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Association of Child Pugh Class with Esophageal Varices and Portal Hypertensive Gastropathy in Patients with Cirrhosis

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ABSTRACT

Oesophageal-varices and portal-hypertensive-gastropathy are common in cirrhotic-patients. The Child Pugh-classification, a key measure of liver disease severity, helps assess their association, offering insights into disease progression and management. **Objective:** To determine the association between Childs PUGH class, oesophageal varices and portal hypertensive gastropathy in patients with cirrhosis. **Methods:** This Cross Sectional Study was conducted at the Department of Gastroenterology, LUMHS, Jamshoro, Pakistan. Doppler ultrasound was used to diagnose portal hypertension. Following the ultrasound, endoscopy was performed to diagnose oesophageal varices and portal hypertensive gastropathy. The data collected were electronically recorded for research purposes using the provided proforma. **Results:** Oesophageal varices were noted in 122 (88.4%) patients and portal hypertensive gastropathy in 117(84.8%) patients. In association of Child-Pugh class with oesophageal varices, class A was noted in 9.4%, class B in 23.2%, and class C in 55.8% of patients resulting in a significant p- value of 0.008 whereas in the association of Child-Pugh-class with portal-hypertensive-gastropathy, class A was noted in 8.0%, class B in 23.9%, while class C had 52.9% resulting in a non-significant p- value of 0.122. **Conclusions:** This study found a strong association between cirrhosis severity and the presence of esophageal varices, with the highest prevalence observed in Child-Pugh Class C patients (p = 0.008). However, the association between Child-Pugh class and portal hypertensive gastropathy was not statistically significant (p = 0.122).

INTRODUCTION

Cirrhosis is a chronic liver disease characterized by the histological development of regenerative nodules surrounded by fibrous bands, which can result in Portal Hypertension (PHTN) [1]. The increased pressure within the portal venous system leads to the formation of venous collaterals, contributing to the development of esophageal varices and variceal bleeding—major complications associated with significant morbidity and mortality. Small varices have an annual progression rate of 10%, while the risk of bleeding from small and large varices is approximately 5% and 15% per year, respectively [2, 3]. The six-week mortality rate following an initial variceal bleed is estimated to be around 20% [4]. Portal Hypertensive Gastropathy (PHG) is a common consequence of cirrhotic portal hypertension but can also arise due to non-cirrhotic causes. It is clinically relevant due to its potential to cause acute, massive, or chronic blood loss. Endoscopically, PHG presents as a mosaic-like pattern resembling snake skin, with or without red spots [5]. The reported prevalence of PHG in cirrhotic patients ranges from 20% to 98%, with most cases being mild. Previous studies indicate that mild PHG is present in approximately 60% of patients, whereas

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severe PHG is observed in more than 46% of cases [6]. However, the association between PHG and liver function severity, as classified by the Child-Pugh score, remains inconsistent.Different Studies found a significant correlation between PHG occurrence [7-9] and Child-Pugh classification, whereas El-Kalla *et al.*, did not observe any significant relationship [10]. Tiwari et al., reported that the frequency of esophageal varices in cirrhotic patients was 90.1%. Among those with Child-Pugh class A, 48.3% had varices, whereas 94.2% and 100% of patients in Child-Pugh classes B and C, respectively, presented with varices another study reported the frequency of oesophageal varices 93.8% [9]. Similarly frequency of portal hypertensive gastropathy was also 93.8% [11].

Existing literature shows inconsistent findings regarding the association of Child-Pugh classification with portal hypertensive gastropathy, while a relatively clearer correlation exists with esophageal varices. However, limited local data from Pakistan specifically addressing both complications in a single cirrhotic population is available. There is also variability in reported prevalence due to differences in study design, population characteristics, and diagnostic criteria. Therefore, the problem is the unclear and locally underexplored relationship between liver disease severity and portal hypertension-related complications. Thus, the aimed of our study was to find out the association between Child PUGH, oesophageal varices and portal hypertension gastropathy in local population keeping in view of lack of availability of local literature.

METHODS

This cross-sectional study was conducted in the Department of Gastroenterology, LUMHS, Jamshoro, over a period of six months, from February, 2023, to August, 2023. The sample size was calculated using the OpenEpi online sample size calculator, based on a 90.1% frequency of oesophageal varices in liver cirrhosis, a 5% margin of error, and a 95% confidence interval, resulting in a required sample size of 138 [9]. Non-probability, consecutive sampling technique was used. Patients aged 18 to 70 years of either gender, diagnosed with liver cirrhosis and presenting with hematemesis or melena with endoscopy done, were included. Patients with previously diagnosed varices or Portal Hypertensive Gastropathy (PHG), those on prophylactic-β-blocker-therapy, or having hepatocellular-carcinoma, portal vein or splenic vein thrombosis, or hematologic disorders were excluded. Informed written consent was taken from each participant prior to enrollment in the study. The study was approved as dissertation by College of Physician & Surgeon, Pakistan via Letter No. CPSP/REU/GAS-2021-164-1158. Liver cirrhosis was diagnosed on ultrasound based on three or more features: reduced liver lobe size (left <90 mm, right <70 mm), surface irregularity/nodularity, decreased echogenicity compared to the right kidney, ascitic fluid >100 mL, or portal vein diameter >13 mm. Oesophageal varices were identified via endoscopy, showing abnormal tortuous bluish submucosal veins in the lower oesophagus, antrum, or fundus. Portal-hypertensive-gastropathy was diagnosed endoscopically by the presence of erythematous polygonal areas with a whitish-reticular-border in a mosaic-pattern in the gastric-fundus/body. Child-Pugh classification was determined using serum bilirubin, albumin, prothrombin time, ascites, and hepatic encephalopathy, categorizing patients into Class A, B, or C. Data were analyzed using SPSS version 21.0. The normality of the data was assessed using the Shapiro-Wilk test. As the data were found to be normally distributed, parametric tests were applied. Chi square test was applied to check for the significance of the association of Child Pugh Class with Esophageal Varices and Portal Hypertensive Gastropathy. P value ≤ 0.05 was considered statistically significant.

RESULTS

Majority of patients were male (66.7%) and rural residents (55.8%) with mean age of 42.92 ± 15.59 years. The average duration of cirrhosis was 29.54 ± 14.75 months. Hypertension was present in 55.8% of patients, while 44.9% had diabetes mellitus, and 46.4% were smokers, (Table 1).

Table 1: Descriptive Analysis (n=138)

Characteristics	Mean ± SD/Frequency (%)
Mean Age	42.92 ± 15.59
Weight	65.39 ± 14.57
Height	161.97 ± 7.22
Body Mass Index	25.04 ± 5.91
Duration of Cirrhosis	29.54 ± 14.75
Hepatic Venous Gradient Pressure	4.23 ± 2.07
Gender Distribution	
Male	92 (66.7%)
Female	46 (33.3%)
Residential Status	
Urban	61 (44.2%)
Rural	77 (55.8%)
Comorbidity Status	
Presence of Diabetes Mellitus	62 (44.9%)
Presence of Hypertension	77 (55.8%)
Smokers	64 (46.4%)

Regarding disease severity, 10.9% of patients were classified as Child-Pugh Class A, 25.4% as Class B, and 63.8% as Class C. Oesophageal varices were detected in 88.4% of patients, while 84.8% had portal hypertensive gastropathy, (Table 2).

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Table 2: Frequency of Child-Pughclass Distribution, Oesophageal-Varices, and Portal-Hypertensive-Gastropathy (n=138)

Category	Frequency (%)
Child-Pugh Class	
Class A	15 (10.9%)
Class B	35 (25.4%)
Class C	88 (63.8%)
Oesophageal Varices	
Present	122 (88.4%)
Absent	16 (11.6%)
Portal Hypertensive Gastropathy	
Present	117 (84.8%)
Absent	21 (15.2%)

A significant association was observed between Child-Pugh class and the presence of oesophageal varices (p = 0.008). Class C patients were highest (55.8%), followed by Class B (23.2%) and Class A (9.4%).However, the association between Child-Pugh class and portal hypertensive gastropathy was not statistically significant (p = 0.122).Although PHG was more common in Class C patients (52.9%) than in Class A (8.0%) and Class B (23.9%), the difference was not statistically meaningful, (Table 3).

Table 3: Association of Childpughclass with Oesophagealvarices and Portalhypertensivegastropathy (n=138)

Child Pugh Class	Coronary Angiographic Profile		p-Value	Confidence Interval
	Present Frequency (%)	Absent Frequency (%)		
Class A	13 (9.4%)	2 (1.4%)	0.008*	95%
Class B	32 (23.2%)	3 (2.2%)		
Class C	77 (55.8%)	11 (8.0%)		
Portal Hypertensive Gastropathy				
Class A	11 (8.0%)	4 (2.9%)	0.122	95%
Class B	33 (23.9%)	2 (1.4%)		
Class C	73 (52.9%)	15 (10.9%)		

*Statistically Significant (Chi – square test was applied)

DISCUSSION

Oesophageal varices and portal hypertensive gastropathy are major complications associated with cirrhosis due to increased portal vein pressure. Oesophageal varices are dilated, fragile veins in the oesophagus, whereas portal hypertensive gastropathy refers to mucosal changes in the stomach resulting from portal hypertension. Both conditions significantly increase the risk of gastrointestinal bleeding, making their early identification and management crucial for cirrhotic patients [12, 13]. In this study, the mean age of the patients was 42.92 ± 15.59years, which is consistent with prior studies that reported mean ages of 44 ± 12.61 years [14]. The majority of patients in this study were male (66.7%), which aligns with findings from Saleem K *et al.* (53.15% male) [15]. Similarly, Sungkar T *et al.*, reported a male predominance of 71.4% [11]. The prevalence of oesophageal varices in this study was 88.4%, while portal hypertensive gastropathy was present in 84.8% of patients. These findings align with previous studies that reported oesophageal varices in 90.1% and 93.8% of cirrhotic patients [16, 17].The prevalence of portal hypertensive gastropathy varies widely, with reported rates ranging from 20% to 98% [18]. Child-Pugh classification is a critical tool in assessing the severity of cirrhosis, incorporating factors such as bilirubin levels, albumin levels, INR, ascites, and encephalopathy [19].In this study, the association between Child-Pugh class and oesophageal varices was statistically significant (p = 0.008). The distribution of varices across Child-Pugh classes was 9.4% in class A, 23.2% in class B, and 55.8% in class C. Similarly, portal hypertensive gastropathy was found in 8.0% of patients in class A, 23.9% in class B, and 52.9% in class C, with a non-significant p-value of 0.122. These findings contrast with previous studies by Nishino K *et al.*, and Tiwari PS *et al.*, which found a significant association between portal hypertensive gastropathy and Child-Pugh stage [8, 9]. However, El-Kalla F *et al.*, did not observe a significant difference in the prevalence of portal hypertensive gastropathy across different Child-Pugh stages [10].The inconsistency in the association between PHG and Child-Pugh classification arises from variations in patient populations, non-standardized PHG grading, small sample sizes, and inter-observer differences in endoscopic interpretation.Moreover, confounders like H. pylori infection and portal pressure-modifying medications further obscure the relationship.Early detection and management of oesophageal varices and portal hypertensive gastropathy remain essential in preventing severe bleeding events.Endoscopic screening is the gold standard for diagnosing these conditions, with grading systems such as the Baveno criteria guiding treatment strategies [20].Prophylactic measures, including beta-blockers and endoscopic variceal band ligation, are recommended for high-risk patients to reduce the likelihood of life-threatening hemorrhages. Managing cirrhosis holistically, addressing complications such as ascites and hepatic encephalopathy, is crucial in reducing portal hypertension and improving patient outcomes [21].

One of the key limitation of the study is the variability in PHG prevalence due to the potential confounders like differences in patient selection, endoscopic interpretation, liver disease stage and etiology, beta-blocker use, comorbidities, and inconsistent diagnostic criteria across studies. Other limitations included the use of non-probability consecutive sampling which had limited the generalizability of results and the absence of histological confirmation which had limited the diagnostic precision. Future studies should include multicenter, larger-scale longitudinal designs with standardized

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endoscopic grading systems and better control of confounding variables. Incorporating objective measures such as hepatic venous pressure gradient and follow-up outcomes would further strengthen evidence.

CONCLUSIONS

The study found a significant association between Child-Pugh class and the presence of esophageal varices, with the highest prevalence observed in Child-Pugh Class C patients. However, no statistically significant association was found between Child-Pugh class and portal hypertensive gastropathy, suggesting that while cirrhosis severity correlates with esophageal varices, it does not have the same effect on the development of portal hypertensive gastropathy.

Authors' Contribution

Conceptualization: SIH
Methodology: MSB
Formal analysis: KHS
Writing and Drafting: SIH, NLS, ARQ, US, KHS, MSB
Review and Editing: SIH, NLS, ARQ, US, KHS, MSB

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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