

# A Study of Lipid Profile and Its Correlation with Diabetes Mellitus

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## Abstract

Atherosclerosis is commonly seen in patients suffering from dyslipidaemia. The elevations in Total cholesterol levels, Triglycerides, Low Density Lipoprotein and decreased High Density Lipoprotein indicate the risk of CVD. The present study deals with the comparison of the lipid proliferation and elevated blood glucose levels. Biometric tests analysis indicated the diabetic patients suffer from abnormal cholesterol parameters and are prone to cardiovascular diseases.

**Keywords:** HbA1c, lipid profile, Atherosclerosis, Dyslipidemia

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## I. INTRODUCTION

Abnormality in the lipid profile contributes to the risk of Atherosclerosis in diabetic patients.[1] Need arises to measure and compare the lipid profile data of diabetic patients. The present study deals with the comparative analysis of the lipid profile samples with the healthy groups. In the global diabetic epidemic India ranks second after China. Diabetes is a chronic metabolic disease characterised by elevated levels of blood glucose leading to damage of heart and Atherosclerosis and is common cause of death across the world.[2] Recent studies suggest that over 90 percent of people with diabetes have type 2 diabetes, which is driven by socioeconomic, environmental and genetic factors.[3] Key factors include urbanization and obesity. This range is expected to rise to 643 million by 2030 worldwide. Diabetes has reached epidemic proportions in countries like China and India, as per GBD 2019 report, diabetes mellitus type-2 is the leading cause of mortality in India.[4]

## II. MATERIAL AND METHODS

Fasting blood glucose testing was conducted by venipuncture technique.[5] After the centrifugation at 3500 rpm, the lipid profile tests and serum tests were conducted. TC was analyzed by colorimetric technique and enzymatic techniques were used for triglycerides.[6] Serum glucose was determined by using the glucose oxidase enzymatic method

[7]. All the parameters which were under investigation were determined in the serum of the subjects by using commercially available reagent kits. The lipid profile of the subjects was classified, based on the ATP III model [8]. The values of all the parameters were given in mg/dl and they were expressed as mean  $\pm$  SD. The statistical significance of the difference between the control and the study groups were evaluated by the Student's t-test. Pearson's correlation test was performed to examine various correlations.[9] Friedwald's method was used for obtaining LDL-C levels.[10] Reagent test kits were of commercial grade. In the serum obtained, LDL-Cholesterol by was estimated by using Friedewald's formula [12] as has been shown below:

$$\text{LDL-C} = \text{TC} - \text{HDL-C} - (\text{TG}/5).$$

The samples of 100 T2 diabetic and healthy samples each, were collected. The biometric tests were conducted in the Future Hospital, Bareilly, U.P.

## III. RESULTS AND DISCUSSION

This study FBG, lipid profile and HbA1c was analysed. Clinical and biochemical analysis was performed for 100 patients with Diabetes Mellitus, divided in two stock samples of 50% each for healthy and controls. Table-1 indicates the mean age of T2 diabetic patients and of the controls. The mean age observed is  $\pm 47.16$  for females and  $\pm 47.15$  for males, respectively in T2DP and was found to be  $\pm 48.20$  for healthy females and  $\pm 47.90$  for controls male. The similarity was of mean TC, TG and LDL-C of the fasting blood sugar samples and was negatively correlated to the healthy samples. The negative results were observed in FBG with HDL-C of the T2 diabetic samples. Positively related results were observed for FBG with TC, TG and LDL-

C. This study revealed the fact that Dyslipidaemia was observed in the diabetic population.[13] Reference range to determine lipoprotein levels and to obtain complete lipoprotein profile after 9 to 12 hrs. fast as per ATP III classification [14] of LDL, HDL and TC as mg/dL is as follows

**ATP III classification**

LDL Cholesterol—Primary Target of Therapy

<100           Optimal  
130-159       Borderline high

>190           Very high

Total Cholesterol  
<200           Desirable  
>240           High

HDL Cholesterol  
<40            Low

**Table-1 Mean age of the T2 diabetics and control**

Gender.	No. of patients.	Mean age
Female.	50.	±47.16
Male.	50.	±47.15
Total.	100	±47.16
Gender.	Control	Age
Female.	50.	±48.20
Male.	50.	±47.90
Total.	100	±48.50

Table-2 indicates that diabetic patients show increased lipid profile values and no such prominent correlation is indicated in the sample values of those of control. Table-3 gives the details of the FBS levels of the diabetic and control groups.

LDL-C = TC - HDL-C - (TG/5). TG/HDL ratio

was found to be on the higher side ( $p < 0.01$ ) indicates hypercholesterolemia.[15] Table-4 shows correlation data, FBG indicates positive correlation with cholesterol ( $p < 0.05$ ) and TG ( $p < 0.05$ ) were positive, HDL cholesterol indicates a negative correlation [16]. LDL and TG cholesterol indicates a positive correlation as ( $p < 0.001$ ).[17]

**Table-2 Parameters indicating TC, HDL-C, LDL-C and TG of diabetics and those of controls.(mg/dl)**

Normal.	Observed(T2DP)	Mean(± SD)
TG<150.	80-370.	221.6±101.12
HDL 45-65.	20-50.	31.5±6.7
TC. <200.	127-340.	227.6±57.72
LDL<100.	55-180.	136.5±43.72
Normal.	Observed(Control)	Mean(±SD)
TG<150.	100-120	100.6±100.00
HDL 45-65.	50-60.	41.5±5.7
LDL<100.	65-97	76.5±33.01
TC. <200.	127-150	137.6±26.03

**Table-3 FBG and HbA1c percentage observed in T2 diabetic patients**

Female.	Observed	± SD
<b>FBG</b>		
70-100.	80-110	200 ±50.1

Male 70-100.	85-100.	220.3±52.3
<b>HbA1c</b> Female <6.5.	6.5-10.30	9.40±2.02
Male <6.5.	6.5-10.40.	9.52±2.33

**Table-4 Correlation of Serum levels and Glucose of T2diabetics**

Pearson coefficient values:

- 1 0.05 level correlation
2. 0.01level correlation
- 3 0.001level correlation

	<b>FBG</b>	<b>TC</b>	<b>LDL</b>	<b>TG</b>	<b>HbA1c</b>	<b>HDL</b>
<b>TG/HDL</b>	-0.4222	0.410	0.500	0.023	0.324	0.220
<b>FBG</b>		- 0.562	0.850	-0.321	-0.236	- 0.001
<b>TC</b>	-0.011	0.601	0.990	-0.023	0.355	0.023
<b>TG</b>	0.023	0.356	0.653	0.224	0.435	0.002
<b>LDL</b>		0.773	0.080	0.077	0.060	0.010

#### IV. CONCLUSION

Serum lipid profile control plays a pivotal role in the blood sugar level control of the patient. Cardiovascular disorders and atherosclerosis are the results of abnormal serum lipid profile and elevated blood glucose levels in T2diabetics. This research clearly indicates the correlation of elevated blood glucose levels and cholesterol levels, a root cause of dyslipidemia in Diabetes Mellitus.

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