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Assessment of fasting and postprandial lipid profile in diabetic patients and healthy individuals

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Abstract

Background: Type II diabetes mellitus (DM) is characterized by insulin resistance such as glucose intolerance, dyslipidemia, and hypertension, and results in an increased predisposition to atherosclerotic vascular disease. The present study was conducted to evaluate fasting and postprandial lipid profile in diabetic patients.

Materials & Methods: We put 80 type II diabetes patients in group I and 80 healthy subjects in group II. Parameters such as HbA1c, FBS, PBS, total cholesterol (TC), triglycerides (TG), high density lipoprotein-cholesterol (HDL-C), very-low-density lipoprotein cholesterol (VLDL) and low-density lipoprotein cholesterol (LDL) were determined.

Results: Group I had 35 males and 45 females and group II had 40 males and 40 females. The mean VLDL was 35.3 mg/dl and 29.6 mg/dl, LDL was 174.4 mg/dl and 82.2 mg/dl, TG was 180.2 mg/dl and 154.3 mg/dl, TC was 210.8 mg/dl and 172.4 mg/dl, HDL-C was 46.2 mg/dl and 56.2 mg/dl, PBS was 142.2 mg/dl and 130.4 mg/dl and HbA1c was 9.2% and 4.6% in group I and II respectively. The difference was significant ($p < 0.05$).

Conclusion: Postprandial lipid profile had higher values as compared to fasting lipid profile among type 2 DM patients.

Keywords: Diabetes mellitus, lipid profile, LDL

Introduction

Type II diabetes mellitus (DM) is characterized by insulin resistance such as glucose intolerance, dyslipidemia, and hypertension, and results in an increased predisposition to atherosclerotic vascular disease. The increased prevalence of cardiovascular disability in type II DM is believed to be because of a prolonged and exaggerated postprandial dysmetabolism, most notably hyperglycemia and hypertriglyceridemia, which induce endothelial dysfunction and oxidative stress. Thus, postprandial dyslipidemia is as significant as fasting dyslipidemia in causing atherosclerotic complications in type 2 DM [2]. Diabetic dyslipidemia is thought to be a vital factor contributing to an increased cardiovascular risk in type II DM. However, postprandial hypertriglyceridemia in spite of normal fasting triglyceride (TG) levels may independently contribute to early atherosclerosis in type 2 DM [3]. Diabetic dyslipidemia includes quantitative as well as qualitative and kinetic lipoprotein derangements, all of which contribute to accelerated atherosclerosis. The notable quantitative abnormalities are increased TG and decreased high density lipoprotein (HDL) levels [4]. Postprandial evaluation of TG and TG/HDL suggested deranged lipid abnormalities in diabetes. However, its estimation could not distinguish the prediabetes from healthy individuals [5]. As glycaemia has an impact on the lipid abnormalities and cardiovascular disease, an attempt was taken up to compare the FLP and PPLP within each of the individual groups. Postprandially, after normal food intake, TG was increased significantly in healthy individuals, prediabetes, and diabetes [6]. The present study was conducted to evaluate fasting and postprandial lipid profile in diabetic patients.

Materials & Methods

The present study consisted of 80 type II diabetes patients of both genders. A written consent was obtained from patients.

Data such as name, age, gender etc. was recorded. We put type II diabetes patients in group I and healthy subjects in group II. Parameters such as HbA1c, FBS, PBS, total cholesterol (TC), triglycerides (TG), high density lipoprotein- cholesterol (HDL-C), very-low-density lipoprotein cholesterol (VLDL) and low-density lipoprotein cholesterol (LDL) were determined. Data thus obtained were subjected to statistical analysis. P value <0.05 was considered significant.

Results

Table 1: Distribution of patients

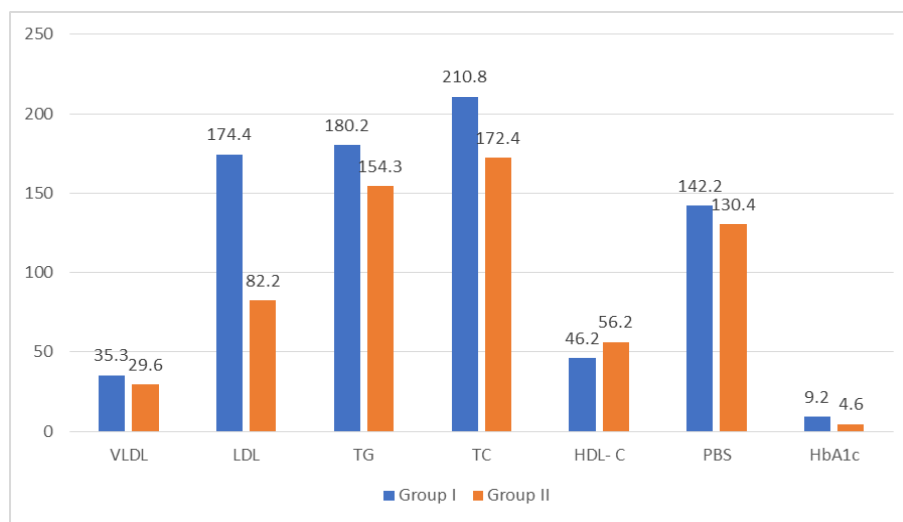
Groups	Group I	Group II
M:F	35:45	40:40

Table 1 shows that group I had 35 males and 45 females and group II had 40 males and 40 females.

Table 2: Comparison of parameters

Parameters	Group I	Group II	P value
VLDL	35.3	29.6	0.05
LDL	174.4	82.2	0.01
TG	180.2	154.3	0.04
TC	210.8	172.4	0.05
HDL- C	46.2	56.2	0.02
PBS	142.2	130.4	0.05
HbA1c	9.2	4.6	0.01

Table 2, graph 1 shows that mean VLDL was 35.3 mg/dl and 29.6 mg/dl, LDL was 174.4 mg/dl and 82.2 mg/dl, TG was 180.2 mg/dl and 154.3 mg/dl, TC was 210.8 mg/dl and 172.4 mg/dl, HDL- C was 46.2 mg/dl and 56.2 mg/dl, PBS was 142.2 mg/dl and 130.4 mg/dl and HbA1c was 9.2% and 4.6% in group I and II respectively. The difference was significant ($p < 0.05$).

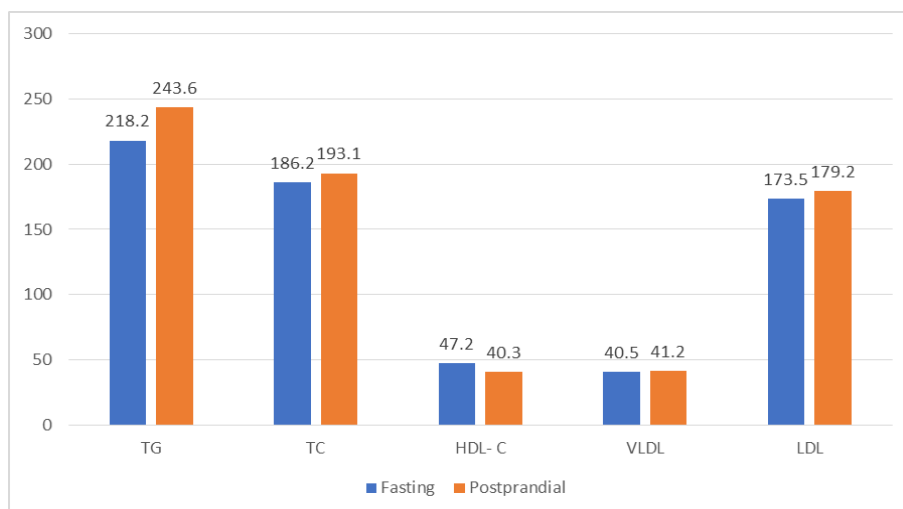


Graph 1: Comparison of parameters

Table 3: Fasting and postprandial lipid profile

Parameters	Fasting	Postprandial	P value
TG	218.2	243.6	0.04
TC	186.2	193.1	0.91
HDL- C	47.2	40.3	0.03
VLDL	40.5	41.2	0.82
LDL	173.5	179.2	0.90

Table 3, graph 2 shows that mean fasting and postprandial TG value was 218.2 and 243.6, TC was 186.2 and 193.1, HDL- C was 47.2 and 40.3, VLDL was 40.5 and 41.2 and LDL was 173.5 and 179.2 respectively. The difference was significant ($p < 0.05$).



Graph 2: Fasting and postprandial lipid profile

Discussion

Diabetes mellitus (DM) referred as a group of metabolic disorders characterized by high blood sugar levels over an extended period [7]. Hyperglycemia occurs due to increase in high blood sugar levels by a deficiency in insulin action or secretion or both [8]. It may lead to disturbances in the metabolism of Lipid, carbohydrates, and protein [9]. Worldwide, among DM the prevalence of type 2 or non-insulin dependent diabetes mellitus (NIDDM) increasing significantly in South Asian population, especially in developing country like India [10]. The present study was conducted to evaluate fasting and postprandial lipid profile in diabetic patients.

We found that group I had 35 males and 45 females and group II had 40 males and 40 females. Raghavendra *et al.* [11] evaluated dyslipidemia in 100 type 2 DM patients and 100 controls. The fasting and postprandial lipid profile significantly altered in individuals with type 2 diabetes when compared with controls. The postprandial lipid parameters significantly increased in the type 2 DM subjects as compared to the fasting lipid parameters, and the postprandial HDL level significantly decreased as compared to the fasting HDL level.

We observed that mean VLDL was 35.3 mg/dl and 29.6 mg/dl, LDL was 174.4 mg/dl and 82.2 mg/dl, TG was 180.2 mg/dl and 154.3 mg/dl, TC was 210.8 mg/dl and 172.4 mg/dl, HDL- C was 46.2 mg/dl and 56.2 mg/dl, PBS was 142.2 mg/dl and 130.4 mg/dl and HbA1c was 9.2% and 4.6% in group I and II respectively. Chahal *et al.* [12] compared the fasting and postprandial lipid profiles 50 type 2 diabetic patients and 50 healthy age- and gender-matched controls. Fasting and postprandial lipid levels were estimated in all the subjects and compared. Mean total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL), and very low density lipoprotein (VLDL) levels were significantly higher and high density lipoprotein (HDL) level was significantly lower in the diabetics in comparison to the controls in both fasting (200.82, 172.59, 126.20, 37.63, and 40.74 mg/dL in diabetics versus 179.90, 98.03, 109.54, 19.60, and 50.46 mg/dL in controls) and postprandial states (223.75, 232.99, 139.19, 46.52, and 40.54 mg/dL in diabetics versus 185.36, 102.20, 110.36, 20.24, and 48.96 mg/dL in controls). The mean postprandial TC and TG levels (223.75, 232.99 mg/dL) in diabetics were significantly higher when compared to their fasting values (200.82, 172.59 mg/dL) in these patients.

We found that mean fasting and postprandial TG value was 218.2 and 243.6, TC was 186.2 and 193.1, HDL- C was 47.2 and 40.3, VLDL was 40.5 and 41.2 and LDL was 173.5 and 179.2 respectively. Suryabhan L *et al.* [13] showed that asymptomatic and symptomatic macrovascular diseases are linked with postprandial hypertriglyceridemia among type 2 DM patients. Oxidative stress and postprandial dysmetabolism related to the insulin resistance. Therefore, it increases the prevalence of cardiovascular disease among type 2 DM. Prolonged and exaggerated postprandial lipid profile linked with mortality and morbidity of CVD.

Chakraborty *et al.* [14] evaluated fasting and postprandial blood lipid parameters and atherogenic lipid ratios for cardiovascular risk assessment, in prediabetes and diabetes. Postprandially, triglycerides (TG) was increased significantly in diabetes compared to controls and prediabetics. Among the lipid ratios, triglyceride/high density lipoprotein (TG/HDLc) was significantly increased

postprandially in diabetes compared to controls ($P < 0.05$). A comparative analysis of fasting and postprandial parameters within each group showed a significant increase in postprandial TG/HDLc compared to the fasting state in prediabetes and diabetes. Postprandial TG and TG/HDLc showed a stronger correlation with HbA1c compared to fasting TG and TG/HDLc. The prevalence of dyslipidemia and insulin resistance was higher in postprandial state than the fasting state in prediabetes and diabetes.

Conclusion

Authors found that postprandial lipid profile had higher values as compared to fasting lipid profile among type 2 DM patients.

Conflict of Interest

Not available

Financial Support

Not available

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