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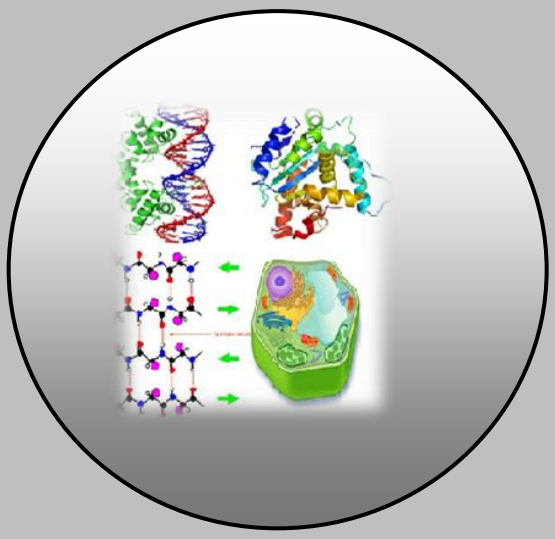

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Post-prandial Hyperglycemia and impaired Fibrinolytic activity in Non Insulin Dependent *Diabetes mellitus* (NIDDM)

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ABSTRACT

In the present study, 50 patients of non-insulin-dependent diabetes mellitus (NIDDM) of age group 30 to 70 years, along with 50 age matched normal healthy controls were investigated for fasting blood sugar (FBS), post-prandial blood sugar (PPBS), plasma fibrinogen and plasminogen activator inhibitor-1 (PAI-1).
All parameters were significantly elevated in diabetes when compared to controls (p<0.001). A significant correlations of PPBS fibrinogen (r=0.28, p<0.05) and PAI-1 activity (r=0.29, p<0.05) was noted in these patients while no significant correlation was found with FBS. These findings suggest that the post-prandial hyperglycemia is associated with decrease fibrinolytic activity and hypercoagulability in NIDDM.
Keywords – Post-prandial hyperglycemia, Hypercoagulability, Fibrinolytic activity and PAI-1.

INTRODUCTION

Non-insulin-dependent diabetes mellitus (NIDDM) is the most common metabolic disorder characterized by hyperglycemia and glycosuria (Jayakumari et al. 2002). Vascular disease in NIDDM is a common problem and mortality due to atherombotic disorders is 4-5 times more common in patients with diabetes mellitus than normal age matched populations and 80% patients with diabetes die a thrombotic death (Carr, 2000).

NIDDM patients are often diagnosed with vascular disease at the same time as hyperglycemia is clinically recognized. Thus, the pathogens of metabolic and vascular disease in NIDDM is insidious probably long before the diagnosis of diabetes (Haller, 1997).

One of the major finding in NIDDM is alteration in fibrinolytic system. Euglobin clot lysis time or whole blood clot lysis time which is a global test of fibrinolysis may be normal or prolonged suggesting deficient fibrinolysis in NIDDM (Cohen, 1989, Almer, 1975) Post-prandial hyperglycemia is well recognized risk factor for the development of vascular complications in NIDDM. Research has suggested that post-prandial hyperglycemia may contribute to hypercoagulability and impaired fibrinolytic activity in patients with NIDDM (Shah and Joshi, 2001) Clinical studies have also shown an association of elevated plasma PAI-1 activity and increased plasma fibrinogen levels in patients with NIDDM in post-prandial state (Festa et al, 1999 and Deepa et al., 2002). The study was aimed to find out the association of post-prandial hyperglycemain with plasma fibrinogen and PAI-1 activity which may contribute to hypercoagulability and impaired fibrinolytic in NIDDM.

MATERIAL AND METHODS

The study was conducted in the department of Biochemistry at G.R. Medical College and J.A. Group of Hospitals, Gwalior (M.P.). The controls consisted of 50 normal healthy persons of age group 30-70 years and cases comprised of 50 NIDDM patients of same age group.

All cases were diagnosed by history and clinical evaluation by physician and all the samples were analysed in the post-prandial state (after 2 hours OGTT). The fasting blood sugar was estimated after a 12 hours overnight fast to confirm diabetes. The estimation of FBS and PPBS was done by glucose oxidase method (Hackett, 1998). Plasma fibrinogen was estimated by lempert's method (Lempert, 1988) and plasma PAI-1 activity was measured by a commercial kit method (Diagnostica Stago, Seine France.) during study all ethical norms are kept in mind. Writte constent of the subjects were also taken before starting study. The data were analysed by using software Microsoft Excel. Significance of values was calculated by student's "t" test (independent "t" test). The Pearson's correlation coefficient test was performed to determine the correlation among risk factors.

RESULTS

The biochemical characteristics of the study groups in post-prandial state are shown in table 1. All parameters, i.e. FBS (5.08$\pm$0.64), PPBS (10.39$\pm$0.93), plasma fibrinogen (3.16$\pm$0.42) and PAI-1 activity (10.67$\pm$0.80) were found significantly higher ($p<0.001$) in diabetic patients when compared to controls. Pearson's correlation coefficient was established to find out the association among risk factors (table 2).

A strong correlation of PPBS with plasma fibrinogen ($r=0.29$, $p<0.05$) was noted, while no significant correlation was found with FBS.

DISCUSSION

Non-insulin-dependent diabetes mellitus is generally considered a hypercoagulable state attributable to enhanced coagulation and impaired fibrinolysis as wee as platelet hyperaggregability and endothelial dysfunction.

In people with type-II diabetes, a primary defect is the loss of early insulin secretion, ultimately resulting post-prandial hyperglycemia and mealtime glucose spikes, which have been referred to as the new hidden threat in diabetes. Research has also indicates that in contrast to asymptomatic fasting hyperglycemia, asymptomatic glucose spikes are an independent and progressive risk factor for morbidity and mortality from cardiovascular and cerebrovascular disease (Haniffer, 1988).

The results of the resent study show an association of post-prandial hyperglycemia with increased plasma PAI-1 activity. In the post-prandial state, an acute rise in blood sugar favors non enzymatic glycation of plasminogen and makes the molecule less suspectable to activation by tissue plasminogen activator. Under these conditions endothelial cells show an increased secretion of tissue plasminogen activator and a far greater increase in PAI-1, the major inhibitory protein for fibrinolysis leading to a net depression of fibrinolytic activity (Geiger and Berinder, 1988).

Plasma fibrinogen is also reported to be an independent risk factor for myocardial infarction and CAD mortality in NIDDM (Geiger and Berinder, 1988). Due to strong association of fibrinogen with blood viscosity and thrombus formation, circulating levels of fibrinogen has been known to have a strong and consistent relationship with CHD (both with and without diabetes) (Swahn et al., 1989). In the present study plasma fibrinogen was also found elevated in patients with NIDDM. A significant correlation between plasma fibrinogen and PPBS was also observed. This suggests that plasma fibrinogen is an independent risk factor which seems to confer strongest risk for cardiovascular disease followed by PAI-1 activity.

Therefore it is concluded that the post-prandial hyperglycemia is always associated with hypercoagulability and impaired fibrinolytic activity in NIDDM which may contribute to the development of vascular disease.

Table 1. Showing the biochemical characteristics of study groups in post-prandial state.

Parameters	Normal healthy controls (n=50)	NIDDM patients (n=50)
FBS (mmo1/1)	4.24±0.42	5.08±0.64***
PPBS (mmo1/1)	6.09±0.46	10.39±0.93***
Plasma Fibrinogen (grms/1)	2.38±0.24	3.16±0.42***
PAI-1 activity (IU/ml)	6.65+0.38	10.67±0.80***

Table-2. Showing the correlation among risk factors in post-prandial state (n=50).

Variables	PPBS	Fibrinogen	PAI-1
FBS	0.18	0.21	0.22
PPBS	-	0.28*	0.29*
Fibrinogen	-	-	0.2

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