

Prognostic Significance of Hypokalemia on Length of Hospital Stay in Patients with Hepatic Encephalopathy

Daniyal Fahad¹, Shahbaz Haider¹, Sumera Tabassum², Faryal Khalid¹, Saima Mushtaque³, Akhtar Ali⁴

Department of Medicine¹, Department of Radiology², Department of Accident and Emergency³, Jinnah Postgraduate Medical Center, Department of Pharmacology, Ziauddin Medical College⁴, Karachi.

Abstract

Background: Patients with cirrhosis may have either a chronic neuropsychiatric state due to portal-systemic shunting or have an acute episode with some precipitating factor labeled as hepatic encephalopathy. In patients with encephalopathy, hypokalemic alkalosis leads to an increase in the amount of nonionic ammonia that readily crosses the blood brain barrier and accumulates in the CNS that can worsen the disease.

Objective: The purpose of the study was to determine the frequency of hypokalemia in patients with hepatic encephalopathy and to compare the length of the hospital stay in hepatic encephalopathy patients with and without hypokalemia.

Study type, settings & duration: This cross sectional study was conducted at Jinnah Postgraduate Medical Centre, Karachi from February to July 2021.

Methodology: The sample was calculated by using WHO sample size calculator at 95% confidence interval and absolute precision of 8% with anticipated population proportion of 35%. The sample was recruited by using non-probability consecutive sampling technique. Hepatic encephalopathy was diagnosed on basis of clinical examination by West Haven Classification grades. Patients were diagnosed for hypokalemia by hospital lab as having potassium levels <3.5 meq/L. The information was recorded on proformas and data was analyzed.

Results: The mean serum potassium level was 3.49 ± 0.51 mmol/L, frequency of hypokalemia was observed in 48 (35%) participants. The mean length of hospital stay was 5.86 ± 1.18 days. There was no any association between hypokalemia and prolonged hospital stay (p -value = 0.394).

Conclusion: The frequency of hypokalemia was observed in 35% patients with hepatic encephalopathy. However, there was no difference in length of the hospital stay in patients with hepatic encephalopathy patients with hypokalemia and without hypokalemia.

Key words: Hypokalemia, hepatic encephalopathy, frequency, hospital stay.

Introduction

World Health organization (WHO) defines cirrhosis as a diffuse process characterized

Corresponding Author:

Daniyal Fahad

Department of Medicine

Jinnah Postgraduate Medical Centre, Karachi.

Email: daniyalhussain78@yahoo.com

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Authors Contribution

DF conceptualized the project. DF, FK & SM did the data collection. SH & ST did the literature search. AA performed the statistical analysis. Drafting, revision & writing of manuscript were done by DF, FK & AA.

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by fibrosis and the conversion into structurally abnormal nodules of normal liver architecture.¹ Cirrhosis is a common cause of death in our society and its most important etiological factors are viral hepatitis. In up to 70% of all patients with cirrhosis hepatic encephalopathy occurs and leads to death in 30% of them.^{2,3} Five years after the diagnosis of cirrhosis, at least one episode of hepatic encephalopathy is likely to develop 26 percent.⁴ After the first clinical manifestation of hepatic encephalopathy, the patient's prognosis is very poor: probability of five-year survival is 16% to 22%, compared with that of 55% to 70% in cirrhosis patients without hepatic encephalopathy (HE).⁴

Patients with cirrhosis may have either a chronic neuropsychiatric state due to portal-systemic shunting (porto-systemic encephalopathy)

or have an acute episode with some precipitating factor labeled as hepatic encephalopathy. The PSE group usually present with personality changes and gradual intellectual deterioration and have relatively better survival than those who develop hepatic encephalopathy acutely due to some precipitating factors (100% vs 70-80%)⁵. Precipitating factors can be found in 80% of case with HE. Treating the precipitating factors is a pillar in the treatment of HE. Hypokalemia is an important precipitating factors.³

Hypokalemic alkalosis leads to an increase in the amount of nonionic ammonia that readily crosses the blood brain barrier and accumulates in the CNS. Extreme levels of ammonia can be seen in basal ganglia and cerebellum of cirrhotic patients with HE.⁶ Hence the study was aimed to determine the frequency of hypokalemia in patients with hepatic encephalopathy and to compare the length of the hospital stay in hepatic encephalopathy patients with and without hypokalemia.

Methodology

It was a cross sectional study conducted at Jinnah Postgraduate Medical Centre, Karachi from February to July 2021. The calculated sample size was n=137, sample was calculated by using WHO sample size calculator at 95% confidence interval and absolute precision of 8% with anticipated population proportion of 35%.⁷ The sample was recruited by non-probability consecutive sampling technique whereas, inclusion criteria was patients with age 18-65 years, either gender and with diagnosed hepatic encephalopathy. The set exclusion criteria were acute fulminant hepatitis, non-cirrhotic portal hypertension, hyper and hypoglycemic coma, stroke and uremia.

All the patients meeting the inclusion criteria was enrolled. Hepatic encephalopathy was diagnosed on basis of clinical examination by West Haven Classification grades. Presence of no abnormality labelled as stage "0", trivial lack of awareness, euphoria, anxiety was labeled as stage I, lethargy or apathy was labelled as stage II, confused gross disorientation, bizarre behavior as stage III, and coma or unable to test mental state as stage IV. Patients was diagnosed for hypokalemia by hospital lab as having potassium levels <3.5 meq/L. The length of hospital stay was recorded in all patients. This information along demographic characteristics like age of the patients, gender, residence (rural/urban) and duration of disease was recorded in the proforma. The frequency of hypokalemia among study participants and mean difference of length of hospital stay was calculated between patients with and without hypokalemia by

using independent t-test. *p* value <0.05 was taken as significant.

The Ethical approval was obtained from Institutional Review Board of Jinnah Postgraduate Medical Centre (JPMC), Karachi.

Results

There were 137 participants in the study as per calculated sample size, mean age of the patients was 40.43±10.53 years. There were 62 (45.3%) patients with ≤40 years and 75 (54.7%) with >40 years of age. Table-1 shows the demographic data of study participants. Mean duration of disease was 5.65 ±0.93 years.

Table 1: Demographic distribution of participants.

Age	Mean ±SD	40.43 ±10.53
Factor F(P)	<40 years F (P)	62 (45.3%)
	>40 years F (P)	75 (54.7%)
Gender	Male F (P)	53 (39.0%)
	Female F (P)	84 (61.0%)
Geographical distribution	Rural F (P)	58 (42.3%)
	Urban F (P)	79 (57.7%)

Table 2: Comparison of hypokalemia with age of the patients.

Age, years	Hypokalemia		p-value
	Yes	No	
≤40	16 (25.8%)	46 (74.2%)	0.040
>40	32 (42.7%)	43 (57.3%)	
Gender			0.047
Male	24 (45.3%)	29 (54.7%)	
Female	24 (28.6%)	60 (71.4%)	
Duration of disease			0.061
≤6	43 (38.7%)	68 (61.3%)	
>6	5 (19.2%)	21 (80.8%)	

There were 111 (81%) patients with ≤6 years of duration of disease whereas 26 (19%) with >6 years of duration of disease. The mean serum potassium level was 3.49±0.51 mmol/L, hypokalemia was observed in 48 (35%) participants. The mean length of hospital stay was 5.86±1.18 days. A significant association of hypokalemia was observed with age (*p*-value 0.040) (Table-2), gender (*p*-value 0.047) (Table-3), and residence (*p*-value 0.040) (Table-4).

Table 3: Mean of difference in length of hospital stay between patients with and without hypokalemia.

Hypokalemia	Length of Hospital Stay Mean ±SD	p-value	95% CI
Yes	5.97 ±1.19	0.394	-0.23 to 0.60
No	5.78 ±1.17		

Table 4: Age of the patients and mean difference of length of hospital stay between with and without hypokalemia.

Age, years	Hypokalemia	Length of Hospital Stay Mean \pm SD	p-value	95% CI
≤ 6	Yes	6.43 \pm 1.15	0.349	-0.36 to 1.02
	No	6.10 \pm 1.21		
> 6	Yes	5.75 \pm 1.16	0.272	-0.23 to 0.79
	No	5.46 \pm 1.05		

Whereas duration of disease was found to be insignificantly associated with presence of hypokalemia (p -value 0.061). (Table-5)

Table 5: Gender of the patients and mean difference of length of hospital stay between with and without hypokalemia.

Gender	Hypokalemia	Length of hospital stay Mean \pm SD	p-value	95% CI
Male	Yes	5.95 \pm 1.04	0.806	-0.69 to 0.54
	No	6.03 \pm 1.17		
Female	Yes	6.01 \pm 1.35	0.287	-0.27 to 0.91
	No	5.68 \pm 1.19		

Discussion

Hypokalemia is a serious complication of hepatic encephalopathy, its treatment or due to its complications⁸. According to Jamali et al., 50-80% of patients with treatment for cirrhosis and its complications develop hypokalemia.⁹ In current study, hypokalemia was observed in 35% of patients with hepatic encephalitis that is lesser than his reported data. However, hypokalemia was found in 18% Bakwa et al,⁷ 14% Tapper EB et al¹³ and 11% Qazi F. et al.¹⁵ Many other studies conducted worldwide had shown variable frequency of hypokalemia in subjects suffering from chronic liver disease with complications or with treatment. While to the best of our search, there is no sample data on the potassium level in the context of adult medicine especially for the hepatic encephalitis patients at country level

Gaduputi V, investigated the prognosticate outcomes of hypokalemia in hepatic encephalopathy. Potential prognostic variables such as serum pH, systemic vascular resistance (SVR) and serum ammonia levels were also observed in subjects with low and normal potassium levels. Stay in the hospital (p value= 0.001) and ICU (p value= 0.0003) were significantly longer among the subjects with hypokalemia (< 4 mEq/L). Statistically significant correlation among serum potassium level and duration of hospital and ICU stay was observed.¹⁰

On the contrary the current study couldn't find significant association between serum potassium level and duration of hospital stay. The difference in findings are suggested to be due to difference in the inclusion and exclusion criteria of both the studies.

Ahmed et al¹¹ and Mehboob F¹² established association of hypokalemia with gastrointestinal bleeding. In 34% subjects, hypokalemia was noted and most patients had mild category of hypokalemia. Different other studies conducted from different areas had demonstrated that hypokalemia in cirrhotic subjects ranges from 33% to 68%.^{3,7,9}

As the cirrhotic patients present with constellation of symptoms due to disease or its' complications which include hypokalemia therefore identification of appropriate symptoms of hypokalemia cannot be separated but in suspected cases it may be confirmed by assessing low potassium levels with the help of serum electrolyte analysis.¹³⁻¹⁵ The results of the current study seemed to be encouraging as the findings are according to reported data and these will also be helpful in managing our seriously morbid patients. As the incidence and prevalence of cirrhosis is increasing in our society, so the economic burden associated with the disease and complications is also increasing. Hence, all the cirrhotic patients need complete thorough investigations for the proper management and prevention of complications. Repeated electrolyte assessment should be considered in all the patients of cirrhosis admitted in the hospital so that the patients can be prevented from developing hypokalemia and related outcomes.^{16,17}

In short, prevalence of hypokalemia is quite high in hospitalized cirrhotic patients. Index of suspicious should be high to make an early diagnosis.¹⁸ Serum potassium (electrolytes) analysis should be advised to all indoor patients of cirrhosis, encephalopathy due to cirrhosis or other suspected symptoms of hypokalemia.^{19,20}

The frequency of hypokalemia was observed in 35% patients with hepatic encephalopathy. However, there was no difference in length of the hospital stay in patients with hepatic encephalopathy patients with hypokalemia and without hypokalemia.

Conflict of interest: None declared.

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