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Comparative Study of Plasma Fibrinogen Level between Type II Diabetes Mellitus Patients and Normal Subjects

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Abstract

Background: Type II diabetes mellitus occurs due to deficient insulin production in the setting of insulin resistance. In India, more than 62 million people are diagnosed as having diabetes. The risk of developing coronary artery disease is 2-4 fold high in diabetics and this excess risk was not fully explained by classical risk factors like smoking, hypertension and dyslipidemia. In diabetes mellitus , elevated fibrinogen involved in all stages of atherogenesis and considered as an important cardiovascular risk factor.

Aim and objectives: To compare the plasma fibrinogen level between type II diabetics and healthy individuals. To correlate the plasma fibrinogen level with HbA1c value in type II diabetic patients.

Materials and methods: This is cross sectional type of study. 75 type II diabetic patients of age between 40-60 years taken as study group. 75 age and sex matched healthy individuals taken as control group. Study subjects were selected from the outpatient department, CMCH. Patients with history of systemic hypertension, smoking, infectious and inflammatory conditions were excluded from the study. Blood sample was taken and analysed for plasma fibrinogen and HbA1c by turbidimetric immunoassay method.

Results: Statistical analysis was done by using student 't'test and pearson correlation coefficient. In the present study, mean plasma fibrinogen level was significantly increased (p <0.0001) in diabetic patients (450.09 ± 50) when compared to control group (269.14 ± 54) . significantly increased plasma fibrinogen level was observed in diabetics with HbA1c of >7% (478.95±35) when compared to patients of HbA1c<7%(420.46±46) and also positively correlated with HbA1c value (r>0.5).

Conclusion: In the present study , Increased plasma fibrinogen level was observed in diabetic patients. It could be due to advanced glycation end products mediated endothelial injury, apoprotein - a and increased amount of glycosylated fibrinogen. This elevated plasma fibrinogen along with other blood clotting factors produce hypercoagulable state in diabetes mellitus. Increased plasma fibrinogen involved in all stages of atherogenesis, which results in formation of occlusive thrombus. So the measurement of plasma fibrinogen is considered as an important tool to assess cardiovascular risk in diabetic patients.

Keywords: diabetes, fibrinogen, HbA1c, cardiovascular risk factor

Introduction

Diabetes mellitus is a chronic disorder of metabolic derangements associated with hyperglycemia resulting from impaired action and/or reduced secretion of insulin [1]. It is rapidly achieving the potential epidemic status in India

with more than 62 million people are diagnosed as having diabetes. Increasing prevalence of diabetes is because of life style modifications like westernization of diet, and reduced physical activity [2]. The risk of developing coronary artery disease is 2-4 fold high in diabetics. The conventional risk factors responsible for cardiovascular diseases in diabetes are obesity, smoking, hypercholesterolemia, and hypertension, with the primary trigger being the hyperglycemia [1]. Fibrinogen is a soluble glycoprotein present in the plasma and designated as first clotting factor in the blood coagulation system[3]. Plasma fibrinogen level also correlated with risk factors like diabetes mellitus, hypertension, smoking, obesity and dyslipidemia [4] So this study has been done to evaluate the association between plasma fibrinogen level and type II diabetes mellitus .

Aims & Objectives:

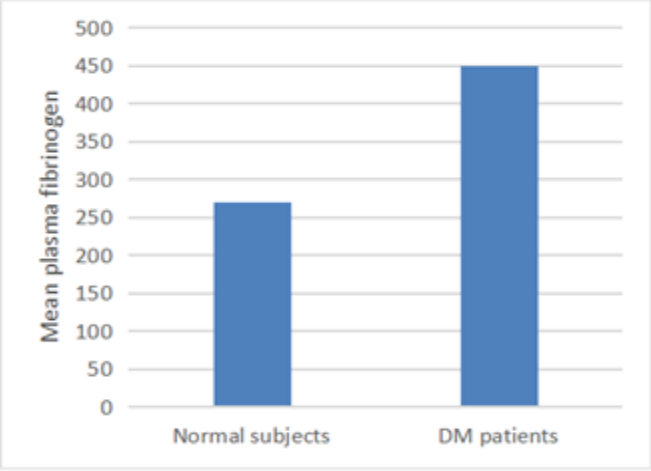
To study the level of plasma fibrinogen in type II diabetes mellitus patients and healthy individuals.To evaluate the association between plasma fibrinogen level and glycosylated haemoglobin in type II diabetes mellitus patients.

Materials And Methods:

Study group includes 75 Type II diabetic patients of both sexes in the age of 40-60 years . 75 Age and sex matched healthy individuals accompanying the patients taken as control group in the study.This is a cross-sectional study. It was carried out in the Coimbatore Medical College Hospital, Coimbatore.The study was conducted for the period of 1 year.Patients with history of type I diabetes mellitus Hypertension, Smoking,Obesity, Coagulation disorders, patients on anticoagulants were excluded from the study. Clearance from the institutional ethical committee was obtained. The subjects were explained about procedure in detail and informed consent was obtained.Thorough history taking and clinical examination was done.Median cubital vein in the front of forearm was selected for venous blood collection.After sterile puncture,4ml of blood was collected and poured into separate containers having different anticoagulants. 3.2% sodium citrate anticoagulant added blood was used for measuring plasma fibrinogen and random blood sugar. The anticoagulant EDTA (Ethelyne Diamine Tetra Acetic acid) mixed whole blood is used for measuring glycosylated haemoglobin (HbA1c).Plasma fibrinogen and HbA1c levels were measured by Turbidimetric immunoassay

Statistical Analysis & Results: Statistical analysis was done by student't' test and pearson correlation coefficient.Then the results were tabulated.In this study it was observed that,Mean plasma fibrinogen level was increased in study group when compared to control group. Among diabetic patients, patients with HbA1c>7% had high mean plasma fibrinogen than patients with HbA1c<7% and it was statistically significant.

Plasma fibrinogen(mgs%)	Normal subjects	DM patients
	269.14 ± 54	450.09±50



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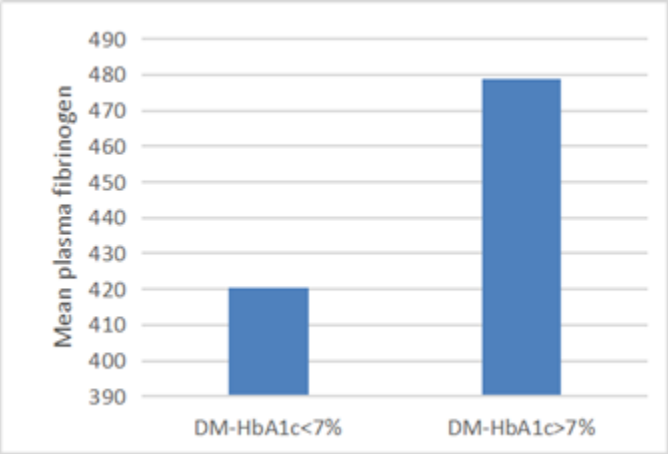
Plasma fibrinogen(mgs%)	DM patients(HbA1c<7%)	DM patients(HbA1c>7%)
	420.46±46	478.95±35



Discussion:

Diabetes mellitus is a global health problem and is expected to affect nearly 330 million people by the year 2030[5] . Cardiovascular diseases like myocardial infarction, angina are common complications of diabetes mellitus. These cardiovascular complications accounting for nearly 75% of death due to thrombosis in diabetes[6] . Altered hemostasis due to hypercoagulable state is implicated as an important risk factor responsible for cardiovascular complications in diabetes. Among the hemostatic factors, fibrinogen has been involved in the pathogenesis of atherosclerosis and considered as an independent risk factor for cardiovascular complications[7].

In the present study, 75 type II diabetes mellitus patients were taken as study group and 75 age and sex matched healthy individuals taken as control group. This study shows that, mean plasma fibrinogen level was significantly increased in the study group when compared to control group. These findings were consistent with the study results of Archana sachin bembde[8], Nizar M.abderurahman et al[9], Taj Muhammad khan et al[10], Ritu Madan et al[6], DR Kafle et al[3], Bruno G et al[10], Venkataramana. G et al[11]. Mean plasma fibrinogen level was increased in Patients with HbA1c > 7% (478.95±35) than in Patients with HbA1c <7% (420.46±46) and these results were statistically significant. These findings were consistent with Study results of DR Kafle and P Shrestha[3], Binayo sapkota et al[12], A.S.Bembde[8], Ogbera and Alfred[13], Nizar and Elshazali[9].Plasma fibrinogen is positively correlated with glycosylated haemoglobin (r>0.5). These findings were consistent with the study results of Ogbera and Alfred[13], Binayo sapkota et al[12], A.S.Bembde[8], Antonio ceriello et al[1].

Various mechanisms were put forward regarding increased plasma fibrinogen level in type II diabetes. The possible mechanisms are low grade chronic systemic inflammation present in type II diabetes is associated with increased synthesis of acute phase reactant proteins by the liver[14]. advanced glycation end products produced by the non enzymatic glycosylation of intracellular and extracellular proteins induced endothelial dysfunction which leads onto increased amount of clotting factors in the blood. Activation of coagulation pathway results in increased production of thrombin and fibrin degradation products, which in turn enhances fibrinogen production by the liver [6]. This increased plasma fibrinogen involved in all stages of atherogenesis and formation of occlusive thrombus in the blood vessels.

Conclusion: In this study , increased plasma fibrinogen level was observed in diabetic patients. It could be due to insulin deficiency associated metabolic stress, advanced glycation end products mediated endothelial injury, chronic systemic

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inflammation, Apoprotein - a present in LP(a) molecule and increased amount of glycosylated fibrinogen.This elevated plasma fibrinogen along with other blood clotting factors produce hypercoagulable state in diabetes mellitus. Increased plasma fibrinogen involved in all stages of atherogenesis and considered as an independent cardiovascular risk factor. Because of having excess risk of cardiovascular complications, measurement of plasma fibrinogen should be considered as an important tool to assess cardiovascular risk in diabetic patients.

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