Original Research Article

A Study of Correlation of Postprandial Lipid Profile with Carotid Intima Media Thickness in Type-II Diabetes Mellitus

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ABSTRACT

Objectives: Study of Correlation Of Postprandial Lipid Profile With Carotid Intima Media Thickness In Type-II Diabetes Mellitus.

Material and Methods: 30 type-2 diabetic patients and 30 healthy non diabetic control subjects will be taken from indoor wards of medicine department. American Diabetes Association Guidelines will be followed to diagnose diabetes episode of cerebrovascular diseases or intracranial space-occupying lesions were excluded. The collected data were analyzed using appropriate statistical test between the variables.

Results: The mean Carotid Intima Media Thickness (CIMT) value were found to be raised in diabetic (1.00+-.489) as compared to healthy subjects (.43+-.02) signifying that Type-2 DM is associated with raised CIMT values. Raised CIMT (>0.8mm) was found in 14(46.7%) in diabetic patients as compared to 3(10%) in healthy.

Conclusion: Carotid Intima Medial Thickness which is a marker of atherosclerosis and predictor of unfavourable cerebrovascular events which are important cause of morbidity and mortality, is raised in Type-2 DM patients especially those having abnormal fasting and postprandial dyslipidemia, .

Keywords: T2DM, Postprandial, carotid intima thickness

INTRODUCTION

Diabetes mellitus comprises a group of common disorder that share the phenotype of hyperglycemic. Depending on the etiology of diabetes mellitus, factor contributing to hyperglycemia may include reduced insulin secretion, decreased glucose metabolism, and increased glucose production.[1] Based on etiopathogenic categories, it is classified as Type-1 and Type-2 diabetes mellitus. In Type-1 there is absolute deficiency of insulin secretion. In Type-2 there is a combination of resistance to insulin action and inadequate compensatory insulin secretory response. Diabetes mellitus is accompanied by wide spread biochemical, morphological and functional abnormalities which may precipitate certain complications that affect the renal, cardio-vascular, neural systems and also skin, liver, collagen and elastic fibers. Thus, diabetes is a multisystem disorder that affects many organs of the body.[2]

It is well-established that dyslipidemia is a major risk factor for macrovascular complications in patients with type-2 diabetes mellitus (T2DM) and affects 10%-73% of this population.[3-7] Approximately, 80% of deaths in patients with diabetes are attributable to cardiovascular disease (CVD). Asian

Indians have higher risk of CHD than whites.[8]

In the WHO multinational study, the single risk factor that correlated most closely with the occurrence of Coronary artery disease in diabetics was serum TG concentration. In a Finnish 7- year prospective study, high triglyceride levels (>203 mg/dl) were associated with a 2-fold increase in risk for Coronary artery disease events.[9]

So to investigate the role of postprandial lipid profile in hypertriglyceridemia in early atherosclerosis there is a need to correlate between postprandial triglyceride levels and carotid intima media thickness value.

AIMS AND OBJECTIVES OF THE STUDY

- To study the postprandial lipid profile levels in patients with type-II diabetes.
- To study the carotid intima media thickness by Doppler ultrasonography.
- To correlate postprandial lipid profile levels and carotid intima media thickness.

MATERIALS & METHODOLOGY

The study will be conducted at MMIMSR Mullana Ambala. Thirty type-2 diabetic patients and 30 healthy non diabetic control subjects will be taken from indoor wards of medicine department. American Diabetes Association Guidelines will be followed to diagnose diabetes

American Diabetes Association Guidelines:

- A1C>6.5%. The test should be performed in a laboratory using a method that is National Glycohaemo-globin Standardized Program (NGSP) certified and standardized to the Diabetes Control And Complication Trial (DCCT) assay.
- FPG >126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.
- Two-hour plasma glucose>200 mg/dL (11.1 mmol/L) during an Oral Glucose Tolerance Test (OGTT). The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.
- In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose >200 mg/dL (11.1 mmol/L).

INCLUSION CRITERIA:

- As describe above.

EXCLUSION CRETERIA:

- TYPE 1 DM patients
- Those with history of inherited disorders of lipid metabolism (lipoprotein lipase deficiency, familial apolipoprotein C-II deficiency, familial hypercholesterolemia, familial defective apoB-100)
- Liver disease
- Hypothyroidism
- Cushing syndrome
- Nephrotic syndrome
- H/O Smoking or Alcohol
- H/O taking drugs that affect lipid metabolism like lipid lowering drugs, estrogens(OCP),thiazides, Glucocorticoids , beta blockers etc.

RESULT

- The mean Carotid Intima Media Thickness (CIMT) value were found to be raised in diabetic(1.00+-.489) as compared to healthy subjects(.43+-.02) signifying that Type-2 DM is associated with raised CIMT values. Raised CIMT (>0.8mm) was found in 14(46.7%) in diabetic patients as compared to 3(10%) in healthy.
- On further studying raised CIMT levels(>0.8mm) were found in 3(16.7%), 9(90%), 2(100%) of diabetic patients having postprandial cholesterol levels <200, 200-250, >250 respectively signifying that high postprandial cholesterol levels are positivley associated with raised CIMT.

- On further studying raised CIMT levels (>0.8mm) were found in 11(78.6%), 3(18.8%) of diabetic patients having postprandial HDL-C levels <40, 40-60 respectively signifying that postprandial HDL-C levels are negatively associated with raised CIMT.
- On further studying raised CIMT levels(>0.8mm) were found in 4(28.6%), 9(60%), 1(100%) of diabetic patients having postprandial LDL-C levels <100, 100-160, >160 respectively signifying that high postprandial LCL-C levels are positively associated with raised CIMT.
- On further studying raised CIMT levels (>0.8mm) were found in 1(16.7%), 13(81.2%) of diabetic patients having postprandial triglyceride levels 150-199, >250 respectively signifying that high postprandial triglyceride levels are strongly and positively associated with raised CIMT.

DISCUSSION

This cross sectional interventional study was conducted in Department of Medicine, MMIMSR Mullana Ambala, which is a tertiary care hospital situated in Ambala and catering to Nursing Homes and Hospitals of the region as well as patients from whole of Ambala and areas around Ambala. A total of 30 diabetic patients who fulfil the inclusion and exclusion criterion and who reported to the Department of Medicine, MMIMSR Mullana Ambala, were included in the study. Thirty healthy non diabetic control subjects were taken from indoor wards of medicine department. Written informed consent was obtained from the patients enrolled in the study and they were followed up. Diagnosis was done on the basis of ECG, Urine examination, Ultrasonography of Common carotid artery, chest radiography and clinical signs/ symptoms as per the applicable and widely accepted protocols.

Table 1: Mean age of Study Participants

Statistics Indicator	Age In Yrs
Mean	48.13
Std. Deviation	9.39
Range	40
Minimum	30
Maximum	70

- In our study mean age of sample population was 48.13 years with standard deviation of 9.39 years. The minimum age of the study participants was 30 years where as the maximum age of the patients was 70 years. The range of the age for study participants was 40 years.

Table 2: Distribution of study participants according to Gender

Sex	N	%
Male	32	53.3
Female	28	46.7
Total	60	100.0

- Thirty two (53.3%) among participants were males compared to 28 (46.7%) study participants were females.

Table 3: Distribution of study participants into cases and controls

Type of study participants	Frequency	Percent
Diabetic Patients	30	50.0
Healthy Adults	30	50.0
Total	60	100.0

- Thirty diabetics were there as well as thirty non diabetic healthy controls were among study participants.

Table 4: Mean value of PPBS among diabetics and healthy controls

Blood Sugar Parameters	Type of patient	N	Mean	Std. Deviation	Std. Error Mean	P value
Post prandial blood sugar	Diabetic Patients	30	273.73	35.402	6.464	.856
	Healthy Adults	30	187.13	32.863	6.000	

- The mean post prandial blood sugar of diabetic patients was 273.7±6.5 mg/dl whereas the mean post prandial blood sugar of healthy adults was 187.13l. This difference was found statistically non significant (p value<0.05)

Table 5. Correlation of Post Prandial Lipid Profile in Type-2 Diabetes Mellitus and healthy with CIMT.

Post Prandial Biochemical Parameter	Statistic	Carotid Intimal-Medial Thickness	
		Diabetic Patients	Healthy Adults
Post prandial Cholesterol	Pearson Correlation	.741**	.031
	Sig. (2-tailed)	.000	.872
Post prandial HDL	Pearson Correlation	-.176	.031
	Sig. (2-tailed)	.353	.872
Post prandial LDL	Pearson Correlation	.624**	.031
	Sig. (2-tailed)	.000	.872
Post prandial VLDL	Pearson Correlation	.587**	.041
	Sig. (2-tailed)	.000	.832
Post prandial triglycerides	Pearson Correlation	.588**	.031
	Sig. (2-tailed)	.000	..872

Table-5 correlates between post prandial cholesterol and CIMT for diabetic patients was found positive and statistically significant (r=0.741, p value<0.05) whereas the correlation between post prandial cholesterol and CIMT for healthy controls was found positive but non-significant(r=-0.31, p value=0.872)

The correlation between post prandial HDL and CIMT for diabetic patients was found negative and statistically significant (r=-0.176, p value=0.353) whereas the correlation between post prandial HDL and CIMT for healthy controls was found positive and non significant(r=0.31, p value=0.872)

The correlation between post prandial LDL and CIMT for diabetic patients was found positive and statistically significant (r=0.624, p value<0.05) whereas the correlation between post prandial LDL and CIMT for healthy controls was found and non significant(r=0.31, p value=0.872)

The correlation between post prandial VLDL and CIMT for diabetic patients was found positive and statistically significant (r=0.587, p value<0.05) whereas the correlation between post prandial VLDL and CIMT for healthy controls was found positive and non significant(r=0.41, p value=0.872)

The correlation between post prandial post prandial triglyceride and CIMT for diabetic patients was found positive and statistically significant (r=0.588, p value<0.05) whereas the correlation between post prandial triglyceride and CIMT for healthy controls was found positive and non significant (r=0.31, p value=0.872)

- **CORRELATION OF POST PRANDIAL LIPID PROFILE IN TYPE 2 DM**

Table6. Distribution of study participants according to CIMT grade

Type of patients	Carotid Intimal-Medial Thickness	
	<.8	>.8
DIABETIC	16(53.3%)	14(46.7%)
HEALTHY	27(90%)	3(10%)

This clearly shows that occurrence of diabetes was associated with high chances of having raised CMT values.

CONCLUSION

Carotid Intima Medial Thickness which is a marker of atherosclerosis and predictor of unfavourable cerebrovascular events which are important cause of morbidity and mortality, is raised in Type-2 DM patients especially those having abnormal fasting and postprandial dyslipidemia,

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