ORIGINAL ARTICLE

# Predictors of Esophageal Varices and Risk of Variceal Bleeding in Patients of Liver Cirrhosis

Panta P[1], Khadka D[1], KC R[1], Khanal B[1], Shah G[2], Basnet S[1]

**ABSTRACT**

**Introduction**: Variceal bleeding from esophageal varices has high morbidity and mortality. There are invasive and non invasive methods by which risk of bleeding can be predicted. Upper Gastro-intestinal endoscopy is invasive, uncomfortable and expensive procedure though being the gold standard to screen Esophageal Varices (EV). **Aims:** To know the role of non-invasive markers for prediction of esophageal varices and variceal bleed with liver cirrhosis. **Methods:** A prospective hospital based study was carried in the Department of Internal Medicine, Nepalgunj Medical College, Kohalpur from October 2021 to March 2022. A total of 70 patients who met the inclusion criteria were enrolled. The non invasive markers were done and correlated with endoscopy. **Results:** Our study included 70 patients with liver cirrhosis. The mean age in our study was 63.1±8.346 years. During upper gastrointestinal endoscopy, esophageal varices was present in 46 (65.71%) patients. Child Turcot Pugh Score C (81.43%) was found in majority. Significant association was found between score C (P<0.05), thrombocytopenia, Model for End stage Liver Disease Score (P=0.017) and low albumin level with esophageal varices and variceal bleeding. Similarly, significant alcohol intake was associated with esophageal varices and variceal bleed. However, no association was found between age and esophageal varices. **Conclusion**: Child Turcot Pugh score, thrombocytopenia, low albumin level and Model for End stage Liver Disease along with significant alcohol intake correlated with presence of esophageal varices and can be considered as non invasive tools for screening of esophageal varices and variceal bleeding in cirrhosis.

***Keywords***: Esophageal varices, non-invasive markers, variceal bleed

**Authors:**

1. Dr. Prabesh Pant
2. Dr. Dipendra Khakda
3. Dr. Subechhya Basnet
4. Dr. Rupak K.C.
5. Dr. Bibek Khanal
6. Mr. Gaurav Jung Shah

[1]Department of Medicine, Nepalgunj Medical College and Teaching Hospital, Kohalpur, Banke

[2]Department of Community Medicine, Nepalgunj Medical College, Chisapani, Banke

**Address for Correspondence:**

Dr. Prabesh Pant
Department of Mediicne
Nepalgunj Medical College and Teaching Hospital
Kohalpur, Banke
Email: pantaprabesh@gmail.com

## INTRODUCTION

Fibrous tissue and regenerative nodules distorts liver architecture leading to cirrhosis, as end stage of any chronic liver disease.[1] Cirrhosis progressively causes Portal Hypertension, thus leading to variceal bleeding. Gastroesophageal varices secondary to liver cirrhosis is caused as a result of portal hypertension.[2,3] Hepatic venous pressure gradient >10 mmHg cause esophageal varices and > 12 mmHg in patient may cause variceal hemorrhages[4,5] In patient with liver cirrhosis, about 30% of patients during the course of their illness suffer from variceal hemorrhage which is caused by portal hypertension related complication.[4] Bleeding in each episode rise the risk of death by approximately 20%.[6] Esophageal Varices can be diagnosed by various ways such as Upper gastrointestinal endoscopy (UGI endoscopy) which is the gold standard for treatment and diagnosis of esophageal varices and variceal bleed. The invasiveness and less cost effectiveness are its demerits.[7] Also the occurrence of Esophageal varices (EV) mainly depends upon hepatic venous pressure gradient (HVPG), which is more invasive and less available.[8] Therefore, the non invasive markers which are cheap and easily producible and which include clinical and laboratory parameters can be helpful in our settings to assess the predictors of presence of EV and risk of bleeding. Hence, this study was conducted to find out the predictors of EV and associated risk of bleeding.

## METHODS

This was a prospective hospital based study. The study was carried in the Department of Internal Medicine, Nepalgunj

Medical College, Kohalpur from October 2021 to March 2022 after taking informed consent and ethical approval from institutional review committee. A total of 70 patients were enrolled. The patients who met the inclusion criteria were studied.

**Inclusion criteria:**

All the patient with Liver cirrhosis who presented with upper gastrointestinal bleeding (hematemesis and malena) were included.

**Exclusion criteria:**

Patients with following criteria were excluded in our study:

- Hemodynamically unstable patient.
- Patient with history of ultrasonography evidence suggestive of Hepatocellular carcinoma and other causes of upper gastrointestinal bleeding like esophageal carcinoma, esophagitis, carcinoma of stomach and vascular malformations were excluded.
- Refusal to consent.
- Other causes of thrombocytopenia.
- Hypoalbuminemia other than cirrhosis.

Detailed history along with clinical examination was done. History of amount of alcohol intake (in gms) along with the duration was also taken. Ultrasonography of abdomen was done to establish diagnosis of Cirrhosis. Blood samples from each patient were sent to assess the liver function test including prothrombin time and international normalized ratio [INR] and serum albumin. Renal function test and complete blood count were sent. Model for end stage liver disease (MELD) score and Child Turcot Pugh (CTP) score were calculated. The MELD score was calculated using the United Network for Organ Sharing (UNOS) internet site MELD calculator.[10] Thrombocytopenia was considered when platelet count is <1,50,000/mm$^3$ and Serum albumin level <3.5 g/dl was considered to be hypoalbuminemia. The laboratory parameters along with MELD and CTP scores were correlated with the presence of EV and risk for bleeding which was then confirmed by Upper Gastrointestinal Endoscopy (UGI endoscopy). During UGI endoscopy size of varices, number of variceal column and presence or absences of red color sign were noted.

**Statistical Analysis**

Data collection and results of different test was recorded in the preformed sheet. Collected data was coded as per variables and entered in standard statistical data analysis software version 26. Normally distributed data were reported as mean±SD using descriptive stastistics. 'P' value of <0.05 was considered statistically significant. Chi-square and Fisher-Exact test was used to test the association between categorical variables at Confidence interval of 95%. Independent Sample T test was used to analyse the association between mean age and alcohol intake with presence of variceal bleed.

**RESULTS**

Our study included 70 patients meeting all the inclusion criteria. The mean age in our study was 63.1±8.346 years (range 43-80 years). During UGI endoscopy, EV was present in 46 (65.71%) patients (Figure 1). Among 46 (65.71%) patients with varices, 29 (63%) had large varices (Grade 3 & 4) and rest (37%) had small varices (Grade 1 & 2). Similarly, among 46 (65.71%) patients with varices 31 (67.4%) presented with red colour sign (RCS) (Figure 2). Among 70 patients included in our study, majority were in between 56-65 age interval (Figure 3). Child Turcot Pugh (CTP) Score C (81.43%) was found in majority in our study (Figure 4). In the study, 46 (48.9%) patients underwent ligation of sac while in 48 (51.1%) patients hernial sac was not ligated.

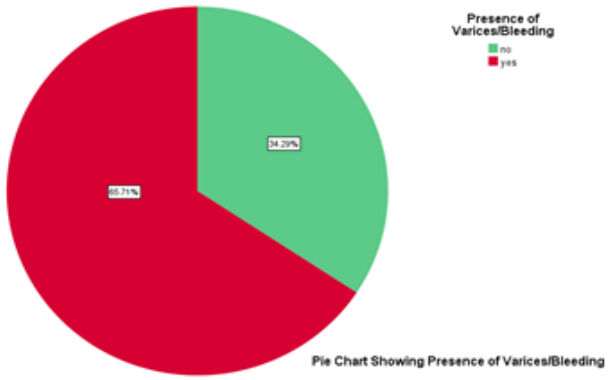


***Figure 1***

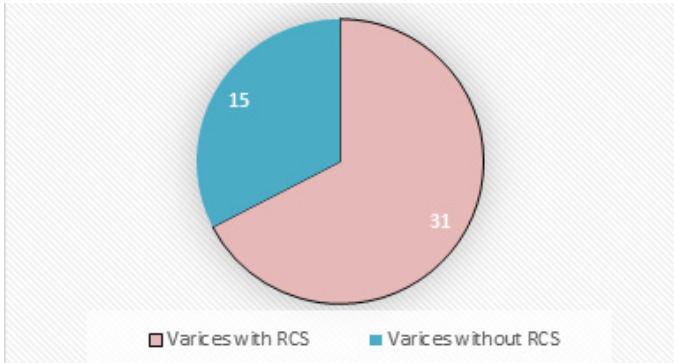


***Figure 2***

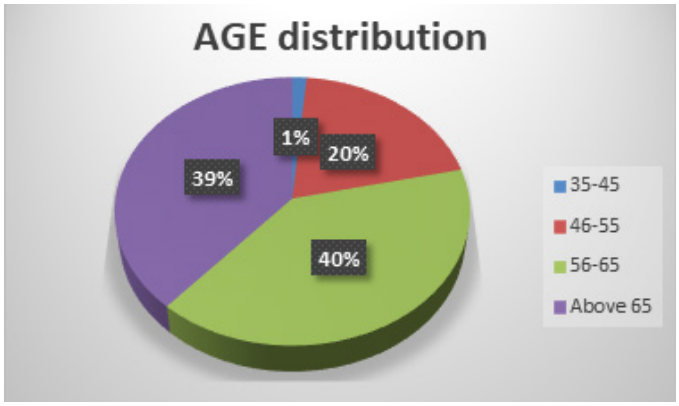


***Figure 3***

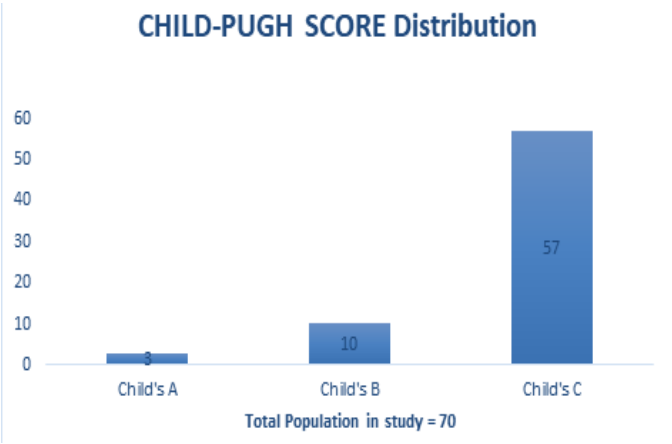


*Figure 4*

Significant Association was found between CTP score C, Thrombocytopenia, MELD Score and Low albumin Level with EV as shown in Table I.

| Predictors | VB (yes) | VB (no) | Total (n) | Chi-Square |
|---|---|---|---|---|
| **Albumin level (gm/dl)** | | | | |
| Low albumin level(<3.5gm/dl) | 46 | 19 | 65 | P=0.004 |
| Normal Albumin level(>3.5gm/dl) | 0 | 5 | 5 | |
| **CTP Score** | | | | |
| Child A | 0 | 3 | 3 | P<0.05 |
| Child B | 0 | 10 | 10 | |
| Child C | 46 | 11 | 57 | |
| **Platelet Count** | | | | |
| Low Platelet Count | 40 | 7 | 47 | P=0.00002 |
| Normal Count | 6 | 17 | 23 | |
| **MELD Score** | | | | |
| Low MELD (< 15) | 10 | 12 | 22 | P=0.017 |
| High MELD(>15) | 36 | 12 | 48 | |
| **Hemoglobin level** | | | | |
| Less than 11mg/dl | 31 | 15 | 46 | P=0.792 |
| More than 11mg/dl | 15 | 9 | 24 | |

**EV= Esophageal Varices ,VB= Variceal Bleed*

***Table I: Association between Predictors and EV with VB***

Similarly, significant alcohol intake was associated with EV and VB. However, no association was found between age and EV as shown in Table II.

| Predictors | VB (yes) | VB (no) | mean | S.D. |
|---|---|---|---|---|
| Age | 46 | 24 | 63.13 y ( yes) | 8.007 |
| | | | 63.04 y (no) | 9.139 |
| Alcohol intake (in gm) | 46 | 24 | 151.96 gm (yes) | 57.295 |
| | | | 147.08 gm (no) | 56.374 |

***Table II : Association Between Age and Alcohol intake with EV with VB***

## DISCUSSION

Esophageal variceal bleeding (EVB) is a dangerous complication in patient with cirrhosis which accounts for mortality of around 10-20%.[8] Appropriate management of EVB can be done using history, clinical examination, laboratory studies along with early UGI endoscopy.[12] UGI endoscopy being invasive and less cost effective in the developing nations with limited resources, there is a need for evaluation of non-invasive markers.[8] Further, the non-invasive marker can be used to differentiate between high risk and low risk patients which help to cut down unnecessary endoscopies.[13] To overcome this problem, non-invasive markers like platelet count, CTP class, hypoalbuminemia, MELD score and significant recent alcohol intake can be taken into account. In this study, there is significant association between CTP class and EV. Majority of the patients with EV are in CTP class C (p value < 0.05) which is consistent with the study conducted in Central hospital of Nepal where it was found that majority of the patients with EV were in CTP class C (p value < 0.01).[11] The present study shows that thrombocytopenia is significantly associated with EV and variceal bleed (p value < 0.05) which is consistent with the study reported by Chalasine et al, where it was found to have low platelet count (88,000/mm$^3$) as an independent predictor of EV.[11,14] Low platelet count associated with EV is due to hypersplenism which develops in liver cirrhosis resulting in rise in portal pressure. Also the myelotoxic effect of alcohol along with decrease in the production of thrombopoeitin contributes to thrombocytopenia.[8] Low albumin as a predictor of EV as studied by Kothari et al showed significant association with EV which is in tune with our present study where presence of EV and variceal bleed is more common in patients with low albumin (p value =0.004).[7] However, study conducted in Ghana showed that low albumin is not associated with variceal bleed.[9] This discrepancy may be due to the nature of study population. Low albumin level may be due to malabsorption syndrome and other conditions related to hypoalbuminemia.

High MELD Score in our study was associated with EV and variceal bleed (p=0.017). This is inconsistent with the study conducted by Kothari et al, where they found significant association between MELD score and EV.[8] The history of daily alcohol intake is found to be slightly higher in patients with EV and variceal bleed (mean alcohol intake in gms per day 151.96 vs 147.08). However, a study conducted in India showed a significant association between alcohol intake and

EV. This difference is may be due to sample size and various etiologies of cirrhosis.[8] In the current study, it is found that age has no relation with EV and variceal bleed (mean age in variceal group 63.13 vs 63.04) which is contrary to the study conducted in Ghana where they found significant association. The difference may be due to sample size.[9] However, our study is consistent with the study conducted by Kothari et al.[8] There is no relation of anemia with EV (P=O.79) in this current study which is similar with one study conducted in India.[8]

**LIMITATIONS**

Our study has few limitations. The study would have been better if conducted over multi centers and large samples along with frequent follow ups. Also there was no uniformity.

**CONCLUSION**

CTP score, thrombocytopenia, low albumin level and high MELD score along with significant alcohol intake correlated with presence of EV and variceal bleeding and hence can be considered as non invasive tools for screening of EV in liver cirrhosis.

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