Original Article

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Diagnostic accuracy of serum albumin for diagnosis of esophageal varices in patients of chronic liver disease

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A B S T R A C T

Objective: To determine the diagnostic accuracy of serum albumin for detection of esophageal varices (EVs) in patients of chronic liver disease (CLD) taking Esophagogastroduodenoscopy (EGD)as a gold standard.

Methodology: The cross sectional study was accomplished at the department of gastroenterology, Isra University Hospital Hyderabad in collaboration with department of Gastroenterology, AIMS Hospital, Hyderabad, during six months from February 2017 to July 2017. All the Patients of age 20-60 years of either gender presenting with CLD were included. Blood samples from each patient submitted to laboratory to assess serum albumin level. Serum albumin level <3.4 g/dl was assessed as positive. Then patients were referred to department of gastroenterology for EGD. The data recording process was carried out by a proforma.

Results: Mean age of the patients was 53.63±14.61 years with male to female ratio was 2.3:1. Esophageal varices on serum albumin were found positive in 39 (41.1%) cases and EGD was found positive in 38.95% cases. The sensitivity of esophageal varices on serum albumin was 81.08% with specificity of 84.48%. The PPV value was 76.92%, NPV value was 87.5% and diagnostic accuracy of esophageal varices on serum albumin was 83.16% taking esophageal varices on EGD as gold standard.

Conclusion: Serum albumin is a useful forecaster of esophageal varices among patients of chronic hepatic disorder with 81.08% sensitivity and of 84.48% specificity.

Keywords: Esophagogastroduodenoscopy, Esophageal Varices, Serum Albumin, Chronic Liver Disease.

Introduction

EVs are abnormally enlarged veins in the lower esophageal part. EVs occur if normal blood circulation towards the hepatic-organ is blocked due to a scar tissue or clot formed within liver. The rupture of gastric varices (GV) causes variceal hemorrhage, a most fatal complication of cirrhosis. Literature has reported that

>90% of cirrhotic patients develop EV out of which 30% may bleed.[1] The prevalence of EV among cirrhotic subjects is projected from 60.0% to 80.0% depending on the etiology and severity of hepatic disorders.[2] Current guidelines suggest that all cases with cirrhosis should undergo screening with endoscopy at diagnosis for identifying EVs in patients at high risks for bleeding who can be benefitted from primary prophylaxis. This method puts a heavy load over endoscopy units as well as the recurrent testing gradually can possibly have a negative impact on patient's compliance. Noninvasive detection of EVs cases at highest risk might limit exploration to those most likely to benefit. Upper gastrointestinal endoscopy is considered to be the benchmark against which all other assays are evaluated, however it has limitations.[3] Hypoalbuminemia is reliable substitute indicator for the existence of EVs in CLD because of HBV and HCV.[4] It is reported that sensitivity and specificity of serum albumin for detection of EV is 66% and 80% respectively.[5] In agreement; a study reported the specificity and sensitivity of serum albumin level for detection of EV was 56% and 83.8% respectively.[6] Another study reported that sensitivity and specificity of serum albumin level for detection of EV was 53.2% and 91% respectively.[7] Literature reports that some non-invasive methods are available which can detect presence of EVs. But in routine, these procedures are not adopted and patients have to undergo EGD. EGD is an invasive procedure which also has side effects and repeated EGD is also risk for poor prognosis of patients in such critical condition which may lead to more severe outcome.[8] Through this study intended to appraise the diagnostic accuracy of serum-albumin level, so that in future we can implement the results of this study as earlier reported accuracy of serum albumin is variable in the different studies. In routine, in tertiary care hospitals, physicians rely on EGD but in sub-urban areas or at peripheries, facility of EGD is not available. So, this study will also help to rule out the problem of EVs just assessment through albumin level in case results show high diagnostic accuracy instead of referring patient to some tertiary care hospital which also have burden. This will also help to reduce burden of hospital by reducing number of referrals from peripheries.

Methodology

A cross sectional study was conducted at Gastroenterology department, Isra University Hospital Hyderabad in collaboration with department of Gastroenterology, AIMS Hospital, Hyderabad. The duration of study was six months from February 2017 to July 2017. Sample size of n=95 was determined with confidence level of 95% along with estimated percentage of esophageal varices i.e. 60%[4] and taking sensitivity and specificity of serum albumin level i.e. 53.2% and 91% [6] with 11% and 8% margin of error respectively in patients of CLD. All the Patients of age 20-60 years of either gender presenting with CLD were included. All the subjects receiving EVs band ligation and sclerotherapy and prophylactic therapy for portal hypertension, patients with hypoalbuminemia due to congestive cardiac failure (EF<50% on echo), nephritic syndrome (24 hour urinary protein >3.5gm/dl) or underweight (BMI<19kg/m2) and patients with extra-hepatic metastasis (on CT scan abdomen), thrombosis of splenic vein or portal vein(on Doppler USG) were excluded. Well-versed consent was taken from all patients. Blood specimens were obtained from each patient by 5cc syringe. The specimens were submitted to the hospital laboratory to assess serum albumin level. After assessing the reports, patients were categorized as negative or positive for esophageal varices (according to operational definition). Serum albumi level <3.4 g/dl was assessed as positive. Then patients were referred to department of gastroenterology for EGD.

All EGDs were done by senior gastroenterologist minimum experience >5 years. Presence or absence of varices was recorded (according to operational definition). The data recording process was carried out by a proforma and data analysis was done via SPSS version16. Mean±SD was calculated for quantitative variables such as age and duration of CLD. Frequencies & percentages were computed for qualitative variables such as gender and presence of EVs on serum albumin and EGD. 2x2 table was generated to calculate negative predictive values and positive predictive values (NPV & PPV respectively), specificity, sensitivity and diagnostic accuracy of serum albumin taking EGD as gold standard.

Results

In this study overall 95 cases were studied. The patients' mean age was 53.92±14.61 years with minimum 30 years and maximum 80 years of age. (Table No I)
67 (70.5%) cases were males and 28(29.5%) cases were females. The male to female ratio was 2.3:1.

Table I: Descriptive statistics of age, duration of CLD and serum albumin level (years)

Variables	Mean±SD	Minimum	Maximum
Age (years)	53.92±14.61 years	30 years	80 years
Duration of CLD	2.32±1.06 months	1 months	5 months
Serum Albumin level	3.65±0.82 g/dl	2.1 g/dl	5.0 g/dl

Esophageal varices on serum albumin was shown in Table No II

Table No II: 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
Esophageal varices on EGD	Positive	37	38.9
	Negative	58	61.1
	Total	95	100.0

Esophageal varices on serum albumin were found positive in 39 cases in which it was observed positive as well by EGD in 30 cases. The sensitivity of esophageal varices on serum albumin was 81.08% with specificity of 84.48%. The PPV value was 76.92%, NPV value was 87.5% and diagnostic accuracy of esophageal varices on serum albumin was 83.16% taking esophageal varices on EGD as gold standard. **Table No III**

Table No III: 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

We assessed a noninvasive diagnostic marker (serum albumin) to predict the esophageal varices, and found serum albumin was a good forecaster for diagnosis of EVs. In this series albumin level of the subjects was 3.65±0.82 g/dl, and these findings were similar to the study of Laeeq SM et al[7] as mean albumin level was 2.88±0.68 among cirrhotic patients presented with EVs. In another study of Khan et al.[8] 60.5% patients had low albumin level and severity of EVs was significantly correlated with low level of albumin. Recently, Ijaz N et al[9] also established a significant negative association between esophageal varices and low level of serum albumin among cirrhotic cases.

In this study mean age of the patients was 53.92±14.61 years and males were in majority as 70.5% out of all cases. These findings were similar to the study of Kumar S et al[10] as, out of all cases 62% were males and patients' mean age was 44.6 ± 13.6 years. Kraja B et al[11] also found similar findings regarding age and gender.

In our study the diagnosis of EV on serum albumin was found positive in 38.95% patients and EGD was found positive in 61.05% patients. The diagnostic accuracy of esophageal varices on serum albumin was recorded 83.16% taking esophageal varices on EGD as gold standard with sensitivity and specificity of 81.08%, 84.48% respectively. Gana et al. evaluated the spleen size by ultrasonography and also established splenomegaly as a marker of EV in adolescents and children. Additionally, they formed an index that included serum albumin level, the spleen size and the number of platelets.[12] One study reported that sensitivity of serum albumin for detection of EV i.e. 66% and specificity i.e. 80%.[7] In another study proposed that serum-ascites albumin gradient is a superior discriminator of portal hypertension as compared to ascites protein concentration.[13] Sarangapani A et al[14] also found similar findings. Another study in agreement to this study reported that specificity and sensitivity of serum albumin level for detection of EV was 56% and 83.8% respectively.[8] Another study reported that sensitivity and specificity of serum albumin level for detection of EV was 53.2% and 91% respectively.[6] In the study of Kim H et al[15] study, reported higher sensitivity 98.0% and specificity (94.9%) was shown at the level of albumin 4.0 g/dL. Budiyasa DG et al and Bressler B et al also albumin as a best predictor esophageal varices.[16,17]

Conclusion

Serum albumin is a useful forecaster of esophageal varices in cases of chronic hepatic disease with 81.08% sensitivity and of 84.48% specificity. Serum albumin levels should be screened routinely among CLD patients to predict the esophageal varices.

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