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Original Article

Polyethylene Glycol in the Treatment of Hepatic Encephalopathy in Patients with Liver Cirrhosis

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Abstract

Objective: This study aims to determine the effectiveness and safety of polyethylene glycol (PEG) in patients with hepatic encephalopathy.

Methods: This cross-sectional study was conducted at Northwest General Hospital and Research Centre, Peshawar, Pakistan. All patients participated in this study were diagnosed with hepatic encephalopathy from January 2019 to August 2021. All patients were given 3 sachets of polyethylene glycol daily. Recovery days, length of hospital stay, and recurrent episodes were assessed.

Results: A total of 75 patients with different hepatic diseases admitted to the hospital due to hepatic encephalopathy were given 3 sachets of polyethylene glycol daily. On average, 2.81 days for recovery and 5 days of hospital stay were required. The mean number of recurrent hepatic encephalopathy episodes was 0.52.

Conclusion: Polyethylene glycol is considered effective and safe in patients with hepatic encephalopathy, with short recovery days, hospital stay, and few recurrent episodes.

Keywords: Hepatic encephalopathy, polyethylene glycol, liver cirrhosis.

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Introduction

Hepatic disorders including hepatitis B and C - chronic liver disease (CLD), hepatitis C - CLD and hepatocellular carcinoma (HCC), cryptogenic cirrhosis, Wilson Disease, and disseminated malignancy are the main underlying causes of hepatic encephalopathy (HE)[1]. HE can be categorized into 2 types, overt and minimal[2]. Overt HE is characterized by both neurological and psychiatric abnormalities which can be tested clinically, whereas minimal hepatic HE can only be diagnosed by specific psychometric tests[2,3].

Child-Pugh Score is a scoring system that predicts mortality in HE[4]. It classifies patients into 3 groups (A-B-C) based on serum bilirubin, serum albumin, ascites, neurological disorder, and clinical nutrition status[5], where group A refers to a good hepatic function, group B refers to moderately impaired hepatic function, and group C refers to advanced hepatic dysfunction. West Haven criteria is another grading system to assess the severity of overt HE[5], ranging from Grade 0 which is normal to Grade 4 which indicates coma.

Initiating empirical therapy for acute hospitalized HE patients, while assessing and identifying the main precipitating causes followed by prevention of secondary, HE are the main goals of treatment. Non-absorbable disaccharides, such as lactulose which decreases ammonia level, have been used as a first-line treatment for overt HE[6-8]. Polyethylene glycol (PEG), an osmotic laxative, is being compared to lactulose for its effectiveness and safety in treating HE. However, the effects of PEG still warrant investigations and trials.

Methods

This cross-sectional study was conducted at Northwest General Hospital and Research Centre, Peshawar, Pakistan. All patients participated in this study were diagnosed with HE from January 2019 to August 2021. Ethical approval was obtained from Northwest General Hospital and Research Centre, and written informed consent was obtained from all participants.

A total of 75 patients with cirrhosis and hospitalized due to acute HE episodes were assessed. Child-Pugh

Score and Hepatic Encephalopathy Grade, both scoring systems were used to assess the levels of hepatic dysfunction after admission. All patients were given 3 PEG sachets to be dissolved in 125ml water (1 sachet = 13.8g powder for oral solution) before use, once per day. The primary outcomes of this study were no.of days to recovery, length of hospital stay, the duration of PEG intake, and the number of recurrent episodes. Descriptive statistics were used to present the primary outcomes of this study.

Results

The demographic information and clinical data in Table 1 showed that participants had a mean age of 59.8 years and most of them were male (62.7%). Hepatitis B and C –CLD, and Hepatitis C - CLD + HCC were the main underlying causes of cirrhosis. Child- Pugh Score, and HE grade as shown in Table 1 indicates that most patients were in group B and C and Grade 4 HE.

Table 1: *Basic Demographics and Clinical Data (n=75)*

Characteristics		Frequency	Child Pugh Score	West Haven Grade
Gender	Male	47 (62.7%)		
	Female	28 (37.3%)		
Age (mean years		59.8		
Disease	Hepatitis C – CLD	29 (38.7%)	A (31%)	2 (10%)
			B (34.5%)	3 (38%)
			C (34.5%)	4 (52%)
	Hepatitis B – CLD	21 (28%)	A (4.8%)	2 (4.75%)
			B (57.1%)	3 (38%)
			C (38.1%)	4 (57.25%)
	Hepatitis C - CLD + HCC	11 (14.7%)	A (9.1%)	3 (36.4%)
			B (27.3%)	4 (63.6%)
			C (63.6%)	
	Cryptogenic Cirrhosis	9 (12%)	A (11.11%)	2(22.22%)
			B (55.55%)	3(22.22%)
			C (33.33%)	4(55.55%)
	Hepatocellular carcinoma	1(1.33%)	C	4
	Wilson Disease			3
	Hepatitis B and C – CLD	1 (1.33%)	B	3
	Hepatitis C - CLD + Hepatocellular carcinoma	1(1.33%)	C	4
	Disseminated Malignancy	1(1.33%)	C	3
Total			A (17.3%)	2 (8%)
			B (41.3%)	3 (37.3%)
			C (41.3%)	4 (54.7%)

Child Pugh Score: Group A- good hepatic function; Group B- moderately impaired hepatic function; Group C- advanced hepatic dysfunction.
West Haven Grade: Grade 0- No abnormalities; Grade 1- Mild confusion; Grade 2- Moderate confusion; Grade 3- Somnolent but arousable; Grade 4- Coma.

The mean recovery days was 2.81 days and the mean of length of hospital stay was 5 days. The mean number of recurrent HE episodes was 0.52. More than 60% of the patients took PEG for 2 weeks after being discharged from the hospital. No death cases were reported.

Discussion

This cross-sectional study found that the use of 3 PEG sachets daily is safe and effective in treating HE. Several studies assessing the effect of PEG in acute HE episodes showed similar results[9-12,15]. In a randomized clinical trial[13], the mean time for HE resolution was 1 day compared to 2.81 days in this study. Another study[11] that compared PEG and lactulose showed a mean of 0.52 days for complete resolution, 1.77 days for length of hospital stay. Similarly, in a meta-analysis[14] 1 day for HE resolution was reported. This difference could be linked to several factors including the severity of HE, administration of lactulose after 24 hours, PEG dose, and patient demographics. Concerning other primary outcomes, all of them showed a promising result in acute HE.

This study is amongst a few clinical trials which assess the effects of PEG in treating acute HE. A large number of patients (n=75) having severe case of HE was assessed. This study, however, was conducted in a hospital, limiting the generalizability of the findings. In addition, PEG was not compared to another treatment regimen, therefore no comparison could be made.

Conclusion

PEG is a safe osmotic laxative, when administered within 24 hours of hospital admission in treating patients with acute overt HE. Intake of three sachets of PEG daily after acute HE can lead to a quicker recovery, reduced length of hospital stay, and fewer recurrences. Further large multi-centered studies are needed to assess whether PEG could replace old regimes or be given together for better outcomes.

Ethical Approval: The IRB/EC approved this study via letter no. NWGH/ EC/14 dated October 04, 2021.

Conflict of interest: None

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Authors' Contribution

KAK: Conceptualization of the project

SUQ: Design of the work

ZNK: Data acquisition, analysis, or interpretation

SUQ, ZNK: Draft of the work

KAK: Critical review of important intellectual content

All authors approve the version to be published

All authors agree to be accountable for all aspects of the work

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