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Association of Platelet Count with Severity of Chronic Liver Disease

Bandan Thapa, MD[1]; Birendra Kumar Yadav, MBBS[2]; Aabishkar Subedi, MD[3];
Bibek Joshi, MBBS[4] ; Priya Yadav, MBBS[5]; Sharmila Lamichhane, MBBS[6]; Reshma Dahal , MBBS[7]
Bir Hospital, Kathmandu Nepal

Abstract:-

- ***Introduction:***

Chronic liver disease (CLD) is a significant global health concern, encompassing a range of liver pathologies with varying degrees of severity. This cross-sectional study aims to investigate the relationship between platelet count and the severity of CLD. Platelet count is a readily available and cost-effective clinical parameter that may serve as a valuable prognostic marker for CLD progression.

- ***Materials and Method:***

The study included 122 patients in Chitwan Medical College Teaching Hospital (CMCTH) diagnosed with CLD during one year starting from March 2022. Data were collected using the proforma specially designed for this study. Parameters like age and gender, as well as brief clinical data, including liver function tests, imaging findings, and platelet count, were collected. Patients were then classified into different stages of severity based on established criteria, i.e. child Pugh Score system (CTP score). Statistical analyses were performed using a statistical package for the social science (SPSS); statistical program version 20.0, to explore the association between platelet count and CLD severity.

- ***Results:***

The majority of patients who had chronic liver disease were found to be high in the age group of 40-60 years. Thrombocytopenia was found in 72.1% of chronic liver disease patients. After classifying the severity of chronic liver disease, it was found that 55.7% of patients had a severe disease that was CTP-C, 36.1% were found to be CTP-B and 8.2% were CTP-A. In patients with normal platelet count, 44.1% had CTP-B, 41.2 had CTPC and 14.7% had CTP-A score. In patients with thrombocytopenia, 61.4% had CTP-C, 33.0% had CTP-B and 5.7% had CTP-A score.

- ***Conclusion:***

This study provides a valuable snapshot of the potential association between platelet count and the severity of chronic liver disease. The prevalence of thrombocytopenia across different disease stages underscores its clinical relevance.

The platelet count is decreased in chronic liver disease, however, it cannot be defined as the sole predictor for the severity of CLD.

Keywords:- *Chronic Liver Disease; Investigation; Platelet Count; Severity of Chronic Liver Disease; Thrombocytopenia.*

I. INTRODUCTION

Chronic liver disease (CLD) represents a substantial global health burden [1] , with a wide spectrum of etiologies, including viral infections, alcohol consumption, metabolic disorders, and autoimmune conditions. An estimated 1.5 billion people worldwide have chronic liver disease, with a marked 13% increase in cirrhosis cases noted in the last decade. [2] The progression of CLD is complex and variable, ranging from mild fibrosis to cirrhosis, with the latter being associated with a significantly increased risk of complications, including hepatocellular carcinoma and liver failure. Cirrhosis is currently the 11th most common cause of death globally and liver cancer is the 16th leading cause of death; combined, they account for 3.5% of all deaths worldwide.[3] Accurate assessment of the severity and prognosis of CLD is crucial for timely intervention and optimal patient care.[2]

Currently, liver biopsy is considered the gold standard for assessing liver fibrosis and determining the severity of CLD.[2] However, this invasive procedure is associated with various limitations, including the risk of complications, sampling error, inter-observer variability, and patient reluctance. Consequently, there is a growing need for noninvasive and easily accessible markers/tools to evaluate CLD severity effectively.

Platelet count is an attractive candidate for such a marker due to its routine clinical practice measurement and potential role as an indicator of liver function and fibrosis progression.[2] The liver plays a central role in regulating platelet count, and thrombocytopenia (reduced platelet count) is a common hematological manifestation of liver dysfunction. Additionally, numerous studies have suggested an inverse relationship between platelet count and the severity of CLD, with lower platelet counts being associated with more advanced stages of fibrosis and cirrhosis.

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II. METHODOLOGY

- *Type of study:*
  Descriptive cross-sectional study/ Prospective observational study.

- *Study Variables:*
  Independent variables =Severity of Chronic liver disease- (C-T-P Score).
  Dependent variables = Platelet count.

- *Sample Size:*
  All patient with the diagnosis of Chronic Liver Disease, presented in gastro medicine department over the study period were taken in study and total of 122 patient were included.

- *Study Site:*
  Department of Medicine, CMCTH, Bharatpur, Chitwan, Nepal.

- *Sampling Technique:*
  Non-probability Consecutive sampling technique.

- *Data Collection Tools:*
  After obtaining informed consent, detailed history, clinical examination, lab investigation reports were entered in the proforma specially designed for the study.

- *Data Collection Technique / Methods (Specify):*
  Using a data collection tool (proforma) the information was collected by the researcher himself and checked and confirmed with the on-duty doctor or nurse in charge for any missing data or peculiarities. Data were collected on structured Performa. Performa was presented before the actual study started. Upon receiving cases fulfilling the inclusion criteria, they were explained about the study in detail. Participants were assured of full confidentiality and written informed consent was taken subsequently. Routine and specific laboratory tests were carried out using standard laboratory protocol.

III. RESULTS

A total of 122 patients who fulfilled the inclusion and exclusion criteria were taken up for the study. The socio-demographic and clinical variables are presented below. The mean ± S.D. age of the patients was 53.35± 13.227 years ranging from 21 years to 96 years. The majority of the patients were in the age group 40-60 Years (n=70, 57.4%). Majority of the patient were male i.e. 74.6% (n=91)

Table 1: Distribution based on Age

Age	Frequency	Percentage
≤ 40 Years	15	12.3
40-60 Years	70	57.4
≥60 Years	37	30.3

Out of 122 patients, 27.9% (n=34) had normal platelet count and 72.1% (n=88) patient had thrombocytopenia.

Table 2: Distribution According to Platelet Count

Platelet Count	Frequency	Percentage
Normal	34	27.9
Thrombocytopenia	88	72.1

Severity of chronic liver disease was calculated using variables like total serum albumin, serum bilirubin, INR, grading of ascites and grading of encephalopathy.

Serum albumin: 11.5% (n=14) patient had normal serum albumin. 30.3% (n=37) had mildly decreased albumin level and majority i.e. 58.2% (n=71) had severe decrement of serum albumin.

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Table 3: Serum Albumin Level

Serum Albumin	Frequency (n)	Percent (%)
Normal(>3.5g/dl)	14	11.5
Mild (2.8-3.5g/dl)	37	30.3
Severe (<2.8g/dl)	71	58.2

- Serum bilirubin: Majority of patient i.e. 49.2% (n=60), had severe increment of serum bilirubin (>3.0mg/dl).

Table 4: Serum Bilirubin Level

Serum Bilrubin	Frequency (n)	Percent (%)
Mild (<2.0mg/dl)	33	27.0
Moderate (2-3mg/dl)	29	23.8
Severe(>3mg/dl)	60	49.2

- International Normalized Ratio: The majority of patients i.e. 60.2% (n=74), had normal INR values.

Table 5: INR Level

INR	Frequency(n)	Percent(%)
Normal(<1.7)	74	60.7
Mild to Moderate(1.7-2.3)	32	26.2
Severe (>2.3)	16	13.1

- Grading of ascites: The majority of patients had mild or moderate to severe ascites i.e. 38.5% (n=47).

Table 6: Grading of Ascites

Ascites grading	Frequency(n)	Percent(%)
None	28	23.0
Mild	47	38.5
Moderate to severe	47	38.5

- Grading of encephalopathy: The majority of patients i.e. 94% (n=77), were free of encephalopathy. [Table 7]

Table 7: Grading of Encephalopathy

Encephalopathy Grade	Frequency(n)	Percent(%)
None	94	77.0
Minimal	17	13.9
Advanced	11	9.0

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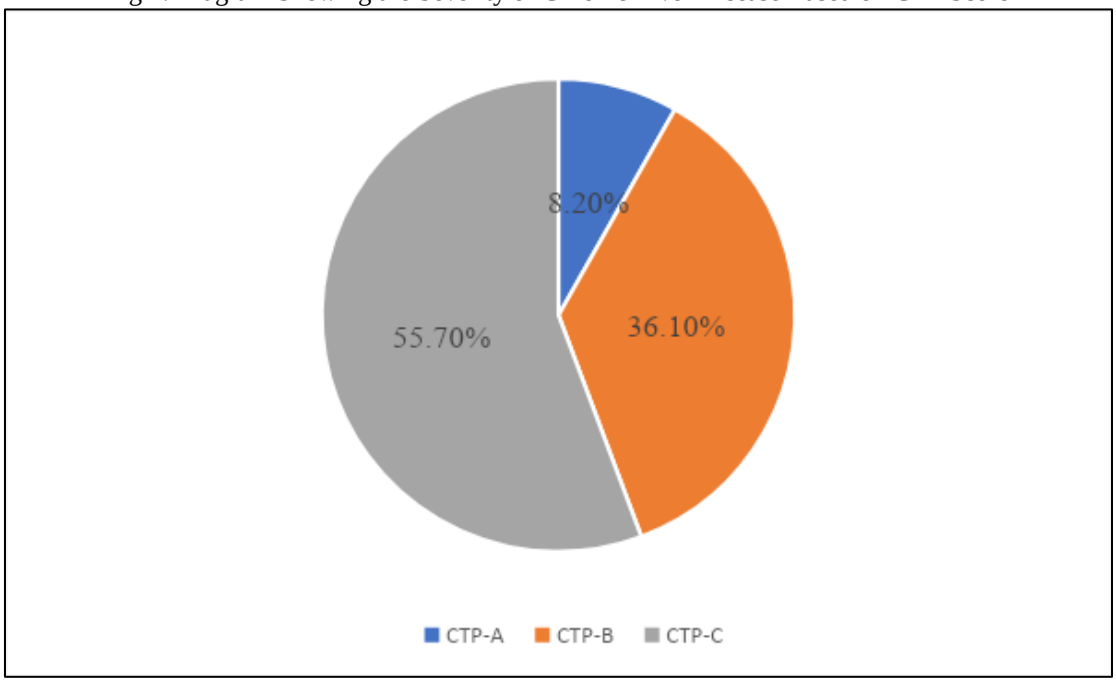
➢ *Severity of Chronic Liver Disease, CTP Score.*

Using these parameters CTP score was calculated and patients were classified as CTPA, CTP-B, and CTP-C and found to be, 8.2% (n=10) had a score of CTP-A, 36.1% had a score of CTP-B, and 55.7(n=68) had a score of CTP-C. The majority of patients had more severe disease i.e. CTP-C.

Table 8: Severity of Chronic Liver Disease

CTP score	Frequency(n)	Percent(%)
CTP-A	10	8.2
CTP-B	44	36.1
CTP-C	68	55.7

Fig 1: Diagram Showing the Severity of Chronic Liver Disease Based on CTP Score



➢ *Association of Platelet Count with Severity of Chronic Liver Disease*

In patient with normal platelet count, 44.1% had CTP-B, 41.2 had CTP-C and 14.7% had CTP-A score. In patient with thrombocytopenia, 61.4% had CTP-C, 33.0% had CTP-B and 5.7% had CTP-A score.

Table 9: Association of Platelet Count with Severity of Chronic Liver Disease (CTP Score)

Platelet Count	CTP-A	CTP-B	CTP-C	p value
Normal platelet count	5 (14.7%)	15(44.1%)	12(41.2%)	0.08
Thrombocytopenia	5(5.7%)	29(33.0%)	54(62.4%)	

*Fisher Exact Test (statistically significant P<0.05.)

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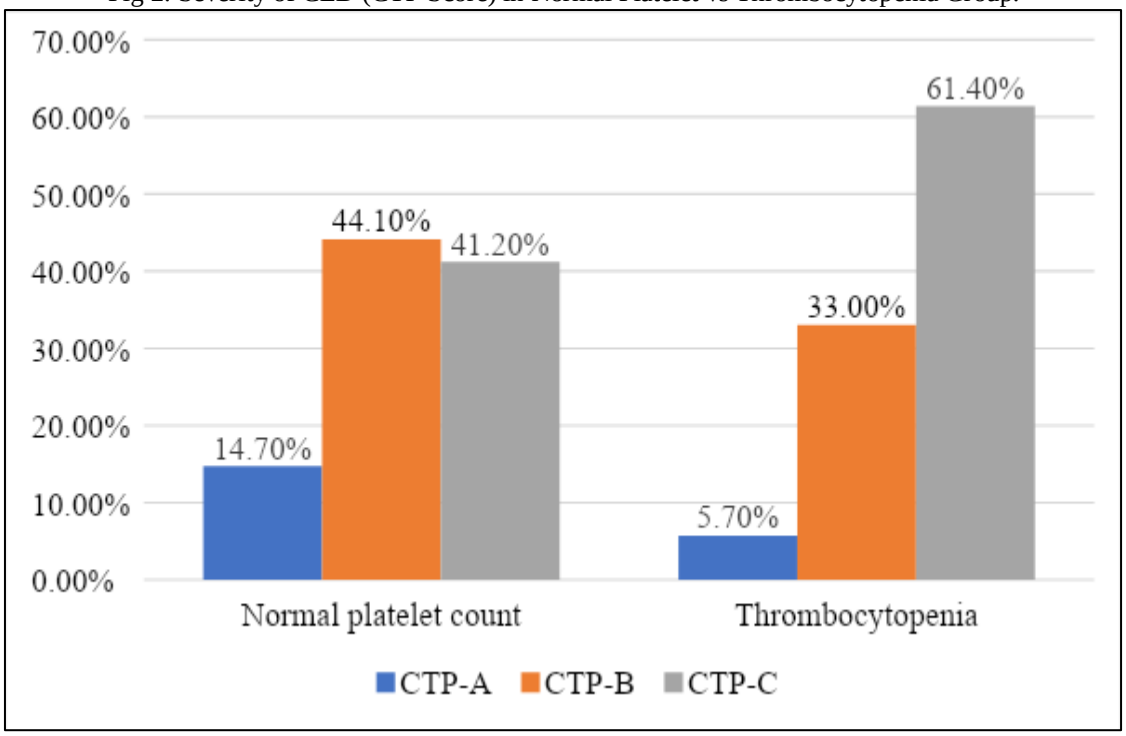
Fig 2: Severity of CLD (CTP Score) in Normal Platelet vs Thrombocytopenia Group.



IV. DISCUSSION

The study aimed to explore the potential association between platelet counts with the severity of disease. Out of 122 patients included in this study, 74.6% of the patients were male followed by 25.4% of female. The study conducted by Behara and Das, 2019, showed 85.51% were male followed by 14.49% were female, which was similar to this study. The higher percentage was found in males may be due to the cultural background. [4]

The majority of patients were in the age group of 40-60 years which was 57.4%, followed by 30.3% above 60 years and the least were below 40 years which was 12.3%. Cultural background like consumption of alcohol may have contributed higher percentage in the middle-aged group.

Among the patients with chronic liver disease, 72.1% had thrombocytopenia which was similar to the result that was 76% as compared to Afdhal et al. 2008, which exhibited thrombocytopenia, emphasizing its prevalence in the context of chronic liver disease. [5]

From this study, out of total patients with chronic liver disease, the majority of patients had severe hypoalbuminemia which was found to be 58.2% followed by mild hypoalbuminemia which 30.3% and 11.5% of patients had normal albumin levels.

This study found among the total number of patients, most of them had severe hyperbilirubinemia which was 49.2% followed by moderate hyperbilirubinemia which was 23.8% and the remaining had normal to mild hyperbilirubinemia which was 27.0%.

Among the total patients, majority of patients had a normal International Normalize Ratio (INR) which was 60.7%, followed by a mild to moderate increment of INR that was 26.2%, and the least was found to have a severe increment in INR which was 13.1%.

Out of the total patients, 38.5% patients had mild and moderate to severe ascites, and 28% of patients were found to have no ascites.

The majority of patients were found to have no encephalopathy which was found to be 77.0% followed by minimal encephalopathy which was 13.9% and the least had advanced grade of encephalopathy which was 9.0%.

Stratifying patients based on the Child-Turcotte-Pugh (CTP) score, this study observed varying degrees of severity. Among which majority of patients had a score of C which was found to be 55.7%, followed by a score B which was 36.1%, and the least had a score A which was found to be 8.2%. So, this cross-sectional snapshot provides a valuable overview of thrombocytopenia prevalence across different stages of the disease.

A closer examination of the association between platelet count and disease severity revealed an interesting pattern. In the group with the normal platelet count, it was found that 14.7% had score A, 44.1% had score B and 41.2% had score C, contrarily, in the thrombocytopenia group, 5.7% had score A, 33.0% had score B and 61.4% had score C. These findings suggest a potential association yet the cross-sectional nature of our study limits our ability to establish causality.

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The Fisher's Exact Test yielded a 'p-value' of 0.08, suggesting there is no significant association between platelet count with the severity of chronic liver diseases. Despite the p-value falling just beyond the conventional threshold, the clinical implications within the scope of a cross-sectional study are substantial. Thrombocytopenia's prevalence across different severity categories emphasizes its clinical relevance as a marker of disease. This study provides a valuable snapshot that prompts consideration of platelet count in the context of assessing chronic liver disease at a specific point in time.

V. CONCLUSION

Our cross-sectional study provides a valuable snapshot of the potential association between platelet count and the severity of chronic liver disease. The prevalence of thrombocytopenia across different disease stages underscores its clinical relevance. The finding of these results is not statistically significant (p-value <0.08). This cross-sectional design calls for cautious interpretation, emphasizing the need for further research to elucidate platelet count dynamics in chronic liver disease.

VI. RECOMMENDATION

The study was aimed to find out the association between the platelet count and the severity of chronic liver disease. It was found that platelet count is decreased in chronic liver disease though the result yields no statistical significance. Therefore platelet count can't be considered as the sole predictor for disease severity, so in future multifactorial predictive models can be generated to weigh the disease severity.

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