The Professional Medical Journal
www.theprofesional.com

https://doi.org/10.29309/TPMJ/2021.28.06.6258

ORIGINAL PROF-0-6258

# To determine the correlation between mean platelet count and frequency of grading of esophageal varices in patients of liver cirrhosis.

**Masood Javed[1], Dilshad Mohammad[2], Zain Masood[3], Ghulam Abbas Sheikh[4], Muzammal Iftikhar[5], Afaira Hamed[6]**

1. FCPS (Medicine)
Professor of Medicine
AFM&DC, Faisalabad.
2. FCPS (Medicine)
Associate Professor Medicine
FMU, Faisalabad
3. MSC, HND
Clinical Nutritionist
Agriculture University, Faisalabad.
4. FCPS (Medicine)
Professor of Medicine
AFM&DC, Faisalabad.
5. FCPS (Medicine)
Senior Registrar Medicine
FMU, Faisalabad.
6. MBBS
PGR Medicine
FMU, Faisalabad.

**Correspondence Address:**
Dr. Dilshad Mohammad
Department of Medicine
FMU, Faisalabad.
dilshaddoctor@yahoo.com

**Article received on:**
05/12/2020
**Accepted for publication:**
15/02/2021

**ABSTRACT… Objectives:** To determine the correlation between mean platelet count and grading of esophageal varices in patients of liver cirrhosis. **Study Design:** Cross Sectional study. **Setting:** Department of Medicine, DHQ Hospital (FMU) &AFM&DC Faisalabad. **Period:** 17th August 2019 to 16th February 2020. **Material & Methods:** A total of 105 patients liver cirrhosis with esophageal varices were included in the study according to the inclusion and exclusion criteria. For assessment of platelet count 2ml blood sample was sent to hospital pathology laboratory and it was reported by the pathologist. Upper GI endoscopy was performed by gastroenterologist for confirmation and grading of oesophageal varices. **Results:** In our study, it was observed that 04 (3.81%) patients had grade- I EV, 34 (32.38%) Grade-II, 39 (37.14%) Grade III, 15 (14.29%) Grade IV and 13 (12.38%) patients had Grade V esophageal varices. While correlating the mean platelet count and grading of esophageal varices in patients of liver cirrhosis, it was observed that the mean platelet count of the patients with Grade-I EV was 149000± 26000, platelet count in patients with Grade-II EV was 122000 ± 26000, platelet count in patients with Grade-III EV was 100000 ± 23000, platelet count in patients with Grade-IV EV was 98000 ± 26000 and platelet count in patients with Grade-V EV was 94000 ± 22000 with correlation r value of 0.370 and p-value of 0.0001 which is statistically significant. **Conclusion:** This study concluded that there is inverse correlation between mean platelet count and grades of esophageal varices in patients of liver cirrhosis.

**Key words:** Cirrhosis, Esophageal Varices, Platelet Count.

**Article Citation:** Javed M, Mohammad D, Masood Z, Sheikh GA, Iftikhar M, Hamed A. To determine the correlation between mean platelet count and frequency of grading of esophageal varices in patients of liver cirrhosis. Professional Med J 2021; 28(6):833-841. https://doi.org/10.29309/TPMJ/2021.28.06.6258

## INTRODUCTION

Liver cirrhosis is one of the major health problems having a significant role in high morbidity and mortality throughout the world. Globally it is considered to be 13th leading cause of death.[1] Liver cirrhosis is defined pathologically as inflammation culminating in fibrosis of the liver. Liver cirrhosis may lead to metabolic hepatic failure, hyperdynamic circulation, hepatic encephalopathy and portal hypertension which has an important role in the clinical manifestations of this disease[2] as it results in the development of esophageal varices in 50-60% of such patients. A life threatening bleeding occurs in 30-40% of these patients and 1 year mortality is 20-70% in these patients. It has been observed that life time incidence of esophageal varices and subsequent bleed is as high as 90% in cirrhotics.[3]

Chronic hepatitis B, chronic hepatitis C, nonalcoholic steato hepatitis, nonalcoholic fatty liver disease and chronic alcohol abuse are major etiological factors in Liver cirrhosis. Primary biliary cirrhosis, veinoocclusive diseases such as splenic vein thrombosis, portal vein thrombosis and thrombosis of inferior vena cava are also important causative factors especially in females. Addionally, seclerosing collangitis, TB, schistosomiasis, Wilson's disease, hemochromatosis, alpha 1 antitrypsin deficiency and Idiopathic portal hypertension are also included in this list.

It is now established that EndothelinI[1], by causing vasoconstriction and Nitric oxide (vasodilator) deficiency also plays a role in pathogenesis of portal hypertension and esophageal varices.

Anything due to any reason, interfering with Portal venous flow, leads to a rise in Portal venous pressure (> IOmrn) resulting in the development of collateral circulation and thereby esophageal varices.[4] Research studies show that a portal vein diameter greater than l3 mm should be considered as cut off point for portal hypertension

Esophageal varices are abnommally dilated native veins of the esophagus that normally serve as collaterals to the central venous circulation and these varices project directly into the lumen of the esophagus and are seen in 50 -60% of cirrhotic patients on their first presentation.

Guidelines published by Baveno V1 Consensus Workshop and The American Association for the Study of Liver Disease (AASLD) recommends screening for the presence of Varices in all cirrhotic pts by upper GI Endoscopy which is considered to be the standard procedure not only for evaluation of varices but also for assessing the risk of bleed.[6,7,8] However endoscopy is invasive, costly and a time consuming procedure and it also does not give any clue about the anatomy outside the esophagous. Besides this, the use of this modality, for screening the cirrhotic pts for varices, puts extra burden on endoscopy units.[9]

Whenever endoscopy cannot be performed due to any of these reasons certain non- invasive methods are recommended for detecting esophageal varices.[4,6,10] These alternate procedures include Doppler USG, CT, MRI and Angiography.[11] In addition to these Platelet count is also a noninvasive parameter with high accuracy for the prediction of esophageal varices as cirrhotic pts having esophageal varices usually have a platelet count of < 100,000/cmm.[3] As a matter of fact there is quite a low chance of esophageal varices in cirrhotics having high platelet count a fact which enables us to avoid costly methods of screening such pts for esophageal varices.[12]

Doppler Ultrasound is excellent for evaluating velocity and direction of flow in Portal venous system and also its patency in addition to size and echotexture of liver. EUS is especially helpful in evaluation and management of varices.[13] CT and MRI though expensive are noninvasive and more helpful in evaluating other associated anomalies and adjacent structures but they may be inconclusive in some cases where Angiography is done for this evaluation and previously it was considered to be a standard procedure in this respect.[14]

Esophageal varices are graded into Gradel, II, III, IV and V according to their size and appearance. Size of the varices in addition to various other factors such as infection increases the risk of rupture and bleed from esophageal varices.[15] Various risk factors for variceal hemorrhage from esophageal varices include; size, presence of red sign, child classification, alcohol intake and local changes in distal esophagus such as GERD.[11]

In view of the dreadful outcome of this life threatening disease, early detection and treatment even prophylactic, is vital in improving the outcome in these patients as this will lower down the upper GI related mortality.[17,18] For this purpose alternative noninvasive methods instead of endoscopy are now being preferably used.[19]

Thrombocytopenia (platelet count <150, 000/ ML) is a frequent finding in patients of chronic liver disease and is observed in up to 76% of patients.[20,21,22] The pathogens of thrombocytopenia in CLD is multifactorial and includes decreased thrombopoietin, splenic sequestration of platelets, and myelosuppression of platelet production due to hepatitis virus[23] Gue et al and many other researchers have demonstrated in their studies this relationship between size of varices and platelet count.[4] Ammnanullah Abbasi et al in their study determined the level of platelets in various grades of esophageal varices and observed that there was actually an inverse relationship between them ($r = -0.32$ I, $P < 0.00$ I).[24]

Liver cirrhosis and esophageal varices with or without bleed is a common presentation in tertiary care hospitals. Although thrombocytopenia has been proposed as a noninvasive cost effective method for predicting the presence of gastroesophageal varices[25,26], there is not much data available on this relationship and also there

is no agreement regarding a specific platelet count level that can reliably predict the presence and grades of varices.

The results of my study will help in assessing this relationship between platelet count and grading of EV so that these patients may be picked up easily and cost effectively, cutting down the cost of screening, minimizing the complications of liver cirrhosis and optimizing the patients care. However this study is conducted on a limited number of patients in a localized area which limits the scope of this study so multicentered studies in this respect are needed to have better consensus in this respect.

## OBJECTIVE

To determine the correlation between mean platelet count and frequency of grading of esophageal varices in patients of liver cirrhosis.

### Liver Cirrhosis

On abdominal ultrasound, the patient having portal hypertension (portal vein diameter I 2 mm), with changed echotexture of liver.

### Esophageal Varices

Diagnosed on upper gastrointestinal endoscopy and graded as follows:
Grade I: Varices are small (< 2mm in diameter), Linear, blue or red in colour and not projecting above the surface.
Grade 2: Varices are 2-3 mm in diameter, mildly tortuous, bluish in colour, elevated above the surface but. Occupying <I/3" of the lumen.
Grade 3: Large veins 3-4mm in diameter are coil shaped or tortuous, bluish in colour occupying >I/3rd of the lumen
Grade 4: >4mm tortuous bluish varices which almost meet in the mid-line.
Grade 5: Grape-like in appearance, occlude the lumen and hinders the advancing oesophagoscope and demonstrate the cherry red sign.

### Platelet Count

Thrornbocytopenia is said when Platelet count is <I 50,000. It was assessed in uL by sending 2ml blood to the hospital pathology laboratory.

## MATERIAL & METHODS

It is a Cross-sectional study. At department of Medicine, DHQ Hospital, FM U and AFM & DC Faisalabad. From 17 August 2019 to 16 February 2020. By using WHO sample size calnilator for correlation r -- -O.ZT6. Confidence level 95% Alpha I error 5% Alpha 2 error 10% Sample size = 105. Non- probability, consecutive sampling.

### Inclusion Criteria

- Patients between 20 years to 60 years age, of both genders.
- Patient with liver cirrhosis and esophageal varices as per operational definition.

### Exclusion Criteria

- Child Pugh Class C cirrhotic patients.
- Patients with hepatocellular carcinoma, Portal vein thrombosis.
- Patients with parenteral drug addiction, or HI V +ve patients
- Current alcoholics.
- Patients with previous or current treatment with beta-blocker, diuretics and other vasoactive drugs.

After taking approval from hospital ethical committee (IEC/74-20), patients coming through OPD were enrolled according to the inclusion/ exclusion criteria and informed consent was taken from them.

### Data Collection Procedure

For assessment of platelet count 2ml blood sample was sent to Hospital laboratory and it was reported by the pathologist. For grading of esophageal varices upper GI Endoscopy was performed by the gastroenterologist and reported as per definition. All the information was entered in the performa.

### Data Analysis Procedure

All the data was entered and analyzed on SPSS Version21. Mean Standard deviation were calculated for age and platelet count. Frequency and percentages were calculated for Gender, Child Pugh Class and Grades of esophageal varices. Shearman s correlation was used to correlate platelet count and grade of varices.

Effect modifier like age, Child Pugh class were stratified and post-stratification Shearman's correlation was applied. P-value < 0.05 was taken significant.

## RESULTS

Age range in this study was from 20 to 60 years with mean age of 39.86 +/- l l .50 years. Most of the patients 67 (63.8 l %) were between 20 to 40 years of age as shown in Table-I. Out of the 105 patients, 70 (66.67%) were male and 35 (33.33%) were females with male to female ratio of 2: 1 (Figure 1). Mean platelet count was 112,600 +/- 31000 /u L. Distribution of patients according to child Pugh class is shown in Table-II.

In my study, it was observed that 04 (3.8 %) patients developed grade 1, 34 (32.38%) grade-11, 39 (37.14%) grade 111, 15 (14.29%) grade lV and 13 (12.38%) Grade V esophageal varices Table-III. While correlating the mean platelet count and frequency of grading of esophageal varices in patients of liver cirrhosis, it was observed that the mean platelet count of the patients with Grade -1 EV was 149,000+/- 22000, platelet count in patients with Grade -11 EV was 122,000 +/- 26000, platelet count in patients with Grade -111 EV was 100,000 +/- 23000, platelet count in patients with Grade- IV EV was 98000 +/- 26000 and platelet count in patients with Grade-V EV was 94000 +/- 22000 with correlation r value of 0.370 and p-value of 0.000 1 which is statistically significant Table-IV.

Correlation between platelet count and severity of esophageal varices with respect to age and child Pugh class is shown in Table-V & Vl respectively.

| Age (years) | No. of Patients %age |
|---|---|
| 20-40 | 67 (63.81) |
| 41-60 | 42 (36.19) |
| Total | 105 (100.0) |

**Table-I. Age distribution of patients (n=105). Mean ± SD = 39.86 ± 11.50 years**

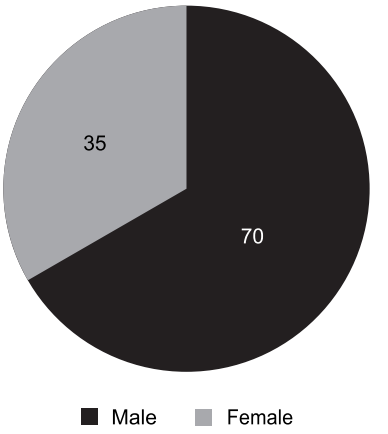


**Figure-1. Distribution of patients according to gender (n=105).**

| | | Frequency %age |
|---|---|---|
| Child PUGH class | A | 27 (25.71) |
| | B | 24 (22.86) |
| | C | 54 (51.43) |

**Table-II. Distribution of patients according to Child Pugh class (n=105).**

| Grading | No. of Patients %age |
|---|---|
| I | 04 (3.81) |
| II | 34 (32.38) |
| III | 39 (37.14) |
| IV | 15 (14.29) |
| V | 13 (12.38) |

**Table-III. Distribution of patients according to grading of esophageal varices (n=105).**

| Grading of Esophageal Varices | Platelet Count | Spearman Rank Correlations | P-Value |
|---|---|---|---|
| | Mean ± SD | | |
| I | 149,000 ± 22000 | 0.370 | 0.0001 |
| II | 122,000 ± 26000 | | |
| III | 100,000 ± 23000 | | |
| IV | 98;000 ± 26000 | | |
| V | 94,000 ± 22000 | | |

**Table-IV. Correlation between mean platelet count and frequency of grading of esophageal varices in patients of liver cirrhosis.**

| Age | Grading of Esophageal Varices | Platelet Count Mean ± SD | Spearman Rank Correlations | P-Value |
|---|---|---|---|---|
| 20-40 years | I | 136,000 ± 27,000 | 0.165 | 0.182 |
| | II | 118,000 ± 26,000 | | |
| | III | 103,000 ± 19,000 | | |
| | IV | 99000 ± 28000 | | |
| | V | 960000 ± 24000 | | |
| 41-60 years | I | 152,000 ± 31,000 | 0.385 | 0.017 |
| | II | 125,000 ± 26,000 | | |
| | III | 99,000 ± 26000 | | |
| | IV | 96000 ± 21,000 | | |
| | V | 91000 ± 23000 | | |

**Table-V. Correlation between platelet count and severity of esophageal varices with respect to age.**

| Class | Grading of Esophageal Varices | Platelet Count Mean ± SD | Spearman Rank Correlations | P-Value |
|---|---|---|---|---|
| A | I | 139,000 ± 21,000 | 0.233 | 0.243 |
| | II | 127000 ± 22,000 | | |
| | III | 107000 ± 15,000 | | |
| | III | 100000 ± 28000 | | |
| | V | 85000 ± 21000 | | |
| B | I | 147,000 ± 22000 | 0.191 | 0.113 |
| | II | 122,000 ± 25,000 | | |
| | III | 99,000 ± 22000 | | |
| | IV | 97,000 ± 26,000 | | |
| | V | 93,000 ± 23,000 | | |
| C | I | 152,000 ± 31,000 | 0.385 | 0.017 |
| | II | 125,000 ± 26,000 | | |
| | III | 99,000 ± 26000 | | |
| | IV | 96000 ± 21000 | | |
| | V | 91000 ± 23000 | | |

**Table-VI. Correlation between platelet count with severity of esophageal varices with respect to child pugh class.**

## DISCUSSION

Esophageal varices, which are abnormally dilated collateral veins, develop due to portal hypertension in patients of liver cirrhosis leading to upper GI bleed as they rupture. The esophageal varices exists in 40% and 60% in compensated and decompensated disease during the diagnosis of liver cirrhosis and ascites.[27] A 5% increase is noted in esophageal varices (EVs) per year and progression rate from small to large varices is 5 – 10% while a 30-35% mortality is reported due to these esophageal varices.[28] With these figures in mind screening of varices and follow up is mandatory in all cirrhotic population to prevent sudden bleeding and hemorrhage.[29]

There is no doubt that Endoscopy is a gold standard procedure in evaluation as well as management of Varices but it is an invasive, expensive and cumbersome procedure, requiring instruments and expertise. Alternatively some noninvasive procedures are now recommended for screening purposes.

Patients with advanced cirrhosis have a complex haemostatic disturbance, and thrombocytopenia (platelet count< I 50000/ul) is usual y observed in liver cirrhosis, so platelet count can be used as a noninvasive and easy alternate method for the screening purpose.[30]

Various research studies have proved this association of low platelet count with the presence of esophageal varices.[31] In addition to this research

studies has also documented that the platelet counts are actually inversely proportional to the grading of esophageal varices.[32] At the same time it is observed in some studies that platelet count has only low to moderate accuracy in this respect so in view of this observation a combination of low platelet count with child pugh classification or Platelet count/spleen diameter ratio appears to be a better way of screening.

According to the literature the cause of low platelet count in cirrhosis of liver is multifactorial but studies like one carried out by Panzer S et al suggests a direct pathogenic role of HCV in the development of thrombocytopenia

In a local study published in 2009, Noorullman et al, found that 50 patients out of 155 (32.3%) had thrombocytopenia.[20] In a study conducted in Tehran, the prevalence of thrombocytopenia was found to be l3.3% which was higher as compared to controls.[21] Agha et al[34] found that median platelet count (82,000 vs 172,000/ML; P<0.0001) in cirrhotic patients correlated with the presence or absence of EV, respectively. Tafarel et al[35] revealed that factors independently associated with EVs were: thrombocytopenia (platelet count <92,000/ mm3; P<0.01) and AST higher than 1.47x upper normal limit (UNL) (P = 0.03). A platelet count lower than 92,000/rum' had sensitivity of 65.7%, specificity of 57.9%, and an area under the ROC curve of 0.62 for the presence of EV that needs prophylactic therapy. These findings are also in agreement with the findings of Tanweer et al[36] and Sanjay and Chandrashekar[31] who also reported the same relationship between EV s and platelet count.

Sarwaret al[37] in another study included 101 patients; 65 patients had EV whereas 36 patients had no varices. High-grade varices were seen in 15 patients and 50 patients had low-grade varices. They reported that patients with platelet count less than 88x103/mm 3 are more likely to be associated with high-grade varices. Furthermore, Cherian et al[38] in their research studied 229 patients. EVs were present in 178 patients (small, n = 97: large, n = 8 l), and 51 patients had no varices. It was reported in their study that platelet count less than 100 x 103/mm $^3$ was significantly associated with the presence of EVs, and a count less than 90 x 103/mm 3 was significantly associated with the presence of large EVs.

Sort et al[39] investigated 353 patients, 123 had medium/large-sized EVs and 230 had small or no EVs. The results showed that platelet count less than 120 x 103/mm3 was significantly associated with the presence of large EVs.

Shaikh et al[40] investigated 100 patients with chronic liver disease; 72 patients were reactive for anti HCV. Total of 85 patients had EVs, whereas 15 patients had no varices. They found that platelet count at a cutoff value of 76 x 103/mm 3 had 90% sensitivity and 100% specificity for the detection of EVs.

Thomopoulos[41] noticed that the discriminating threshold for the presence of varices or large varices differs among studies and a cutoff value of 68000-140000/mm$^3$ has been reported for platelets in different studies. These differences may be due to different populations studied as regards the etiology of cirrhosis and/or the stage of the disease.

This study was conducted to reaffirm this correlation between mean platelet count and presence and grading of varices in liver cirrhosis and the results does not only confirm this association of low platelet count with the presence of varices but also shows the presence of an inverse relationship between them.

## CONCLUSION

This results of this study an association between low platelet count and grades of esophageal varices but also there is an inverse correlation between mean platelet count and frequency of grading of esophageal varices in patients of liver cirrhosis.

So, it is recommended that platelet count can be used as a screening method for detection of esophageal varices early, cost effectively and conveniently thereby avoiding number of unnecessary endoscopies. This fact is very useful

in our setting where availability of instruments and procedural cost matters a lot.



## REFERENCES


1. Kraja B, Mone I, Akshija I, Kocollari A, Prifti S, Burazeri G. **Predictors of esophageal varices and first variceal bleeding in liver cirrhosis patients.** World J Gastroenterol. 2017; 23:4806-14.

2. Shin SU, Lee J, Yu MH, Yoon JH, Han JK, Choi B, et al. **Prediction of esophageal varices in patients with cirrhosis: Usefulness of three-dimensional MR elastography with echo-planar imaging technique.** Radiology. 2014; 272:143-53.

3. Mahafuzzaman M, Hoque MN, Ahmed S, Bhuiyan TM. **Correlation between platelet count vs spleen bipolar diameter ration and esophageal varices in liver cirrhosis.** BIRDEM Med J. 2018; 8(2):159-66.

4. Chandail VS, Kotwal SK, Koul S, Gupta R, Mahajan A. **Non-invasive markers for prediction of varices in patients with portal hypertension.** Int J Res Med Sci. 2017; 5:1007-10

5. Gemechu Geleto, Wondim Getnet and Tsegaye Tewelde. **Mean normal portal vein diameter using sonography among clients coming to radiology department of Jimma University, Southwest.** Ethiopia Ethiop J Health Sci. 2016 May; 26(3):237-242.

6. Kim NJ, Su F, Biggins SW. **Noninvasive modalities are preferred to screen for the diagnosis of esophageal varices when the diagnosis of cirrhosis is made.** Clin Liver Dis (Hobokin). 2020 Sep 4; 16(2):48-52

7. De Macedo GF, Ferrira FG, Riberio MA, Szutan LA, Aseef MS, Rossini LG. **Reliability in Endoscopic diagnosis of Portal Hypertensive Gastropathy.** World J Gastrointest Endosc. 2013 July16; 5(7):323-31

8. Furuichi Y, Kawai T, Ichimura S, Metoki R, Miyata Y, Oshima T, et al. **Flexible imaging color enhancement improves visibility of transnasal endoscopic images in diagnosing esophageal varices: A multicenter prospective blinded study.** J Dig Dis. 2012 Dec. 13(12):634-41. );

9. Rye K, Scott R, Mortimore G, Lawson A, Austin A, Freeman J. **Towards non-invasive detection of oesophageal varices.** Int J Hepatol. 2012; 2012:343-91.

10. Bhattarai S, Gyawali M, Dewan KR, Shrestha G, Patowary BS, Sharma P. **Study of portal vein diameter and spleen size by ultrasonography and their association with gastro-esophageal varices.** Nepal J Radiol. 2014; 4(2):6-14.

11. Gaduputi V, Patel H, Sakam S, Neshangi S, Ahmed R, Lombino M, et al. **Value of portal venous system radiological indices in predicting esophageal varices.** Clin Exp Gastroenterol. 2015; 8:89–93.

12. Priyadarshi BP, Khan IK, Kumar AK, Midha T, Madhuri et al. **Study the association between platelet count and grades of esophageal varices in patients of Liver Cirrhosis with portal hypertension.** Int J Adv Med 2020; 7:603-7.

13. Masalaite L, Valantinas J, Stanaitis J. **Endoscopic ultrasound findings predict the recurrence of esophageal varices after endoscopic band ligation: A prospective cohort study.** Scand J Gastroenterol. 2015. 50 (11):1322-30.

14. Saad WE, Al-Osaimi AM, Caldwell SH. **Pre- and post-balloon-occluded retrograde transvenous obliteration clinical evaluation, management, and imaging: Indications, management protocols, and follow-up.** Tech VascInterv Radiol. 2012 Sep. 15(3):165-202.

15. Sudha Rani KVL, Sudarsi B, Siddeswari R, Manohar S. **Correlation of portal vein size with esophageal varices severity in patients with cirrhosis of liver with portal hypertension.** Int J Sci Res Publicat. 2015; 5(1):1-5.

16. Bledar K, Iris M, Ilir A, Adea K, Skerdi P, Gene B. **Predictors of esophageal varices and first variceal bleeding in liver cirrhosis patients.** Word J Gastroenterol. 2017; 23:4806-14.

17. Kamil Ozdil, Oguzhan Ozturk et al. **Relationship between size of varices and platelet count/spleen size ratio in cirrhotic patients.** North Clin Istanb. 2016; 3(1):46-52.

18. Chen X, Chen T, Zhang X, Li Z, Zhou P, Li H, et al. **Platelet count combined with right liver volume and spleen volume measured by magnetic resonance imaging for identifying cirrhosis and esophageal varices.** World J Gastroenterol. 2015; 21:10184-91.

19. Jamil Z, Mlaik M, Durrani AA. **Platelet count to splenic diameter ratioand other noninvasive markers as predictors of esophageal varices in patients with liver cirrhosis.** Turk J Gastroenterol. 2017; 28:347-52.

20. Noor-ul-iman, Khan H. **Thrombocytopenia in chronic liver disease due to hepatitis C infection.** Rawal Med J. 2009; 34:72-4.

21. Behnava B, Alavian S, Asl MA. **The prevalence of thrombocytopenia in patients with chronic Hepatitis B and C.** Hep Mon. 2006; 6 (2): 67-9.

22. De Almeida AJ, Campos-de-Magalhães M, de Melo Marçal OP, Brandão-Mello CE, Okawa MY, de Oliveira RV, et al. **Hepatitis C virus-associated thrombocytopenia: A controlled prospective, virological study.** Ann Hematol. 2004; 83:434-40.

23. Abd-Elsalam S, Habba E, Elkhalawany W, Tawfeek S, Elbatea H, El-Kalla F et al. **Correlation of platelet count with endoscopic findings in a cohort of Egyptian patients with Liver cirrhosis.** Medicine (Baltimore). 2016; 95(23).

24. Amanullah Abbasi, Nazish Butt, Abdul Rab Bhutto, SM Munir. **Correlation of thrombocytopenia with grading of esophageal varices in chronic liver disease pts.** J Coll Physcians Surg Pak. 2010 Jun; 20(6):369-72.

25. El-Din, Nouth MA, El-Momen, Ali KA, Badway AM, El-Daly AH. **Correlation of thrombocytopenia with grading of esophageal varices in cirrhotic liver disease patients.** Menoufia Med J 2018; 31:588-93.);

26. Abd-Elsalem S, Habba E, El-khedawany W, Tawfeek S, Elbatea H, El-Kalla F et al. **Correlation of platelet count with endoscopic findings in a cohort of Egyptian patients with Liver.** Medicina (Baltimore) 2016;95(23):e3853);

27. Sarangapani A, Shanmugam A, Kalyanasundaram M, Rangachari B, Thangavelu P, Subbarayan JK. **Noninvasive prediction of large esophageal varices in chronic liver disease patients.** Saudi J Gastroentero. 2010; 16(1):38-42);

28. Barrera F, Riquelme A, Soza A, Contreras A, Barrios G, Padilla O, et al. **Platelet count/spleen diameter ratio for non-invasive prediction of high risk esophageal varices in cirrhotic patients.** Ann Hepato. 2009; 8(4):325-30.

29. Dite P, Labrecque D, Fried M, Gangl A, Khan GA, Bjorkman D, et al. **Esophageal varices.** World Gastroenterology Organisation practice guideline: June, 2008.

30. Sanjay R, Chandrashekar M. **Noninvasive prediction of esophageal varices using right lobe of liver to albumin ratio.** Int J Recent Trends SciTechnol 2015; 16:13– 15.

31. Samuel H Sigal, Zachary Sherman and Arun Jesudian. **Clinical implications of Thrombocytopenia for Cirrhotic pts.** hepat Med.2020 April 4;12:44-60.

32. Garcia-Tsao G, Sanyal AJ, Grace ND, Carey W; **Practice Guidelines Committee of the American Association for the Study of Liver Diseases; Practice Parameters Committee of the American College of Gastroenterology. Prevention and management of gastroesophageal varices and variceal hemorrhage in cirrhosis.** Hepatology. 2007 Sep; 46(3):922-38.

33. Panzer S, Seel E, Brunner M, Körmöczi GF, Schmid M, Ferenci P, et al. **Platelet autoantibodies are common in hepatitis C infection, irrespective of the presence of thrombocytopenia.** Eur J Haematol. 2006; 77:513-7.

34. Agha A, Abdulhadi MM, Marenco S, et al. **Use of the platelet count/spleen diameter ratio for the noninvasive diagnosis of esophageal varices in patients with schistosomiasis.** Saudi J Gastroenterol 2011; 17:307–311

35. Tafarel JR, Tolentino LH, Correa LM, et al. **Prediction of esophageal varices in hepatic cirrhosis by noninvasive markers.** Eur J GastroenterolHepatol 2011; 23:754–758.

36. Tanveer S, Pervez T, Taseer I, Khan AQ., Arshad M. **Association of Platelet count, spleeomegaly and oesophageal varices in pts with hepatic cirrhosis.** Prof Med J 2011; 18:426-29.

37. Sarwar S, Khan AA, Alam A, Butt AK, Shafqat F, Malik K, Ahmad I, Niazi AK. **Non-endoscopic prediction of presence of esophageal varices in cirrhosis.** Journal of the College of Physicians and Surgeons-Pakistan: JCPSP. 2005; 15:528–31.

38. Cherian JV, Deepak N, Ponnusamy RP, Somasundaram A, Jayanthiet V. **Non- invasive predictors of esophageal varices.** Saudi J Gastroenterol 2011; 17:64–68.

39. Sort P, Muelas M, Isava A, Llaó J, Porta F, Puig I, Domínguez-Curell C, EsteveE, Yanguas C, Vida F. **Diagnostic accuracy of abdominal ultrasound in the screening of esophageal varices in patients with cirrhosis.** European journal of astroenterology & hepatology. 2014; 26:1335-41. Back to cited text no. 12

40. Shaikh NA, Bhatty SA, Sumbhuani AK, Akhter SS, Vaswani AS, Khatri G. **Non endoscopic prediction of oesophageal varices with platelet count, splenic size and platelet count/splenic diameter ratio.** Med Channel 2009; 15:18–21.

41. Thomopoulos KC. **Non-invasive prediction of esophageal varices: Is it possible?** Saudi J Gastroenterol 2011; 17:1–3.

## AUTHORSHIP AND CONTRIBUTION DECLARATION

| Sr. # | Author(s) Full Name | Contribution to the paper | Author(s) Signature |
|---|---|---|---|
| 1 | Masood Javed | Study design, Insight for research for formulation manuscript writing. | |
| 2 | Dilshad Mohammad | Manuscript writing, Data collected. | |
| 3 | Zain Masood | Statsitical analysis. | |
| 4 | Ghulam Abbas Sheikh | Critical ervision of manuscript, References. | |
| 5 | Muzammal Iftikhar | Interpretataion of results. | |
| 6 | Afaira Hamed | Data collection. | |