

## Association of Esophageal Varices with Portal Vein Diameter More Than 13 mm in Chronic Liver Disease Patients

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### ABSTRACT

**Objective:** To determine the frequency and association of esophageal varices with diameter of portal vein more than 13 mm in patients of chronic liver disease (CLD).

**Study Design:** Cross-sectional study.

**Place and Duration of Study:** Department of Gastroenterology, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Feb to Aug 2018.

**Methodology:** The study included one hundred and sixty-one patients of chronic liver disease with portal vein diameter more than 13 mm. Patients with the history of variceal bleeding, prior variceal treatment and liver transplantation were excluded. A consultant radiologist performed the hepatobiliary ultrasound in all the patients to measure the portal vein diameter. The presence of esophageal varices was confirmed on upper GI endoscopy performed by the consultant gastroenterologist.

**Results:** The mean age of the patients was  $47.16 \pm 9.36$  years. Most of the patients included in our study 102 (63.35%) were between 46-65 years of age. Out of the 161 patients, 95 (59.01%) were males and 66 (40.99%) were females. Esophageal varices were found in 128 patients (79.50%) with chronic liver disease with portal vein diameter >13 mm. Age, gender, duration of illness and BMI had no relation with the presence of esophageal varices in our target population.

**Conclusion:** Patients of CLD with portal diameter greater than 13 mm had more chance for the presence of esophageal varices in our study.

**Keywords:** Cirrhosis, Esophageal varices, Portal vein diameter.

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### INTRODUCTION

Patients with the cirrhotic liver can develop portal hypertension as a complication. Hepatic venous pressure gradient (HVPG) above 5 mmHg is usually taken as a reference for portal vein hypertension. Patients with HVPG >10 mmHg are at the risk of developing esophageal varices and subsequent bleeding.<sup>1</sup> Variceal bleeding has been regarded as one of the most fatal complications of portal hypertension.<sup>2</sup> Esophago-gastroduodenoscopy (EGD) is the modality of choice to diagnose the presence of esophageal varices. The complication of variceal bleeding secondary to increased portal vein pressure is so common that it is recommended to perform EGD in every patient after the diagnosis of cirrhosis.<sup>3,4</sup>

Veins around the stomach and esophagus, when dilated abnormally, are termed as varices. They form collateral connections within the esophagus wall and communicate directly into the esophageal lumen.<sup>5</sup> Though esophageal and para esophageal varices are

from different sites but are usually considered together for clinical purposes. Paraesophageal varices have less risk of bleeding and hemorrhage as compared to the esophageal varices.<sup>6</sup>

One of the leading causes of mortality and morbidity in patients with liver cirrhosis is variceal hemorrhage. With each passing year, the risk of developing portal hypertension leading to varices and bleeding increases. Therefore, high surveillance is required by the treating hepatologist to counter this complication.<sup>7</sup> Size of the esophageal varices has been a predictor of hemorrhage and mortality. Usually, 20% mortality has been associated with the presence of esophageal varices leading to life-threatening hemorrhage. Therefore, one of the prime goals of treating hepatologists has been the control of bleeding due to varices secondary to portal vein hypertension.<sup>8</sup>

The presence of esophageal varices in cirrhotic patients has not been a rare phenomenon and 40-60% of these patients have this condition secondary to the raised pressure of the portal vein. The PVD can be a good technique to counter this condition prior to invasive modalities like endoscopy.<sup>9</sup> A study has shown

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that esophageal varices were found in 81.51% patients of chronic liver disease with the diameter of portal vein more than 13 millimeters.<sup>10</sup>

As the frequency of chronic liver disease increases day by day in our population, there must be a re-evaluation of the frequency of esophageal varices in patients with portal vein diameter >13 mm as the majority of our population belong to the periphery where advanced healthcare facilities are lacking. This study provided a non-invasive assessment of esophageal varices in these particular patients, so that they could be managed timely and effectively.

**METHODOLOGY**

This cross-sectional study was carried out Department of Gastroenterology, Pak Emirates Military Hospital, Rawalpindi, from February to August 2018. Sample size was calculated with the help of WHO sample size calculator by taking population prevalence with portal vein diameter of >13 mm as 90%.<sup>11</sup> Non-probability, consecutive sampling technique was used for data collection.

**Inclusion Criteria:** Patients of either gender with age ranging from 25-65 years having chronic liver disease for last 3 months and portal vein size >13 mm on USG abdomen were included in the study.

**Exclusion Criteria:** Patients with the history of variceal bleeding or history of prior variceal treatment or variceal bleeding prophylaxis or patients who were candidates for liver transplantation were excluded from the study.

After approval from the Ethical Review Committee and CPSP, a total of 161 patients presented to the Department of Gastroenterology of Pak Emirates Military Hospital, Rawalpindi, were included in the study. Informed consent was taken from the patient. Ultrasonography of each patient was carried out by a consultant radiologist specially trained in hepatic parameters for measuring the portal vein diameter. The presence or absence of esophageal varices was confirmed on endoscopy, which was performed by the consultant gastroenterologist in each patient.

All the data was entered in the structured proforma. Statistical Package for Social Sciences (SPSS) version 20 was used for the data analysis. Quantitative variables were summarized as mean ± SD and qualitative variables were summarized as frequency and percentages. Chi-square test was applied to find out the association. The p-value of ≤0.05 was considered statistically significant.

**RESULTS**

Out of the 161 patients, 95 (59.01%) were males and 66 (40.99%) were females with a male to female ratio of 1.4:1. The mean age of the patients was 47.16 ± 9.36 years. One hundred and two (63.35%) patients were between the ages of 46 to 65 years. The mean duration of disease was 2.42 ± 1.41 years. Mean BMI of the patients was 28.96 ± 2.66 kg/m<sup>2</sup>. The distribution of patients according to child-pugh class was shown in the Figure.

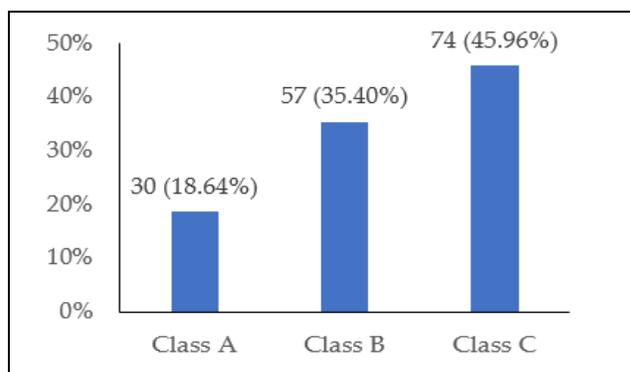


Figure: Distribution of patients according to child pugh class (n=161).

Frequency of esophageal varices in CLD patients with portal vein diameter >13 mm was 128 (79.50%). There was no statically significant difference between different age groups and gender, as shown in Table-I. The association of Esophageal varices with duration of disease and BMI were shown in the Table-II.

Table-I: Association of esophageal varices with age groups and gender.

Age (years)	Esophageal Varices		p-value
	Present	Absent	
25-45	45 (27.9%)	14 (8.7%)	0.440
46-65	83 (51.5%)	19 (11.2%)	
<b>Gender</b>			
Male	74 (45.9%)	21 (13.1%)	0.544
Female	54 (33.5%)	12 (7.4%)	

Table-II: Association of esophageal varices with duration of disease and body mass index.

Duration of Disease	Esophageal Varices		p-value
	Present	Absent	
3 months-1 years	53 (33.8%)	12 (7.4%)	0.301
>1 year	75 (46.1%)	21 (13.1%)	
<b>BMI (kg/m<sup>2</sup>)</b>			
≤27	38 (23.6%)	14 (8.7%)	0.163
>27	90 (55.9%)	19 (11.2%)	

## DISCUSSION

Liver cirrhosis has been a commonly encountered medical condition all over the world.<sup>12,13</sup> Our country has been facing a similar challenge. Cirrhotic patients commonly encounter esophageal varices, which lead to bleeding.<sup>14</sup> Hepatic venous pressure gradient (HVPG) exceeding 10 mm Hg is an independent risk factor for the development of esophageal varices. Usually, patients with advanced liver disease with this pressure in portal vein start developing the varices and face the complications. The mortality rate becomes alarmingly high in this condition and around 20% of patients develop fetal complications.<sup>15,16</sup>

This study only included patients with portal vein diameter more significant than 13cm. Our results revealed that patients with portal vein diameter above 13 mm had a high frequency of esophageal varices. This has been demonstrated in the past studies, where researchers found that with each passing year, the cirrhotic liver worsens and portal vein diameter enlarges, raising the chances of esophageal varices formation and bleeding.

A study conducted by Lipp et al, on patients with CLD revealed that portal vein diameter and average spleen size and platelet count have a significant association with variceal bleeding.<sup>8</sup> Their results strengthened our findings as more than 70% of patients with varices had portal vein diameter above 13mm. The size of the portal vein also determined the size of varices in this study.

Cirrhotic patients suffer from splenomegaly and enlargement of the portal vein.<sup>17</sup> Sudha *et al*,<sup>18</sup> concluded that cut-off value is usually 13mm and diameter more than this predicts variceal bleeding. Groszmann *et al*,<sup>19</sup> in their analysis, concluded that increased size of portal vein and splenomegaly emerged as predictors for esophageal varices and bleeding in the patients suffering from chronic liver disease.

The patients with compensated cirrhosis with small varices at screening endoscopy should undergo surveillance endoscopy every year if there is ongoing liver injury; otherwise, once in 2 years. However, this approach has two significant limitations. Endoscopy is an invasive procedure and secondly, the cost-effectiveness of this approach is also questionable. Despite the advantages of endoscopy, it is still an unpleasant and expensive invasive method. It also carries the risk of bleeding due to manipulation, as proved by a study in 2015.<sup>15</sup> Only 30-40% of patients with compensated cirrhosis were found to have gastro-oesophageal

varices on screening endoscopy.<sup>19</sup> USG may therefore be a more cost-effective and non-invasive method to routinely screen patients at high risk for the presence of varices, to reduce the increasing burden and procedure costs of endoscopy units.

## CONCLUSION

Patients of CLD with portal diameter greater than 30mm had more chance for the presence of esophageal varices in our study.

**Conflict of Interest:** None.

## Authors' Contribution

AM., AK., KRB., JK: Direct contribution, FA., UBZ: Intellectual contribution.

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