



# CORRELATION OF COAGULATION PROFILE IN LIVER DISEASE PATIENTS IN A TERTIARY CARE HOSPITAL

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## ABSTRACT

**Objective:** To determine the coagulation abnormalities among liver disease patients admitted in a tertiary care hospital of Hind Institute of Medical Sciences, Barabanki, Uttar Pradesh (India) for a period of 1 year (January 2015 to December 2015).

**Methods:** Patients were labeled as liver disease patients on the basis of Liver Function Tests (LFT) done in the hospital at the time of admission. Patients blood were collected in sodium citrate and plain vaccutainer for coagulation tests [prothrombin time (PT), activated partial thromboplastin time (aPTT)] and liver function tests respectively. The prothrombin time ratio was calculated and then used to calculate the international normalized ratio. Following parameters were included in Liver Function Test, serum bilirubin, SGOT, SGPT, ALP, Total Protein and serum albumin.

**Results:** Total number of cases studied in a period of 1 year (January 2015 to December 2015) were 311. In 284(91.3%) cases both LFT and coagulation profile were done. In 261 (83.9%) cases (out of total 311 cases) coagulation tests were normal and in 50 (16.1%) cases coagulation tests were found to be deranged. Out of these 50 cases, PT was raised in 44(100%) cases, APTT was raised in 21(95.4%) cases and both PT and APTT were raised in 15(93.75%) cases.

**Conclusion:** Coagulation abnormalities were profound patients with chronic liver diseases. In case of acute liver disease, usually PT (Prothrombin Time) is increased, but aPTT (activated partial thromboplastin time) is found to be normal. aPTT (activated partial thromboplastin time) is usually increased in chronic liver diseases, but the PT (Prothrombin Time) prolongation is usually not seen in initial stages of chronic liver disease until the stage of liver fibrosis and cirrhosis is reached. Nevertheless, these parameters (PT and aPTT) were still widely used as prognostic markers in liver disease patients.

**Key Words:** Coagulation abnormalities, Chronic liver disease, PT, aPTT

## INTRODUCTION

Liver plays a major role in hemostasis, as most of the coagulation factors, anticoagulant proteins and components of the fibrinolytic system are synthesized here. Additionally, it acts as a reticuloendothelial system and regulates coagulation and fibrinolysis by removing these coagulation factors from the circulation. As the liver is a highly vascularized organ liver diseases can alter the abdominal blood flow and predispose patients to significant bleeding problems. Impaired haemostasis resulting from abnormal liver function has multifactorial etiology like impaired coagulation factor synthesis, synthesis of coagulation factors with altered function, increased consumption of coagulation factors and altered clearance of coagulation factors. Coagulation disorders

in liver disease are usually measured by the prolongation of global screening tests such as the prothrombin time (PT) and the activated partial thromboplastin time (aPTT)<sup>8</sup>. PT determines the time needed for the platelet-poor plasma to clot after the addition of tissue factor (thromboplastin) and calcium chloride. Whereas aPTT determines the time needed for the platelet-poor plasma to clot when mixed with a particulate or soluble activator of the contact coagulation factors (factor XII, pre-kallikrein and high-molecular-weight kininogen) and negatively charged phospholipids such as platelet substitutes<sup>9</sup>. PT determines vitamin K dependent extrinsic factors VII, X, II, V and fibrinogen. The aPTT measures the activities of intrinsic and common pathways of coagulation cascade most sensitive to factor VIII, IX, XI, XII and those of the contact system<sup>10</sup>.

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## MATERIALS AND METHODS

Patients were labeled as liver disease patients on the basis of Liver Function Tests (LFT) done in the hospital at the time of admission. Patients blood were collected in sodium citrate and plain vacutainer for coagulation tests [prothrombin time (PT), activated partial thromboplastin time (aPTT)] and liver function tests respectively. The prothrombin time ratio was calculated and then used to calculate the international normalized ratio. Following parameters were included in Liver Function Test, serum bilirubin, SGOT, SGPT, ALP, Total Protein and serum albumin.

## RESULTS

Total number of cases studied in a period of 1 year (January 2015 to December 2015) were 311. In 284 (91.3%) cases both LFT and coagulation profile were done (Table 1). Out of these 284 cases LFT was deranged in 83 (29.2%) cases and 201 (70.7%) cases LFT was found to be normal (Table 2). In 261 (83.9%) cases (out of total 311 cases) coagulation tests were normal and in 50 (16.1%) cases coagulation tests were found to be deranged (Table 3).

Our study was mainly focused on these 50 (16.1%) cases of deranged coagulation tests. We did LFT in these 50 cases of deranged coagulation tests and found that out of these 50 cases LFT was found to be deranged in 44 (88%) cases only. 6 (12%) cases in which LFT was found normal were of anti-coagulant medication.

Out of these 50 cases only PT was done in 28 (56%) cases, only APTT was done in 6 (12%) cases and in 16 (32%) cases both PT and APTT was done (Table 4).

Total number of cases in which PT was done were 44 and total number of cases in which APTT was done were 22 (Table 5).

PT was raised in 44 (100%) cases, APTT was raised in 21 (95.4%) cases and both PT and APTT were raised in 15 (93.75%) cases (Table 6).

**Table 1**

Total number of cases studied	311
No. of cases in which both LFT and Coagulation tests done	284 (91.3%)
No. of cases in which only Coagulation tests done	27 (8.7%)

**Table 2**

No. of cases in which both LFT and Coagulation tests done	Deranged LFT cases	Normal LFT cases
284	83 (29.2%)	201 (70.7%)

**Table 3**

Total no. of cases in which Coagulation tests were done	Deranged Coagulation tests cases	Normal Coagulation tests cases
311	50 (16.1%)	261 (83.9%)

**Table 4**

Total no. of cases with raised PT	28 + 16	44
Total no. of cases with raised APTT	6 + 15	21

**Table 5**

No. of cases with raised PT	44
No. of cases with raised APTT	21
No. of cases with raised PT and APTT	15

## DISCUSSION

Liver plays a major role in hemostasis, as it is the primary site for synthesis of most of the coagulation factors and various proteins involved in fibrinolytic pathway. These include vitamin K dependent coagulation factors (factor II, VII, IX, X, Protein C and Protein S), factor V, XIII, fibrinogen, antithrombin and plasminogen. All the Vitamin K dependent factors have glutamic residues at their amino terminal. These glutamic residues must be converted to gamma-carboxyglutamic acid residues, which then bind to calcium and lead to formation of activation complexes<sup>1</sup>.

Most of the patients with liver disease have coagulopathies<sup>1</sup>, resulting in imbalanced hemostasis. These changes lead to increase risk of bleeding as well as thrombosis. Coagulation tests are especially important in patients who are at bleeding and thrombotic risks such as gastrointestinal varices and vascular stasis.

PT is a measure of synthetic function of liver and is involved in most of the liver disease. It is used all over the world as a major therapeutic indicator regarding liver transplantation in acute liver failure and cirrhosis, or regarding steroid therapy in alcoholic hepatitis<sup>2,3,4</sup>. Various hepatic disorders, vitamin K deficiency, warfarin toxicity, and fibrinolysis may be associated with prolongation of PT<sup>5</sup>. In acute liver diseases, usually PT is increased, but the aPTT is normal and, but

in chronic liver disease, prolongation of PT is not seen initially until the stage of cirrhosis and the liver fibrosis reaches<sup>6</sup>. As the disease progresses both PT and aPTT levels are prolonged, but in compensated cirrhosis, high level of factor VIII may blunt the prolongation of aPTT<sup>7</sup>. This finding matches with our study, as in our study PT(44) was increased in more number of patients in comparison to aPTT(21) [TABLE-5]. In addition, in advanced liver disease there is a strict balance of the procoagulant.

## CONCLUSION

Coagulation abnormalities were profound patients with chronic liver diseases. . In acute liver diseases, usually PT is increased, but the aPTT is normal and, but in chronic liver disease, prolongation of PT is not seen initially until the stage of cirrhosis and the liver fibrosis. Nevertheless, these parameters (PT and aPTT) were still widely used as prognostic markers in liver disease patients.

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