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ORIGINAL RESEARCH

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

[1]Dr. Rahul Ranjan, [2]Dr. Ashutosh Kumar, [3]Dr.(Prof) Vijay Achari, [4]Dr. Danish Kabir, [5]Dr. Om Prakash

[1,2]Senior Resident, [3]Professor and HOD, [4,5]Post Graduate, Department of General Medicine, Patna Medical College and Hospital, Patna, Bihar India

Corresponding author
Dr. Ashutosh Kumar
Senior Resident, Department of General Medicine, Patna Medical College and Hospital, Patna, Bihar India

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ABSTRACT

Background: Type 2 diabetes mellitus (DM) is defined by insulin resistance, a condition that encompasses glucose intolerance, dyslipidemia, and hypertension, leading to a heightened risk of atherosclerotic vascular disease.Hence; the present study was conducted for the comparison of fasting and postprandial lipid profile in diabetic patients and healthy individuals. **Material and methods:** This study was conducted for the comparison of fasting and postprandial lipid profile in diabetic patients and healthy individuals. The study comprised of total 100 individuals. The subjects had been informed about the procedure and were asked for informed consent. The subjects had been divided into two groups of 50 individuals each. Group 1 comprised of healthy individuals. Group 2 comprised of diabetic individuals. The fasting and postprandial lipid profile was assessed for the individuals of both the groups and the findings had been tabulated. statistical analysis was conducted using SPPSS software. **Results:** In this study, there were 47 females and 53 males. In group 1, there were 50 healthy subjects and in the second group there were 50 diabetic individuals.Fasting total cholesterol in controls was 189.90±12.10 mg/dl and in diabetic subjects was 202.72±51.73 mg/dl.Fasting triglycerides in controls was 97.03±11.67mg/dl and in diabetic subjects was 192.49±81.13mg/dl.Fasting HDL Cholesterol in controls was 51.46±10.47mg/dl and in diabetic subjects was 40.54±11.34 mg/dl.Fasting LDL cholesterol in controls was 106.24±11.11mg/dl and in diabetic subjects was 116.20±28.73mg/dl.Fasting total cholesterol in controls was 18.60±4.13mg/dl and in diabetic subjects was 35.61±16.75mg/dl.Postprandial total cholesterol in controls and cases were 182.36±12.43 mg/dl and 223.72±29.40 mg/dl, respectively.Postprandial triglycerides in controls and cases were 103.20±9.51mg/dl and 233.99±93.67mg/dl, respectively.Postprandial HDL Cholesterol in controls and cases were 48.76±8.63mg/dl and 41.44±12.24mg/dl, respectively.Postprandial LDL cholesterol in controls and cases were 110.16±15.13mg/dl and 138.17±30.80mg/dl, respectively.Postprandial VLDL cholesterol in controls and cases were 21.23±1.90mg/dl and 46.42±27.07mg/dl, respectively. **Conclusion:** DMis characterized by insulin resistance, which is associated with several health issues such as glucose intolerance, hypertension, dyslipidaemia, a procoagulant state, and an increased likelihood of developing both microvascular and macrovascular complications.This study indicates that assessing the postprandial lipid profile is equally crucial as evaluating the fasting lipid profile in type 2 diabetes.

Keywords: Diabetes, Lipid profile, Fasting, Postprandial

INTRODUCTION

Type 2 diabetes mellitus (DM) is defined by insulin resistance, a condition that encompasses glucose intolerance, dyslipidemia, and hypertension, leading to a heightened risk of atherosclerotic vascular disease.[1] The elevated incidence of cardiovascular complications in individuals with type 2 DM is thought to stem from prolonged and exaggerated postprandial dysmetabolism, particularly characterized by hyperglycemia and hypertriglyceridemia, which promote endothelial dysfunction and oxidative stress.[2] Consequently, postprandial dyslipidemia is considered equally important as fasting dyslipidemia in the development of atherosclerotic complications associated with type 2 DM.[3]Diabetic dyslipidemia is regarded as a crucial element that heightens cardiovascular risk in type 2 DM. Notably, postprandial hypertriglyceridemia, even in the presence of normal fasting triglyceride levels, may independently facilitate the onset of early atherosclerosis in this population. Diabetic dyslipidemia encompasses not only quantitative alterations but also qualitative and kinetic changes in lipoproteins, all of which contribute to the

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acceleration of atherosclerosis.[4]Hence; the present study was conducted for the comparison of fasting and postprandial lipid profile in diabetic patients and healthy individuals.

MATERIAL AND METHODS

This study was conducted for the comparison of fasting and postprandial lipid profile in diabetic patients and healthy individuals. The study comprised of total 100 individuals. The subjects had been informed about the procedure and were asked for informed consent. The subjects had been divided into two groups of 50 individuals each. Group 1 comprised of healthy individuals. Group 2 comprised of diabetic individuals. The fasting and postprandial lipid profile was assessed for the individuals of both the groups and the findings had been tabulated. statistical analysis was conducted using SPPSS software.

RESULTS

Table 1: Group-wise distribution of subjects.

Groups	Number of subjects	Percentage
Group 1 (Control)	50	50
Group 2 (Diabetic)	50	50
Total	100	100

In group 1, there were 50 healthy subjects and in the second group there were 50 diabetic individuals.

Table 2: Fasting lipid profile of subjects of both groups.

Parameters	Controls (n=50)	Diabetics (n=50)	p-value
Fasting total cholesterol (mg/dl)	189.90±12.10	202.72±51.73	0.048*
Fasting triglycerides (mg/dl)	97.03±11.67	192.49±81.13	0.002*
Fasting HDL Cholesterol (mg/dl)	51.46±10.47	40.54±11.34	0.007*
Fasting LDL cholesterol (mg/dl)	106.24±11.11	116.20±28.73	0.003*
Fasting VLDL cholesterol (mg/dl)	18.60±4.13	35.61±16.75	0.008*

*: Significant

Fasting total cholesterol in controls was 189.90±12.10 mg/dl and in diabetic subjects was 202.72±51.73 mg/dl.Fasting triglycerides in controls was 97.03±11.67mg/dl and in diabetic subjects was 192.49±81.13mg/dl.Fasting HDL Cholesterol in controls was 51.46±10.47mg/dl and in diabetic subjects was 40.54±11.34 mg/dl.Fasting LDL cholesterol in controls was 106.24±11.11mg/dl and in diabetic subjects was 116.20±28.73mg/dl.Fasting total cholesterol in controls was 18.60±4.13mg/dl and in diabetic subjects was 35.61±16.75mg/dl.

Table 3: Postprandial lipid profile of subjects of both groups.

Parameters	Controls (n=50)	Diabetics (n=50)	p-value
Postprandialtotal cholesterol (mg/dl)	182.36±12.43	223.72±29.40	0.000*
Postprandialtriglycerides (mg/dl)	103.20±9.51	233.99±93.67	0.007*
PostprandialHDL Cholesterol (mg/dl)	48.76±8.63	41.44±12.24	0.003*
PostprandialLDL cholesterol (mg/dl)	110.16±15.13	138.17±30.80	0.001*
PostprandialVLDL cholesterol (mg/dl)	21.23±1.90	46.42±27.07	0.000*

*: Significant

Postprandial total cholesterol in controls and cases were 182.36±12.43 mg/dl and 223.72±29.40 mg/dl, respectively. Postprandial triglycerides in controls and cases were 103.20±9.51mg/dl and 233.99±93.67mg/dl, respectively. Postprandial HDL Cholesterol in controls and cases were 48.76±8.63mg/dl and 41.44±12.24mg/dl, respectively. Postprandial LDL cholesterol in controls and cases were 110.16±15.13mg/dl and 138.17±30.80mg/dl, respectively. Postprandial VLDL cholesterol in controls and cases were 21.23±1.90mg/dl and 46.42±27.07mg/dl, respectively.

DISCUSSION

Type 2 Diabetes Mellitus (DM) is defined by insulin resistance, which is linked to various conditions including glucose intolerance, hypertension, dyslipidaemia, a procoagulant state, and an elevated risk of both microvascular and macrovascular diseases.[5]

Individuals with diabetes often experience hyperlipidaemia, placing them at a heightened risk for coronary heart disease.[6] The increased cardiovascular mortality associated with Type 2 DM can be attributed to a prolonged and exaggerated postprandial state.[7,8]

Notably, the abnormal lipid profile observed during the postprandial period is more critical than that during fasting in contributing to atherosclerotic complications among individuals with Type 2 diabetes.[9]

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Suryabhan LL et al.[10] The present study was conducted to assess the significance of postprandial dyslipidaemia with respect to fasting dyslipidaemia, in the pathogenesis of atherosclerotic changes and possible cardiovascular diseases (CVD) and complications. Methods and Statistical Analysis: Fifty diagnosed cases of type 2 DM which were in the age group of 35-65 years, which had a duration of diabetes of more than five years, were included in the study and 50 age and sex matched healthy subjects were taken as the controls. In both the study groups, they measured the serum levels of fasting as well as the postprandial lipid profile, which was comprised of the total Cholesterol (TC), triglycerides (TGs), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and the waist-hip ratio (WHI) as the cardiovascular risk factors. The statistical analysis was done by using the Students unpaired 't'-test. The results of this study showed significantly increased levels of serum total cholesterol, TGs, LDL-C and VLDL-C in the postprandial state as compared to those in the fasting state ($p<0.001$) and as compared to those in the fasting and the postprandial states of the controls ($p<0.001$). The serum HDL-C level was significantly lower in the postprandial state as compared to that in the fasting state ($p<0.001$). Also, the postprandial and the fasting HDL-C levels were significantly lower as compared to the levels in their respective control groups ($p<0.001$). The findings of the present study indicated that the lipid profile, as a cardiovascular risk factor, was significantly elevated in the postprandial state as compared to that in the fasting state and that it was significantly elevated in the postprandial and the fasting states in the Type 2 DM patients as compared to the levels in their respective control groups. This signified a routine estimation of the postprandial lipid profile, rather than the fasting lipid parameters, in the cardiovascular risk assessment in Type 2 DM.

Chahal J et al[11] assessed and compared the fasting and postprandial lipid profiles in type 2 DM patients. This case-control study was conducted in the Medicine department of a tertiary care teaching hospital. The study included 100 subjects; 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. The Student's *t*-test and the analysis of variance (ANOVA) test were used for comparison between two and more than two groups, respectively, for normally distributed data. 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. Type 2 DM patients show significant postprandial lipid abnormalities particularly postprandial hypertriglyceridemia. Raised postprandial lipid parameters highlight that estimating lipids in the postprandial state is equally important as is estimation of lipids in the fasting state in type 2 DM.

CONCLUSION

DMis characterized by insulin resistance, which is associated with several health issues such as glucose intolerance, hypertension, dyslipidaemia, a procoagulant state, and an increased likelihood of developing both microvascular and macrovascular complications.This study indicates that assessing the postprandial lipid profile is equally crucial as evaluating the fasting lipid profile in type 2 diabetes.

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