

# Lipid profile in type II diabetes mellitus patients: A cross sectional study

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## Abstract

**Background:** Patients with type 2 diabetes have an increased prevalence of lipid abnormalities, contributing to their high risk of cardiovascular diseases (CVD). The study intends to find the association of glycaemic control with lipid profile in type II diabetic patients. **Methods:** This cross sectional study was conducted among 80 type-II Diabetes mellitus patients of aged 35 to 80 years in a tertiary care hospital in between July 2019 to December 2019. Patients were analysed on the basis of parameters like level of total cholesterol (TC), triglycerides (TG), low density lipoprotein (LDL), high density lipoprotein (HDL) and Glycosylated haemoglobin (HbA1c). Association between glycaemic control and lipid profile abnormalities was done using chi square and t test. **Results:** Mean patient age was 57.80±6.815 years. Majority of the patients were belonging to the age group of 46-65 years. Majority (58%) patients were males. according to our results, 85% of diabetic patients had atleast one lipid abnormality. Mean HbA1C level was 9.4±2.04. significant association was noted between poor glycaemic control and dyslipidemia (p <0.05). **Conclusions:** Significant association exists between poor glycaemic control and dyslipidemia thus indicating that diabetic patients were more prone for dyslipidemia, which could cause cardiovascular disorders.

**Keywords:** Lipid profile, Dyslipidemia, Diabetes, Serum cholesterol, Serum triglyceride, Serum LDL

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## INTRODUCTION

Type 2 diabetes mellitus (DM) is a metabolic disorder, characterised by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both.<sup>1</sup> Patients with type-2 diabetes have increased risk of cardiovascular disease associated with atherogenic dyslipidemia. Coronary artery disease, especially myocardial infarction is the leading cause of morbidity and mortality world wide<sup>2</sup> Hyperglycemia and atherosclerosis are related in type-2 diabetes.<sup>3</sup> The dyslipidemia is a major risk factor for

Coronary Heart Disease<sup>4</sup> The most common pattern of abnormality in patients with Type 2 diabetes mellitus is increased triglyceride levels, decreased HDL levels and increased concentration of LDL particles. These LDL particles have been identified as a major risk factor for chronic heart disease (CHD) by the National Cholesterol Education Programme (NCEP) Adult Treatment panel (ATP) III. It has been shown that reducing the plasma LDL cholesterol levels sharply reduces the risk of subsequent clinical coronary heart diseases in both patients with pre-existing coronary heart diseases and in patients free of coronary heart diseases. While LDL cholesterol is a strong risk factor for coronary artery disease (CAD).<sup>5</sup> Glycosylated haemoglobin (HbA1) is a term used to describe a series of stable minor haemoglobin components formed slowly and non-enzymatically from haemoglobin and glucose.<sup>6</sup> The present study was done to study the association of glycaemic control with lipid profile in type II diabetic patients.

## MATERIALS AND METHODS

This is a cross sectional study conducted at Viswabharathi Medical college and General hospital from July 2019 to December 2019. Total 80 patients of Type 2 diabetes mellitus in the age group of 35 to 80 years visiting general medicine OPD were randomly selected after applying inclusion and exclusion criteria, and after obtaining written and informed consent from them.

### Inclusion Criteria

1. Patients with type 2 diabetes mellitus

### Exclusion Criteria

1. Patient with liver disorders
2. Patients on lipid lowering agents (statins, fibrates, etc.)
3. Patients on treatment with medications which alter lipid profile
4. Patients with age <35 years and > 80 years.

HbA1c and Fasting Lipid profile: Total cholesterol, Triglycerides, HDL and VLDL cholesterol were measured using blood analyser. LDL cholesterol was calculated using friedwald formula and HbA1c was estimated by appropriate standard kits. Patients having one or more parameters (TG, HDL cholesterol, or LDL cholesterol) outside the targets recommended by American Diabetes Association (ADA) were considered to have dyslipidemia.[7] Which include TG $\geq$ 150 mg/dl, LDL $\geq$  100mg/dl, HDL $\leq$ 40 mg/dl. Patients were divided into two groups; 1) Group I, with controlled glycaemia (HbA1c<7%), and 2) Group II, with uncontrolled glycaemia (HbA1c $\geq$ 7%).

**Statistical Analysis:** The data was analysed with SPSS version 16.0. The mean, SD, chisquare test and t test were used to interpret the results.

## RESULTS

Of the 80 patients 46 (58%) were male, and 34 (42%) were female. table 1. Majority of the patients were belonging to the age group of 45-65 years table 2. Mean HbA1c level of all patients was 9.4 $\pm$ 2.04.

**Table 1:** Distribution of Gender with type-2 diabetes

Sex(n=80)	Frequency	Percent
Female	34	42
Male	46	58
<b>Total</b>	<b>80</b>	<b>100</b>

**Table 2:** Distribution of Age with type-2 diabetes

Age (Years)	Frequency	Percent
35-44	6	7.5
45-54	30	37.5
55-65	32	40
>65	12	15
<b>Total</b>	<b>80</b>	<b>100.0</b>

In table 3, Mean total cholesterol, Mean triglycerides, Mean LDL Cholesterol and Mean HDL Cholesterol were compared between group I and Group II patients and it was found that group II patients had high mean lipid profile values which is significant.

**Table 3:** Mean lipid values in Group I and II

	Group I	Group II	p value
Total Cholesterol (mg/dl)	124.31 $\pm$ 22.06	184 $\pm$ 25.64	0.003
Triglyceride (mg/dl)	108.60 $\pm$ 25.51	194.65 $\pm$ 36.92	0.03
HDL (mg/dl)	46.85 $\pm$ 5.38	38.86 $\pm$ 4.32	0.004
LDL (mg/dl)	66.65 $\pm$ 15.78	91.25 $\pm$ 23.67	0.04

In table 4, It was found that group II patients are having lipid abnormalities more than group I patients which is significant.

**Table 4:** Lipid abnormalities in Group I and II

	Group I(n=20)	Group II (n=60)	P value
Hypercholesterolemia	0	13 (21%)	0.004
Hypertriglyceridemia	1 (4%)	51 (85%)	0.04
High LDL	0	7 (11%)	0.03
Low HDL	2 (9%)	31 (52%)	0.02

## DISCUSSION

In the present study, we have evaluated the pattern of lipid profile parameters in diabetic subjects and its correlation with HbA1c. Our study showed that 85% patients had dyslipidemia which is comparable to study done by Udawat *et al.*<sup>8</sup> where it was 89% our study reported high prevalence of hypercholesterolemia, hypertriglyceridemia, high LDL and low HDL levels which are well known risk factors for CVD. Insulin affects the liver apolipoprotein production. It regulates the enzymatic activity of lipoprotein lipase and Cholesterol ester transport protein. All these factors are likely cause of dyslipidemia in Diabetes mellitus<sup>9</sup> Moreover, insulin deficiency reduces the activity of hepatic lipase and several steps in the production of biologically active lipoprotein lipase may be altered in DM.<sup>10</sup> In this study, a significant correlation was observed between levels of glycosylated hemoglobin (HbA1c) and lipid profile. This may in turn help in predicting the lipid profile levels from the degree of glycemic control and therefore, identifying the patients with increased risk of diabetic complications. Lipid abnormalities are common in diabetic patients and frequently seen in patients with type-2 diabetic mellitus. The abnormal lipid profile observed in type 2 Diabetes mellitus is said to be related to insulin resistance as reported in previous studies, which leads to increased release of free fatty acids from fatty tissue, impaired

insulin dependent muscle uptake of free fatty acids and increase fatty acid release to the hepatic tissue.<sup>11</sup>

## CONCLUSION

In conclusion Uncontrolled glycemia and dyslipidemia are common in type 2 DM patients. Dyslipidemia in terms of hypercholesterolemia, hypertriglyceridemia, high LDL and low HDL is significantly more frequent among uncontrolled diabetics thus indicating that diabetic patients were more prone for dyslipidemia, which could cause cardiovascular disorders.

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