



HYPONATREMIA;

PREVALENCE OF HYPONATREMIA IN PATIENTS PRESENTING WITH HEPATIC ENCEPHALOPATHY.

1. FCPS (Medicine)
Associate Professor
Department of Medicine
DG Khan Medical College,
Dera Ghazi Khan.
2. MBBS
Demonstrator
Department of Physiology
University of Medical and
Dental College, Faisalabad.
3. MBBS
Demonstrator
Department of Anatomy
Aziz Fatima Medical College,
Faisalabad.

Correspondence Address:

Dr. Riaz Ahmed Javid
Department of Medicine
DG Khan Medical College,
Dera Ghazi Khan.
riazabr1@hotmail.com

Article received on:

19/06/2017

Accepted for publication:

25/10/2017

Received after proof reading:

03/11/2017

INTRODUCTION

Cirrhosis is the end result of almost all chronic liver diseases.¹ Histopathologically cirrhosis is called a phenomena which alter normal architecture of liver into diffuse fibrosis and morphologically into abnormal nodules. The progression to cirrhosis is a result of chronic progressive injury to liver is varied. It may take 40 years in some cases to as to 6-10 years in some other cases.²

There is no relation between histological findings of liver cirrhosis and clinical presentation of patients.² Some patients have worse in their histological picture of liver biopsy but have no symptoms. In this way they have normal life expectancy. Some others have worse symptomology of liver disease (cirrhosis) but have little finding on liver biopsy. In this way they assume to have limited life expectancy. Presentation of cirrhosis having symptoms broadly classified into three categories liver synthetic function, liver detoxification and portal hypertension.²⁻³ Complications usually seen

Riaz Ahmed Javid¹, Ayesha Ghafoor², Ifrah Ahmed³

ABSTRACT... Objectives: To find out the frequency of hyponatremia in cases of hepatic encephalopathy. **Study Design:** Cross-sectional study. **Setting:** Department of Medicine DG Khan Hospital, DG Khan. **Period:** July 2016 to December 2016. **Material and Methods:** Total 80 patients with hepatic encephalopathy either male or female were selected for this study. Hyponatremia was assessed in these selected patients. **Results:** Mean age of the patients was 38.34 ± 11.140 years. Hyponatremia was found in 31 (39%) patients. Hyponatremia was noted in 13 (41.94%) patients of age group 18-36 years and 18 (36.73%) patients of age group 37-55 years. Statistically insignificant association of hyponatremia with age was seen with p value 0.6467. Hyponatremia was found in 21 (40.38%) male patients and 10 (35.71%) female patients. But the difference of frequency of hyponatremia between male and female patients was statistically insignificant with p value 0.8109. **Conclusion:** Results of this study showed a higher percentage of hyponatremia in patients with HE. Male were more victim of HE as compared to female but insignificant association of hyponatremia with gender is noted. Findings of present study showed that there is insignificant association of hyponatremia with grade of HE, socio-economic status, area of residence and age.

Key words: Hypertension, Hyponatremia, Diabetes Mellitus, Ischemic Stroke.

Article Citation: Javid RA, Ghafoor A, Ahmed I. Hyponatremia; Prevalence of hyponatremia in patients presenting with hepatic encephalopathy. Professional Med J 2017;24(11):1647-1651. DOI:10.17957/TPMJ/17.4326

in cirrhosis are portal hypertension, hepatorenal syndrome and hepatic coma and hepatic encephalopathy (HE).³

HE is labeled one when there is no brain disease but spectrum of neuropsychiatric abnormalities due to liver dysfunction present in cirrhotic patients.² It includes personality changes, intellectual impairment and alter conscious level. Although it has different stages but overt HE found in 30% to 40% hepatic cirrhosis cases. It directly with patient morbidity and mortality.⁴

Hospitalization due to HE is associated with 42% survival at one year and 23% at 3 years in followup.⁵

The common factors leading to HE are GI bleeding, infection, constipation, opiates intake, benzodiazepines, diuretic therapy and high protein diet.⁶ Patients having advance cirrhosis always have some renal impairment. Kidneys are

malfunctioning to some level leading to retaining to sodium and water. Some of the patients have disproportionate retention of water relatively sodium as a result Hyponatremia and hypo osmolality in them.⁷ It effects on HE presentation in clinical symptomology. Provenance of hyponatremia in cases of HE is from 1.5 to 28%.⁸⁻⁹

There is lack of epidemiological studies in our settings, so the rationale of our study was to determine the hospital base frequency of hyponatremia n patients with hepatic encephalopathy at medicine department of, DG Khan Hospital, DG Khan. We have tried to come up with the frequency of hyponatremia Although, the results of this study may serve the baseline data for further studies in this part of the country to put forward suggestion for improvement on this aspect of hepatic encephalopathy.

MATERIAL & METHODS

This cross-sectional study was conducted at Department of Medicine, D.G Khan Hospital, D.G Khan from July 2016 to December 2016. Total 80 patients with Hepatic Encephalopathy with age group (18-55 years) of either gender (Male & Female) admitted to hospital with diagnosis of hepatic encephalopathy of minimum 24 hr duration were selected. Patients with history of renal failure, patients with history of severe vomiting (more than 10 episodes/day), patients with history of diarrhea (more than 10 loose stools/day) were excluded from the study.

Blood sample for serum sodium will be drawn during first 24 hours of hospital admission and sent to laboratory. Findings of lab were entered in pre-designed performa along with demographic profile of all the patients.

OPERATIONAL DEFINITIONS

Hyponatremia

Serum Sodium level < 130 mEq/L defined as hyponatremia.

Hepatic Encephalopathy

Case were diagnosed according to adapted West-Haven Criteria.

Collected data was analyzed by using SPSS version 20. Age, serum sodium level and duration of HE was presented as mean and SD. Gender, Hyponatremia, residence, grade of HE, socio-economic status were presented as frequencies and percentages. Effect modifier like age, gender, duration of hepatic encephalopathy, grade of encephalopathy, residence were controlled through stratification. Post stratification Chi-square test was applied by taking $p < 0.05$.

RESULTS

Total 80 patients of hepatic encephalopathy were recruited for present study. Mean age of the patients was 38.34 ± 11.140 years. Hyponatremia was found in 31 (39%) patients. (Figure-1)

Total 31 (38.75%) patients belonged to age group 18-36 years and 49 (61.25%) patients belonged to age group 37-55 years. Hyponatremia was noted in 13 (41.94%) patients of age group 18-36 years and 18 (36.73%) patients of age group 37-55 years. Statistically insignificant association of hyponatremia with age was seen with p value 0.6467. (Table-I)

Male patients were 52 (65%) and female patients were 28 (35%) and hyponatremia was found in 21 (40.38%) male patients and 10 (35.71%) female patients. But the difference of frequency of hyponatremia between male and female patients was statistically insignificant with p value 0.8109. (Table-II)

Grade 0 HE was noted in 2 (2.5%) patients followed by grade 1 (4 (5%)), grade 2 (8 (10%)), grade 3 (15 (18.75%)) and grade 4 in 51 (63.75%) patients. Hyponatremia was found in 1 (50%), 1 (25%), 3 (37.5%), 9 (60%) and 17 (33.33%) patients with grade 0, 1, 2, 3 and 4 HE. Statistically insignificant ($P = 0.4183$) association of hyponatremia with grade of HE was noted. (Table-III)

Out of 80 patients of HE, 32 (40%) patients were poor, 25 (31.5%) patients were belonged to middle class and 23 (28.75%) patients were belonged to upper class. Hyponatremia was noted in 11 (34.38%), 10 (40%) and 10 (43.48%) patients respectively in poor, middle and upper

class. Insignificant ($P = 0.7827$) association of socio-economic status with hyponatremia was noted. (Table-IV)

Total 48 (60%) patients belonged to rural area and 32 (40%) patients belonged to urban area. Hyponatremia was seen in 19 (39.58%) and 12 (37.5%) patients respectively in rural and urban patients. But insignificant ($P = 1.0000$) association of hyponatremia with area of residence was noticed. (Table-V)

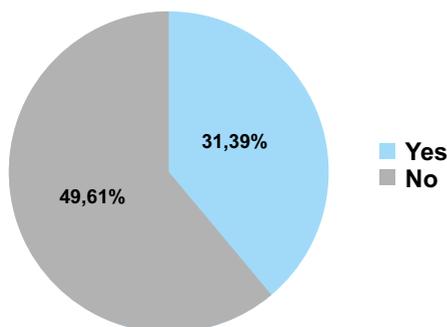


Figure-1. Frequency of hyponatremia

Age Group	Hyponatremia		Total	P value
	Yes	No		
18-36	13 (41.94)	18 (58.06)	31 (38.75)	0.6467
37-55	18 (36.73)	31 (63.26)	49 (61.25)	
Total	31 (38.75)	49 (61.25)	80	

Table-I. Association of hyponatremia with age

Gender	Hyponatremia		Total	P value
	Yes	No		
Male	21 (40.38)	31 (59.62)	52 (65)	0.8109
Female	10 (35.71)	18 (64.29)	28 (35)	
Total	31 (38.75)	49 (61.25)	80	

Table-II. Association of hyponatremia with gender

Grade of HE	Hyponatremia		Total	P value
	Yes	No		
0	1 (50)	1 (50)	2 (2.5)	0.4183
1	1 (25)	3 (75)	4 (5)	
2	3 (37.5)	5 (62.5)	8 (10)	
3	9 (60)	6 (40)	15 (18.75)	
4	17 (33.33)	34 (66.67)	51 (63.75)	
Total	31 (38.75)	49 (61.25)	80	

Table-III. Association of hyponatremia with grade of HE

Socio-economic status	Hyponatremia		Total	P value
	Yes	No		
Poor	11 (34.38)	21 (65.63)	32 (40)	0.7827
Middle	10 (40)	15 (60)	25 (31.5)	
Upper	10 (43.48)	13 (56.52)	23 (28.75)	
Total	31 (38.75)	49 (61.25)	80	

Table-IV. Association of hyponatremia with socio-economic status

Area of residence	Hyponatremia		Total	P value
	Yes	No		
Rural	19 (39.58)	29 (60.42)	48 (60)	1.0000
Urban	12 (37.5)	20 (62.5)	32 (40)	
Total	31 (38.75)	49 (61.25)	80	

Table-V. Association of hyponatremia with area of residence

DISCUSSION

Cirrhosis is one of major causes of death and results in serious complications of cirrhosis like as cites, hepatic encephalopathy and variceal hemorrhage.¹⁰

Kidney function and elevated electrolyte levels are responsible for complications in cases of chronic liver disease (CLD) and most of the patients presented with hyponatremia.¹¹

Higher mortality rate was reported in literature in cases of CLD with hyponatremia as compared to with out hyponatremia.¹²⁻¹⁴ Hyponatremia can induce or aggravate HE, leading to progression of disease and even death.¹⁵

In present average age of the cases of HE was 38.34 ± 11.140 years. Total 38.75% patients belonged to age group 18-36 years and 61.25% patients belonged to age group 37-55 years. Hyponatremia was noted in 41.94% patients of age group 18-36 years and 36.73% patients of age group 37-55 years. Statistically insignificant association of hyponatremia with age was seen with p value 0.6467. Achakzai et al⁶ reported mean age of the patients as 54 years which is higher than our study.

In this study hyponatremia was found in 39% patients. Grade 0 HE was noted in 2.5% patients followed by grade 1 in 5%, grade 2 in 10%, grade

3 in 18.75% and grade 4 in 63.75% patients. Hyponatremia was found in 50%, 25%, 37.5%, 60% and 33.33% patients with grade 0, 1, 2, 3 and 4 HE. Statistically insignificant ($P = 0.4183$) association of hyponatremia with grade of HE was noted. In one study by Out of 69 patients with HE 57 had sodium less than 135 ($p < 0.001$).¹⁷ In a Korean¹⁸ study, prevalence of hyponatremia at a serum sodium² 135 mmol/L was 47.9% in hospitalized patients, and that of severe hyponatremia at a serum sodium² 130 mmol/L was 27.1%. In fact, the severity of hyponatremia, particularly at serum sodium concentrations ≤ 130 mmol/L, corresponded to higher risks for developing as cited, hepatic encephalopathy and other complications of cirrhosis, compared with the risks in patients with a serum sodium ≥ 136 mmol/L.¹⁹⁻²⁰ Borroni et al.¹⁸ reported hyponatraemia in 30% of cases. In a Pakistani study it was found in 26.7% patients.¹² In one study by SIDDIQUI et al, hyponatremia was found in 35% patients.²¹

Alam et al²² reported that 28% of patients had one or another electrolyte imbalance. This further confirms that a huge proportion of patients is affected by hyponatraemia in our local setup, which may be due to diuretic use.²³ A similar study was done by Maqsood et al²⁴ reported presence of hyponatraemia in 50% of patients, which is higher than our findings. Achakzai et al¹⁶ reported frequency of hyponatremia as 46%. Of which 23(13%) patients had grade 1 HE while 80(45%), 64(36%) and 10(6%) had grades 2, 3 and 4 respectively.

CONCLUSION

Results of this study showed a higher percentage of hyponatremia in patients with HE. Male were more victim of HE as compared to female but insignificant association of hyponatremia with gender is noted. Results of this study also revealed that there is insignificant association of hyponatremia with grade of HE, socio-economic status, area of residence and age.

Copyright© 25 Oct, 2017.

REFERENCES

1. **Cirrhosis: Practice Essentials, overview, epidemiology [Internet].** 2016 [cited 25 January 2016]. Available from: <http://emedicine.medscape.com/article/185856-overview#a2>.
2. RF B. **Neurosteroids in hepatic encephalopathy: Novel insights and new therapeutic opportunities.** - PubMed - NCBI [Internet]. Ncbi.nlm.nih.gov. 2016 [cited 8 May 2016]. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26589093#>.
3. Shawcross D, Dunk A, Jalan R, Kircheis G, de Knegt R, Laleman W et al. **How to diagnose and manage hepatic encephalopathy.** Eur J Gastroenterol Hepatol. 2016 Feb; 28(2):146-52.
4. Poordad FF. **Review article: the burden of hepatic encephalopathy.** Aliment Pharmacol Ther. 2007 Feb. 25 Suppl 1:3-9.
5. Bustamante J, Rimola A, Ventura PJ, Navasa M, Cirera I, Reggiardo V, et al. **Prognostic significance of hepatic encephalopathy in patients with cirrhosis.** J Hepatol. 1999 May. 30(5):890-5.
6. Blei AT, Córdoba J. **Hepatic encephalopathy.** Am J Gastroenterol. 2001 Jul. 96(7):1968-76.
7. Ginès P, Guevara M. **Hyponatremia in cirrhosis: pathogenesis, clinical significance, and management.** Hepatology. 2008; 48:1002–10. doi: 10.1002/hep.22418.
8. Maqsood S, Saleem A, Iqbal A, Butt J. **Precipitating factors of hepatic encephalopathy: experience at Pakistan institute of medical sciences Islamabad.** J Ayub Med Coll. 2006; 18(4):57-61.
9. Ahmad H, Rehman M, Saeedi I, Shah D. **Factors precipitating hepatic encephalopathy in cirrhosis liver.** J Pak Med Inst. 2001; 15(1):91-97.
10. Runyon BA. **AASLD Practice Guidelines Committee. Management of adult patients with ascites due to cirrhosis: an update.** Hepatology 2009; 49:2087-107.
11. Martín-Llahí M, Guevara M, Ginès P. **Hyponatremia in cirrhosis: clinical features and management.** Gastroenterol Clin Biol 2006; 30:1144-51.
12. Shaikh S, Mal G, Khalid S, Baloch GH, Akbar Y. **Frequency of hyponatremia and its influence on liver cirrhosis-related complications.** J Pak Med Assoc 2010; 60:116-20.
13. Cárdenas A, Ginès P. **Predicting mortality in cirrhosis-serum sodium helps.** N Engl J Med 2008; 359:1060-6.
14. Khokhar N, Niazi SA. **Chronic liver disease related mortality pattern in Northern Pakistan.** J Coll Physi-

- cians Surg Pak 2003; 13:495-7.
15. Guevara M, Baccaro ME, Ríos J, Martín-Llahí M, Uriz J, Ruiz del Arbol L, et al. **Risk factors for hepatic encephalopathy in patients with cirrhosis and refractory ascites: relevance of serum sodium concentration.** Liver Int 2010; 30:1137-42.
 16. Achakzai MS, ullah Shaikh H, Mobin A, Majid S, Javed A, Khalid AB, et al. **Factors leading to hepatic encephalopathy in patients with liver cirrhosis at a tertiary care hospital in Karachi, Pakistan. Gomal Journal of Medical Sciences [Internet].** 2016 [cited 2017 Mar 29]; 14(2). Available from: <http://www.gjms.com.pk/ojs2x/index.php/gjms/article/view/1357>.
 17. Qureshi MO, Khokhar N, Saleem A, Niazi TK. **Correlation of hyponatremia with hepatic encephalopathy and severity of liver disease.** J Coll Physicians Surg Pak. 2014; 24(2):135–137.
 18. Borroni G, Maggi A, Sangiovanni A, Cazzaniga M, Salerno F. **Clinical relevance of hyponatremia for the hospital outcome of cirrhotic patients.** Dig Liver Dis 2000; 32:605-10.
 19. Cárdenas A, Ginès P. **Predicting mortality in cirrhosis-serum sodium helps.** N Engl J Med 2008; 359:1060-6.
 20. Guevara M, Baccaro ME, Ríos J, Martín-Llahí M, Uriz J, Ruiz del Arbol L, et al. **Risk factors for hepatic encephalopathy in patients with cirrhosis and refractory ascites: relevance of serum sodium concentration.** Liver Int 2010; 30:1137-42.
 21. Siddiqui AA, Ujjan I, Shaikh MA. **Impacts of hyponatraemia on the complications of liver cirrhosis.** Medical Channel [Internet]. 2012 [cited 2017 Mar 29]; 18(2). Available from: <http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=16815491&AN=100705661&h=RTKpnsC-JNbVtR50Rij6VOgixlvbalFagFbTxSNpiTn1BWb-2bEgqur6t0Wp75xDwZvUdC%2BqB4yhETU4ujH-V5zQ%3D%3D&crl=c>.
 22. Alam I, Razaullah, Haider I, Humayun M, Taqweem A, Nisar M. **Spectrum of precipitating factors of hepatic encephalopathy in liver cirrhosis.** Pak J Med Res 2005; 44(2):96-100.
 23. Abbas Z, Mumtaz K, Salam A, Jafri W. **Factors predicting Hyperkalemia in patients with Cirrhosis receiving Spironolactone.** J Coll Physicians Surg Pak 2003; 13(7):382-4.
 24. Maqsood S, Saleem A, Iqbal A, Butt JA. **Precipitating factors of hepatic encephalopathy: Experience at Pakistan Institute of Medical Sciences Islamabad.** J Ayub Med Coll Abbottabad 2006; 18(4):57-61.



“Reality is a product of our dreams, decisions & actions.”

Unknown

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Riaz Ahmed Javid	Main Writer	
2	Ayesha Ghafoor	Data collection	
3	Ifrac Ahmed	Data collection	