International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Evaluation of PT and APTT in Type 2 Diabetes Mellitus Patients

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Abstract: ***Diabetes mellitus is a group of metabolic disorders in which a person has high blood sugar, either because the body does not produce enough insulin or because cells do not respond to the insulin that is produced. There is evidence to show that patients with diabetes mellitus have changed hematological parameters. Prolonged hyperglycemia in diabetes mellitus patients exposes red blood cells to high glucose concentrations, which glycates proteins implicated in clotting mechanisms such as fibrinogen, prothrombin, and hemoglobin. 30 Blood samples of each type 2 diabetic mellitus patients and non-diabetic patients were collected during this period and their prothrombin time and Activated partial thromboplastin time was analyzed. From the present study there was a significant elevation of PT and APTT in Type 2 diabetes mellitus patients when compared to non-diabetic patients.***

Keywords: Diabetes**,** FBS-Fasting Blood Sugar**,** PT-Prothrombin Time, APTT-Activated Partial Thromboplastin Time

1. Introduction

Diabetes mellitus is a prevalent endocrine disorder with several etiologies. It is typified by chronic hyperglycemia and the ensuing disturbances in the metabolism of carbs, lipids, and proteins. The characteristic symptoms of polydipsia (increased thirst), polyuria (frequent urination), and polyphagia (increased appetite) are brought on by excessive blood glucose. About 90% of diabetic people have non-insulin type II diabetes, whereas 10% have insulin dependency. Diabetes is a serious health issue [1].

There is evidence to suggest that patients with diabetes mellitus have changed hematological parameters. Persistent hyperglycemia exposes red blood cells (RBCs) to high glucose concentrations in patients with diabetes mellitus, which causes glycation of hemoglobin, prothrombin, fibrinogen, and other proteins involved in clotting mechanisms. The clotting cascade is not fully activated and functions as a result of the glycation. The availability of intrinsic and extrinsic coagulation proteins is reduced by glycosylation, which impacts the ability to clot [2].

Hematological indices such as prothrombin time (PT) and activated partial thromboplastin time (APTT) provide information about a patient's coagulation state. These elements, which can be categorized into three pathways: intrinsic, extrinsic, and common, together are crucial for stopping bleeding disorders. There are roughly twelve clotting factors in one unit of blood. These are blood-borne proteins that are dormant but can become active in response to injury to blood vessels or tissues. The process of turning liquid blood into a semisolid gel is called blood clotting. Fibrin, a protein, is the fiber (polymer) that forms clots. Fibrinogen is the inactive precursor that gives rise to fibrin monomers. Fibrinogen, often known as Factor I, is essential to blood viscosity. Vascular damage induction is linked to hyperfibrinogenemia, or an increased concentration of fibrinogen in patents with uncontrolled NIDDM [2], [3].

In the laboratory, measurement of PT, APTT, and fibrinogen concentration are the most commonly employed laboratory tests in patients with a suspected coagulopathy. Prothrombin time is a laboratory screening test used to detect disorders involving the activity of the factors I, II, V, VII, and X of the extrinsic and common pathways. Activated partial thromboplastin time is used to screen for abnormalities of the intrinsic and common clotting systems and to monitor the anticoagulant effect of circulating heparin. It measures the activities of factors I, II, V, VIII, IX–XI, and XII of the intrinsic and common pathways. These proteins undergo modifications that encourage the emergence of a hypercoagulable and pro-thrombotic state. Due to the increased chance of an occlusive thrombus within a cerebral or coronary artery, which can result in the development of an atherosclerotic lesion, this can increase the risk of cardiovascular disease. Therefore, in patients with diabetes mellitus, PT and APTT can be utilized to evaluate the risk of clotting problems. Even though coagulation diagnostic tests are becoming increasingly complex, PT and APTT are still crucial foundational tests in clinical laboratories. To conclude the purpose of the current study was to assess the PT and APTT in Diabetic and Non Diabetic subjects [1] - [5].

2. Method

This study was conducted in Department of Pathology, Total Sixty (60) Samples, 30 diabetic samples and 30 apparently healthy non diabetic controls were selected and blood samples taken and analysed. Type 1 diabetes mellitus, Patients with thromboembolism history, Patients who were pregnant or had just undergone surgery were not allowed to participate in the trial. Specimens for PT and APTT measurement were obtained by venipuncture and samples collected into a citrated anticoagulant tube in ratio 1:9 after a

12 hour fast. Semi-Automatic Erba ECL coagulation analyser is used for the determination of PT, APTT by using Uniplastin and Liquicelin-E and Tulip Calcium Chloride kit. The reference ranges for PT and APTT in our lab are 11–14 seconds and 22–37 seconds, respectively.

3. Result

3.1 Fasting blood glucose of cases and controls

Group	*Number*	*Mean* FBS (mg/dl)
Case group	30	217.73
Control group	30	73.56

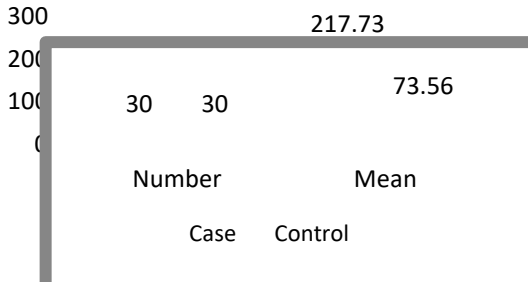

Figure 1: Fasting Blood Glucose of cases and controls

3.2 Mean Protrombin Time of Cases and Controls

Group	*Number*	*Mean* PT (Sec)
Case	30	17.78
Control	30	12.83

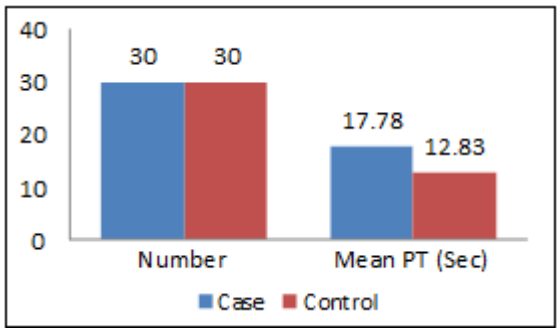

Figure 2: Mean PT of cases and controls

3.3 Mean APTT of Cases and Controls

Group	*Number*	*Mean* APTT (Sec)
Case	30	17.78
Control	30	12.83

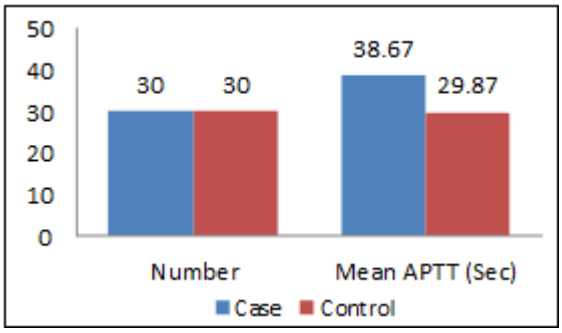

Figure 3: Mean APTT of cases and controls

4. Conclusion

This prospective study found that PT and APTT is an important factor in Diabetes Mellitus. In the present study, it was observed that the Mean level of prothrombin time in Type 2 diabetic patients was 17.78 and of control was 12.83 and the mean level of activated partial thromboplastin time in Type 2 diabetic patients was 38.67 and of control were 29.85. A significant difference was seen among cases and controls of PT and APTT. As a result, PT and APTT shortening in type II diabetic patients who are not receiving treatment may be a helpful marker for diabetic patients. In order to avoid hypercoagulation, it is crucial to monitor the PT and APTT in individuals with recent diabetes diagnosis.

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