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CORRELATION OF PLATELET COUNT/SPLEEN DIAMETER RATIO AND UPPER GASTROINTESTINAL ENDOSCOPY FINDINGS IN CHRONIC LIVER DISEASE PATIENTS

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ABSTRACT

BACKGROUND: Chronic liver disease (CLD) with its different aetilogy and presentation is a very common cause of hospital admission in a tropical country. Sometimes CLD presented with acute variceal bleeding which may be life threatening.

AIM AND OBJECTIVE: To study the corelation between platelet count/spleen diameter ratio and detection of oesophageal varix(OV) by upper gastrointestinal endoscopy in patients with chronic liver disease.

METHODS: In our single centre, prospective, observational study, 70 consecutive patients with CLD were included.

RESULTS: In the present study, the most common symptom was abdominal distension (100%). Thrombocytopenia was present in 44(63%) of study population. There was a significant association between thrombocytopenia and OV. Majority of patients (75%) in the study population had spleen diameter (SD) between125-160mm and 25(47%) of them had OV. There was also no significant association between splenomegaly and OV, between the 2 groups with spleen diameter <160 mm and spleen diameter >160 mm. The majority (53%) of the study population had PC/SD ratio less than 1000. There was a significant association between PC/SD and OV, between the 2 groups - PC/SD <1000 and PC/SD >1000. Using a PC/SD ratio cut-off 909 the sensitivity was 97.14% and specificity was 100%.

CONCLUSION : From our study it can be concluded that Platelet count/spleen diameter ratio is a strong parameter, which is independently associated with the presence of oesophageal varix in patients of chronic liver disease (CLD) irrespective of its aetiology and by using this non-invasive methods we can restrict the use of endoscopy to those cirrhotic patients who have high risk of OV.

KEYWORDS : Chronic liver diseases, platelet count/spleen ratio, oesophgeal varix.

INTRODUCTION:

CLD in the clinical context is a disease process of the liver that involves a process of progressive destruction and regeneration of the liver parenchyma leading to fibrosis and cirrhosis. [1,2] "Chronic liver disease" refers to disease of the liver which lasts over a period of six months. It progresses slowly from hepatitis to cirrhosis, over 20 to 40 years. Major clinical complications of cirrhosis include ascites, renal failure, hepatic encephalopathy and variceal bleeding due to portal hypertension. The prevalence of oesophageal varices in patients with cirrhosis is approximately 60-80% and risk of bleeding is 25-35% in those patients. [3] Incidence of variceal haemorrhage ranges from 20 to 30% within 2 years. Patients with cirrhosis can remain free of major complications for several years (compensated cirrhosis). Decompensated cirrhosis is associated with short survival, liver transplantation is often indicated as the only effective therapy. [4] Cirrhosis is a risk factor for developing hepatocellular carcinoma.

Liver biopsy is considered the gold-standard method for assessment of liver fibrosis. [5] Ultrasonography, computed tomography, and MRI which can detect changes in the hepatic parenchyma due to moderate to severe fibrosis [6] but they are costly and is highly operator-dependent. Non-invasive methods currently in development include blood protein profiling using proteomic technology and new clinical glycomics technology, which is based on DNA sequencer/fragment analyzers which are able to generate profiles of serum protein *N*-glycans. [7] As the technology becomes validated, the non-invasive diagnosis of liver disease may become relevant in clinical practice.In order to reduce the ever-increasing burden of invasive procedures, some studies have attempted to identify non-invasive parameters to predict the presence of oesophageal varices (OV). [8] Asymptomatic oesophageal varices, which is quite common, can be easily diagnosed with invasive endoscopy or otherwise suspected with non-invasive platelet/spleen diameter ratio [9] in a country like ours, where financial constraint is a major problem. It can be very useful and applicable at various small centres like community health centres (CHCs) and primary health centres (PHCs) in our country with limited resources.

The present study was conducted with an objective to find out the correlation of platelet count(PC) / spleen diameter(SD) ratio to predict oesophageal varices in chronic liver disease.

MATERIALS AND METHODS:

It was a single centre, prospective, cross-sectional observational study. The study was done for one year period at in-patient department of Carmichael Hospital for Tropical Diseases, School of Tropical Medicine, Kolkata.from July 2017 to June 2018 on 70 patients with CLD over 18 years of age. The diagnosis of CLD was made by clinical, laboratory and radiological findings. All the selected patients were subjected to detailed assessment including focussed interview and history elicitation with particular emphasis relating to liver involvement. Venous blood was taken after clinical diagnosis. Samples were taken on Day1 or at the day of admission when feasible. All venous blood samples were tested for bilirubin, AST, ALT, alkaline phosphatase, albumin, globulin, PT and INR, complete hemogram, urea, creatinine. First sample was also tested for HBsAg, anti HCV and ELISA for HIV.

Child-Pugh Score was calculated. Ultrasonography of abdomen was done on day 1 and on later days as and when indicated. Upper GI endoscopy was performed on all the patients by experienced endoscopist. Maximum longitudinal spleen diameter was determined and bipolar spleen diameter was expressed in millimetre (mm). Platelet count/spleen diameter ratio was calculated and correlated with the presence or absence of oesophageal varices. A pre-designed proforma was used to collect information from the patients. Data was tabulated and analysed according to appropriate statistical methods like Medcalc version, Chi square test, Unpaired T test and Fischer's exact test. Descriptive and inferential statistical analysis was done using IBM SPSS ver.20.

RESULTS:

In the present study 57% were males and 43% were females with male: female (2:1). Out of 70 patients, age of the patient range from 20-73 years. Most patients are between 41-50 years of age.

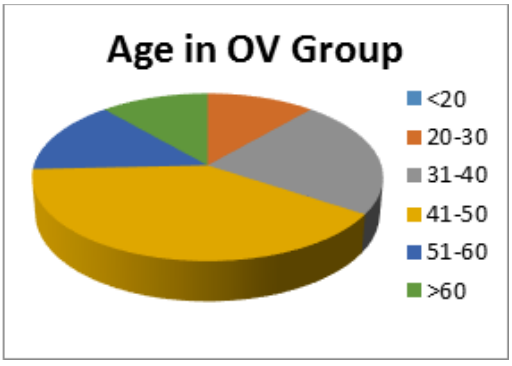
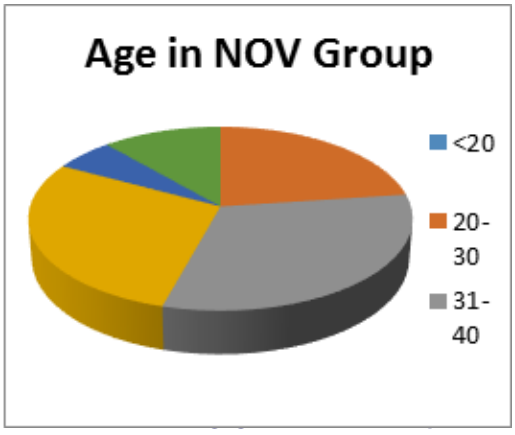


Figure 1 – Pie-chart showing age variations in OV patients



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Among the study population, alcohol and Hepatitis B virus were the most common aetiological factors (27% each). Other aetiological factors like HCV (13%), alcohol with HBV (17%) and other (9%) (Non-HBV/HCV/alcoholic) were also noted in present study. Distribution of varices according to aetiology showed that 8 patients of alcohol related cirrhosis, 11 of HBV,6 of alcohol + HBV,5 of HCV and 5 of other aetiology had OV. Aetiology had no correlation with OV; (p=0.94).

TABLE I - Aetiological variations in OV and NOV patients

	Range	Number	OV	NOV
Platelet count (lakh/mm3)	0.5-1	9	9	0
	1-1.5	35	26	9
	≥ 1.5	26	0	26
Spleen diameter (mm)	<125	14	8	6
	125-160	53	25	28
	≥160	3	2	1
Platelet/Spleen Ratio (PSR)	<500	0	0	0
	500-1000	37	35	2
	>1000	33	0	33

Distribution of PC/SD ratio according to grade of OV showed mean for OV was 778 and that for NOV was 1319; p value <0.0001, significant. Platelet count mean for OV was 1 lakh/mm^3 and for NOV was 1.75 lakh/mm^3; p value <0.0001, significant (Table III).Mean age for OV and NOV patients were 44.7 and 40.7 respectively; p value = 0.09, not significant (Table III).Mean spleen diameter were 137 for OV and 134 for NOV patients; p value = 0.6, not significant (Table III).

TABLE III - Age, Platelet count, Spleen size and PSR in OV and NOV patients

	Group	Number	Mean	SD	P Value
Age	OV NOV	35 35	44.7 40.7	10.7 14	0.09
Platelet count*	OV NOV	35 35	1 1.75	0.17 0.32	<0.0001
Spleen size	OV NOV	35 35	137 134	11.8 10.6	0.6
Platelet/ Spleen Ratio*	OV NOV	35 35	778 1319	108.6 265.2	<0.0001

*highly significant

Using a PC/SD ratio cut-off 909 the sensitivity was 97.14% (95% CI 85.08% to99.93%) and specificity was 100% (95% CI 90% to 100%). The PPV was 100% and NPV 97.2%. (95% CI 83.53% to99.59%). The accuracy was 98.6% (95% CI 92.30% to99.96%) and negative likelihood ratio was 0.03 (95% CI 0.00 to 0.20) (Table IV).

TABLE IV - PSR IN OV and NOV patients

Platelet/Spleen Ratio	OV	NOV	Total
≤909	34	0	34
>909	1	35	36
Total	35	35	70
SENSITIVITY=97.1%			
SPECIFICITY=100%			
PPV=100%			
NPV=97.2%			
ACCURACY=98.6%			
NEGATIVE LIKELIHOOD RATIO=0.03			

Discussion:

The study analysed 70 patients with CLD. The mean age of the study population was 43±12.5 years; range 20-73 years. The incidence of OVs was similar in the young and elderly. Age had no correlation with OV (p=0.09). Legasto et al studied 150 patients, where the mean age was 51 years in OV group and 57 in NOV group, which was slightly higher than the mean of our study population [10].There was a male preponderance in the study as is evident by a male to female ratio of 2:1. OV was present in 23(51%) male and 12(48%) female patients with p value 0.80 - not significant. OV was present in 66% patients; 54(67.5%) males and 12(60%) females in a study by Sharma et al. [11]

The mean platelet count of cases with OV was 1,00,000±17,000/mm^3 and that in the NOV group was 1,75,000±32,000/mm^3. Average spleen diameter in ultrasonography was 137mm. Portal vein mean was 13.5cm while platelet/spleen ratio mean was 778 in OV patients. Thomopoulos et al had reported a low platelet count (<1,18,000/mm^3), splenomegaly (>135 mm) and ascites to be independent predictors of varices [12].

In our study splenomegaly was observed in patients with OV, but the association was not statistically significant (p=0.60).The PC/SD ratio was lower in patients with OV compared with NOV. Mean for OV was 778±108.6 and 1319±265.2 for NOV patients (p=0.0001).The present study also calculated the sensitivity and specificity keeping the PC/SD ratio cut-off 909(based on the original study by Giannini et al); the values obtained were sensitivity and specificity of 97.1% and 100%respectively. The positive and negative predictive values for PC/SD ratio were 100% and 97.2% respectively, which were comparable to the previous studies [13]. Giannini et al in their study of

266 patients with cirrhosis (included alcoholic, HBV& HCV related) found that platelet count/spleen diameter ratio is the only parameter which is independently associated with the presence of OV.

The difference in the sensitivity of PC/SD ratio in various studies may be because of difference in the sample size, aetiology of cirrhosis, human error in identifying OV during endoscopy, geographical & ethnic difference of sample population studied and inter-observer variation in documentation of spleen diameter and grading of varices.

All patients with cirrhosis should undergo USG routinely at 6 months interval for HCC screening. Also, platelet count is easily obtainable. So, by using PC/SD ratio we can identify patients who are at high risk of developing varices, even in a primary health care set up. Platelet count/spleen diameter ratio is a better predictor of presence of oesophageal varices than platelet count or spleen size alone because low platelet count cannot be solely attributed to portal hypertension, nor can splenomegaly alone. The use of the ratio bypasses this possible drawback since it normalizes platelet count to splenic sequestration, most likely representing the aliquot of thrombocytopenia caused by portal hypertension in liver cirrhosis. By subjecting only those patients who are having low PC/SD, preferably less than 909, we may avoid unnecessary endoscopy, which is an unpleasant and costly procedure.

The present study had few limitations. The cases were mainly alcohol and HBV related cirrhosis patients. Cases due to other aetiology were few; hence validity of PC/SD ratio in cirrhosis due to other aetiology is questionable. The diagnosis of cirrhosis was made mainly on clinical, biochemical and USG parameters rather than liver biopsy. The USG abdomen and EGD were not routinely done by single consultant, hence there may be intra-observer variability in measuring spleen diameter and varices grading.

Conclusion:

Platelet count/spleen diameter ratio is a strong parameter, which is independently associated with the presence of oesophageal varix in patients of chronic liver disease (CLD) irrespective of its aetiology. Platelet count alone and PS/SD or PSR are statistically significant in predicting oesophageal varices (OV) in CLD patients. Child Pugh score was also statistically significant in this study in predicting OV.

Oesophago-gastroduodenoscopy (EGD) is the gold standard for diagnosis of OV; however, by using non-invasive methods we can restrict the use of endoscopy to those cirrhotic patients who have high risk of OV (low PC/SD ratio ≤ 909).

Asymptomatic oesophageal varices, which is quite common, can be easily diagnosed with invasive endoscopy. It can be suspected with non-invasive parameter like platelet/spleen diameter ratio in a country like ours, where financial constraint is a major problem for most patients. It can be very useful and applicable to diagnose oesohageal viarices (OV) at various small centres like community health centres (CHCs) and primary health centres (PHCs) in a country with limited resources.

Conflicts of interest:

There are no conflicts of interest.

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