ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

A Prospective Study On Predicting Esophageal Varices In Cirrhosis With Platelet Count To Spleen Diameter Ratio, Right Lobe Of Liver Diameter To Serum Albumin Ratio, Portal Vein Diameter In A Tertiary Care Hospital In Chennai, Tamil Nadu, India.

Balamanikandan P[1], S Sridhar[2]*, H Gokulakrishnan[3], and Ajay Mal Revanth[4].

[1]Assistant Professor, Institute Of Internal Medicine, Madras Medical College, Chennai, Tamil Nadu, India.
[2]Assistant Professor, Institute Of Internal Medicine, Madras Medical College, Chennai, Tamil Nadu, India.
[3]Assistant Professor, Institute Of Internal Medicine, Madras Medical College, Chennai, Tamil Nadu, India.
[4]Junior Resident, Institute Of Internal Medicine, Madras Medical College, Chennai, Tamil Nadu, India.

ABSTRACT

Portal hypertension commonly accompanies the presence of liver cirrhosis, and the development of oesophageal varices (OV) is one of the major complications of portal hypertension. The prevalence of OV in patients with liver cirrhosis may range from 60% to 80%, and the reported mortality from variceal bleeding ranges from 17% to 57%. It is noteworthy however that variceal haemorrhage is not confined to patients with large OV although they are more likely to bleed from ruptured varices than patients with small OV. Around 30% of the patients with esophageal varices will develop bleeding within one year after diagnosis of varices. In spite of improved diagnosis and adequate treatment for varices, the mortality rate remains very high (20%-35%). The presence of esophageal varices almost correlates with the severity of disease in patients with cirrhosis. One of the important predictor of bleeding from varices is considered to be size of the esophageal varices. Hence diagnosis of large varices, earlier before the bleeding is always important to avoid or reduce this highly threatening complication of cirrhosis. To study the values of ultrasonographic, biochemical and hematological indices in predicting the presence of esophageal varices in cirrhosis.To find out whether Right lobe of liver to albumin ratio, platelet count to spleen diameter ratio and portal vein diameter can be used as a screening tool to suspect the presence of esophageal varices in patients with cirrhosis. This Prospective Analytical study was conducted on 75 patients admitted in Government Rajiv Gandhi Government Hospital & Madras Medical College during the study period from April 2020 to September 2021. A previously designed profoma will be used to collect the demographic and clinical details of the patients.A detailed history will be taken and a clinical examination will be performed.The following information will be collected for each patient: age, gender, etiology of cirrhosis, biochemical parameters like aspartate aminotransferase [AST] , alanine aminotransferase [ALT], total bilirubin, serum albumin, prothrombin time, serum creatinine, platelet count, presence and degree of ascites and encephalopathy assessed according to ChildPugh criteria. In our study, most of the patients were between 41-50 years of age. The youngest patient in our study was 22 years of age and the oldest was 56 years of age, with a median age of 43 years of age. In our study, 69.33% of patients had ascites of various degree, whereas 30.67% of the patients had no ascites. Majority of the patients in our study presented with ascites. In our study on doing upper endoscopy, 60 patients had varices and 15 patients did not have varices. Majority of the patients (80%) in our study had varices. On grading the varices, 14 patients had grade 1 varices, 15 patients had grade 2 varices, 22 patients had grade 3 varices and 9 patients had grade 4 varices. In no varices group, all the patients were in Class A. In grade 4 varices group, 0% were in Class A, 22.22% were in Class B , 77.78% were in Class C. With P value <0.001 which is significant, large varices correlated with the severity of liver disease, as child pugh class C has maximum no of large varices. In patients with no varices, the mean value was around 1129.36. Grade 1 varices, the mean value was around 741.46. Grade 2 varices, the mean value was around 683.78.Grade 3 varices, the mean value was around 583.63.Grade 4 varices, the mean value was around 525.58. p value of the ratio was <0.001 which was significant and also showed association of lower the platelet count to splenic diameter ratio higher the grades of varices. Higher grades of esophageal varices is seen with parameters like lower platelet count, larger spleen size, lower right lobe of liver size, lower serum albumin levels and higher portal vein size. Lower the platelet count to splenic diameter ratio, higher the right lobe of liver to serum albumin ratio, higher portal vein diameter, higher the incidence of varices and higher the grades.

Keywords: oesophageal varices, liver cirrhosis, platelet count, spleen diameter, endoscopy

https://doi.org/10.33887/rjpbcs/2023.14.4.20

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Cirrhosis is a one of the common diseases in our country with significant morbidity and is also one of the important cause for premature deaths. Worldwide the most common causes of cirrhosis are viral hepatitis and consumption of excessive alcohol [1]. Among the viral causes of hepatitis the most common includes the hepatitis B and hepatitis C viruses. Around 300 million peoples in the world are affected by hepatitis B virus. The spectrum of illness of hepatitis B is from acute infection which is mostly asymptomatic to chronic hepatitis B infection which leads to dreadful complications such as cirrhosis and hepato cellular carcinoma. After exposure to hepatitis B infection about 15-20% develop cirrhosis over 5-20 years in their life [2]. The incidence of cirrhosis in patients with chronic hepatitis B infection is directly proportional to the positivity of HBeAg. The patients affected with Hepatitis C are usually unaware of the illness and are diagnosed only when they progress to stage of chronic liver disease. Three fourth of the patients have chronic infection due to inadequate clearance of virus. The next most common cause is cirrhosis is Alcohol [3]. The death due to cirrhosis due to alcohol is on increasing trend. The mean age at which presentation is also falling, meaning that younger age group are getting affected now a days. When the alcohol consumption is > 160 gm per day for 10 years they are more prone to develop cirrhosis [4]. The 3rd common cause of cirrhosis is Non- alcoholic fatty liver disease (NAFLD). It mostly affects the wealthy societies. The prevalence of this disease increases with rise of obesity. The patients with Diabetes mellitus and Metabolic syndrome are more prone to develop NAFLD [5]. The major complication of cirrhosis is portal hypertension which in turn leads to variceal bleeding which accounts for 35-40%. Esophageal varices are porto-systemic connections and they develop as a complication of portal venous hypertension (a progressive complication of cirrhosis), preferentially in the sub-mucosal layer of the lower part of esophagus [6]. Rupture and bleeding from esophageal varices are one of the major complications of cirrhosis and are associated with a high death rate. Variceal bleeding accounts for 10–30% of all cases of upper gastrointestinal bleeding. Increased splanchnic blood flow and increased resistance to the blood flow through cirrhotic liver tissues causes portal hypertension. One of the major complication of portal hypertension is formation of esophageal varices. The prevalence of which is about 50% in patients with cirrhosis. About 33% of patients with varices used to die because of bleeding from varices after its development [7]. The chances of esophageal varices in patients with cirrhosis in their life accounts to about 5 to 15 percent per year and the rate of progression from small sized to large sized varices accounts to about 8 percent per year. Hence early identification and right grading of varices always remains the first step in assessing the risk and thereby avoiding death due to upper Gastrointestinal bleeding. Around 30% of the patients with esophageal varices will develop bleeding within one year after diagnosis of varices. In spite of improved diagnosis and adequate treatment for varices, the mortality rate remains very high (20%-35%). The presence of esophageal varices almost correlates with the severity of disease in patients with cirrhosis [8].

MATERIALS AND METHODS

This Prospective Analytical study was conducted on 75 patients admitted in Government Rajiv Gandhi Government Hospital & Madras Medical College during the study period from April 2020 to September 2021. A previously designed profoma will be used to collect the demographic and clinical details of the patients.A detailed history will be taken and a clinical examination will be performed.The following information will be collected for each patient: age, gender, etiology of cirrhosis, biochemical parameters like aspartate aminotransferase [AST] , alanine aminotransferase [ALT], total bilirubin, serum albumin, prothrombin time, serum creatinine, platelet count, presence and degree of ascites and encephalopathy assessed according to Child Pugh criteria.

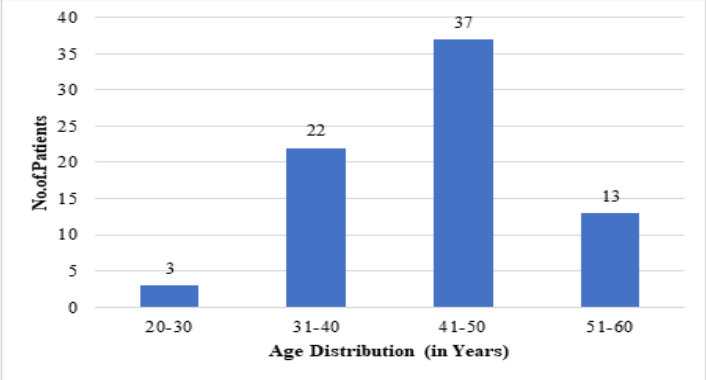
Stastical Analysis

The data collected during the study was formulated into a master chart in Microsoft office excel and statistical analysis was done with help of computer using statistical software package SPSS V.17 for windows. Using this software, frequencies, range, mean, standard deviation and 'p'were calculated through student 't' test, one way ANOVA, pearson correlation and chi square test .P value of < 0.05 was taken as significant.

ISSN: 0975-8585

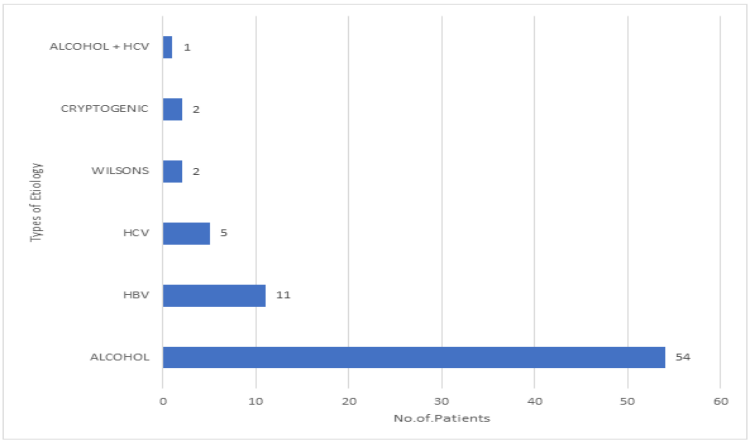
RESULTS

Graph 1: Age distribution in our study:



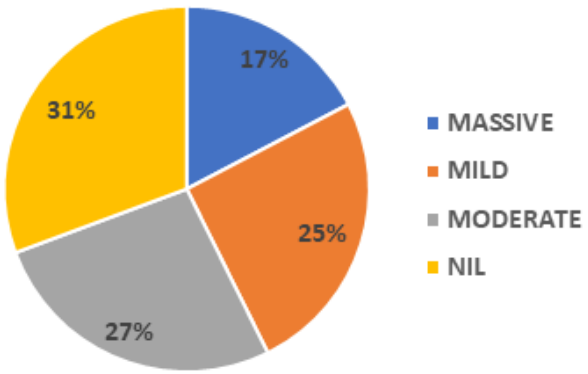
In our study, most of the patients were between 41-50 years of age. The youngest patient in our study was 22 years of age and the oldest was 56 years of age, with a median age of 43 years of age.Gender Distribution in our study, In our study, males contributed to the majority of cases of around 88%, whereas females contributed to only 22% of the cases.

Graph 2: Distribution of etiology in our study:



Out of 75 patients in the study, 54 patients had a history of alcohol intake > 180 ml/day. Thus alcoholics constitute around 72% in our study. Chronic viral hepatitis like HBV, HCV infection together contributes to around 16%, which measures 21.33% of our study population. Remaining cases are contributed by other causes.

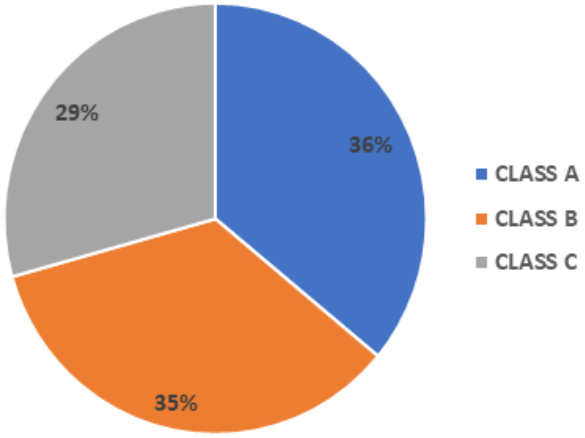
Graph 3: Distribution of Ascites in our study:



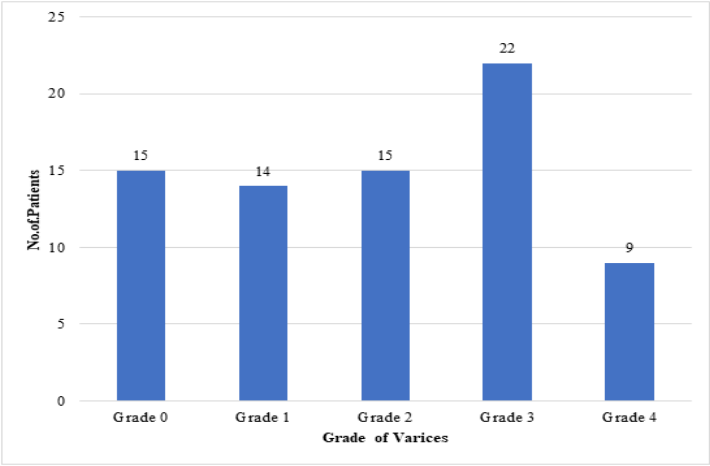
ISSN: 0975-8585

In our study, 69.33% of patients had ascites of various degree, whereas 30.67% of the patients had no ascites. Majority of the patients in our study presented with ascites.

Graph 4: Distribution of Child Pugh Score in our study



Graph 5: Distribution of Varices and its grade in our study



In our study on doing upper endoscopy, 60 patients had varices and 15 patients did not have varices. Majority of the patients (80%) in our study had varices. On grading the varices, 14 patients had grade 1 varices, 15 patients had grade 2 varices, 22 patients had grade 3 varices and 9 patients had grade 4 varices.

Table 1: Child Pugh Score and grade of varices distribution in our study:

Child Pugh Score	Grade of Varices					Total
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	
CLASS A	15 (100%)	9 (64.29%)	3(20%)	0 (0%)	0 (0%)	27 (36%)
CLASS B	0 (0%)	5 (35.71%)	10(66.67%)	9(40.91%)	2(22.22%)	26 (34.67%)
CLASS C	0 (0%)	0 (0%)	2(13.33%)	13(59.09%)	7(77.78%)	22(29.33%)
Total	15 (100%)	14 (100%)	15 (100%)	22(100%)	9 (100%)	75 (100%)
P value <0.001 – significant						

ISSN: 0975-8585

Table 2: Distribution of Platelet count and grade of varices in our study

Grade of Varices	Mean platelet count	SD
Grade 0	137333.3	34118.84
Grade 1	100785.71	26068.48
Grade 2	91333.3	19642.03
Grade 3	81454.54	25427.25
Grade 4	71000	30471.29
P value < 0.001 - significant		

Table 3: Distribution of Splenic diameter and grade of varices in our study

Grade of varices	Mean Spleen diameter (mm)	SD
Grade 0	120.86	16.22
Grade 1	137.21	20.78
Grade 2	136.4	14.45
Grade 3	143.36	19.29
Grade 4	142.44	20.37
P value < 0.001 — significant		

Table 4: Distribution of Platelet count to splenic diameter ratio and grade of varices in our study

Grade of varices	Mean Platelet count to Spleen diameter ratio	SD
Grade 0	1129.36	174.68
Grade 1	741.46	179.19
Grade 2	683.78	197.89
Grade 3	583.63	215.63
Grade 4	525.58	273.43
P value < 0.001 — significant		

Table 5: Distribution of Right lobe of liver and grade of varices in our study

Grade of varices	Mean Right lobe of liver (cm)	SD
Grade 0	14.11	0.78
Grade 1	12.96	0.87
Grade 2	12.58	0.79
Grade 3	12.18	0.70
Grade 4	11.58	0.90
P value < 0.001 — significant		

Table 6: Distribution of serum albumin and grade of varices in our study

Grade of varices	Mean serum albumin (g/dl)	SD
Grade 0	3.45	0.20
Grade 1	2.74	0.34
Grade 2	2.51	0.39
Grade 3	2.09	0.24
Grade 4	1.83	0.22
P value < 0.001 — significant		

ISSN: 0975-8585

Table 7: Distribution of Right lobe of liver to serum albumin ratio and grade of varices in our study

Grade of varices	Mean Right lobe of liver to serum albumin ratio	SD
Grade 0	4.09	0.28
Grade 1	4.77	0.53
Grade 2	5.08	0.57
Grade 3	5.87	0.55
Grade 4	6.38	0.74
P value < 0.001 — significant		

Table 8: Distribution of Portal vein diameter and grade of varices in our study

Grade of varices	Mean Portal vein diameter (mm)	SD
Grade 0	10.74	1.34
Grade 1	13.55	0.59
Grade 2	14.28	0.62
Grade 3	15.25	0.66
Grade 4	16.18	0.52
P value < 0.001 — significant		

DISCUSSION

Esophageal variceal bleeding remains the leading cause of acute mortality in patients with cirrhosis. Platelet count to spleen diameter (PC/SD) ratio less than 909 is one of several parameters proposed for the noninvasive prediction of esophageal varices [10]. In our study, most of the patients were between 41-50 years of age. The youngest patient in our study was 22 years of age and the oldest was 56 years of age, with a median age of 43 years of age. Similar to other studies done, in our study also males contributed to the majority of cases of around 88%, whereas females contributed to only 22% of the cases.

Out of 75 patients in the study, 54 patients had a history of alcohol intake > 180 ml/day. Thus, alcoholics constitute around 72% in our study. Chronic viral hepatitis like HBV, HCV infection together contributes to around 16%, which measures 21.33% of our study population. Remaining cases are contributed by other causes [11]. In our study on doing upper endoscopy, 60 patients had varices and 15 patients (20%) did not have varices. Majority of the patients (80%) in our study had varices. On grading the varices, 14 patients (18.67%) had grade 1 varices, 15 patients (20%) had grade 2 varices, 22 patients (29.33%) had grade 3 varices and 9 patients (12%) had grade 4 varices. Majority of the patients in our study had grade 3 varices. In no varices group, all the patients were in Class A [12]. In grade 4 varices group, 0% were in Class A, 22.22% were in Class B , 77.78% were in Class C. With P value <0.001 which is significant, large varices correlated with the severity of liver disease, as child pugh class C has maximum no of large varices. In this day and age, clinical decision aids must prove to be not only clinically useful but also cost effective in order to be widely accepted [13]. In fact, cirrhotic patients usually undergo annual/biannual abdominal ultrasonography as part of surveillance programmes for hepatocellular carcinoma. Therefore, follow up of cirrhotic patients to identify liver cancer allows us the opportunity to determine the platelet count/spleen diameter ratio at least annually or biannually [14]. As the yearly incidence of OV in patients with liver cirrhosis is approximately 5%, Finally, this study undoubtedly has some shortcomings, such as its retrospective setting and its validation. None the less, the only prospective study performed concerning this topic obtained results that were no different from ours or from those of other retrospective studies [15]. With regards to validation of the study, we climbed the first steps of the "reproducibility hierarchy" by using internal validation and historical transportability criteria, trying to avoid computer generated systems such as the jackknife cross validation method or bootstrapping technique so as to reproduce independent validation as closely as possible. However, we are also aware that only external validation will assess the usefulness of our model, and evaluate whether it can gain widespread clinical use [16].

ISSN: 0975-8585

CONCLUSION

Higher grades of esophageal varices is seen with parameters like lower platelet count, larger spleen size, lower right lobe of liver size, lower serum albumin levels and higher portal vein size. Lower the platelet count to splenic diameter ratio, higher the right lobe of liver to serum albumin ratio, higher portal vein diameter, higher the incidence of varices and higher the grades. From our study we conclude that presence of a lower platelet count to splenic diameter ratio, higher right lobe of liver to serum albumin ratio, higher portal vein diameter ratio determine the presence of varices and can thus identify the group of patients who needs endoscopy for the screening of esophageal varices, thereby decreases the burden on the endoscopy units and also help to avoid screening endoscopy whenever not needed.

REFERENCES

[1] Gupta, TK, Chen L, Groszmann RJ. Pathophysiology of portal hypertension. Clin Liver Dis 1997; 1:1-12.
[2] De Franchis R, Primignani M. Natural history of portal hypertension inpatients with cirrhosis. Clin Liver Dis 2001; 5: 645-63.
[3] Luketic VA, Sanyal AJ. Oesophageal varices. I clinical presentation, medical therapy and endoscopic therapy. Gastroenterology Clinics of North America 2000: 29: 337-385.
[4] Rigo GP, Merghi A, Chalen NJ, Mastronardi M, Codoluppi PL, Ferrari Aet al. A prospective study of the ability of the three endoscopic classification to predict hemorrhage from oesophageal varices. Gastro Intest Endos 1992; 38: 425-9.
[5] The Northern Italian Endoscopic club for the study and treatment of oesophageal varices. Prediction of the first variceal hemorrhage in patients with cirrhosis of the liver and oesophageal varices: a prospective multicenter study. N Engl J Med 1988; 319: 983-9.
[6] D'Amico G, Garcia-Isao G, Cales P. Diagnosis of portal hypertension; Howand When. Proceedings of the third Baveno International consensus workshop on definitions, methodology and therapeutic strategies. Oxford: Black well science 2001: 36-63.
[7] D'Amico G, Pagliano L, Bosch J, The treatment of portal hypertension, a meta analysis review. Hepatol 1995: 22: 332-54.
[8] Brenna MRS, Targowhik L, Gareti SD, Hetal AK, Ian MG. Endoscopic screening for oesophageal varices in cirrhosis. Is it ever cost effective? Hepatol 2003; 37: 366-77.
[9] De Franchis R, Dell'Era A, Primignani M. Diagnosis and monitoring of portal hypertension. Dig Liver Dis 2008; 40(5):312-7.
[10] Bruce R. Bacon. Cirrhosis and its complications. Chapter 308. Harrison's principles of Internal Medicine 18th edition. McGraw-Hill. 2012
[11] Andrew K. Burroughs. The Portal Venous System and Portal Hypertension. Chapter 9. Diseases of the Liver and Biliary System. Twelfth Edition. Wiley Blackwell. 2011.
[12] Sheila Sherlock, James Dooley. Hepatic Cirrhosis. Chapter 21. Diseases of the liver and biliary system. 11thedition.
[13] Vijay H. Shah, Patrick S. Kamath. Portal Hypertension and Gastrointestinal Bleeding. Sleisenger and Fordtran Gastrointestinal and Liver Disease. 9thedition. Chapter 84 and 90.
[14] Child CG, Turcotte JG. Surgery and portal hypertension. In: Child CG (edi). The liver and portal hypertension. Philadelphia: WB Saunders, 1964:50-64.
[15] Madhotra R, Mulcahy HE, Willner I, et al. Prediction of esophageal varices in patients with cirrhosis, Journal Of Clinical Gastroenterology 2002;34:81–5
[16] Zaman A, Becker T, Lopidus J, et al. Risk factors for the presence of varices in cirrhotic patients without a history of variceal hemorrhage. Archives Of Internal Medicine 2001;161:2564–70.