A Comparative Study of Coagulation Time in Type 2 Diabetes Mellitus and Healthy Individuals

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ABSTRACT

Introdction: Complication of Type 2 diabetes mellitus (DM) includes coagulation impairment. Hypercoagulable state in patient with DM may prone thromboembolic risk for vascular disease. Study aimed to determine Activated Partial Thromboplastin Time and Prothrombin Time. in diabetes mellitus type II, for observing their coagubility condition.

Material and Methods: This study was conducted in the Department of Physiology, Rohilkhand Medical College, Bareilly. One hundred (100) male patients with type 2 diabetes mellitus aged 40-60 years and one hundred age, BMI matched normal subjects were included as control in this study. Prothrombin Time (PT), Activated Partial Thromboplastin Time (APTT) were estimated. For statistical analysis unpaired student't test was used.

Results: In this study PT and APTT were significantly (P<0.001) lower in diabetes mellitus than those of control group.

Conclusion: From this study, it may be close to that diabetic patients are accelerate to develop coagulation impairment.

Keywords: Clotting factors, coagulation time, hyperglycemia, Type 2 DM.

INTRODUCTION

Diabetes mellitus type 2 is a long term metabolic disorder. it is characterized by increase blood glucose levels and lack of insulin.[1] In worldwide approximately 80% of diabetic patients died in thrombosis. 70% of these deaths are by cause of cerebrovascular events, cardiovascular complications and peripheral vascular complications.[2,3] In abnormal diabetes Vascular endothelium is the primary defense against thrombosis, Endothelial abnormalities play role in the increased clotting factors and activation of platelets seen in diabetes. In severe diabetes Coagulation activation markers are elevated those are prothrombin activation fragment 1+2 and thrombin-anti-thrombin complexes. The plasma levels of several clotting factors containing kallikrein, von Willebrand fibrinogen and factors VII, VIII, XI, XII are elevated in diabetes. The level of the anticoagulant protein C (PC) is lower in severe diabetes.[4] The present study aim was to compare the coagulation tests in T2DM patients and healthy individuals.

MATERIAL AND METHODS

The present cross sectional study was carried out in the Department of Physiology and collaboration with biochemistry department at Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, after approval of institutional ethical committee. About 60 individuals samples were collected, which were thirty (30) diabetic type II males aged between 40-60 years suffering from diabetes for more than five years and remaining thirty (30) were age matched healthy individuals. A structured proforma was designed to estimate and record the personal data of chosen subjects regarding their name, age, sex, height and weight, personal history like drinking, smoking, any history of lung disease, history of persistent cough etc. Individuals with history of type 1 DM hypertension, allergy, cancer, cardiac dysfunction, autonomic dysfunctions and Anticoagulant therapy were excluded.

Sample collection and procedure

For collection of blood sample, it was chosen Antecubital vein. The tourniquet was tied 5cm above the elbow joint to restrict venous return. The skin was sterilized over the vein with a cotton swab. 5 ml of disposal syringe was inserted to anterior cubaital vein. The plunger was withdrawn and as the desired amount of blood was collected, the tourniquet was withdrawn. A swab was placed over the puncture site, and the needle was withdrawn. The swab was pressed to arrest the bleeding. The needle was removed carefully avoiding contamination of fingers. Collected samples from both the patients and controls transferred to clean container or a tube having 3.2% trisodium citrate.

Procedure

Immediately mixed the blood with anticoagulant avoiding foam formation. Centrifuge the sample for 15 min at approximately 3000 rpm and collect the plasma in separate tube. Fresh plasma is preferred for testing as it performs best when tested immediately. Sample may be tested within 2 hours at 25 to 30° C and within 3 hour at 2 to 8° C. Take hemostatic reagent into a test tube or reaction cuvette; add patient plasma into test tube or reaction cuvette. Incubate the test tube or cuvette containing plasma and reagent, PT and APTT were measured on coagulometer model. Our laboratory reference ranges of coagulation tests were; PT (11-16 seconds) and APTT (30 seconds).

STATISTICAL ANALYSIS

The data was statistically analyzed using the SPSS software (version 12.0) and by applying Student's t-test.

RESULTS

Table-1 shows the anthropometric parameters of cases and control groups. There was no significant difference in their age, weight, Height and BMI. Table 2 shows that comparison of coagulation parameters in Type 2 DM and Non Diabetics. There was significant difference was noted in APTT and PT showing a

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Anthropometric parameters	Cases (30) Mean ± SD	Control (30) Mean ± SD	P value
Age (yrs)	54.29±0.96	51±1.53	0.55
Weight (kg)	67.51±8.09	65.75±9.19	0.4
Height (m)	1.49±0.06	1.29±0.08	0.86
BMI (Kg/m2)	23.04±32.84	22.53±3.05	0.59

Table-1: Anthropometric parameters of Type 2 DM and control group

Parameters	Cases (30) Mean ± SD	Control (30) Mean ± SD	P value
APTT (sec)	27.81±1.49	30.36±1.29	<0.001
PT(sec)	10.35±0.32	12.58±0.38	<0.001

Table-2: Comparison of coagulation parameters on cases and controls

lower value in diabetics than controls ($p<0.05$)

DISCUSSION

The present study was conducted to compare coagulation tests among Type 2 Diabetic Mellitus and normal healthy individuals. Type II Diabetes Mellitus is characterized by heavy risk of atherothrombotic complications affecting the cerebral, coronary and peripheral arterial trees. PT is an indicator of defects extrinsic and common pathway while APTT indicates in intrinsic and common pathway. This may account for abnormalities in hemostasis. Platelet abnormalities and dysfunction in coagulation cascade can elevated atherogenesis in diabetic patients. Insulin resistance (IR) is a uniform finding in type 2 diabetes, as are abnormalities in the macrovascular and microvascular circulations.[5] Our study shows that decreased values APTT and PT in type II diabetic males. Similar findings were observed in Zhao et al.[6] and Acang and Jalil[7] observed decreased PT levels in T2DM individuals. There was significant difference was noted in APTT showing a lower value in diabetics than controls. Our results supported by Similar results were found in Chan et al.[8] In Type 2 DM fibrinogen levels increased, main function is fibrin clot formation and platelet aggregation.[9] fibrinolytc activity has decreased in Type 2 DM Patients due to due to increase values of plasminogen activator inhibitor -1, which decreased the formation of fibrinolytic plasmin from plasminogen[10] In patients with Type 2 DM, abnormalities in, platelets dysfunction, coagulation and decreased activity of fibrinolytic system can collectively enhance atherogenesis in diabetic patients.

CONCLUSION

The data shows that patients with type 2 diabetes mellitus had a hypercoagulable state and hypofibrinolysis, thereby signification that activation of coagulation with a decreased fibrinolytic activity may contribute to the more prone to vascular disease and cerebral vascular in type 2 diabetic patients

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