



**COMPARISON OF DIAGNOSTIC ACCURACY OF SERUM ALBUMIN AND
ENDOSCOPY FOR ESOPHAGEAL VARICES IN PATIENTS OF CHRONIC LIVER
DISEASE**

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ABSTRACT

Background: Chronic liver disease (CLD) is characterized by series of progressive destruction followed by regeneration of liver parenchyma that leads to fibrosis and cirrhosis. Presently, esophagogastroduodenoscopy (EGD) is said to be gold standard test in diagnosis of esophageal Varices (EVs), but it is a highly skillful interventional procedure so needs subjective expertise. In contrast, serum albumin can be useful tool in prediction of esophageal varices. **Objective:** The aim of this study is to explore the diagnostic efficacy of serum albumin for prediction of esophageal varices in patients suffering from chronic liver disease by taking EGD as gold standard investigation for EVs. **Material & Methods:** This was a cross sectional study conducted at Department of Medicine, LUMHS Hospital hyderabad/Jamshoro and department of Gastroenterology, AIMS Hospital, Hyderabad from January 2018 to November 2018. The study was designed on non-probability, consecutive sampling technique. Informed written consent was received from all patients. Demographic details (name, gender, age and contact) were also noted. Venous blood sample was taken from all patients by using 5cc disposable syringes. The samples were brought to LUMHS Hospital laboratory for serum albumin levels assessment. The results were assessed and patients were labeled either positive or negative for esophageal varices. EGD was done in all patient by a consultant gastroenterologist. Presence or absence of the varices was noted. 2x2 table was applied to calculate the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of serum albumin levels as compared to known gold standard test esophagogastroduodenoscopy. **Results:** In this study the mean age of the patients was noted as 53.63±15.32 years. The male to female ratio of the patients noted was 2.3:1. EVs on serum albumin levels were found positive in 39 (41.1%) cases & EGD was found positive in 37 (38.95%) cases. The sensitivity of esophageal varices on serum albumin was 81.1% and specificity 84.5%. The PPV value was 76.9%, NPV value was 87.5% and diagnostic accuracy of esophageal varices on serum albumin was 83.2%. **Conclusion:** Based on results of this study we are of opinion that serum albumin is a reliable predictor and first line diagnostic tool for esophageal varices development in patients of chronic liver disease.

KEYWORDS: Serum Albumin, Esophageal Varices (EVs), Chronic Liver Disease (CLD), Esophagogastroduodenoscopy (EGD).

INTRODUCTION

Portal hypertension (PHTN) is an increase in the hepatic sinusoidal pressure of >6 mmHg. One of the major causes of PHTN is liver cirrhosis which results due to increased vascular resistance to blood flow at hepatic sinusoidal level, it further leads to development of esophageal varices (EV).^[1] EVs are abnormally dilated veins present in lower segment of the esophagus. EVs develop due to obstruction in blood flow to liver by a scar tissue in the liver or clot in major blood vessel.

Collateral circulatory vessels are not competent enough to afford large volume of blood due to their smaller lumen. So the vessels are engorged with blood that may leak, bleed or rupture, known as variceal bleed.^[2]

The most fatal complication of liver cirrhosis is variceal bleeding due to rupture. More than 90% of cirrhotic patients develop EVs, out of which 30% are at risk of spontaneous bleeding.^[3] The incidence of EVs development in cirrhotic patients is predicted from 60%

to 80% based on severity and etiology of the liver diseases.^[4]

Screening endoscopy is preferable in current guidelines for early detection of EVs for prophylactic measures to be taken for high risk EVs. This approach places overburden upon diagnostic and therapeutic gastroenterology units, and the procedure may have detrimental effects in patient's compliance due to invasiveness and repetition...High risk patients of liver disease for EVs would likely be more benefited from non-invasive investigation than invasive techniques for procedural complications. Till yet esophagogastroduodenoscopy is thought to be gold standard investigation against which many non-invasive investigations are being compared due to its complication risks.^[5]

Hypoalbuminemia is an associated marker with the presence of esophageal varices due to CLD in hepatitis B and C patients.^[6] A recent study reported the sensitivity of serum albumin levels for detection of EV as 66% and the specificity as 80%.^[7]

Another study also reported the sensitivity and specificity of serum albumin levels for detection of EV as 56% and 83.8% respectively.^[8] Another study also reported the sensitivity and specificity of serum albumin levels in CLD patients for detection of EV as 53.2% and 91% respectively.^[6]

Rationale of the present study is to find out the diagnostic approach of serum albumin levels in patients of CLD for early detection of esophageal varices taking EGD as gold standard. Literature suggests some non-invasive techniques and investigations by which EVs can be detected despite that, those procedures are not applied and patients undergo EGD routinely. EGD is an invasive procedure associated with complications and side effects and repeated EGD may lead to further deterioration of patient's condition.^[9] This study is based on assessment of the diagnostic capability of serum albumin levels for detection of EVs in patients of CLD for implementation of serum albumin levels as a routine investigation in such patients instead of EGD. Studies have been conducted internationally with different sensitivity and specificity levels, but no study is present in local setting; so we intended to verify the results in our setting for further implementation of the study in healthcare system. Routinely EGD being an invasive procedure it needs tertiary care setups for its availability which are already overburdened due to necessary referral from primary care physicians for diagnosis and management of EVs because incidence of Hepatitis is increasing day by day and there is no established, cost effective, locally available laboratory investigation for detection of EVs. This study will save the cost of patients on their health, time of patients as they will not have to wait for their number as for EGD and will share the burden of tertiary care setups in their working.

MATERIALS AND METHODS

Study Design: Cross sectional study.

Setting: Unit I, Department of Medicine, LUMHS Hospital hyderabad/Jamshoro in connection with department of Gastroenterology, AIMS Hospital, Hyderabad. The duration of the study was from January 2018 to November 2018.

Sample size: A sample of 95 cases was taken with 95% confidence level and expected percentage of esophageal varices was suspected 60%^[4] and sensitivity and specificity of serum albumin levels was taken 53.2% and 91%^[6] with 11% and 8% margin of error respectively in patients of CLD.

Sampling Technique

Non-Probability, Consecutive sampling.

Selection Criteria

Inclusion Criteria

➤ Patients of age 20-60 years of either genders who presented with CLD (as per operational definition).

Exclusion Criteria

➤ Patients who were receiving either sclerotherapy or band ligation of EVs or prophylactic treatment of portal hypertension (data collected through medical history/record).

➤ Patients with hypoalbuminemia due to cardiac failure (through echo having EF<50%), nephritic syndrome (through 24 hour urinary albumin >3.5gm/dl) or underweight due to any cause (BMI<19kg/m²).

➤ Patients with extra-hepatic metastasis (through CT scan abdomen), thrombosis of the splenic vein or portal vein (through Doppler USG).

Data Collection Procedure: After getting approval from hospital ethical committee, 95 patients fulfilling the inclusion criteria were registered in this study from OPD of Department of Medicine. Informed written consent was obtained from each patient. Demographic details (name, gender, age and contact) were also noted. Venous blood sample was taken from all patients by using 5cc disposable syringes. The samples were brought to LUMHS Hospital laboratory for serum albumin levels assessment. The results were assessed and patients were labeled either positive or negative for esophageal varices (as per operational definitions). EGD was done in all patient by a consultant gastroenterologist. Presence or absence of the varices was noted (as per operational definitions). All this information was noted in the attached proforma.

Data Analysis: The data was analyzed through SPSS version 16. Mean ± SD was calculated for quantitative variables like age and duration of CLD. Frequency and percentage was calculated for qualitative variables like

gender and presence of EVs on serum albumin levels and EGD. 2x2 table was applied to calculate the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of serum albumin levels as compared to known gold standard test esophagogastroduodenoscopy.

RESULTS

A sample 95 cases as taken in this study. The mean age of the patients was noted as 53.92±14.61 years with minimum age of 30 years and maximum ages of 80 years as shown in Table # 1.

The male to female ratio of the patients calculated was 2.3:1 with 67(70.5%) male cases and 28(29.5%) female cases as shown in Fig # 1.

The mean duration of CLD of the patients was noted as 2.32±1.06 months with minimum 1 month duration and maximum 5 months duration as shown in Table # 2.

The mean serum albumin level of the patients was noted as 3.65±0.82 g/dl with minimum 2.1 g/dl and maximum 5 g/dl as shown in Table # 3.

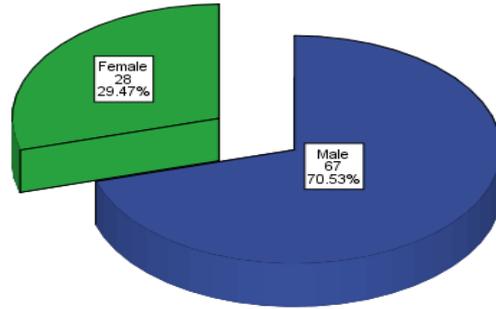
In this study esophageal varices were present in 39 (41.1%) cases and absent in 56 (58.9%) case on the basis of serum albumin levels as shown in Table # 4.

This study also described esophageal varices present in 37 (38.95%) cases and absent in 58 (61.05%) cases on the basis of EGD as shown in Fig # 2.

This study has shown presence of esophageal varices on serum albumin levels in 39 cases in which it was also observed in 30 cases as well by EGD. The sensitivity of esophageal varices on serum albumin levels was noted as 81.08% with specificity of 84.48%. The PPV value calculated was 76.92%, NPV value was 87.5%. The diagnostic accuracy for esophageal varices on basis of serum albumin levels was noted 83.16% by taking esophageal varices on EGD as gold standard as shown in Table # 5.

Table # 1: Descriptive statistics of age (years).

Age (years)	n	95
	Mean	53.92
	SD	14.61
	Minimum	30
	Maximum	80



Fig#1: Frequency distribution of gender.

Table#2: Descriptive statistics of duration of CLD.

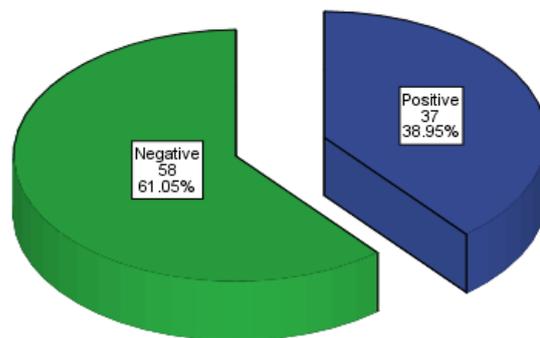
Duration of CLD	n	95
	Mean	2.32
	SD	1.06
	Minimum	1
	Maximum	5

Table#3: Descriptive statistics of Serum albumin level

Serum Albumin level	n	95
	Mean	3.65
	SD	0.82
	Minimum	2.1
	Maximum	5.0

Table#4: Frequency distribution of esophageal varices on serum albumin.

		Frequency	Percent
Esophageal varices on serum albumin	Positive	39	41.1
	Negative	56	58.9
	Total	95	100.0



Fig#2: Frequency distribution of esophageal varices on EGD.

Table#5: Comparison of serum albumin with EGD for prediction of EVs.

		EVs on EGD		Total
		Positive	Negative	
EVs on serum albumin	Positive	30	9	39
	Negative	7	49	56
Total		37	58	95

Sensitivity	81.08%
Specificity	84.48%
PPV	76.92%
NPV	87.5%
Diagnostic Accuracy	83.16%

DISCUSSION

This was a cross sectional study conducted at Department of Medicine, LUMHS Hospital Hyderabad/Jamshoro in connection with department of Gastroenterology, AIMS Hospital Hyderabad, to explore the diagnostic efficacy of serum albumin for prediction of esophageal varices in patients suffering from chronic liver disease by taking EGD as gold standard investigation for EVs. Variceal hemorrhage associated with portal hypertension is one of the fatal and life threatening complication in patients of CLD. In spite of the recent advancements in the management of EVs and CLD, variceal hemorrhage still carries a high mortality rate of up to 20% within six weeks period of the initial bleeding episode.^[10-12] Although EGD is the gold standard investigation for determination of EVs in CLD patients but EGD is an expensive and uncomfortable burden for patients and additionally it is an overburden to lesser number of tertiary care gastroenterology setups due to high referral rate from primary care physicians.^[13]

Hoefs was the first who found a linear correlation between portal venous pressure and SAAG ($r=0.73$, $P=0.0001$) in 56 patients of chronic liver disease, of whom 52 cases had alcoholic liver disease.^[14]

In present study the diagnosis of esophageal varices based on serum albumin levels was made positive in 38.95% patients and on the basis of EGD it was in 61.05% patients. The diagnostic accuracy, sensitivity and specificity for esophageal varices based on serum albumin levels was noted as 83.16%, 81.08% and 84.48% respectively by taking EGD as gold standard investigation for EVs. Relevant results have been found in some studies as Gana *et al.* assessed the size of spleen through ultrasonography (US) and also found splenomegaly as an indicator of EVs in children and adolescents in their study. In addition, they generated an index including the serum albumin level, number of platelets and spleen size.^[15]

Zein *et al.* reported the sensitivity of serum albumin levels for detection of EV as 66% and the specificity as 80%.^[7]

Pare and coworkers suggested that the serum-ascites albumin gradient (SAAG) can be a better tool in determination of portal hypertension instead of ascitic fluid protein concentration.^[16] Indeed, SAAG is now being used in clinical management in the workup of ascites.^[17] another study agrees with results of this study and reported the sensitivity and specificity of serum albumin level for detection of EV was 56% and 83.8% respectively.^[8]

Another study conducted by Hossain *et al.* also reported consistent results with sensitivity and specificity of serum albumin levels for detection of EV as 53.2% and 91% respectively.^[6]

In a case series of Roberta *et al.*, the $SI \geq 1.18$ showed good accuracy (85.9%) and the NPV (86.6%). It is workable that the splenic size can differentiate the patients as to a prerequisite of performing EGD, but among all 15 cases with $SI \leq 1.18$, only two had EVs, and both of them were of small-caliber, with no sign of redness that indicates lower risk of bleeding and no need of primary prophylaxis.^[18]

CONCLUSION

It is concluded that serum albumin is a useful, reliable, cost effective predictor and first line diagnostic tool for esophageal varices development in patients of chronic liver disease. It is suggested that serum albumin levels should be used in first line investigation of EVs in patients of CLD to prevent interventional procedures, patient discomfort, financial losses, and overburden to tertiary care setups linked with unnecessary referral from primary care physicians.

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