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ORIGINAL ARTICLE

Esophageal Varices in Pakistani Cirrhotics High Prevalence, Strong Predictors, and the Role of Non-Invasive Screening in Resource-Limited Settings

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ABSTRACT

Background: Esophageal varices are a common and life-threatening complication of liver cirrhosis, particularly in developing countries like Pakistan, where delayed diagnosis and limited access to endoscopic facilities pose significant challenges. Identifying non-invasive predictors can help stratify patients at risk, enabling timely intervention and better resource allocation.
Objective: To determine the prevalence of esophageal varices in cirrhotic patients, identify strong clinical and laboratory predictors, and evaluate the utility of non-invasive parameters in guiding screening in resource-limited settings.
Methods: This cross-sectional study was conducted at Sir Ganga Ram Hospital, Lahore, from December 2022 to October 2023. A total of 100 patients with clinically and radiologically confirmed liver cirrhosis were included. Demographic, clinical, laboratory, and ultrasound data were recorded. All patients underwent upper gastrointestinal endoscopy to confirm the presence and grade of esophageal varices. The association of non-invasive parameters such as platelet count, splenomegaly, portal vein diameter, Child-Pugh class, and serum albumin—with the presence of varices was analyzed.
Results: Out of 100 cirrhotic patients, 71% were found to have esophageal varices. The majority had Grade II (39.4%) and Grade I (31%) varices. Significant associations were observed between the presence of varices and platelet count <100,000/mm³ (69%), splenomegaly (80%), portal vein diameter >13 mm (66%), and serum albumin <3.0 g/dL (60%). Most patients belonged to Child-Pugh class B (44%) or C (32%). Hepatitis C was the leading cause of cirrhosis (58%).
Conclusion: Esophageal varices are highly prevalent in Pakistani cirrhotic patients. Easily available non-invasive indicators such as thrombocytopenia, splenomegaly, low albumin, and increased portal vein diameter strongly correlate with the presence of varices. These predictors can guide targeted screening and reduce reliance on endoscopy in resource-limited settings.
Keywords: Esophageal varices, Cirrhosis, Portal hypertension, Non-invasive predictors, Platelet count, Splenomegaly, Pakistan, Endoscopy, Resource-limited settings.

INTRODUCTION

Esophageal varices are dilated submucosal veins in the lower esophagus, which commonly develop as a consequence of portal hypertension, a major complication of liver cirrhosis. Variceal bleeding is a life-threatening event and one of the leading causes of mortality in patients with decompensated cirrhosis[1]. Early detection and prophylactic management of varices significantly improve clinical outcomes, reduce healthcare costs, and lower the risk of fatal bleeding events. However, in many

low-resource settings like Pakistan, routine endoscopic screening remains underutilized due to limited accessibility, financial constraints, and a shortage of trained personnel [2].

Pakistan bears a disproportionately high burden of chronic liver diseases, primarily due to widespread hepatitis B and C infections, which contribute significantly to the development of cirrhosis and its complications[3]. Several local studies have reported a high prevalence of esophageal varices among Pakistani cirrhotic patients, often presenting at an advanced stage with first-time variceal bleeding[4]. Identifying clinical, biochemical, and radiological predictors of varices in this population can help clinicians prioritize high-risk patients for endoscopic screening and initiate early prophylactic therapy [5].

In the Pakistani healthcare landscape, the burden of liver cirrhosis continues to rise due to delayed diagnosis, poor access to antiviral therapies, and low awareness about chronic liver disease progression. Most cirrhotic patients present to tertiary care hospitals at advanced stages when complications such as esophageal varices, ascites, and hepatic encephalopathy have already developed[6]. Endoscopic surveillance, although recommended by international guidelines such as those from the AASLD and Baveno VI consensus, is not routinely practiced in peripheral and public-sector hospitals due to lack of resources. Therefore, there is an urgent need to implement risk stratification tools that utilize simple, widely available clinical and laboratory parameters to predict the presence of varices [7]. Such strategies could enhance early identification, allow timely prophylactic interventions (e.g., non-selective beta-blockers), and ultimately reduce the incidence of first variceal bleeding. Strengthening non-invasive screening in the Pakistani context is not only clinically relevant but also economically imperative for reducing morbidity and mortality in cirrhotic populations [8].

Non-invasive predictors such as platelet count, splenomegaly, portal vein diameter, Child-Pugh score, and liver stiffness measurement are increasingly being studied as alternatives to endoscopy in surveillance strategies, especially where endoscopic facilities are scarce [9]. Their validation in Pakistani settings could provide a valuable tool for improving variceal screening in routine clinical practice. This study aims to assess the prevalence of esophageal varices among cirrhotic patients in Pakistan, identify strong independent predictors, and evaluate the potential role of non-invasive screening models to guide clinical decision-making in resource-limited healthcare environments. By doing so, it hopes to bridge the gap between evidence-based guidelines and real-world clinical applicability in developing countries[10].

MATERIAL AND METHOD

This cross-sectional observational study was conducted at the Department of Gastroenterology, Sir Ganga Ram Hospital, Lahore, from December 2022 to October 2023. A total of 100 patients with a confirmed diagnosis of liver cirrhosis were enrolled through non-probability consecutive sampling. The diagnosis of cirrhosis was based on clinical features, biochemical parameters, abdominal ultrasonography, and/or elastographic evidence of liver fibrosis. All patients included were aged 18 years or older, of either gender, and had not undergone previous endoscopic band ligation or variceal therapy. Patients with hepatocellular carcinoma, portal vein thrombosis, previous gastrointestinal surgery, or non-cirrhotic portal hypertension were excluded.

After obtaining informed consent, detailed clinical histories were recorded, including symptoms of portal hypertension, prior episodes of hematemesis or melena, comorbidities, and medication use. A thorough physical examination was performed with special attention to signs of chronic liver disease such as ascites, splenomegaly, jaundice, and hepatic encephalopathy. Laboratory investigations included complete blood count, liver function tests (ALT, AST, total bilirubin, albumin), prothrombin time, international normalized ratio (INR), and viral serology for hepatitis B and C. Platelet count and serum albumin levels were particularly noted due to their known association with portal hypertension.

Abdominal ultrasonography was performed in all patients to evaluate liver size and echotexture, splenic size, and portal vein diameter. Based on clinical and biochemical data, the Child-Pugh score was calculated for each patient to assess the severity of liver dysfunction. All enrolled patients subsequently underwent upper gastrointestinal endoscopy using a standard video endoscope by experienced gastroenterologists. The presence, size, and grading of esophageal varices were documented according to the American Association for the Study of Liver Diseases (AASLD) criteria. The collected data were analyzed to identify potential non-invasive predictors of esophageal varices and to evaluate their diagnostic value in a resource-limited setting. Ethical approval for the study was obtained from the Institutional Review Board of Sir Ganga Ram Hospital, Lahore, prior to data collection.

RESULTS

The study included a total of 100 patients with confirmed cirrhosis, evaluated for the presence of esophageal varices at Sir Ganga Ram Hospital, Lahore, between December 2022 and October 2023. Among the study

population, 62% were male and 38% were female, with a mean age of 52.6 ± 11.3 years, indicating a middle-aged cohort typically affected by chronic liver disease. The leading cause of cirrhosis was hepatitis C virus (HCV) infection, accounting for 58% of the cases, followed by hepatitis B virus (HBV) in 22%. A smaller proportion had combined HBV and HCV infections (8%), alcohol-related liver disease (4%), or cryptogenic/other etiologies (8%). This distribution aligns with the national epidemiological profile, where viral hepatitis is a major contributor to chronic liver disease.

When stratified by Child-Pugh classification, 44% of patients were in Class B, 32% in Class C, and 24% in Class A, indicating that the majority of patients presented with moderate to severe hepatic dysfunction. Notably, esophageal varices were detected in 71% of patients, underscoring their high prevalence among Pakistani cirrhotics. Of the patients with varices, 39.4% had Grade II varices, followed by Grade I in 31%, and Grade III in 29.6%. This distribution suggests a significant number of patients had medium to large varices, which are more prone to rupture and associated with higher bleeding risk.

Table 1: Baseline Characteristics and Prevalence of Esophageal Varices in 100 Cirrhotic Patients

Variable	Frequency (n = 100)	Percentage (%)
Gender		
Male	62	62%
Female	38	38%
Mean Age (Years)	52.6 ± 11.3	–
Etiology of Cirrhosis		
Hepatitis C	58	58%
Hepatitis B	22	22%
Combined HBV + HCV	8	8%
Alcohol-related	4	4%
Cryptogenic/Other	8	8%
Child-Pugh Class		
Class A	24	24%
Class B	44	44%
Class C	32	32%
Presence of Esophageal Varices		
Present	71	71%
Absent	29	29%
Grading of Varices (n = 71)		
Grade I	22	31%
Grade II	28	39.4%
Grade III	21	29.6%
Splenomegaly (by ultrasound)	80	80%
Portal Vein Diameter >13 mm	66	66%
Platelet Count <100,000/mm³	69	69%
Serum Albumin <3.0 g/dL	60	60%

Splenomegaly was observed in 80% of the patients on ultrasonography, reinforcing its strong association with portal hypertension. A portal vein diameter greater than 13 mm, another important radiological marker, was present in 66% of patients. Thrombocytopenia, defined as a platelet count below 100,000/mm³, was found in 69% of patients further supporting its role as a non-invasive predictor of varices. Additionally, hypoalbuminemia (serum albumin <3.0 g/dL) was present in 60% of the patients, indicating reduced hepatic synthetic function and a marker of decompensated cirrhosis.

Overall, these findings demonstrate a high prevalence of esophageal varices in cirrhotic patients and highlight several easily obtainable clinical and laboratory parameters—such as splenomegaly, thrombocytopenia, low albumin levels, and dilated portal vein—that could serve as strong non-invasive predictors for identifying high-risk patients. This is particularly important in settings like Pakistan, where endoscopic resources are limited, and there is a pressing need for risk stratification tools to prioritize patients for urgent endoscopic screening and prophylactic treatment.

Therefore, the results of this study demonstrate a high prevalence (71%) of esophageal varices among cirrhotic patients, with significant associations observed between the presence of varices and non-invasive parameters such as splenomegaly, low platelet count, increased portal vein diameter, and hypoalbuminemia highlighting their potential utility as reliable predictors in resource-limited clinical settings.

DISCUSSION

The present study highlights the significant burden of esophageal varices among cirrhotic patients in Pakistan, with a prevalence of 71%, which is consistent with findings from previous national and international studies. This high frequency underscores the advanced stage at which many patients present to tertiary care centers, often with decompensated liver disease [11]. The predominance of viral hepatitis, particularly hepatitis C (58%) and hepatitis B (22%), as the underlying etiology of cirrhosis in our cohort is in line with Pakistan's epidemiological trends, where hepatitis C virus remains endemic and continues to be a major public health concern [12].

Most patients in this study were classified as Child-Pugh Class B or C, indicating moderate to severe hepatic dysfunction. The distribution of variceal grades (Grade II being most common) further reinforces the late presentation and advanced portal hypertension observed in this population [13]. Importantly, the study confirms that several non-invasive clinical and laboratory parameters such as splenomegaly, thrombocytopenia, hypoalbuminemia, and increased portal vein diameter

were significantly associated with the presence of esophageal varices [14].

These findings support the clinical utility of non-invasive markers as surrogate predictors of varices, especially in settings where routine endoscopic surveillance is not feasible due to limited resources. Thrombocytopenia (present in 69% of patients with varices) and splenomegaly (noted in 80% of cases) are both well-established consequences of portal hypertension and serve as practical indicators for screening prioritization [15]. Similarly, a portal vein diameter >13 mm was observed in 66% of patients with varices, supporting its predictive value. Low serum albumin, a reflection of impaired liver synthetic function, was also common among patients with varices, further reinforcing its role as a clinical marker of disease severity and risk [16].

The findings of this study are comparable to those of similar studies conducted in other developing countries [17-19]. For example, research from India and Egypt has shown a variceal prevalence of 60–75% among cirrhotics, with platelet count, splenomegaly, and Child-Pugh class consistently emerging as reliable predictors. Furthermore, the Baveno VI consensus guidelines advocate the use of non-invasive methods for initial screening to avoid unnecessary endoscopies, particularly in low-risk patients a recommendation highly relevant in the Pakistani healthcare context [18].

Despite these promising findings, some limitations of the study should be acknowledged. The single-center design and relatively small sample size (n=100) may limit generalizability to the broader population [19,21-26]. Additionally, advanced non-invasive tools such as transient elastography and liver stiffness measurement were not used due to unavailability, which could have enhanced the predictive model. Future multi-center studies with larger samples and more advanced diagnostic modalities would be valuable to further validate and refine non-invasive screening protocols [20,27-36].

CONLUSION

In conclusion, this study confirms that esophageal varices are highly prevalent among cirrhotic patients in Pakistan and can be effectively predicted using non-invasive clinical and laboratory parameters. Implementation of simple, cost-effective screening strategies based on these predictors could significantly reduce the burden of undiagnosed varices, allow timely prophylactic management, and improve outcomes in resource-limited healthcare systems like ours.

DECLARATION

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Research Interest

The authors have a collective academic and clinical interest in hepatology, gastrointestinal endoscopy, and the development of non-invasive diagnostic approaches for liver-related complications. This study aligns with their ongoing commitment to improving screening strategies and clinical outcomes in chronic liver disease, particularly in resource-limited settings.

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