Original Research Article

A comparative study on the fasting and post prandial lipid levels as a cardiovascular risk factor in patients with type 2 diabetes mellitus

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Abstract

Background: Diabetes mellitus is a major independent risk factor for cardiovascular disease (CVD). Excess abdominal fat, assessed by measurement of waist to hip ratio, is independently associated with a higher risk for cardiovascular disease.

Aim and objectives: To study the fasting and post prandial lipid levels in patients with type 2 diabetes mellitus and to assess the significance of post prandial dyslipidemia with respect to fasting dyslipidemia as cardiovascular risk factor in these patients.

Materials and methods: The study was conducted on 100 patients from General Medicine ward and Diabetology OPD of Government Rajaji Hospital, Madurai, and 100 age and sex matched healthy subjects as controls during the period of March 2016 To August 2016. Subjects believed to fulfil all eligibility criteria, and none of the exclusion criteria were included in the study. A predesigned proforma was used to collect the demographic and clinical details of the patients and the controls. By Clinical examination abdominal obesity was measured by waist hip ratio WHR>.90 in men and WHR>.80 in women were taken as having significant cardiovascular risk. Laboratory investigations fasting Blood Sugar, 2hr Post Prandial Blood sugar, fasting lipid profile and 6 hours post prandial were done. Comparison of various parameters were done and significance assessed by Student t test. One way ANOVA, Pearson Correlation and Chi square test and P value of < 0.05 was taken as significant.

Results: Among the 100 cases of Type 2 Diabetes mellitus, by taking value of WHR 0.90 for males and 0.8 for females, the cardiovascular risk was assessed. 96 had cardiovascular risk (50 male, 46 females). By comparing with the standard reference values of the lipid profile out of the 100 diabetic subjects 53 had fasting dyslipidemia (29 males, 24 females) and 64 had post prandial dyslipidemia (23 males , 41 females). We observed a significant increase in both fasting as well as postprandial blood glucose levels in the Type 2 Diabetic subjects, as compared to those of their respective controls. Also, the postprandial blood glucose level was significantly increased as compared to that in the fasting state in the Type 2 Diabetic subjects but the HDL-cholesterol level was not significantly decreased in fasting as well as postprandial state in the Type 2 DM patients as compared to that of control subjects in our study.

Conclusion: Persistent postprandial hypertriglyceridemia may result in a proatherogenic environment leading to atherosclerosis and macrovascular disease in type 2 diabetes subjects. LDL oxidation in the postprandial state seems to be affected by an acute increase in glycemia. Thus, oxidative modification of LDL may contribute to higher CVD risk among diabetic patients, and elevated levels of TG may contribute to the rapid LDL oxidation seen in Type 2 DM. Hence, it is important and beneficial to estimate the postprandial lipid profile, in addition to the fasting lipid profile, in the cardiovascular risk assessment in the patients with Type 2 DM.

Key words

Fasting and post prandial lipid levels, Cardiovascular risk factor, Type 2 diabetes mellitus.

Introduction

Diabetes mellitus is a major independent risk factor for cardiovascular disease (CVD). Excess abdominal fat, assessed by measurement of waist to hip ratio, is independently associated with a higher risk for cardiovascular disease [1]. The high cardiovascular mortality which is associated with Type 2 DM is due to a prolonged, exaggerated, postprandial state [2]. The abnormal lipid profile in the postprandial state is more significant than the abnormal lipid profile in the fasting state in causing atherosclerotic complications in Type 2 diabetes.

Materials and methods

Study Population

The study was conducted in Government Rajaji Hospital, Madurai during a period of March 2016 to August 2016. The aim of the study was to study the fasting and post prandial lipid levels in patients with type 2 diabetes mellitus and to assess the significance of post prandial dyslipidemia with respect to fasting dyslipidemia as cardiovascular risk factor in these patients. This study comprised of 100 patients in study group and 100 healthy subjects in control group.

Inclusion criteria

All patients with diabetes mellitus diagnosed according to World Health Organization (WHO) criteria

- Onset of diabetes after 30 years
- Duration more than or equal to 5 years in General Medicine wards and attending Diabetology OPD of Government Rajaji Hospital, Madurai.

Exclusion criteria

Patients with

- History of lipid disorder
- History of hypertension
- History or electrocardiography (ECG) evidence of CAD
- History of heart failure
- History of renal dysfunction
- History of liver disease
- History of stroke
- History of GI surgery
- History or features of hypothyroidism,
- History of drug intake affecting lipid metabolism.

Design of study

Prospective Analytical Study

Statistical analysis

Master chart was prepared with all the information collected about the selected cases .with the help of computer Data analysis was done by using SPSS software and Sigma Stat 3.5 version (2012). Using this software, percentage, mean, standard deviation and `p' value were calculated through Student 't' test, One way ANOVA, Pearson Correlation and Chi square test and P value of < 0.05 was taken as significant.

Results

The study population for type 2 Diabetes mellitus consisted of 100 patients (53 males and 47 females) and the control group consisted of 100 subjects (53 males and 47 females).

Type 2 diabetes cases were in the age group of 36-75 years. 24% of the cases were in the age group of 36-45 years, 38%to age group 46-55 years, and 37% to the age group 56-65 years. 1% was between 66-75years.

The average blood glucose levels of fasting and post prandial in the diabetic subjects were 168.94 mg/dl and 237.15 mg/dl respectively. In control population the average were 92.19 and 116.94 mg/dl respectively.

Among the 100 cases of Type2 Diabetes mellitus, 96 had cardiovascular risk. Of these 96 cases, 50 were male patients and 46 were females. By taking value of WHR 0.90 for males and 0.8.for females, the cardiovascular risk was assessed in control population among 100 people 71 had cardiovascular risk with 32 being males and 39 being females.

The fasting lipid profile was measured for the study and control population, the average values of the fasting levels for the study group were TC of 212.77 mg/dl, TG of 156 mg/dl, LDL of 132.07 mg/dl and HDL of 43.18 mg/dl, For the control population the values were TC of 153.32 mg/dl, TG of 115.31 mg/dl, LDL of 89.2 mg/dl, HDL of 47.9 mg/dl.

The postprandial lipid profile for the study and control population was done, the average values for the study group were TC of 236.33 mg/dl, TG of 176.87 mg/dl, LDL of 165.84 mg/dl and HDL of 41.93 mg/dl, For the control population the values were TC of 185.47 mg/dl, TG of 161.26 mg/dl, LDL of 122.23 mg/dl, HDL of 41.6 mg/dl.

By comparing with the standard reference values of the lipid profile out of the 100 diabetic subjects 53 had fasting dyslipidemia out of which 29 were males and 24 were females. Out of the control subjects 21 had dyslipidemia out of which 10 were males and 11 females. By comparing with the standard reference values of the lipid profile out of the 100 diabetic subjects 64 had post prandial dyslipidemia out of which 23 were males and 41 were females. Out of the control subjects 43 had dyslipidemia out of which 29 were males and 14 were females (**Table – 1, Figure – 1**).

Discussion

In this study the fasting and post prandial lipid levels in patients with type 2 diabetes mellitus was compared and the significance of post prandial dyslipidemia with respect to fasting dyslipidemia as cardiovascular risk factor in these patients was assessed [3].

Among the 100 cases of Type 2 Diabetes mellitus, by taking value of WHR 0.90 for males and 0.8 for females, the cardiovascular risk was assessed. 96 had cardiovascular risk. Of these 96 cases, 50 were male patients and 46 were females. In control population among 100 people 71 had cardiovascular risk with 32 being males and 39 being females. We observed that the waist to hip ratios of the diabetic males and females were found to be statistically significant (p<0.05) as compared to those of their respective controls.

Table – 1: Comparison of postprandial dyslipidemia in type2 diabetic patients and controls.

	case		Control	
	Male	Female	Male	Female
Dyslipidemia	23	41	29	14
No dyslipidemia	30	6	24	22

Figure – 1: Cardiovascular risk in type2 diabetic patients and controls.
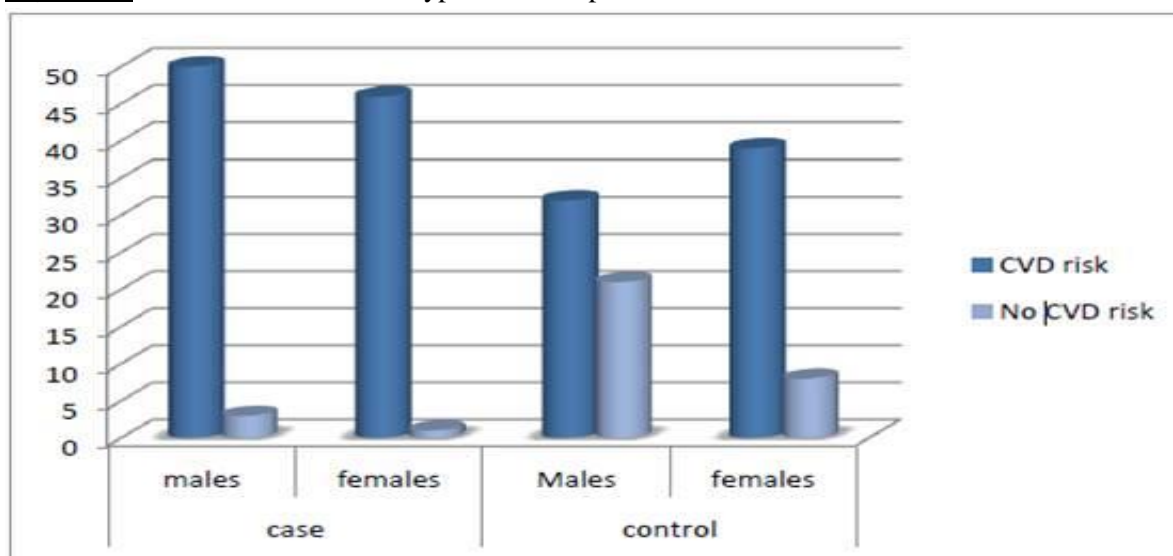
Fasting and post prandial average blood glucose levels were 168.94 mg/dl and 237.15 mg/dl respectively in the diabetic subjects. In control population the average fasting blood glucose was 92.19 mg/dl and postprandial blood glucose was 116.94 mg/dl [4]. In this study, we observed a significant increase in both fasting as well as postprandial blood glucose levels in the Type 2 Diabetic subjects, as compared to those of their respective controls. Also, the postprandial blood glucose level was significantly increased (p<.05) as compared to that in the fasting state in the Type 2 Diabetic subjects.

The fasting lipid profile was measured for the study and control population, the average values of the fasting levels for the study group were TC of 212.77 mg/dl, TG of 156 mg/dl, LDL of 132.07 mg/dl and HDL of 43.18 mg/dl, For the control population the values were TC of 153.32 mg/dl, TG of 115.31 mg/dl, LDL of 89.2 mg/dl, HDL of 47.9 mg/dl.

We observed a significant increase in the serum total cholesterol (TC), triglycerides (TGs), the LDL-cholesterol levels in the fasting state in the Type 2 DM patients as compared to those in the control subjects (p<0.001). The HDL-cholesterol level was significantly decreased in the fasting state in the Type 2 DM patients as compared to that in the control subjects (p<0.001) [5].

The postprandial lipid profile for the study and control population was done. The average values for the study group were TC of 236.33 mg/dl, TG of 176.87 mg/dl, LDL of 165.84 mg/dl and HDL of 41.93 mg/dl. For the control population the values were TC of 185.47 mg/dl, TG of 161.26

mg/dl, LDL of 122.23 mg/dl, HDL of 41.6 mg/dl.

We observed a significant postprandial state increase in the serum total cholesterol (TC), triglycerides (TGs) and the LDL-cholesterol levels in the Type 2 DM patients as compared to those in the control subjects (p<0.001). But the HDL-cholesterol level was not significantly decreased in the postprandial state in the Type 2 DM patients as compared to that in the control subjects (p=0.770).

We observed a significant increase in the serum total cholesterol (TC), triglycerides (TGs), the LDL-cholesterol levels in the postprandial state in the Type 2 DM patients as compared to their serum levels in the fasting state (p<0.001) but in our study the HDL-cholesterol level was not significantly decreased in the postprandial state as compared to that in the fasting state in the Type 2 DM patients (p=.314) [6].

Conclusion

Atherosclerosis is a postprandial phenomenon with respect to lipids, as we are in the postprandial phase for most of the day, with an additional adverse effect of the meal induced hyperglycaemia. The present study suggests that it is important to routinely estimate the postprandial lipid profile, in addition to the fasting lipid parameters, in the cardiovascular risk assessment in Type 2 DM. Thus, by rectifying the abnormal postprandial lipid parameters early in the course of diabetes, we can prevent the hazardous complications which are associated with Type 2 DM, the most common one being atherosclerotic coronary artery disease.

References

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