CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.2604589

Available online at: http://www.iajps.com *Research Article*

STUDY TO KNOW THE CORRELATION OF GLYCOSYLATED HAEMOGLOBIN AND CHANGES IN COAGULATION PROFILE IN PATIENTS OF DIABETES MELLITUS

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Article Received: January 2019 **Accepted:** February 2019 **Published:** March 2019

Abstract:

Objective: *The present study was designed to find out HbA1 levels and coagulation profile parameters like activated partial thromboplastin time (APTT), thrombin time (TT) and prothrombin time (PT) in diabetic patients.*

Study Design: *A Cross-Sectional Study.*

Place and Duration: *In the West medicine and Blood transfusion department of Mayo Hospital Lahore for One year duration from July 2017 to July 2018.*

Methods: *For this purpose 50 cases of noninsulin dependent diabetes mellitus (NIDDM) and 30 controls with equal male to female ratio were taken.*

Results: *The coagulation parameters (PT, APTT, TT) did not show significant difference with control. HbA1 levels were significantly raised in diabetic patients when compared with control group.*

Conclusion: *It is concluded that coagulation parameters have no association with diabetes melitus.*

Key words: *HBA1, coagulation parameters.*

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Please cite this article in press Jawariya Zia et al., ***Study to Know the Correlation of Glycosylated Haemoglobin and Changes in Coagulation Profile in Patients of Diabetes Mellitus.,*** *Indo Am. J. P. Sci, 2019; 06(03).*

INTRODUCTION:

Diabetes mellitus is a chronic disease of fat, protein and carbohydrate metabolism. The diabetes mellitus characteristic feature of is a deficient or defective insulin secretion response that results in the incomplete use of carbohydrates and the resulting hyperglycaemia[1-3]. The normal hemostasis of glucose is tightly regulated by three interrelated processes, glucose production in the liver, uptake by peripheral tissues, and insulin secretion by the pancreas. Most of the current clinical and experimental evidence suggests that the complications of diabetes mellitus, particularly hyperglycemia, are a result of metabolic disorders. b) altered microvascular haemodynamic and c) abnormal metabolism of polyol-inositol[4]. Non-enzymatic glycosylation of proteins results in the formation of "Schiff bases", which are the reversible products of glucose's early glycosylation with proteins. These early glycosylation products due to prolonged hyperglycemia are subjected to a series of slow chemical rearrangements to form the irreversible end products of advanced glycosylation[5]. These irreversible AGE products facilitate the cross-linking of saturated plasma proteins (eg, LDL and IgG) with the matrix, as well as the insoluble matrix components (collagen cross-linking peptides)[6]. These irreversible AGE products are responsible for vascular and nephrotic problems linked with diabetes mellitus in the long term. In some body tissues (nerves, kidneys, blood vessels and eye lenses) that do not need insulin for transport of glucose, hyperglycemia causes an increase in sorbitol (polyol) and fructose[7]. In turn, the increase in osmolarity causes the flow of water and the results of cellular osmotic lesions. Sorbitol accumulation is also associated with a decrease in the content of the metabolism of myoinositol, diacylglycerol, phosphoinositide, Na +, K + ATPase activity and protein kinase c. This pathway may contribute to ocular and neurological changes associated with diabetes mellitus. Diabetes mellitus has certain effects on antithrombin III activity and hyperglycemia-dependent glycosylated hemoglobin[8]. Hemoglobin Alc is produced by a synthetic glycosylation of hemoglobin A. Hemoglobin Alc reflects the control of blood glucose for a month or two (Fraser et al., 1979)[9]. The use of glycohemoglobin assays for routine diabetes care provides an objective measure of the risk of developing diabetic complications, and the result of this test may alert patients and doctors to the need for a change in treatment.

MATERIALS AND METHODS:

This Cross-Sectional Study was held in the West medicine and Blood transfusion department of Mayo Hospital Lahore for One year duration from July 2017 to July 2018.A total of eighty subjects were included in the study. They were divided into two groups. Fifty (50) non-insulin dependent diabetes mellitus group (NIDDM) in men and women were selected for the study. Group II consisted of thirty healthy subjects.

4.5 ml of blood was put into plastic test tubes containing 0.5 ml of 3.13 % aqueous trisodium citrate dehydrate salt (1:10 dilution). Immediately after mixing correctly, platelet poor plasma (PPP) was separated by centrifugation of blood at 4000 rpm for 15 minutes. Activated partial thromboplastin time (APTT), thrombintTime (TT) and prothrombin time (PT) was recorded within 2 hours of collection.

2. One ml of blood was added to a plastic test tube containing 1.5 mg of anhydrous dipotassium ethylenediaminetetraacetic acid (EDTA) salt. This example was used in the preparation of hemolysates for glycosylated hemoglobin (HbA1). This portion of the sample was stored at a temperature of 40 ° C for a maximum of eight days until analyzed.

RESULTS:

The detailed results of PT, APTT, TT and HBA1C are shown in Tables 1 to 4.

Table 1: Comparison of Prothrombin Time (PT) in patients with Diabetes Mellitus (Group I) and Control subjects (Group II)

PT (Sec)	Group I (Subjects with Diabetes Mellitus)	Group II (Control)
Mean ± SD	13.6 ± 1.85	12.8±1.06
Range	13 – 16	12.3–13.3
Total Subjects	50	30

Statistical Analysis: I Vs II p >0.05 (Non Significant)

Table 2: Comparison of Activated Partial Thromboplastin Time (APTT) in patients with Diabetes Mellitus (Group I) and Control subjects (Group II)

APTT (Sec)	Group I (Subjects with Diabetes Mellitus)	Group II (Control)
Mean ± SD	28.7 ± 3.4	28.01 ± 2.4
Range	23 – 36.9	23 – 32
Total Subjects	50	30

Statistical Analysis: I Vs II p >0.05 (Non Significant)

Table 3: Comparison of Thrombin Time (TT) in patients with Diabetes Mellitus (Group I) and Control subjects (Group II)

TT (Sec)	Group I (Subjects with Diabetes Mellitus)	Group II (Control)
Mean ± SD	15.1 ± 3.45	14.8±2.56
Range	5 – 19	7 – 17
Total Subjects	50	30

Statistical Analysis: I Vs II p >0.05 (Non Significant)

Table 4: Comparison of HbA1 in patients with Diabetes Mellitus (Group I) and Control subjects (Group II)

HbA_1 (%)	Group I (Subjects with Diabetes Mellitus)	Group II (Control)
Mean ± SD	10.13 ± 2.04	6.5 ± 0.751
Range	6.5 – 14.5	6.0. – 8.3
Total	50	30

Statistical Analysis: I Vs II p <0.05 (Significant)

DISCUSSION:

Prothrombin time (PT): Prothrombin time in various diabetes groups was compared with the control group. There was no significant difference between them. This finding was consistent with different studies. This test was originally thought to measure prothrombin, but is now known to be dependent on reactions with factors V, VII and X and also on the concentration of fibrinogen in plasma. Factor VII activity was less reported in diabetic patients and the results were insufficient. Fuller et al. (1979) reported higher mean factor VII concentrations in diabetic patients[10-11]. There are few reports on other clotting factors involved in the external pathway. Fuller et al. (1979) reported normal factor II concentrations in diabetic subjects, but reported high factor V concentrations alone in patients with retinopathy. The same study showed that insulin-dependent factor X concentrations were significantly higher in men with diabetes. There is general agreement that fibrinogen concentrations in diabetic patients are significantly increased compared to normal controls. Activated partial thromboplastin time: The difference in APTT between diabetics and control subjects was not significant[13]. These results were consistent with the results of Jones and Peterson (1981). This coagulation assay, such as PT, did not detect hypercoagulable diabetes, because it depends not only on contact factors and factors VII and IX, but also on reactions with factor V, X, prothrombin and fibrinogen. Thrombin time (TT): The difference in TT between diabetes and control was not significant and this finding was consistent with Jones and Peterson (1981)[14]. This coagulation assay performed as PT and APTT is insensitive to detect hypercoagulable status of diabetes mellitus. This test depends on the concentration reaction of fibrinogen. There is general agreement that fibrinogen concentrations in diabetic patients are significantly increased compared to normal controls. Glycohemoglobin (HbA1): HbA1 levels in diabetic patients (Group I) were compared with the control group (Group II)[15]. HbA1 levels were significantly increased in diabetic patients compared to the control group. This finding was consistent with the results of Brooks et al. (1983) and patrassi et al.

CONCLUSION:

It is concluded that coagulation parameters have no association with diabetes melitus.

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