Section: Pathology

Original Research Article

COAGULATION PROFILE IN PATIENTS WITH LIVER DISEASE: A CROSS-SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL MANDYA

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ABSTRACT

Background: The liver is a vital organ that plays a crucial role in maintaining hemostasis. It synthesizes plasma proteins and blood clotting factors. Liver disorders can disrupt these functions, leading to derangements in coagulation factors. The liver's role in regulating hemostasis is complex, and disruption in this process can lead to bleeding and thrombotic complications. Coagulation tests are useful in the evaluation, management and assessment of prognosis of liver diseases. This study aimed to assess coagulation parameters—PT, APTT, and platelet count—among patients with liver diseases.

Materials and Methods: A cross-sectional descriptive study was conducted in Department of Medicine and Pathology, Mandya Institute of Medical Sciences, Mandya. This study included 128 patients clinically diagnosed with liver disease who were divided into three categories – cirrhosis, viral hepatitis, and obstructive jaundice. The coagulation tests PT, APTT and Platelet count were performed and the results were evaluated in group. Coagulation profiles were evaluated using standard laboratory methods.

Results: Among 128 patients, 64 had cirrhosis, 31 had viral hepatitis, and 33 had obstructive jaundice. Prolonged PT was observed in 87.5% (112/128) of cases, APTT in 41.4% (53/128), and thrombocytopenia in 32% (41/128). Cirrhotic bleeders had significantly higher PT and APTT values compared to non-bleeders.

Conclusion: Coagulation abnormalities vary with different liver diseases, duration and severity of disorders. In cirrhosis, raised level of PT and APTT indicates damage to liver resulting in reduced production of coagulation proteins with increased risk of bleeding tendencies. Coagulation abnormalities are prevalent in liver disease and correlate with disease type and severity. Routine coagulation testing is crucial for early detection of bleeding risk and better clinical management.

Keywords: Cirrhosis, Hepatitis, Coagulation Profile, Liver Disease, Thrombocytopenia.

INTRODUCTION

The liver is a vital organ that plays a crucial role in maintaining hemostasis. It synthesizes plasma proteins and blood clotting factors. Liver disorders can disrupt these functions, leading to derangements in coagulation factors.[1]

The liver's role in regulating hemostasis is complex, and any disruption in this process can lead to bleeding and thrombotic complications.[2]

Hepatic disorders are widely prevalent in tropical countries are responsible for morbidity and mortality. Laboratory tests, coagulation tests and liver function tests are useful in the evaluation, management and assessment of prognosis of liver diseases. They provide a sensitive method of screening for the presence of liver dysfunction.[3]

According to World Health Organization estimates, approximately 3% of the global population and 1-2% of India's population are infected with hepatitis C

virus (HCV), with over 170 million chronic carriers worldwide at risk of developing liver cirrhosis or hepatocellular carcinoma. Chronic liver infections affect more than 240 million people globally.[4]

Clinicians typically assess impaired hemostasis in liver disease through global coagulation tests, particularly prothrombin time (PT) and activated partial thromboplastin time (aPTT). As the cornerstone of the coagulation system, the diseased liver places patients at substantially increased risk for both hemorrhagic and thrombotic complications.[5]

Prothrombin time (PT) serves as a useful indicator, correlating well with both the extent of liver cell damage and the presence of abnormal bleeding, thereby offering prognostic value. Notably, the combined prolongation of PT and activated partial thromboplastin time (APTT), even in the absence of significant hypofibrinogenemia, has been identified as a reliable marker of coagulopathy in patients with chronic liver disease.[6]

Cirrhosis, the terminal stage of many hepatic conditions, is frequently associated with hematologic abnormalities, particularly thrombocytopenia and coagulation disorders. Chronic hepatitis—especially of viral origin—remains a major global health concern, caused by various etiologic agents. In such chronic liver disorders, levels of natural anticoagulants such as antithrombin III, protein C, protein S, and alpha-2 macroglobulin are often decreased.[7]

MATERIALS AND METHODS

Study Design: This is a Cross-Sectional Descriptive study conducted to assess Coagulation Profile in Patients with Liver Disease at a tertiary care hospital in Mandya, Karnataka, India. The study was conducted at the Department of Medicine and Pathology, Mandya Institute of Medical Sciences, Mandya. The study was conducted in accordance with the ethical guidelines of the Indian Council of Medical Research (ICMR, 2017) and the New Drugs & Clinical Trials Rules (2019). Institutional Ethics Committee approval was obtained prior to initiation of the study.

Study Duration: This Cross Sectional Descriptive study was conducted from December 2024 to February 2025**.**

Data collection and analysis will be performed post-approval by the Institutional Ethics Committee.

Data Sources: A specially designed proforma will be used to collect data from patients attending medicine department with Liver Disease at tertiary care hospital MIMS, Mandya. They are divided into following three groups:

Cirrhosis -Bleeders (with history of bleeding) and Non bleeders.

Viral hepatitis

Obstructive jaundice.

Blood samples from the patients were collected and following coagulation tests were performed.

1. Bleeding time- Ivy's Method
2. Clotting time- Lee and White Method
3. Platelet count- Abacus 5-part automated hematology analyzer.
4. Prothrombin time- QuickCoag PT-HS by Biomedica Diagnostics Inc.
5. Activated Partial Thromboplastin time- QuickCoag APTT-EA by Biomedica Diagnostics Inc.
6. The clinical history and data of patient's liver disease were correlated and results were recorded.

Inclusion Criteria

- Presence of liver disease including cirrhosis, viral hepatitis, obstructive jaundice.
- Both sex- males and female
- Age- 18 years and above

Exclusion Criteria

- Patients with known history of coagulation disorders.

Patients who are on any of the following drugs in the previous week were excluded: aspirin or nonsteroidal anti-inflammatory drugs, antihistamines, penicillin, sulfonamides, beta blockers, and anticoagulants

Sample Size

$N= Z^2\ 1\text{-}\alpha/2\ Pq/l^2$

$Z1\text{-}\alpha/2=1.96$ standard normal variable

P= 75% Prolonged Prothrombin time [8].

q=100-p=25%

l= 10% of P=7.5

$n= (1.96)2\ (75)(25)/\ (7.5)^2 = 128$

Sampling Method – Purposive sampling

Data Analysis: All the data collected will be entered in Microsoft excel sheet and analyzed using Statistical Package for the Social Sciences (SPSS 22 trial version) software, Descriptive Statistics like Percentage for categorical data like PT, APTT, BT, CT, and Platelet count. Mean, Standard Deviation for continuos data like age, sex, history of drug intake, liver disease and Inferential Statistics, Chi-square test to know to know the association of PT, APTT versus Liver disease and t-test to know the difference between mean of cirrhosis versus hepatitis, PT versus APTT. ANOVA is used to know the Bleeding time, clotting time among the different groups, correlation is used to the relationship between PC, PT, APTT and other suitable statistical tests will be applied and $p< 0.05$ will be considered statistically significant.

RESULTS

Demographics: Among 128 patients, 68 (53%) were male and 60 (47%) were female. The mean age was 46.2 ± 14.5 years. Alcohol and tobacco use were noted in 29% and 21% respectively.

Disease Distribution

- Cirrhosis: 64 (50%)
    - Bleeders: 28
    - Non-bleeders: 36
- Viral Hepatitis: 31 (24.2%)
- Obstructive Jaundice: 33 (25.8%)

Table 1: Coagulation Parameters

Test	Normal	Abnormal
PT	16	112
APTT	75	53
Platelet Count	87	41

Group-wise Analysis

- Cirrhosis (Bleeders): 100% had prolonged PT; 60.7% had prolonged APTT; 89% had thrombocytopenia.
- Viral Hepatitis: 70% had PT prolongation; 16% had prolonged APTT; 16% had thrombocytopenia.
- Obstructive Jaundice: 85% showed prolonged PT; 18% had APTT derangement; 24% were thrombocytopenic.

Table 2: ?

Test name	Normal	Cirrhosis		Viral Hepatitis	Obstructive Jaundice	
		Bleeders	Non bleeders			
Total cases		28	36	31	33	
Prothrombin Time	11-15 Sec	0	2	9	5	16
	HIGH	28	34	22	28	112
aPTT	26-46 Sec	11	11	26	27	75
	HIGH	17	25	5	6	53
Platelet Count	1.5-4.5 L	3	33	26	25	87
	LOW	25	3	5	8	41

Out of the 128 patients, 64 were diagnosed as cirrhosis, 31 as viral hepatitis, and 33 as obstructive jaundice.

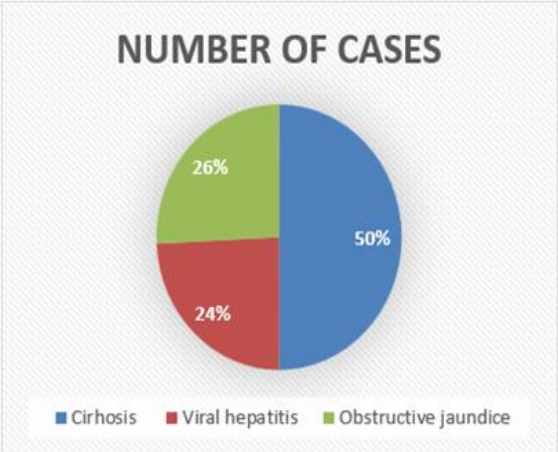

Figure 1: Number of cases

- About 87% (112/128) had prolonged PT, 41% (53/128) had prolonged APTT.

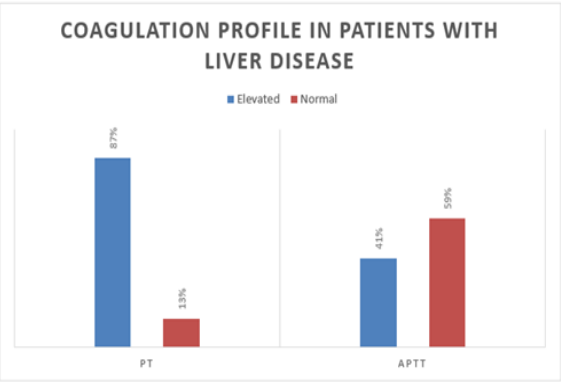

Figure 2: Coagulation profile in patients with liver disease

Thrombocytopenia was seen in 32% (41/128) patients.

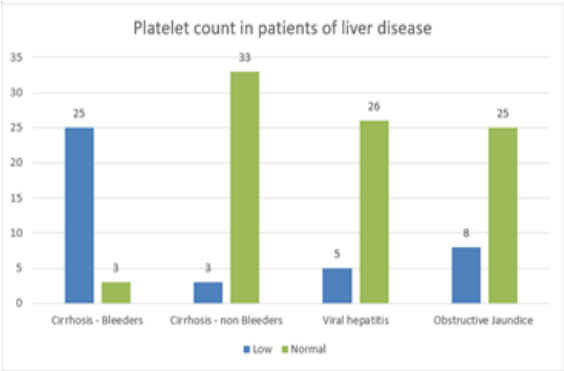

Figure 3: Platelet count in patients of liver disease

DISCUSSION

Our study supports findings from Patil et al,[9] and Bhatia et al,[10] indicating that coagulation abnormalities are more prominent in cirrhosis than other liver pathologies. Cirrhotic bleeders showed the highest incidence of PT and APTT prolongation and low platelet counts, affirming impaired synthesis and platelet sequestration.

Prolonged PT in 87.5% and APTT in 41.4% of patients align with Kotadiya et al,[8] (PT: 75%, APTT: 43%). In contrast, viral hepatitis showed milder coagulation changes, consistent with less extensive hepatocellular damage. Similar findings were also reported in Siddiqui et al,[11] and Shah et al,[6] emphasizing that PT and APTT serve as reliable indicators of hepatic synthetic function.

Thrombocytopenia in 32% of our patients was notably higher in cirrhosis, attributed to splenomegaly and bone marrow suppression—a consistent observation in Tripathi et al.[12]

Table 3

	Our study (128 cases)	Kotadiya et al. (2019) (100 cases)	Bhatia et al. (2020) (300 cases)
Prolonged PT	87%	75%	62%
Prolonged APTT	41%	39%	39.3%
Thrombocytopenia	32%	58%	46%

Strengths

- Uniform inclusion criteria
- Standardized testing protocols
- Real-world relevance in a resource-constrained region

Limitations

- Lack of stratification by Child-Pugh score or MELD
- Imaging or liver biopsy not correlated with coagulation status

CONCLUSION

The current study aims to bridge the knowledge gap by investigating the coagulation profile of patients with liver disease. This study will examine the relationship between liver disease and coagulation abnormalities, and will identify the most common coagulation abnormalities in patients with liver disease. The findings of this study will provide valuable insights into the coagulation profiles of patients with liver disease, and will inform the development of effective management strategies for these patients.

Considering above mentioned factors and importance of coagulation tests which is helpful in evaluation of various hepatic disorders, the present study is undertaken.

This study establishes that coagulation abnormalities are prevalent in liver diseases, particularly cirrhosis. Prolonged PT and APTT, along with thrombocytopenia, were significantly associated with bleeding risk. Coagulation screening is indispensable in the clinical workup of liver disease and should be integrated routinely to mitigate bleeding risks and guide management.

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