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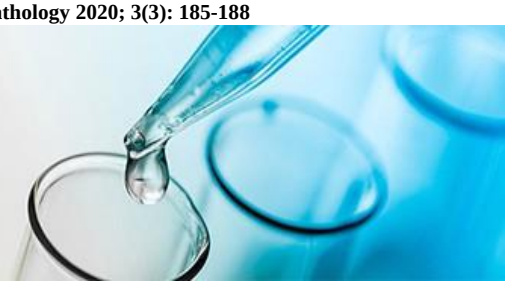

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# Coagulation profile in liver diseases: A study of 250 cases in a tertiary care hospital

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**Abstract**
**Introduction:** The liver is the cornerstone of the coagulation system. The physiology of blood coagulation is closely linked to liver function as it synthesizes most of the factors of coagulation cascade and fibrinolytic proteins. So it is responsible for regulation of haemostasis. Hepatic disorders are widely present in tropical countries and are responsible for morbidity and mortality.
**Aims and Objectives:** The objective of this study was to evaluate coagulation abnormalities associated with chronic liver diseases using tests like prothrombin time (PT), and activated partial thromboplastin time (APTT).
**Materials and Methods:** The study was conducted in the laboratory of Pathology department, during the period from October 2019 to June 2020. This study included 225 patients clinically diagnosed with liver disease who were divided into three categories: 1-cirrhosis, 2-other liver disease and 3-Hepatitis.The coagulation tests PT and APTT were performed and the results were evaluated in groups. 25 normal patients were taken as controls.
**Result:** Out of 250 patients, 190(85%) were males and 60(24%) were females. A total of 13(6%) patients were of cirrhosis, 100 (44%) were of viral hepatitis and jaundice, and 112 (50%) were of other liver diseases and 25 normal patients (10%). Prothrombin time showed marked significant prolongation in all liver diseases. In cirrhosis: 90-100% bleeders showed elevation of Prothrombin time and non bleeders showed elevation in 50-55% cases. In viral hepatitis: 45% cases showed rise in PT. In Alcoholic liver diseases; 38.5% cases showed rise in PT.
APTT is quite Significant in cirrhosis. In cirrhosis, Bleeders showed elevation of APTT in100% cases and non bleeders show 50% cases. In viral hepatitis, 25.3% rise in APTT in Alcoholic liver diseases, 25.9%cases showed rise in APTT.
**Conclusion:** In advancing liver diseases, damage to liver parenchyma resulting in reduced production of coagulation proteins so there is increase in PT and APTT which increase the risk of bleeding tendencies. Prolongation of PT and APTT in advancing liver cirrhosis indicates damage to the liver parenchyma resulting in decreased production of coagulation proteins with increased risk of bleeding tendencies, which can be detected before these ensue.

**Keywords:** Cirrhosis, viral hepatitis, obstructive jaundice, coagulation

## Introduction

The physiology of blood coagulation is closely linked to liver function as the liver synthesizes most of the factors of the coagulation cascade and fibrinolytic proteins. In addition, the liver is also involved in facilitating the clearance of activated clotting and fibrinolytic factors. It plays a predominant role in the regulation of haemostasis. Both cellular and plasmatic coagulation are defective, representing a hallmark of advanced liver disease [1]. Patients with liver disease are at a substantially increased risk of thrombosis and hemorrhage. Owing to the substantial overlap in the haemostatic abnormalities observed in the patients with acute infectious or toxic hepatitis, chronic hepatitis, and cirrhosis, the severity of hepatocellular dysfunction is typically more informative than the etiology. Prothrombin time (PT) and APTT correlates well with the severity of hepatocellular damage as well as with the occurrence of abnormal bleeding and the overall prognosis. Studies have shown that significant prolongation of PT and activated partial thromboplastin time (APTT) in the absence of significant hypofibrinogenemia suggests their importance as a reliable marker of coagulopathies in chronic liver disease patients [2].

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, noninvasive method of screening for the presence of liver dysfunction. Cirrhosis, which is an end stage of many liver diseases is known to be associated with a number of hematological complications, especially thrombocytopenia and coagulation disorders [3]. Chronic hepatitis, constitutes a major health problem and can be caused by different etiological agents. In chronic liver diseases, the levels of anticoagulant proteins like antithrombin III, protein S,protein C, and alpha-2 macroglobulin are reduced. Therefore, the coagulopathy pattern in liver disease isnot limited to being anticoagulation. Rather, this group of disorders resulting from cirrhosis of liver encompasses procoagulant as well as anticoagulation tendencies [4].
The objective of this study was to evaluate coagulation abnormalities with chronic liver diseases.

**Aims and Objectives**
1. To diagnose liver diseases by various coagulation tests.
2. In assessment of prognosis of patients of various liver disease.
3. To see the response of treatment for liver diseases

**Materials and Methods**
This study included 225 patients clinically diagnosed with liver disease attending medicine clinics and admitted in a tertiary care centre.
The patients were divided into three categories as:
1. Cirrhosis
2. Hepatitis
3. Other liver diseases (liver parenchymal disease, alcoholic liver diseases, liver abscess, chronic liver disease, jaundice).

**Inclusion criteria**
Primary criteria of inclusion was presence of liver diseases including cirrhosis, hepatitis, jaundice, liver abscess, alcoholic liver diseases and all other liver diseases. All patients of both sexes, age ranging from 30 to 70 years and irrespective of socioeconomic status, were included.

**Exclusion Criteria:** Patients with previous history of coagulation disorders or who took any of the following drugs in the previous week were excluded: aspirin or Nonsteroidal anti-inflammatory drugs, antihistaminics, penicillin, sulfonamides, beta blockers, and anticoagulants.

**Sample Collection and Procedure**
Blood samples were withdrawn by resident doctors/trained nursing staff in vaccutainer containing 3.2% sodium citrate as anticoagulant. Blood to anticoagulant ratio was9:1. Plasma was obtained following centrifugation of the anticoagulated blood at 3000 rpm for 20 minutes.
APTT – was performed by Tulip diagnostic kit and
PT – by Agappe diagnostic kit.

**Results and analysis**
This is a prospective study of coagulation profile in 225patients clinically diagnosed with liver diseases and 25 normal cases. Cases included were those of cirrhosis, viral hepatitis, jaundice and alcoholic liver disease.
The patients studied ranged from 30 to 70 years of age. Out of 250 patients, 190(76%) were males and 60(24%) were females. A total of 13(5.2%) patients were of cirrhosis, 100 (40%) were of viral hepatitis, and 112 (44.8%) were of other liver diseases and 25 normal patients (10%).

**Table 1:** Gender distribution

| | Males | Females | Total |
|---|---|---|---|
| No of cases | 190 | 60 | 250 |
| % of cases | 76% | 24% | 100% |

**Table 2:** Distribution of cases in different liver diseases

| | Normal patients | Other liver disease | Hepatitis | Cirrhosis |
|---|---|---|---|---|
| No of cases | 25 | 112 | 100 | 13 |
| Percentage % | 10% | 44.8% | 40% | 5.2% |

**Table 3:** Shows prothrombin time and activated partial thromboplastin time in patients with various liver diseases

| Test name | Normal Range | Normal cases | Other liver diseases | Hepatitis | cirrhosis |
|---|---|---|---|---|---|
| No of patients | 12-16 sec | 25 | 112 | 99 | 13 |
| | | | | | 7 bleeder |
| | | | | | 6nonbleeder |
| Prothrombin time | Range 12-16 sec | 25 | 69 | 54 | 6 |
| | High PT | | 43 | 45 | 7 |
| Activated partial thromboplastin time | Range-30-40 sec | 25 | 83 | 74 | 7 |
| | High APTT | | 29 | 25 | 6 |

**Table 4:** Shows % of Prothrombin time and Activated partial thromboplastin time in patients with various liver diseases

| Test name | Normal Range | Normal cases | Alcoholic liver diseses | hepatitis | Cirrhosis |
|---|---|---|---|---|---|
| cases | | 25 | 112 | 99 | 13 |
| PT | Range 12-16 sec | | 61.5% | 54.5% | 46.2% |
| | High PT | | 38.5% | 45.5% | 53.8% |
| APTT | Range-30-40 sec | | 25.9% | 25.3% | 53.8% |
| | HIGH APTT | | 74.1% | 74.7% | 46.2% |

## Discussion

The patients presented with complaints, such as jaundice, fever, anorexia, fatigue, weight loss, edema of limbs, abdominal pain, ascites and bleeding in some patients. Jaundice was the most common presenting complaint in hepatitis and cirrhosis. The patients with other liver diseases had fatigue as the commonest complaint.

Age and sex distribution are comparable with previous studies. The patients age ranged from 30 to 70 years. The maximum patients were in the age group ranging from 40 to 50 years. Thus, all the patients were above 30 years. Similar findings were observed by Bhatia *et al.* [1] and Shah and Jansari *et al.* [2] study. In the present study, male preponderance was observed in cases of liver diseases; similar findings were observed in other studies as by Tarun Kotadiya *et al.* [3] and Bhatia *et al.* [1]

225 patients of various liver diseases with various clinical manifestations were studied for coagulation abnormalities by doing coagulation tests like, Prothrombin time and Activated partial thromboplastin time. 25 normal individuals were included as controls.

The results obtained are tabulated and compared with those of previously published studies well-known workers in this field.

Various observations and results were taken and studies in table form.

**Table 5:** Comparison of prothrombin time in liver disease

| | Cirrhosis | | | Other liver diseases | | | Hepatitis | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Cases** | **prolong** | **%** | **Cases** | **prolong** | **%** | **Cases** | **prolong** | **%** |
| Tarun Kotadiya *et al.* [3] | 20(bleeder) | 19 | 95 | 20 | 16 | 80 | 40 | 30 | 75 |
| | 20(non bleeder) | 10 | 50 | | | | | | |
| Bhatia *et al.* [1] | 156 | 103 | 66 | 69 | 18 | 26 | 75 | 45 | 60 |
| Poonam Rastogi *et al.* [5] | 30 | 30 | 100 | | | | | | |
| D.S. Singh B. Dube *et al.* [6] | 40 | 40 | 100 | | | | | | |
| Aspsia Sdoultati *et al.* [7] | 34 | 34 | 100 | | | | | | |
| S. Gurdoy *et al.* [8] | 35 | 33 | 94 | | | | | | |
| Israel Spector Milton Cor *et al.* [9] | 50 | 50 | 100 | | | | | | |
| Present study | 7(bleeder) | 7 | 100 | 112 | 43 | 38.4 | 99 | 45 | 45.5 |
| | 6(non bleeder) | 5 | 90 | | | | | | |

**Table 6:** Comparison of Activated Partial Prothrombin time in liver diseases with other studies

| | Cirrhosis | | | Other liver diseases | | | Hepatitis | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Cases** | **high** | **%** | **Cases** | **high** | **%** | **Cases** | **high** | **%** |
| Tarun Kotadiya *et al.* [3] | 20(bleeder) | 16 | 80 | 20 | 11 | 55 | 40 | 9 | 22 |
| | 20(non bleeder) | 3 | 15 | | | | | | |
| Bhatiya *et al.* [1] | 156 | 74 | 49 | 69 | 18 | 26 | 75 | 26 | 34.6 |
| Poonam Rastogi *et al.* [5] | 18 | 14 | 77.7 | | | | | | |
| Israel Spector Milton Cor *et al.* [9] | 19 | 9 | 64 | | | | | | |
| Talat Naheed *et al.* [10] | 100 | 75 | 75 | | | | 90 | 36 | 40 |
| Present study | 7(bleeder) | 6 | 85 | 112 | 29 | 25.9 | 99 | 25 | 25.25 |
| | 6non bleeder | 3 | 50 | | | | | | |

The PT is the test widely accepted as a means to monitor patients having disorders of specific coagulation factors in the extrinsic and common pathway of coagulation.

Table 4 shows high PT in 38.5% cases of Alcoholic liver diseases, 45.5% cases of Hepatitis and 53.8% in cirrhosis patients; which is comparable with Tarun Kotadiya study [3].

Table 5 shows prolonged PT in all the bleeders of cirrhosis (100% cases). These values are quite comparable with study of Tarunkotadiya [3], Poonam Rastogi *et al.* [5], D S Singh *et al.* [6], and Aspia *et al.* [7]. In alcoholic hepatitis prolong PT is detected in 38.4% which is comparable with Bhatia *et al.* study [1] .In Hepatitis, prolong PT is detected in 45.5% cases which is also comparable with Bhatia *et al* study [1].

The APTT is the test for intrinsic coagulation pathway. It is especially sensitive for factors XII, IX, XI, XIII, and Platelet factor III adequacies.

Table 6 shows prolonged APTT in 25.9% cases of other liver diseases, 25.3% cases of Hepatitis, and 46.2% cases of Cirrhosis. Similar findings were seen in studies by Tarun Kotadiya[3] and Bhatia *et al.* [1].

**Table 7:** Available evidences regarding prolongation of PT in liver diseases

| Year | Author | Prolonged PT% |
|---|---|---|
| 1961 | Mandel and Lazerson [11] | 66.6 |
| 1962 | Hedenberg and Korsan-Bengtsen [12] | 20.6 |
| 1967 | Spector and Corn [9] | 70 |
| 1999 | Malik *et al.* [13] | 66 |
| 2014 | Shah and Jansari [2] | 52 |
| 2016 | Bhatia *et al.* [1] | 62 |
| 2020 | Present study | |

**Table 8:** Available evidences regarding prolongation of APTT in liver diseases

| Year | Author | Prolonged APTt% |
|---|---|---|
| 1962 | Hedenberg and Korsan-Bengtsen [12] | 19 |
| 1967 | Spector and Corn [9] | 47.5 |
| 2005 | Arif *et al* [14] | 77.5 |
| 2014 | Shah and Jansari [2] | 62 |
| 2016 | Bhatia *et al*. [1] | 39.3 |
| 2020 | Present study | |

## Conclusion

Study of coagulation profile can help in assessing hepatic cell function and detecting cellular injury. Prolongation of PT and APTT in advancing liver cirrhosis indicates a damage of liver parenchyma resulting in decreased production of coagulation proteins with increased risk of bleeding tendencies, which can be detected early, by the determination of PT and APTT levels.

P**rothrombin Time:** Prothrombin time shows marked significant prolongation in all liver diseases. In cirrhosis: 90-100% bleeders shows elevation of Prothrombin time and non bleeders show elevation in 50-55% cases. In viral hepatitis: 45% cases show rise in PT in Alcoholic liver diseases: 38.5% cases show rise in PT Activated Partial Thromboplastin Time: APTT is quite significant in cirrhosis.

In cirrhosis, Bleeders show elevation of APTT in100% cases and non bleeders show 50% cases.

In viral hepatitis, 25.3% rise in APTT

In Alcoholic liver diseases, 25.9%cases show rise in APTT.

## References


1. Gautam Bhatia *et al*. Coagulation Profile in Liver Diseases: A Study of 300 Cases in a Tertiary Care Hospital in Uttarakhand, India January 2017DOI: 10.5005/jp-journals- 10050-10077
2. Shah SN, Jansari T. Coagulation profi le in liver disease-a study of 100 cases. Gujarat M ed J 2014; 69(1):37-40.
3. Tarun P Kotadiya *et al*. A study of coagulation profile in diseases of liver: At tertiary care center hospital Indian Journal of Pathology and Oncology, January-March, 2019; 6(1):107-111
4. Devrajani BR, Ali Talpur MA, Atta-ur-Rahman A, Ali Shah SZ, Das T, Devrajani T. Coagulopathies in patients with liver cirrhosis. World A ppl Sci J. 2012; 17(1):01- 04.
5. Poonam Rastogi, Gupta SC, Dipti Bhishi. Coagulation studies in patients with Cirrhosis of Liver, Bleeder Vs. Non Bleeders. Indian J PatholMicrobiol33:4,323
6. Singh D, Dube B, Gupta P. Hepatic Cirrhosis in Varansi A. haemostaticapprosial JIMA 69:26-30.
7. Aspasia S Soultati, Dourkis SP. Predicating utility of a model for end stage liver disease in echologic liver disease. World J Gastroenterol. 2006; 12(25):4020-4025
8. Sebney Gurdey, Baskal M case records of coagulation defects in liver disease. Turk J Gastroenteral 2005; 16(3):129-133
9. Israelispector, Corn Milton. Lab, Test of hemostasis. The relationship to haemorrhage in liver disease. Arch Intern Med. 19:577-582
10. Talat Naweed, Nabeel, cirrhotic or Non Cirrhotic portalhypertension. Pak J Med. 2001; 17(3):133-141
11. Ratnoft OD. cook. Haemostasis mechanism of Liver disease. Medical Clinics of North America, 47-721. 11.Mandel EE, Lazerson Ja Thrombosthenia in liver disease N English J Med 1961; 265(2):56-61
12. Hedenberg L, Korsan-Bengsten K. Clotting tests and other tests of the hemostatic mechanism in cirrhosis of the liver and other diagnostic significance. Acta Med Scand 1962; 172(2):229-235
13. Malik AY, Amjad I, HaqSHayer A. Acquired coagulopathy in females suffering from acute and chronic liver diseases. Mother Child 1999; 37(4)119-226
14. Arif S. *et al*, A study of prothrombin time and activated partial thromboplastin time in the liver cirrhosis. JPostgrad Med Inst. 2005; 14(2):19-21.