

Study of Lipid Profile among Non-obese Type-2 Diabetes Mellitus Patients

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ABSTRACT

Introduction: Type-2 Diabetes Mellitus is the most common endocrine and metabolic disease throughout the world. The increasing incidence of type-2 Diabetes among adolescent individuals is the key point in both the developed and developing nations. Recent studies have shown that the prevalence of dyslipidemia is common among Indian population and this unique lipid distribution is due to genetic as well as dietary factors. Most of the studies on diabetes with dyslipidemia was conducted in obese diabetes patients and a smaller number of studies have been conducted in non-obese type-2 diabetes patients. With this background; present study was aimed observe Lipid profile in Non-obese type-2 Diabetes mellitus patients and to compare the same with the Non-Obese adults without type-2 diabetes mellitus.

Materials and Methods: Comparative cross-sectional study was conducted on non-obese type-2 diabetes patients and non-obese adults without type-2 diabetes. A sample consisting of 100 patients and 100 controls was collected over a period of Six months. Lipid profile was assessed after overnight fasting and classified as per the ATP III Guidelines.

Results: The gender distribution was 39% females in the non-diabetic control group and 33% in diabetic group. Statistical significance was observed over the lipid profile levels among the non-obese type-2 diabetic patients when compared

non-obese, non-diabetic control group; especially with total cholesterol, triglycerides and VLDL levels.

Conclusion: Present study has documented several abnormalities in lipid profile among type-2 diabetic patients and revealed that the dyslipidemia was high among non-obese diabetic patients when compared to non-obese people without diabetes.

Keywords: Body Mass Index, Dyslipidemia, Lipid profile, Non-obese, Type-2 diabetes.

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INTRODUCTION

Type-2 Diabetes Mellitus is the most prevalent endocrine disorder in India and throughout the world. The increasing incidence of type-2 Diabetes among adolescent individuals is the key point in both the developed and developing nations.¹ Prevalence of type-2 Diabetes among the individuals over 18 years of age has risen from 4.7% in 1980 to 9.4% in 2019.²

Worldwide, the number of people with diabetes has increased significantly between 1980 and 2019, from 108 million to a current figure which is six times higher. 40% of this increase was estimated to result from increased population over years, 28% from a rise in age related prevalence, and 32% from the interaction between the two groups.³

Population aged between 40 to 60 years from the Eastern Mediterranean countries has experienced the greatest rise in prevalence of type-2 Diabetes.⁴

Recent study by Indian Council of Medical Research (ICMR) have shown that the prevalence of dyslipidemia is common among Indian population and this unique lipid distribution is due to genetic as well as dietary factors. Elevated triglycerides and decreased HDL cholesterol are common among type-2 diabetic patients in India.⁵ Indian populations develop diabetes at an earlier age compared to western population and this was established in various studies.^{6,7}

Indian population predominantly have truncal obesity, high prevalence of Hypertension, coronary artery diseases and thrombo-embolytic events.⁸ Most of the studies on diabetes with dyslipidemia was conducted in obese diabetes patients and less number of studies have been conducted in non-obese type-2 diabetes patients. Insulin deficiency and insulin resistance are the key points of type-2 diabetes mellitus and it was well recognized

that insulin resistance can lead to dyslipidemia in type-2 diabetes mellitus. Disturbances in lipid metabolism may manifest few years before the actual onset of type-2 diabetes mellitus.⁹

With this background; present study was aimed observe Lipid profile in Non-obese type-2 Diabetes mellitus patients and to compare the same with Non-Obese adults without type 2 diabetes mellitus.

MATERIALS AND METHODS

Comparative cross-sectional study was conducted on non-obese (BMI less than 25) type-2 diabetes patients in the age group 30 to 60 years, attending both outpatient and inpatient departments of medicine.

For the comparative study, non-obese adults in the age group of 30 to 60 years were selected from the same society, individuals accompanying the patients. We have followed convenient sample consisting of 100 patients and 100 controls. Sample was collected over a period of Six months in the year 2019. Patients with type-1 Diabetes Mellitus, Major systemic illness, Tuberculosis, prolonged fever, Pregnancy and Endocrine disorders were excluded from the study.

Informed consent was taken from all the participants and from control group in present study. Details regarding type-2 Diabetes Mellitus, duration of onset, progression, and complications were recorded. Anthropometric parameters and BMI were calculated. All patients with BMI less than 25 were included and their lipid profile was assessed after overnight fasting. Diagnosis of normal lipid level and Dyslipidemia was considered as per the ATP III Guidelines (Table 1).¹⁰ Data was analyzed using Microsoft Excel and SPSS -16 software.

Table 1: ATP III Classification of total Cholesterol, triglycerides, LDL and HDL (mg/dL)

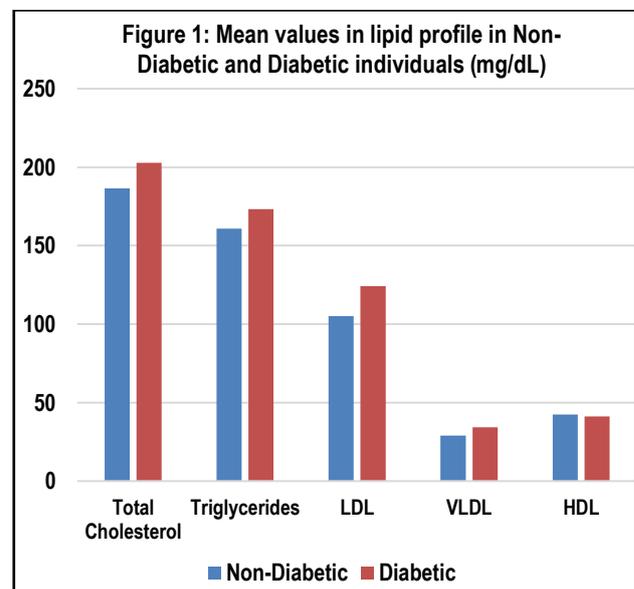
Parameter	Low	Above optimal	High	Very high
Total Cholesterol	200	200-239	> 240	
Triglycerides	150	150-199	200-499	> 500
LDL	<100	100-159	160-189	> 190
HDL	< 40	-	> 60	-

RESULTS

The sample size of present study was 100 subjects each in Diabetes patients and Non-diabetic controls. The gender distribution was 39% females in the non-diabetic control group and 33% in diabetic group. The mean age of the total study population is 48.4 ± 10.6 years, among this Diabetics were having slightly higher mean age of 52.8 ± 7.2 years when compared to 49.2 ± 11.8 years for non-diabetics. The anthropometric measurements of the groups showed that the mean height, weight and BMI were at similar levels for both non-diabetic and diabetic control group. The parameters in Lipid profile were shown in Table 2. Statistical significance was observed over the lipid profile levels among the non-obese type-2 diabetic patients when compared non-obese, non-diabetic control group; especially with total cholesterol, triglycerides and VLDL levels. Mean values of parameters from lipid profile were depicted in figure 1, for visual comparison between Non-Diabetic and Diabetic individuals.

Table 2: Lipid profile in both the groups (mg/dL)

Parameter	Non-Diabetic	Diabetic	p value sample T test
	Mean \pm S. D	Mean \pm S. D	
Total Cholesterol	186.6 \pm 56.2	202.8 \pm 53	0.012
Triglycerides	160.8 \pm 94.8	173.2 \pm 106.4	0.023
LDL	105.2 \pm 48.2	124.3 \pm 62.6	0.056
VLDL	29.1 \pm 13.8	34.4 \pm 18.2	0.014
HDL	42.4 \pm 12.2	41.3 \pm 11.4	0.052



DISCUSSION

The relationship between Body mass index (BMI) and Triglycerides levels was shown in the study done by Ali et al,¹¹ and also the relationship between lipid profile and body fat distribution was shown in the study done by Arora et al.¹² The findings in the study (Ali et al) were similar to present study. Dyslipidemia, a well-known risk factor for cardiovascular manifestations, was mostly observed in the population of the Asian continent. People with Type-2 Diabetes had an increased cardiovascular morbidity and mortality, when compared with non-diabetics. Recent studies done by Ali et al,¹⁰ Hussain et al,¹³ and Khaw et al,¹⁴ shown that the prompt recognition and accurate management of 'Type-2 Diabetes mellitus with associated dyslipidemia' is the key step towards the controlling the risk of cardiovascular disease. Observations in the study done by Tanzil et al,¹⁵ proved that obesity was linked with abnormal lipids and poor cardiovascular outcomes; similar findings were observed in present study.

Study done by Aljabri et al,¹⁶ shown that the prevalence of high LDL levels in men as well as women with diabetes mellitus (23% and 31%, respectively) did not differ significantly (p 0.4) from the rates in non-diabetic men and women (18% and 28%, respectively). The prevalence of high HDL levels in men as well as in women with diabetes mellitus (25% and 27%, respectively) did not differ significantly (p 0.7) from those seen in non-diabetic men and women (23% and 25%, respectively). In contrast to the prevalence of elevated plasma triglycerides levels in type-2 Diabetes (30% in men and 32% in women) was significantly higher than in those without type-2 Diabetes, when compared to present study.

In the studies done by Kannel et al,¹⁷ and Manley et al,¹⁸ a similar profile of altered 'plasma lipid profile' was observed, with the exception of low levels of HDL. Other study by Arbeeney et al,¹⁹ shown that; it is more common in diabetics when compared to non-diabetics due to four-fold increase in VLDL triglyceride. The studies conducted by Santen et al,²⁰ and Perrett et al,²¹ observed higher mean serum triglyceride levels in obese diabetics when compared to non-obese control subjects. In the study done by Kingstrom et al,²² total cholesterol level among type-2 diabetics was reported as 204mg/dl, which was similar to present study.

CONCLUSION

Present study has documented several abnormalities in lipid profile among type-2 diabetic patients and revealed that the dyslipidemia was high among non-obese diabetic patients when compared to non-obese people without diabetes.

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