dicko, M.Y., Tounkara, M., Konaté, A., Diarra, M.T. and Maiga, M.Y. (2025) Hyponatremia in Cirrhotic Patients in the Hepatology and Gastroenterology Department of Gabriel Touré University Hospital. *Open Journal of Gastroenterology*, **15**, 766-773.
https://doi.org/10.4236/ojgas.2025.1512072

Received: November 14, 2025
Accepted: December 13, 2025
Published: December 16, 2025

Abstract

The aim of this study was to investigate hyponatremia in cirrhotic patients. This was a prospective study conducted in the hepatogastroenterology department from January 2020 to June 2021, including hospitalized cirrhotic patients. We collected data on 79 cirrhotic patients with hyponatremia, including 48 men and 31 women, with a mean age of 50.89 ± 13.79 years (range 20 - 80 years). The etiology of cirrhosis was viral, predominantly hepatitis B virus. More than half of the patients (60.76%) were classified as Child-Pugh C. The prevalence of hyponatremia was 45.57% for a serum sodium level < 130 mmol/L and 54.43% for a serum sodium level between 130 and 135 mmol/L. Hyponatremia was correlated with the severity of liver disease. Complication-free survival was shortened in patients with severe hyponatremia. After 18 months of follow-up, 58 patients (73.42%) had died including 44.30% within 1 to 6 months of being diagnosed with hyponatremia. Hyponatremia is a poor prognostic factor in cirrhosis and is correlated with the severity of liver disease.

Keywords

Hyponatremia, Cirrhosis, Mortality, Hepatogastroenterology, Gabriel Touré University Hospital

1. Introduction

Cirrhosis, a serious liver disease with multiple etiologies, constitutes a significant public health problem worldwide due to its frequency and complications (portal

hypertension, hepatic encephalopathy, hepatocellular carcinoma, hepatorenal syndrome) [1]. Hyponatremia is common in cirrhosis, especially in the presence of ascites. This hyponatremia is defined according to generally accepted consensus as a serum sodium level below 130 mmol/l [2]. Several studies have proven that hyponatremia is the most frequent hydro-electrolytic disorder during cirrhosis, occurring at an advanced stage of liver disease [3], it predisposes to the occurrence of hepatic encephalopathy [4]. Its incidence is 57% in hospitalized cirrhotic patients [5]. According to one study, 42% of patients undergoing liver transplantation had developed hyponatremia before transplantation [6]. Hyponatremia was observed in 6.07% of cirrhotic patients in China [7]. In Africa, 9% of cirrhotic patients presented with hyponatremia in Tunisia [8], and 15.8% in Côte d'Ivoire [9]. In Mali, a study on hepatic encephalopathy showed that the triggering factor of this hepatic encephalopathy was represented by hydro-electrolytic disorders in 22% of cases without specifying the type of disorder [10]. In the absence of studies on hyponatremia in cirrhotic patients, in our context, we initiated this work.

2. Patients and Methods

2.1. Study Location

It took place in the hepatogastroenterology department of the Gabriel Touré University Hospital.

2.2. Types and Period of Study

This was a prospective cross-sectional study conducted from January 2020 to June 2021.

2.3. Study Population

The study included all patients hospitalized in the department for cirrhosis.

- **Inclusion criteria:** The following were included:
- Patients who provided oral consent
- Patients hospitalized in the hepatogastroenterology department for compensated or decompensated cirrhosis, diagnosed based on:
  - clinical findings (firm hepatomegaly with a sharp inferior border, or atrophic or normal-sized liver, ascites with or without lower limb edema, central venous catheter, jaundice),
  - ultrasound findings (multinodular liver with irregular contours, ultrasound signs of portal hypertension, portal vein dilation, splenomegaly, ascites, etc.)
  - endoscopic findings (esophageal varices, cardio-tuberositary varices, antral vascular ectasia, portal hypertensive gastropathy)
  - and laboratory findings (low prothrombin time, hypoalbuminemia, thrombocytopenia, anemia).
- Cirrhotic patients who underwent serum sodium measurement

- **Exclusion criteria:**
  - Patients hospitalized for reasons other than cirrhosis were not included.

- Patients hospitalized with cirrhosis but without serum sodium measurement were not included.
- Non-hospitalized patients were not included.

2.4. Ethical Considerations

Verbal consent from the patient or their family was obtained and Patient anonymity was guaranteed.

2.5. Study Methods

All patients meeting our inclusion criteria underwent a complete clinical examination, including an interview to look for medical history, functional signs such as physical asthenia, increased abdominal volume, and history of digestive bleeding.

2.5.1. Physical Examination

Looking for signs of portal hypertension (ascites, Collateral venous circulation, splenomegaly) and signs of hepatocellular insufficiency (spider angioma, jaundice, gynecomastia).

2.5.2. Paraclinical Examinations

➢ Biological:

- Blood ionogram: two criteria for hyponatremia have been defined:
  - Sodium < 130 mmol/L
  - Sodium between 131 - 135 mmol/L
- Urea,
- Prothrombin rate,
- Complete blood count (CBC),
- Total and conjugated bilirubin,
- Serum creatinine and creatinine clearance,
- Serological markers for hepatitis B and C,
- Protein electrophoresis.

➢ Morphological examinations

- Fibroscopy: To look for signs of endoscopic portal hypertension (PH).
- Ultrasound: To look for ultrasound signs of PH and liver morphological abnormalities.

2.6. Data Entry and Analysis

The data were collected on an individual survey form, entered and analyzed on the software "EPI-INFO version 7.2.4.0". The Chi-square test was used to compare the proportions. The significance threshold was set at $p < 0.05$.

3. Results

During the study period, we collected data on 1052 hospitalizations in the hepatogastroenterology department of the Gabriel Touré University Hospital, including 220 cirrhotic patients (20.91%). Among these 220 patients, 79 had hypo-

natremia (35.90%), with 16.36% having a serum sodium level < 130 mmol/L and 19.54% having a level between 131 and 135 mmol/L. The mean age was 50.89 ± 13.79 years (range 20 - 80 years). The male-to-female ratio was 1.55. Altered mental status was the most frequent reason for consultation (49.36%), followed by ascites (Table 1). More than half of the patients had hyponatremia within the first 6 months of the disease (Table 2). A low prothrombin rate was found in 36 patients or 45.57%. Hypoalbuminemia was present in 35 patients or 44.31%, hyperbilirubinemia in 40 patients or 50.63% and thrombocytopenia in 41.77% of patients (Table 3). The majority of patients, 60.75%, were classified as Child C (severe cirrhosis) and 35.45% as Child B (decompensated cirrhosis). Hepatitis B was the dominant etiology in the patients. Hepatic encephalopathy was present in 21.52% of patients with serum sodium levels < 130 mmol/L, compared with 30.34% of patients with serum sodium levels between 130 and 135 mmol/L; ascites was present in 35.44% of patients with serum sodium levels < 130 mmol/L compared to 45.57% with a serum sodium level between 130 - 135 mmol/l, and esophageal varices in 35.44% of patients with a serum sodium level < 130 mmol/l compared to 45.57% with a serum sodium level between 130 - 135 mmol/l in our study. Hyponatremia was associated with the severity of liver disease (Table 4). Hyponatremia was associated with the severity of liver disease (Table 4). After 18 months of follow-up, 58 patients, or 73.42%, died, including 44.30% within 1 to 6 months after the diagnosis of hyponatremia (Table 5).

Table 1. Distribution of patients according to reason for consultation.

Reason for consultation	Effective	Percentage %
Disorder of consciousness	**26**	**53.1**
Ascite	9	18.4
Abdominal pain	3	6.1
Hematemesis	3	6.1
Fever	2	4.1
Jaundice	3	6.1
Vomiting	2	4.1
Rectal bleeding	1	2
Total	49	100

Table 2. Distribution of patients according to the duration of hyponatremia and the diagnosis of cirrhosis.

Onset of the disease	Effective	Percentage %
<1 month	5	10.2
1 - 6 months	25	51
7 - 12 months	8	16.3
>12 months	11	22.5
Total	49	100

Table 3. Distribution of patients according to biological signs.

Biologies		Staff	Percentage %
TP (%) (n = 49)	≥50	27	55.10
	<50	22	44.90
Albumin (g/l) (n = 49)	>35	8	16.33
	28 - 35	18	36.73
	<28	23	46.94
Blood glucose (mmol/l) (n = 49)	0.70 - 1.10	39	79.59
	>1.26	10	20.41
serum creatinine (µmol/l) (n = 49)	≤120	29	59.18
	>120	20	40.82
Creatinine clearance (n = 49)	80 - 130	32	65.31
	<80 (ml/mn)	17	34.69
Urea (mmol/l) (n = 49)	<2.5	14	28.57
	2.5 - 7.5	20	40.82
	>7.5	15	30.61
Ag HBs (n = 50)	Positive	46	92
	Negative	4	8
Anti-HCV Ac (n = 50)	Positive	4	8
	Negative	46	92
Bilirubin (µmol/l)	<35	8	16.33
	35 - 50	13	26.53
	>50	28	57.14
Platelets (10)	≤150	23	46.94
	≥150	26	53.06
Hemoglobin level (g/dl)	≤12 g/dl	39	79.59
	≥12 g/dl	10	20.41

Table 4. Comparison of cirrhosis characteristics in the two groups.

	Group	Group		
	Na < 130	Na [130 - 135]	P	OR (95% CI)
	N (22)	N (27)		
Viral etiology	22 (100%)	27 (100%)	0.28	
Average duration of cirrhosis progression	6.7 months	5.4 months		
β-blocker	1 (4.5%)	3 (11.1%)	0.40	0.38
Diuretic	9 (41%)	17 (63%)	0.12	0.40
Esophageal varices grade II and III	21 (95.4%)	27 (100%)	0.26	

Continued

Ascites	17 (77.3%)	25 (92.4%)	0.12	0.27
Hepatic encephalopathy	12 (54.5%)	17 (63%)	0.11	0.35
Hemorrhage	1 (4.5%)	7 (26%)	0.04	0.13
Hepatocellular carcinoma	2 (9%)	1 (4%)	0.43	2.60
Child-Pugh Stage C	**19 (86.36%)**	**10 (27.03%)**	**0.00001**	**17.10**

Table 5. Distribution of patients according to overall survival.

Death interval	Effective	Percentage %
<1 month	**7**	**17.95**
1 - 6 months	**24**	**61.54**
7 - 12 months	3	7.69
>12 months	5	12.82

4. Discussion

This prospective study, conducted from January 2020 to June 2021, included 220 cirrhotic patients, 79 of whom had hyponatremia. Patients were included based on non-invasive criteria commonly used for the diagnosis of cirrhosis, despite the challenges involved.

Study limitations:

- The single-center nature of the study may limit the generalizability of the results.
- Our sample size was limited due to the high cost of laboratory tests, making diagnosis and patient follow-up difficult.
- The unavailability of treatments such as albumin can influence the observed prognosis

The mean age was 50.89 ± 13.79 years, with a range of 20 to 80 years. This result is comparable to that of Rym *et al.* [11], who reported a mean age of 58 years. The prevalence of hyponatremia was 16.36% if the serum sodium level was <130 mmol/L and 19.54% if it was between 131 and 135 mmol/L. Rym *et al.* reported a lower prevalence of 10.5% for a serum sodium level < 130 mmol/L and 31.4% for a sodium level ≤ 135 mmol/L [11]. In the literature, the prevalence of hyponatremia was 21.6% for a sodium level < 130 mmol/L and 49.4% for a level between 131 and 135 mmol/L [3]. This can be explained by the fact that the cirrhotic patients included in our series had more severe cirrhosis than those in other studies. Regarding risk factors, the occurrence of hyponatremia is classically correlated with the severity of the disease as assessed by Child-Pugh scores [3] [4] in our study. These data corroborate our results and are comparable to that found by G Boroni *et al.* as well as Somberg JC [12] [13]. Hepatic encephalopathy was present in 21.52% of patients with a serum sodium < 130 mmol/l versus 30.34% with a serum sodium between 130 - 135 mmol/l; ascites in 35.44% of patients with a sodium level < 130 mmol/l 65 Hyponatremia in cirrhotic patients in the hepatogastroenterology de-

partment of the Gabriel Touré University Hospital against 45.57% with a sodium level between 130 - 135 mmol/l and esophageal varices in 35.44% of patients with a sodium level < 130 mmol/l against 45.57% with a sodium level between 130 - 135 mmol/l in our study. These results were similar to those of Kim JH *et al.* [14]. In fact, the severity of hyponatremia, particularly at serum sodium concentrations < 130 mmol/L, corresponded to higher risks of developing severe ascites and severe hepatic encephalopathy, compared to the risks in patients with serum sodium ≥ 130 mmol/L. In agreement with previous reports, serum sodium concentration was not associated with the presence of varicose veins. The overall survival at 18 months was 26.58%, comparable to that of Rym *et al.*, who had an overall survival of 22.5% [11].

5. Conclusion

Cirrhosis remains a significant concern for clinicians, particularly hepatogastroenterologists. Diagnosis is very often delayed. The complications to which it predisposes are varied and serious. The occurrence of electrolyte disturbances, including hyponatremia, confirms this severity. Hyponatremia is a poor prognostic factor in chronic liver diseases; it is associated with the severity of liver disease. Therapeutic options are limited in our setting. Survival at 18 months was shortened in our study.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Moussa, A.M., Ibrahim, H., Madjadoum, T., Saleh, T.M. and Nouedoui, C. (2017) Evaluation of Renal Function in a Group of Subjects with Cirrhosis in Ndjamena. *Health Sciences and Disease*, **18**, 78-81.

[2] Ginés, P., Berl, T., Bernardi, M., Bichet, D.G., Hamon, G., Jiménez, W., *et al.* (1998) Hyponatremia in Cirrhosis: From Pathogenesis to Treatment. *Hepatology*, **28**, 851-864. https://doi.org/10.1002/hep.510280337

[3] Angeli, P., Wong, F., Watson, H. and Ginès, P. (2006) Hyponatremia in Cirrhosis: Results of a Patient Population Survey. *Hepatology*, **44**, 1535-1542. https://doi.org/10.1002/hep.21412

[4] Ginès, P. and Guevara, M. (2008) Hyponatremia in Cirrhosis: Pathogenesis, Clinical Significance, and Management. *Hepatology*, **48**, 1002-1010. https://doi.org/10.1002/hep.22418

[5] Gianotti, R.J. and Cardenas, A. (2014) Hyponatraemia and Cirrhosis. *Gastroenterology Report*, **2**, 21-26. https://doi.org/10.1093/gastro/got037

[6] Gaglio, P., Marfo, K. and Chiodo, J. (2012) Hyponatremia in Cirrhosis and End-Stage Liver Disease: Treatment with the Vasopressin V2-Receptor Antagonist Tolvaptan. *Digestive Diseases and Sciences*, **57**, 2774-2785. https://doi.org/10.1007/s10620-012-2276-3

[7] Gang, X., Zhang, Y., Pan, X., Guo, W., Li, Z., Wang, Y., *et al.* (2018) Hyponatremia: Prevalence and Characteristics in Internal Medicine Patients in Northeast of China.

Medicine, **97**, e13389. https://doi.org/10.1097/md.0000000000013389

[8] Asma, O.K., Najet, B., Nabil, A., Msaddek, A., Nabyl, B.M., Mohamed, H., *et al.* (2010) Survival in Tunisian Cirrhosis Patients. *La Tunisie Médicale*, **88**, 804-808.

[9] Bathaix, M.F.Y., Bagny, A., Mahassadi, K.A., Okon, A.J., Kissi-Anzouan, Y.H., Doffou, S., *et al.* (2015) Prognostic Factors for Cirrhosis Hospital in Abidjan (Côte D'ivoire). *Open Journal of Gastroenterology*, **5**, 103-109. https://doi.org/10.4236/ojgas.2015.57017

[10] Katilé, D., Dicko, M.Y., Doumbia Samake, K., Sow Coulibaly, H., Mallé, O., Guindo, H., *et al.* (2017) Encéphalopathie hépatique chez le cirrhotique à Bamako. *Journal Africain d'Hépato-Gastroentérologie*, **11**, 78-80. https://doi.org/10.1007/s12157-017-0709-5

[11] Rym, E., Myriam, C., Hayfa, R., Rafika, E.E., Houda, B.N., Wassila, B., *et al.* (2016) Hyponatremia in Cirrhosis: Risk Factors and Prognostic Value. *La Tunisie Médicale*, **94**, 401-405.

[12] Borroni, G., Maggi, A., Sangiovanni, A., Cazzaniga, M. and Salerno, F. (2000) Clinical Relevance of Hyponatraemia for the Hospital Outcome of Cirrhotic Patients. *Digestive and Liver Disease*, **32**, 605-610. https://doi.org/10.1016/s1590-8658(00)80844-0

[13] Somberg, J.C. and Molnar, J. (2009) Therapeutic Approaches to the Treatment of Edema and Ascites: The Use of Diuretics. *American Journal of Therapeutics*, **16**, 98-101. https://doi.org/10.1097/mjt.0b013e318196082e

[14] Kim, J.H., Lee, J.S., Lee, S.H., Bae, W.K., Kim, N.H., Kim, K.A., *et al.* (2009) The Association between the Serum Sodium Level and the Severity of Complications in Liver Cirrhosis. *The Korean Journal of Internal Medicine*, **24**, 106-112. https://www.ncbi.nlm.nih.gov