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Original Research Article

CORRELATION OF LIVER STIFFNESS MEASUREMENT BY FIBROSCAN WITH PRESENCE OF ESOPHAGEAL VARICES IN PATIENTS OF LIVER CIRRHOSIS: A DESCRIPTIVE OBSERVATIONAL STUDY FOR VIJAYAWADA, AP

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ABSTRACT

Background: Chronic liver disease is characterized by gradual destruction of hepatic tissue over time. The most common complication of chronic liver diseases is portal hypertension. Gastro esophageal varices, ascites, hepatic encephalopathy, hepatorenal syndrome, hepatopulmonary syndrome and hypersplenism develop as a consequence of portal hypertension. As a novel noninvasive assessment method, transient elastography has become highly useful because of its accuracy, simplicity, and rapid results. In particular, transient elastography can accurately predict liver cirrhosis. **Objective:** To correlate the liver stiffness measurement by fibroscan with presence of esophageal varices in patients of liver cirrhosis.

Materials and Methods: The present Descriptive observational study was carried out at Department of Gastroenterology at Guntur Medical College, Guntur Andhra Pradesh, India during June 2024 to March 2025 involving 50 patients who are newly diagnosed as liver cirrhosis. Statistical analysis was carried out using SPSS 24.0 version.

Results: Out of 50 cases, majority were from 51-70 years i.e. 50%. Mean age of the study population was 54.13±13.81 years. Most common etiology of cirrhosis among our patients followed by alcohol (42%). 76.0% of the patients were with CTP Class B which was significantly higher than other patients with CTP Class A and B of the patients (24.0%) ($p<0.0001$). The association between etiology of cirrhosis and fibroscan was not significant ($p>0.05$). Grades of esophageal varices increased significantly with increase in Fibroscan (E Score) ($p<0.05$).

Conclusion: The association between etiology of cirrhosis and fibroscan was not significant ($p>0.05$). Thus, in our study, grades of esophageal varices increased significantly with increase in Fibroscan (E Score) ($p<0.05$).

Key words: Liver stiffness, fibroscan, esophageal varices, liver cirrhosis.

INTRODUCTION

Chronic liver disease is characterized by gradual destruction of hepatic tissue over time. The most common complication of chronic liver diseases is portal hypertension. Gastro esophageal varices, ascites, hepatic encephalopathy, hepatorenal syndrome, hepatopulmonary syndrome and hypersplenism develop as a consequence of portal hypertension. The frequency of esophageal varices is 30-70% in cirrhotic patients. 9- 36% of patients present with “high-risk” varices. About 4-30% of cirrhotic patients presenting with small varices would develop large varices every year and will be at risk of bleeding. Variceal bleeding is one of the leading causes of mortality and morbidity in cirrhotic patients.[1,2]

The early detection of esophageal varices and initiation of primary prophylactic measures corresponds with better disease prognosis and prolongs patient survival. Upper gastrointestinal endoscopy is the gold standard method for the detection of 2-4 However, endoscopy is an invasive method.[5,6] This prompted the need of noninvasive modalities to predict the presence of esophageal varices. Several studies have evaluated the detection of esophageal varices using noninvasive methods to replace the need for invasive endoscopy.[7-9]

As a novel noninvasive assessment method, transient elastography has become highly useful because of its accuracy, simplicity, and rapid results.[10-12] In particular, transient elastography can accurately predict liver cirrhosis. Moreover, recent studies have suggested that transient elastography combined with platelet count could distinguish the absence of esophageal varices.[11] The Baveno VI criteria proposed that cirrhotic patients with a liver stiffness measurement (LSM) of less than 20 kPa and a platelet count of greater than 150,000/μL can avoid screening endoscopy; Maurice et al,[13] further conformed these criteria. In addition, recent studies reported that LSM in patients with liver cirrhosis can predict the presence of large esophageal varices.[13]

Objective: To correlate the liver stiffness measurement by fibroscan with presence of esophageal varices in patients of liver cirrhosis.

MATERIALS AND METHODS

Study area: The study was carried out in The Department of Gastroenterology at Guntur Medical College, Guntur Andhra Pradesh, India.

Type of study design: Descriptive observational study.

Duration of the study: June 2024 to March 2025

Study population: This study was conducted in patients who are newly diagnosed as liver cirrhosis and who match the inclusion and exclusion criteria.

Sample Size

Inclusion Criteria

1. Adult patients ≥ 18 years,
2. Patients with newly diagnosed chronic liver disease without gross ascites irrespective of the etiology.

Exclusion Criteria

1. Patients who have undergone endoscopy previously for variceal bleeding.
2. Patients with hepatocellular carcinoma.
1. Patients who have undergone surgical intervention for portal hypertension.
2. Patients with Post hepatic causes of cirrhosis.

Procedure

This prospective observational study was conducted in patients presenting to Department of Gastroenterology involving patients with the diagnosis of newly detected chronic liver disease. After fulfilling inclusion and exclusion criterion, patients were included in the study with proper informed consent.

All patients of CLD underwent UGIE and fibroscan as per the routine standard protocol. Fibroscan was done to assess the stiffness of liver by 502 Touch model (FibroScan; Echosens) Measurements were performed using M or XL probe on the right lobe of the liver through intercostals spaces on patient lying in the dorsal decubitus position with right arm in maximal abduction. The tip of the probe transducer was placed on skin between the ribs at the level of right lobe of the liver. The tip of the transducer probe was covered with coupling gel and placed on the skin, between the rib bones at the level of the right lobe of the liver. The operator, assisted by an ultrasonic time motion image, located a liver portion of at least 6 cm thick, free of large vascular structures. Once the measurement area had been located, the operator pressed the probe button to start an acquisition. Measurement depth was between 25 mm and 65 mm below the skin surface. Measurements which did not had a correct vibration shape or a correct follow up of the vibration propagation were automatically rejected by the software. Ten successful measurements were taken on each patient and average / mean of them was taken for final scoring. Success rate was calculated as the ratio of number of successful measurements over the total number of acquisitions of which 60% is considered as best.

Statistical Analysis

Data was collected by using a structure proforma. Data entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data was expressed in terms of proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Association between two qualitative variables was seen by using Chi square/ Fischer's exact test. A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

RESULTS

Table 1: Distribution according to age and gender

Age	Number	Percent
18 - 30	4	8.0
31 -50	13	26.0
51 - 70	25	50.0
71 - 90	8	16.0
Total	**50**	**100.0**
Mean ± SD	54.13±13.81	
Gender	**Number**	**Percent**

Male	37	74.0
Female	13	26.0

Out of 50 cases, majority were from 51-70 years i.e. 50% followed by 26% from 31-50 years, 16% from 71-90 years and 8% from 18-30 years. Mean age of the study population was 54.13±13.81 years.

Table 2: Distribution according to causes of cirrhosis

	Number	Percent
NASH	25	50.0
Alcohol	21	42.0
HBV	2	4.0
HCV	1	2.0
Autoimmune	1	2.0
Total	50	100.0

In our study, NASH (Non-alcoholic steatohepatitis) (50%) was the most common etiology of cirrhosis among our patients followed by alcohol (42%), HBV (4%), HCV (2%) and autoimmunity (1%).

Table 3: Distribution according to MELD and Child-Turcotte-Pugh (CTP) score

MELD score	Number	Percent
<20	37	74.0
≥20	13	26.0
Total	50	100.0
Mean ± SD		16.81±5.70
Child-Turcotte-Pugh (CTP)	**Number**	**Percent**
A	1	2.0
B	38	76.0
C	11	22.0
Total	50	100.0

In our study, 74% of the patents had MELD Score<20 which was significantly higher the patients with MELD Score ≥20 (26.0%) (p<0.0001). The mean (±s.d.) of the patients was 16.81±5.70. In our study, 76.0% of the patients were with CTP Class B which was significantly higher than other patients with CTP Class A and B of the patients (24.0%) (p<0.0001).

Table 4: Correlation of Etiology of cirrhosis of liver with Fibroscan (E score) of the patients

Etiology	Number	Mean	SD	F-value	p-value
NASH	25	44.84	18.82	2.011	0.118 NS
Alcohol	21	49.28	21.63		
Hep B	2	36.12	23.05		
Hep C	1	27.03	9.23		
Autoimmune	1	22.1	5.36		

In our study, the mean E score values for the etiologies like NASH and alcohol were 44.84 kPa and 49.28 kPa respectively. The association between etiology of cirrhosis and fibroscan was not significant (p>0.05).

Table 5: Correlation between Fibroscan (E score) and Esophageal varices of the patients

		Fibroscan (E score) in kPa						Total
		15-20		21-25		>25		
		No	%	No	%	No	%	
Oesophageal varices	Grade 1	4	66.7	3	42.9	7	18.9	14
	Grade 2	2	33.3	2	28.6	16	43.2	20
	Grade 3	0	0.0	2	28.6	14	37.8	16
	Total	6	100.0	7	100.0	37	100.0	50

In our study, 74% of the total patients had fibroscan score > 25 kPa, which suggests Clinically Significant Portal Hypertension (CSPH) according to Baveno 7 consensus 2022. 32 % of our patients had high risk varices i.e grade 3 esophageal varices. In those patients, 2 patients had E score in the range of 21-25 kPa and 14 patients had E score > 25 kPa. Correlation between esophageal varices and fibroscan score showed p = 0.011. Thus, in our study, grades of esophageal varices increased significantly with increase in Fibroscan (E Score) (p<0.05).

DISCUSSION

Out of 50 cases, majority were from 51-70 years i.e. 50% followed by 26% from 31-50 years, 16% from 71-90 years and 8% from 18-30 years. Mean age of the study population was 54.13±13.81 years. (Table 1)

In our study, NASH (Non-alcoholic steatohepatitis) (50%) was the most common etiology of cirrhosis among our patients followed by alcohol (42%), HBV (4%), HCV (2%) and autoimmunity (1%). (Table 2)

In our study, 74% of the patents had MELD Score<20 which was significantly higher the patients with MELD Score ≥20 (26.0%) (p<0.0001). The mean (±s.d.) of the patients was 16.81±5.70. In our study, 76.0% of the patients were with CTP Class B which was significantly higher than other patients with CTP Class A and B of the patients (24.0%) (p<0.0001). (Table 3)

In our study, the mean E score values for the etiologies like NASH and alcohol were 44.84 kPa and 49.28 kPa respectively. The association between etiology of cirrhosis and fibroscan was not significant (p>0.05). (Table 4)

In our study, 74% of the total patients had fibroscan score > 25 kPa, which suggests Clinically Significant Portal Hypertension (CSPH) according to Baveno 7 consensus 2022. 32 % of our patients had high risk varices i.e grade 3 esophageal varices. In those patients, 2 patients had E score in the range of 21-25 kPa and 14 patients had E score > 25 kPa. Correlation between esophageal varices and fibroscan score showed p = 0.011. Thus, in our study, grades of esophageal varices increased significantly with increase in Fibroscan (E Score) (p<0.05). (Table 5)

In our study, Correlation between esophageal varices and fibroscan score showed that grades of esophageal varices increased significantly with increase in Fibroscan (E Score). The association between esophageal varices and fibroscan score was statistically significant. (p<0.05). It is comparable to a study by Elbasiony et al,[14] and Fofiu R et al,[15]

Bleeding from esophago-gastric varices is the most important complication of cirrhosis.[16] The first crucial step in prevention is to identify the patients at risk for bleeding by endoscopic screening, in order to select them for prophylactic treatment.[17] Since a variable proportion of patients will not have varices; thus, screening all cirrhotic patients with upper GI endoscopy implies a number of unnecessary endoscopies, which increase the workload of endoscopy units. In addition, compliance with endoscopic screening recommendations may be limited.[18]

In agreement with our results Sporea I et al,[20] studied 1000 patients with TE and showed more or less equivalent cut off values (For the presence of varices, the optimal Fibroscan cut-off was 31 kPa and for bleeding cut-off was 50.7 KPa), according to Lebrec,[21] the larger the size of varices the higher risk of bleeding and according to Sporea20 study cut off value for TE to predict risk of bleeding could be considered as cut off value for prediction of large varices. Moreover, studies carried out by Vizzutti et al,[22] a cut-off value for prediction of varices was 17.6 kPa, these cut off values are smaller than we obtained, but the different demographics and patients characteristics as well as the type of fibroscan machines could be the reason for this discrepancy. More over Castera L et al,[23] showed that Transient elastography could be a valuable tool in diagnosis of cirrhosis but cannot replace endoscopy for variceal screening.

CONCLUSION

- Liver stiffness measurement is a good method for the diagnosis of fibrosis and cirrhosis, irrespective of the cause of liver disease. Liver stiffness measurement by fibroscan is valuable in predicting the presence of esophageal varices in patients with liver cirrhosis. It may help to select patients for endoscopic screening and start portal hypertension prophylactic therapy in them.
- The association between etiology of cirrhosis and fibroscan was not significant (p>0.05).
- Thus, in our study, grades of esophageal varices increased significantly with increase in Fibroscan (E Score) (p<0.05).

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