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EVALUATION OF BLEEDING TIME, CLOTTING TIME, AND LIVER FUNCTION ABNORMALITIES IN PATIENTS WITH LIVER DISEASE: A CROSS-SECTIONAL STUDY.

Dr. Amita Yatish Patil[1*], Dr. Swati Kashinath Choudhary[2]

[1*]Assistant Professor Pathology, Vedanta Institute of Medical Sciences Saswad, Taluka Dahanu Dist.- Palghar Maharashtra 401606
[2]Assistant professor (Biochemistry), MIMSR Medical College, Latur- 413512

***Corresponding Author :**Dr. Amita Yatish Patil
*Assistant Professor Pathology, Vedanta Institute of Medical Sciences Saswad, Taluka Dahanu Dist.- Palghar Maharashtra 401606

Abstract

Background: Liver disease significantly affects coagulation function, leading to abnormalities in Bleeding Time (BT) and Clotting Time (CT). Evaluating these parameters in liver disease patients is crucial for understanding hemostatic dysfunction and managing bleeding risks.

Methods: This cross-sectional study was conducted in a tertiary care center over 18 months, including 120 patients diagnosed with liver disease. BT and CT were assessed using standard methodologies. Liver Function Tests (LFTs) and complete blood counts were performed. Data were analyzed using SPSS 20.0, with statistical significance set at $p < 0.05$.

Results: A significant proportion of liver disease patients exhibited prolonged BT (40.83%) and CT (34.17%), particularly among those with alcoholic liver disease and cirrhosis. However, statistical analysis showed no significant association between liver pathology and BT/CT abnormalities. Liver Function Tests revealed that SGPT was elevated in 73.33% of patients, SGOT in 70%, and bilirubin in 60.83%, reflecting substantial liver dysfunction.

Conclusion: This study highlights that BT and CT abnormalities are common in liver disease, particularly in cirrhosis and alcoholic liver disease patients. Routine assessment of BT and CT is recommended for early detection of coagulation dysfunction and better clinical management. Further large-scale studies are needed to validate these findings and refine treatment approaches.

Keywords: Liver disease, Bleeding Time, Clotting Time, Coagulation abnormalities, Cirrhosis

Introduction

Liver disease is a significant global health burden, affecting millions of individuals and contributing to substantial morbidity and mortality. The liver plays a crucial role in maintaining hemostasis by synthesizing clotting factors, anticoagulants, and fibrinolytic proteins. Consequently, patients with liver disease often present with coagulation abnormalities, including alterations in Bleeding Time (BT) and Clotting Time (CT), which can predispose them to either hemorrhagic or thrombotic complications[1,2].

Coagulation disorders in liver disease primarily arise due to the impaired synthesis of coagulation factors, thrombocytopenia, and dysfunctional platelet activity. In cirrhosis and other chronic liver conditions, the delicate balance between procoagulant and anticoagulant mechanisms is disrupted,

leading to prolonged BT and CT. Studies have shown that coagulation tests are valuable tools in assessing the risk of bleeding tendencies in liver disease patients[3,4].
Bleeding Time (BT) and Clotting Time (CT) are fundamental laboratory investigations that provide insight into primary hemostasis and overall coagulation function. BT evaluates platelet function and vascular integrity, while CT assesses the intrinsic pathway of the coagulation cascade. Abnormal prolongation of these parameters is frequently observed in hepatic dysfunction, correlating with disease severity and clinical outcomes[5].

Previous studies have reported that prolonged BT and CT are common in patients with conditions such as cirrhosis, alcoholic liver disease, and hepatitis, suggesting an increased risk of hemorrhagic complications[6,7]. However, limited studies have specifically focused on analyzing these parameters in different subtypes of liver disease. Given the importance of early detection and risk stratification, it is essential to investigate the prevalence and significance of coagulation abnormalities in liver disease patients.
This study aims to assess the prevalence and pattern of prolonged Bleeding Time (BT) and Clotting Time (CT) in liver disease patients and analyze their distribution across different liver disease subtypes. By identifying trends and statistical significance, this study will contribute to a better understanding of coagulation dysfunction in liver disease and aid in its clinical management.

Methods

This study is a cross-sectional observational study conducted in the Department of Medicine at a tertiary care center over a period of 18 months (January 2016 to June 2017). The study included both inpatient and outpatient cases diagnosed with liver disease. A total of 120 patients with confirmed liver disease were included based on predefined inclusion and exclusion criteria. Patients diagnosed with any form of liver disease, such as cirrhosis, alcoholic liver disease, and hepatitis, were included in the study, provided they gave informed consent and were above 18 years of age. Patients with pregnancy-induced hypertension, recent blood transfusions, those on anticoagulants or antiplatelet therapy, and cases of drug-induced hepatitis were excluded from the study.

Each patient underwent a detailed clinical history and physical examination. Laboratory investigations included Bleeding Time (BT) measured using Ivy's method and Clotting Time (CT) assessed using the Lee and White method. Liver Function Tests (LFTs) such as Serum Aspartate Aminotransferase (SGOT/AST), Serum Alanine Aminotransferase (SGPT/ALT), Total Serum Bilirubin, and Alkaline Phosphatase (ALP) were also conducted. A Complete Blood Count (CBC) was performed to assess platelet count and hemoglobin levels. Blood samples were collected via venipuncture, with 2 ml in EDTA tubes for CBC, 3 ml in plain tubes for biochemical tests, and 2 ml in citrate vacutainers for coagulation studies. BT was measured by making a small incision on the forearm and blotting blood at regular intervals until bleeding ceased. CT was determined by placing whole blood in a test tube and observing the clot formation time.

Data was analyzed using Microsoft Office Excel 2016. The chi-square test was applied to compare categorical variables, and the student's t-test was used for continuous variables. The significance threshold was set at $p < 0.05$. Results were presented in the form of tables and graphs for better visualization of trends. Ethical approval was obtained from the Institutional Ethical and Research Committee before the commencement of the study, and written informed consent was taken from all study participants.

Results

The study included a total of 120 patients diagnosed with liver disease. The age and sex distribution of the study population is detailed in Table 1. The majority of the patients were in the 41-50 years age group (56 cases, 46.67%), followed by the 31-40 years group (40 cases, 33.33%). The male-to-

female ratio was significantly skewed, with 111 males (92.5%) and only 9 females (7.5%), indicating a higher prevalence of liver disease among males.

Table 1: Age and Sex Distribution of Liver Disease Patients

Sr.No.	Age Group in years	Male	%	Female	%	Total
1	21-30	9	81.81	2	18.19	11
2	31-40	37	92.5	3	7.5	40
3	41-50	53	94.64	3	5.36	56
4	>50	12	92.31	1	7.69	13
Total		111	92.5	9	7.5	120

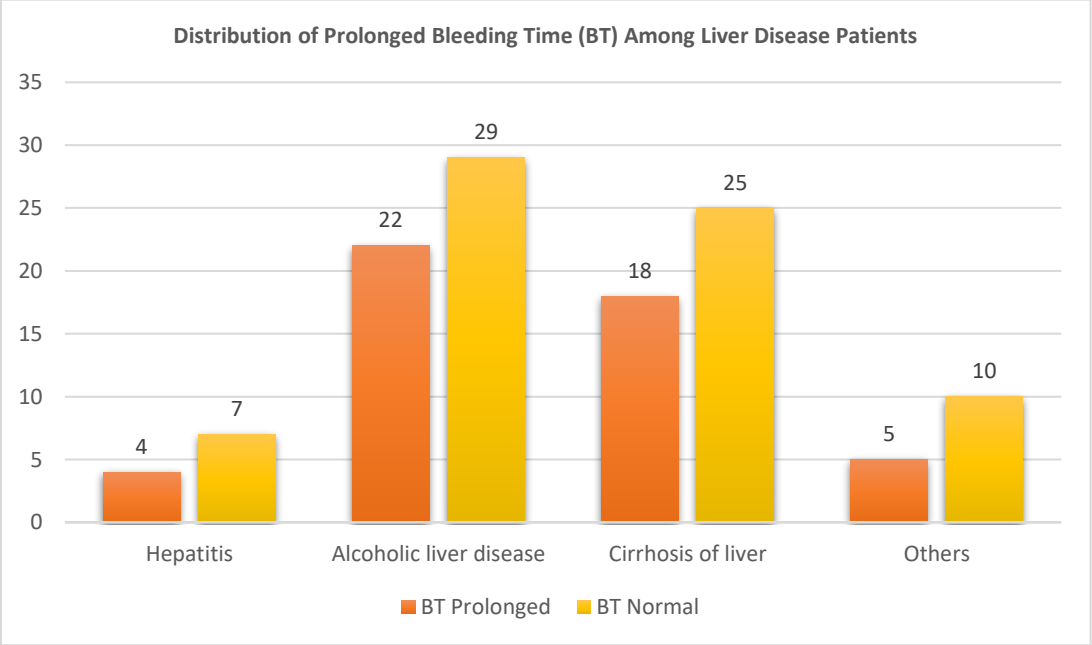
The mean coagulation parameters of the study population are summarized in Table 2. The mean Prothrombin Time (PT) was 18.507 ± 11.56 seconds, while the Activated Partial Thromboplastin Time (APTT) was 35.563 ± 19.850 seconds. The mean platelet count was 2.157 ± 0.796 lakh/mm³. The mean Bleeding Time (BT) was 350.775 ± 98.172 seconds, and the mean Clotting Time (CT) was 409.3 ± 98.261 seconds.

Table 2: Mean ± SD of Coagulation Parameters in Liver Disease Patients

Sr.No.	Parameter	Mean + SD
1	PT (in sec)	18.507 + 11.56
2	APTT (in sec)	35.563+ 19.850
3	Platelet Count (lakh/mm3)	2.157+ 0.796
4	BT (in sec)	350.775 + 98.172
5	CT (in sec)	409.3 + 98.261

The distribution of Bleeding Time (BT) abnormalities across different liver disease subtypes is presented in Figure 1. 49 patients (40.83%) had prolonged BT, with the highest proportion seen in alcoholic liver disease (43.14%), followed by cirrhosis (41.86%). The association between liver pathology and prolonged BT was not statistically significant ($p > 0.05$).

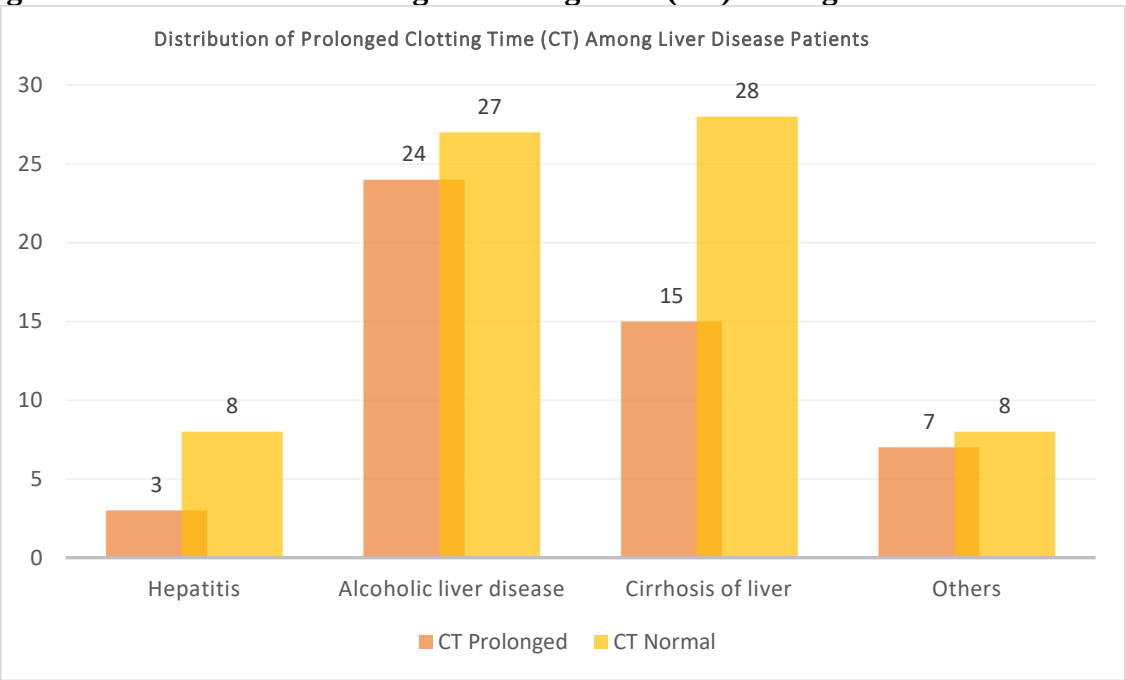
Figure 1: Distribution of Prolonged Bleeding Time (BT) Among Liver Disease Patients



Similarly, Figure 2 depicts the distribution of Clotting Time (CT) abnormalities among liver disease patients. 41 patients (34.17%) had prolonged CT, with the highest proportion observed in alcoholic

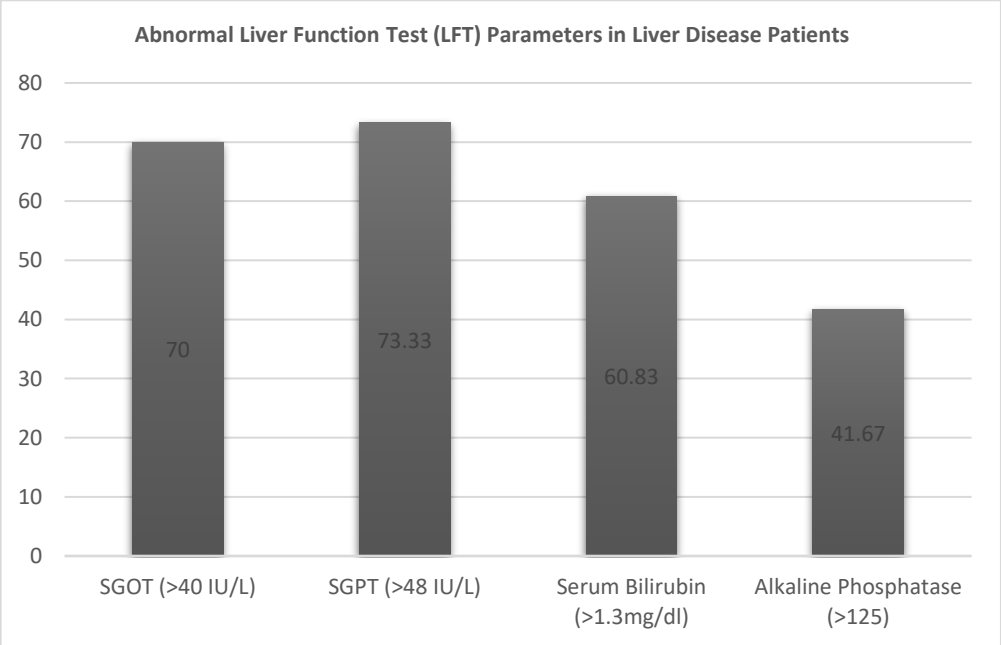
liver disease (47.06%), followed by other liver pathologies (46.67%). Like BT, the association between prolonged CT and liver pathology was not statistically significant ($p > 0.05$).

Figure 2: Distribution of Prolonged Clotting Time (CT) Among Liver Disease Patients



The abnormalities in Liver Function Tests (LFTs) are outlined in Figure 3. The most commonly deranged biochemical parameter was SGPT (>48 IU/L) in 88 patients (73.33%), followed by SGOT (>40 IU/L) in 84 patients (70%). Serum Bilirubin (>1.3 mg/dl) was elevated in 73 patients (60.83%), while Alkaline Phosphatase (>125 IU/L) was increased in 49 patients (41.67%).

Figure3 : Abnormal Liver Function Test (LFT) Parameters in Liver Disease Patients



Significant proportion of liver disease patients exhibited prolonged Bleeding Time and Clotting Time, with alcoholic liver disease showing the highest prevalence of coagulation abnormalities. However, statistical analysis did not reveal a significant association between liver pathology and

these coagulation parameters. The majority of patients had deranged Liver Function Tests (LFTs), particularly elevated SGPT and SGOT levels, suggesting widespread liver dysfunction in the study population.

Discussion

Our study findings align with existing literature that highlights significant coagulation abnormalities in liver disease patients. A recent study conducted at a tertiary care center found that 75% of liver disease patients had prolonged PT, while 39% exhibited prolonged APTT, indicating widespread coagulation dysfunction[9]. Our study similarly identified a high prevalence of prolonged BT and CT in liver disease patients, particularly among those with alcoholic liver disease and cirrhosis.

Another recent study found that PT, APTT, and BT were significantly prolonged in cirrhosis and hepatocellular carcinoma patients, reinforcing the notion that hepatic dysfunction directly impacts coagulation pathways[10]. This aligns with our results, where a higher percentage of patients with alcoholic liver disease and cirrhosis showed coagulation abnormalities compared to other liver pathologies.

A comparative study on liver disease patients also observed that 39 out of 45 patients had altered coagulation profiles, with significant prolongation of PT and APTT in advanced cirrhosis[11]. Our study further strengthens these findings by demonstrating a notable increase in BT and CT abnormalities across different liver disease subtypes, with alcoholic liver disease exhibiting the highest incidence.

Additionally, our study supports previous research indicating that coagulation abnormalities correlate with liver disease severity. A study evaluating 100 cases of chronic liver disease reported significant correlations between prolonged coagulation parameters and declining liver function[12]. This is consistent with our findings, where prolonged BT and CT were observed predominantly in patients with cirrhosis and alcoholic liver disease.

Our study highlights the significance of Bleeding Time and Clotting Time as valuable markers of coagulation dysfunction in liver disease. The findings reinforce previous research demonstrating that prolonged BT and CT are prevalent in cirrhosis and alcoholic liver disease patients and suggest the necessity of routine coagulation assessments for better management of bleeding risks. Future studies with larger sample sizes and advanced coagulation tests may provide further insights into the clinical implications of coagulation abnormalities in liver disease patients.

Conclusion

This study provides strong evidence of coagulation abnormalities in liver disease, particularly with respect to prolonged Bleeding Time (BT) and Clotting Time (CT). A significant proportion of patients, especially those with alcoholic liver disease and cirrhosis, exhibited abnormal coagulation profiles. The findings highlight the need for routine assessment of BT and CT in patients with liver disease to detect bleeding risks early and optimize clinical management. Despite the lack of statistically significant associations between liver disease subtypes and coagulation abnormalities, the trends observed underscore the necessity of individualized monitoring and treatment strategies. Future research with larger, multi-center studies and advanced coagulation tests will be instrumental in further elucidating the clinical implications of these abnormalities and refining treatment protocols for liver disease patients.

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