The Professional Medical Journal
www.theprofesional.com

DOI: 10.17957/TPMJ/16.3337

ORIGINAL PROF-3337

1. MBBS, FCPS (Medicine)
Associate Professor of Medicine
Liaquat University of Medical and
Health Sciences Jamshoro,
Sindh, Pakistan.
2. MBBS, M.D (Medicine)
Associate Professor of Medicine,
Indus Medical College and Hospital,
Tando-Mohammad Khan
Hyderabad, Sindh, Pakistan.
3. MBBS, FCPS (Medicine)
Assistant Professor of Medicine
Liaquat University of Medical and
Health Sciences Jamshoro,
Sindh, Pakistan.
4. MBBS, MCPS, DA, M.PHIL (Physiology)
Assistant Professor of Physiology
Indus Medical College
Tando-Mohammad Khan
Hyderabad, Sindh, Pakistan.
5. MBBS, PG Trainee
(MD General Medicine)
Liaquat University of Medical and
Health Sciences Jamshoro,
Sindh, Pakistan.

Correspondence Address:
Dr. Atif Sitwat Hayat
MBBS, M.D (Medicine)
Associate Professor of Medicine,
Indus Medical College and Hospital,
Tando-Mohammad Khan
Hyderabad, Sind, Pakistan.

Article received on:
11/03/2016
Accepted for publication:
15/05/2016
Received after proof reading:
26/05/2016

HYPONATREMIA;
FREQUENCY AND OUTCOME IN PATIENTS WITH LIVER CIRRHOSIS

Dr. Abdul Haque Khan[1], Dr. Atif Sitwat Hayat[2], Dr. Mona Humaira[3], Dr. Ghulam Nabi Pathan[4], Dr. Ali Akbar[5]

Abstract… Background objective: Hyponatremia is not uncommon complication of liver cirrhosis and may affect hospital mortality. This study was aimed to determine frequency and outcome of hyponatremia in liver cirrhosis patients. **Patients and Methods:** The cirrhotic subjects were assessed for hyponatremia while outcome measured in relation to hyponatremia and its severity. Data was analyzed in SPSS 16.0 and frequencies as well as percentages calculated for hyponatremia. **Results:** Out of one hundred liver cirrhosis patients, 65% were males and 35% females. Mean age ±SD of overall cirrhotic subjects was 40.79±7.83. Hyponatremia was identified in 72% (51% males and 21% females) patients. The mean ± SD for sodium level in overall population was 129.73±8.35 while 119.92±3.61 in hyponatremic cirrhotic patients. **Conclusion:** Dilutional hyponatremia is a frequent finding in liver cirrhosis patients.

Key words: hyponatremia, liver cirrhosis, frequency

Article Citation: Khan AH, Hayat AS, Humaira M, Pathan GN, Akbar A. Hyponatremia; frequency and outcome in patients with liver cirrhosis. Professional Med J 2016;23(6):669-672. **DOI:** 10.17957/TPMJ/16.3337

INTRODUCTION

Cirrhosis is a consequence of chronic liver disease characterized by replacement of liver tissue by fibrous scar leading to progressive loss of liver function. It is most commonly caused by hepatitis B or C and alcoholism but has many other possible causes.

Hyponatremia (serum Na+ < 135 mEq/L) is the most important electrolyte disorder and its homeostasis is vital to normal physiologic function of cells.[1-5] Identifying etiology and risk factors for hyponatremia will help in reducing its incidence and minimize complications associated with it and improve overall cost of healthcare. Patients with hyponatremia have a poor survival.[6-11] According to several studies, hyponatremia occurring as a result of reduced solute- free water clearance is key prognostic factor in patients of liver cirrhosis when hyponatremia was incorporated into severity of liver disease.[12,13]

There is lack of Pakistani data on clinical spectrum of hyponatremia in liver cirrhosis and treatment strategies to be adopted in various clinical studies hence we planned to undertake this prospective study in liver cirrhosis patients at our tertiary care hospital.

MATERIAL AND METHODS

This descriptive case-series study was conducted in Medical Unit-I of Liaquat University Hospital Hyderabad from 28-03-2012 to 27-09-2012. One hundred patients of liver cirrhosis were controlled by non-probability convincing. All participants gave informed and written consent and study was approved by institutional ethical committee.

We include patients of liver cirrhosis of either gender and ≥ 12 years of age. Our study exclude uncooperative patients, cirrhotics on diuretic therapy, hepato-cellular carcinoma and syndrome of inappropriate ADH secretion. Data was recorded on pre-designed proforma. All patients have undergone for detailed history followed by physical examination and appropriate laboratory investigations. About 2.0 mls of venous blood sample was taken and sent to laboratory for

estimation of severe sodium level. The frequency of hyponatremia was evaluated while cirrhosis severity assessed by clinical and biochemical score system i.e child-Pugh score.[8]

Data was entered and analysed in SPSS version 16.00. The stratification was done for quantitative and qualitative variables while descriptive statistics were used to calculate frequency. The mean ± SD was calculated and chi-square test applied at 95% CI, while p-value ≤ 0.05 considered to be statistically significant.

RESULTS

Total one hundred patients were evaluated for hyponatremia and their mean age was 40.79±7.83. Mean sodium level in all study participants was 129.73±83.51, 119.92±3.61 in hyponatremic cirrhotic patients. The sodium levels in male and female hyponatremic cirrhotics were 121.73±8.63 and 118.92±3.31respectively. The mean age ± SD for hyponatremic males was 42.71±8.72 while 40.92±8.52 for females. Majority of our patients having hyponatremia were between ages 30-49 years. This is shown in table-I. The hyponatremia was observed in 72% (51 males and 21 females) patients. This is shown in table-II. The hyponatremic cirrhotic patients commonly presented with abdominal distension (17 cases), jaundice (16 cases), lower limb swelling (11 cases), GI bleeding (10 cases) and altered sensorium (9 cases). This is shown in table-III. In our study, majority 47 (65.3%) have recovered from hyponatremia while 6 (8.3%) were expired and most of them were males. This is shown in tables IV and V.

DISCUSSION

Our study found 72% prevalence rate of hyponatremia in liver cirrhosis of which 27.8% had mild, 41.7% moderate and 30.6% severe hyponatremia. Study by Angeli P et al[14] had shown 50.6% mild, 27.8% moderate and 21.6% severe hyponatremia in cirrhotic patients.

AGE	HYPONATREMIA		TOTAL	P-VALUE
	YES	NO		
12-19	8	00	8	0.03*
	11.1%	00%	8.0%	
20-29	14	5	19	
	19.4%	17.9 %	19.0 %	
30-39	22	6	28	
	30.6%	21.4%	28.0%	
40-49	19	12	31	
	26.4%	42.9%	31.0%	
50-59	6	3	9	
	8.3%	10.7%	9.0%	
60+	3	2	5	
	4.2%	7.1%	5.0%	
Total	72	28	100.0	
	100.0%	100.0%	100.0%	

Table-I. Age in relation to hyponatremia
**Statistically significant*

GENDER	HYPONATREMIA		TOTAL	
	YES	NO		
Male	51	14	65	P-value 0.05*
	70.8%	50.0%	65%	
Female	21	14	35	
	29.2%	50.0%	35.0%	
Total	72	28	100	
	100.0%	100.0%	100.0%	

Table-II. Gender in relation to hyponatremia
**Statistically significant*

Clinical Presentation	Hyponatremia		Total	P-value
	Yes	No		
Abdominal distension	17	2	19	0.05*
	23.6%	7.1%	19.0%	
Lower limb swelling	11	5	16	
	15.3%	17.9%	16.0%	
Jaundice	16	5	21	
	22.2%	17.9%	21.0%	
Altered Sensorium	9	5	14	
	12.5%	17.9%	14.0%	
GI bleeding	10	7	17	
	13.9%	25.0%	17.0%	
Seizures	6	3	9	
	8.3%	10.7%	9.0%	
Combine features	3	1	4	
	4.2%	3.6%	4.0%	
Total	72	28	100	
	100.0%	100.0%	100.0%	

Table-III. Clinical presentation in relation to hyponatremia* *Statistically significant*

Outcome	Gender		Total	P-value
	Male	Female		
Recovered	37	10	47	0.03*
	72.5%	47.6%	65.3%	
Mortality	5	1	6	
	9.8%	4.8%	8.3%	
Left the hospital	9	10	19	
	17.6%	47.6%	26.4%	
Total	51	21	72	
	100.0%	100.0%	100.0%	

Table-IV. Outcome in relation to gender
**Statistically significant*

Outcome	Hyponatremia			Total	P-value
	Mild	Moderate	Severe		
Recovered	15	22	10	47	0.05*
	75.0%	73.3%	45.5%	65.3%	
Mortality	00	4	2	6	
	00	13.3%	9.1%	8.3%	
Left the hospital	5	4	10	19	
	25.0%	13.3%	45.5%	26.4%	
Total	20	30	22	72	
	100.0%	100.0%	100.0%	100.0%	

Table-V. Outcome in relation to severity of hyponatremia
**Statistically significant*

Similar results were seen in study by Kim JH et al[15], who found 52.1% mild, 20.8 moderate and 27.1% severe hyponatremic cirrhotics. Another study from Pakistan by Shaikh S et al[16] also shown mild, moderate and severe hyponatremia in 48.4%, 24.9% and 26.7% liver cirrhosis patients. Borroni G et al[17] conducted a study on hospitalized liver cirrhosis patients and according to serum sodium level, severe hyponatremia was detected in 29.8% in relation to ascites which is closer to our study results.

In present study, males were predominantly affected by hyponatremia which is consistent with study by XU Z et al.[18] Major presenting features were abdominal distension, jaundice and lower limb swelling in our study, while study by Kim SH et al[19] also discovered abdominal pain, distension and jaundice as the main presenting features.

The frequency of hepato-renal syndrome was 11/72 (15%) with severe hyponatremia, 7/72 (9.7%) moderate hyponatremia, 3/72 (4%) mild hyponatremia and 1/72 (1.3%) with normal serum sodium concentration. Angeli P et al[14] showed hepato-renal syndrome in17% patients with severe hyponatremia, 10% moderate hyponatremia and 6% with normal sodium concentration which is quite closer to our study results.

Finally our study showed that mortality rate in higher (8.3%) in patients having moderate to severe hyponatremia. Hence it is important to note that proper and appropriate monitoring of serum sodium concentration is effective tool in management of liver cirrhosis.

CONCLUSION

Dilutional hyponatremia is a frequent finding in liver cirrhosis patients leading to neurological impairment, hepato-renal syndrome, osteoporosis and high mortality. Therefore, early management of hyponatremia to prevent liver cirrhosis related complications.

References

1. Rod rigues-Roisin R, Krowka MJ, Herve P, Fallon MB. **Pulmonary Hepatic vascular Disorders (PHD).** Eur Respir J 2004; 24 (5):861-80.

2. Mendez-Sanchez N, Villa AR, Chavez-Tapia NV, Ponciano-Rodriguez G, Almeda Valdes P, Gonzalez D, et al. **Trends in liver disease prevalence in Mexico from 2005 to 2050 through mortality data**. Ann Hepatol 2005; 4:52-5.

3. National Center for Health Statistics. National Vital Statistics Report. **Chronic liver disease/cirrhosis [online] 2009 Mar 06 [cited 2009 April 05].** Available from URL: http://www.cdc.gov/nchs/fastats/liverdis.htm.

4. Gines P, Guevara M. **Hyponatremia in cirrhosis: pathogenesis, clinical significance and management** Hepatology 2008;48(3):1002-10.

5. Guevara M, Gines P. **Hyponatremia in liver cirrhosis pathogenesis and treatment.** Endocrinol Nutr. Suppl 2:15-21.

6. Gaglio P, Marfo K, Chiodo J. **Hyponatremia in cirrhosis and end-stage liver disease: treatment with the vasopressin V2-receptor antagonist tolvaptan.** Dig

Dis Sci: 2012;57(11):2774-85.

7. Samuel D, **MELD-Na as a prognostic score for cirrhotic patients: Hyponatremia and ascites are back in the game.** J Hepatol 2009;50(4);836-8.

9. Sadler TW. **Langman's Medical Embryology 7th ed USA.** William & Wilkins; 1995. P.254-56.

9. Gartner LP, Hiatt JL, Strum JM. **Cell biology and Histology Board Review Series.** 5th ed. Lippincott Williams and Wilkins: 2007 p. 222-24.

10. Snell RS. Clinical Anatomy. 8th ed. **United States of America; Lippincot Williams and Wilkins:** 2008 p.205-8.

11. Mori H, Hayashi K, Fukuda T, Matsunaga N, Nagasaki M, et al. **Intrahepatic portosystemic venous shunt: occurrence in patients with and without liver cirrhosis.** AJR Am J Roentgenol. 1987; 149(4): 711-4.

12. Ganong WF. **Review of Medical Physiology.** 9th ed. Philadelphia Elsevier Saunders; 2006. p.273-79.

13. Raddatz D, Ramadori G. **Carbohydrate metabolism and the liver actual aspects from physiology and disease.** Z Gastroenterol 2007;45(1):51-62.

14. Angeli P, Wong F, Watson H, Gines P; **CAPPS Investigators. Hyponatremia in cirrhosis: Results of patient population servey.** Hepatology. 2006;44(6):1535-42.

15. Kim JH, Lee JS, Lee SH, Bae WK, Kim NH, Kim KA, et al. **The association between the serum sodium level and the severity of complications in liver cirrhosis.** Korean J Intern Med. 2009;24(2):106-12.

16. Shaikh S, Mal G, Khalid S, Baloch GH, Akber Y. **Frequency of hyponatremia and its influence on liver cirrhosis-related complications.** J Pak Med Assoc. 2010;60(2): 116-20.

17. Borroni G. Maggi A, Sangniovanni, A, Cazzaniga, M, Salerno F. **Clinical relevance of hyponatraemia for the hospital outcome of cirrhotic patients.** Digestive and Liver Disease. 2000;32:605-610.

18. Xu Z, Jiang ZH. **Hyponatremia in patients with ascites complicating liver cirrhosis.** Zhonghua Nei Ke Za Zhi. 1992;30(10): 628-30, 658-9.

19. Kim SH, Oh EG, Lee WH, Kim OS; Han KH. **Symptom experience in Korean patients with liver cirrhosis.** J Pain Symptom Manage. 2006;31(4): 326-34.

"Fear kills more dreams than failure ever will."

Unknown

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Abdul Haque Khan	Data collection & Manuscript typing	
2	Dr. Atif Sitwat Hayat	Manuscript drafting, Study concept and design	
3	Dr. Mona Humaira	Critical revision of the article	
4	Dr. Ghulam Nabi Pathan	Statistical analysis of data	
5	Dr. Ali Akbar	Manuscript of typing	