

Pattern of Lipid Profile of Type 2 Diabetes Patients

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Citation this Article: Dr. Chandreshwar Pratap Singh, Dr. Surendra Kumar, “Pattern of Lipid Profile of Type 2 Diabetes Patients”, IJMSIR- June - 2020, Vol – 5, Issue -3, P. No. 448 – 451.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Diabetes mellitus is a common metabolic disorder characterized by absolute or relative deficiencies in insulin secretion and/or insulin action associated with chronic hyperglycemia and disturbances of carbohydrate, lipid and protein metabolism.

Methods: This is a Hospital based sectional case control study. 100 patients of type 2 DM and 100 age and sex matched healthy controls were taken. Fasting blood glucose (FBG), total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL), triglyceride (TG) and glycated haemoglobin (HbA1c) levels were evaluated.

Results: Mean age in diabetic patients was 45.36± 10.23 years and control patients was 46.48± 11.05 years and age range was 21-75 years. The FBS & Hb1Ac levels in all the diabetics were significantly Higher as compare to control. There was significant difference in mean HDL, Triglycerides level in diabetic and control patients (p<0.05) There was no significant difference in LDL, Cholesterol level in Diabetic and control patients (p>0.05).

Conclusion: We conclude that there is a high prevalence of elevated lipid and lipoprotein levels among the diabetic patients showing that they are more prone to these abnormalities,

Keywords- Diabetes Mellitus -2, Cholesterol, Lipid Profile,

Introduction

Diabetes mellitus is a common metabolic disorder characterized by absolute or relative deficiencies in insulin secretion and/or insulin action associated with chronic hyperglycemia and disturbances of carbohydrate, lipid and protein metabolism.¹

Several previous studies have attempted to correlate blood glucose levels with serum lipid profile parameters.^{2,3} Research findings show that mainly body fat is responsible for increase in prevalence of this disease among the body composition components.³⁻⁵

As early as 1988, it was described a multifactorial metabolic abnormality consisting of insulin resistance with compensatory hyperinsulinaemia, type 2 diabetes mellitus (T2DM), essential hypertension and hypercholesterolaemia.^{6,7} World Health Organization (WHO) and International Diabetes Federation (IDF)

use the term “Metabolic Syndrome” to describe this clustering of conditions.⁸

The term diabetic dyslipidemia comprises a triad of raised triglycerides, reduced high density lipoprotein (HDL) and excess of small, dense low density lipoprotein (LDL) particles. The lipid abnormalities are prevalent in diabetes mellitus because insulin resistance or deficiency affects key enzymes and pathways in lipid metabolism.⁹

In a recent study, it was observed significant trends for rising risk of coronary heart disease, stroke and all-cause mortality in relation to higher levels of baseline HbA1c in more than 11,000 participants in the Atherosclerosis Risk in Communities Study. For HbA1c categories of <6.5% and $\geq 6.5\%$, there was a significant association between fasting blood glucose levels and coronary heart disease, stroke or death from any cause. It was attempted to correlate blood glucose levels with serum lipid profile parameters in previous studies and it is clear that HbA1c values are lower in individuals with a decreased risk of micro-vascular complications.¹⁰

Materials and Methods

From the patients admitted 100 representative cases of Type 2 DM are taken as subjects for the study. Age and sex matches 100 non-diabetic are taken as controls. The diagnosis of diabetes is based on revised criteria according to consensus panel of experts from the National Diabetes Data Group and WHO.

Inclusion Criteria

Patients of Type 2 DM .

Exclusion Criteria

Type 2 diabetes patients with concomitant diseases or condition affecting the lipid levels such as hypothyroidism, on lipostatic drugs, and thiazides.

Method of data collection

- The blood sample of diabetes patients including controls group was taken after fasting for 10-12 hours.
- 5-10ml of venous blood was drawn from the anticubital vein by aseptic technique in plain vial.
- Serum was separated from the collected sample for biochemical analysis. Lipid profile investigations that included serum cholesterol, triglyceride, High density lipoprotein cholesterol (HDLcholesterol) and Low density lipoprotein cholesterol (LDL-cholesterol) were carried out on a semi automated analyzer using standard kits.

Lipid profile measured following methods

- Serum total cholesterol: was measured by Enzymatic method Normal serum cholesterol: 150-250 mg/dl
- Serum HDL cholesterol: was measured by “Phosphotungstate method. Normal HDL – Cholesterol: 30 – 70 mg/dl.
- Serum LDL cholesterol: If the value of Triglycerides is known, LDL-cholesterol can be calculated based on Friedewald’s equation.
- Serum Triglycerides: was measured by enzymatic colorimetric method Normal Serum Triglycerides: Male: 60-165 mg/dl Female: 40-140 mg/dl.

Data analysis

statistical software SPSS (version 20) was used for data analysis. Mann-Whitney U Test was used to compare between the variables. Statistical significance was taken as $p < 0.05$.

Results

This was a cross sectional, case control, hospital based study on 100 type 2 diabetes mellitus patients attending

in OPD with equal number of age and sex matched controls.

Table 1: Socio-demographic profile

Variable	Case	Control	p-value
Age in years (Mean ± SD)	45.36± 10.23	46.48± 11.05	>0.05
Male : Female	66:34	68:32	>0.05
Rural : Urban	53:47	54:46	>0.05

Mean age in diabetic patients was 45.36± 10.23 years and control patients was 46.48± 11.05 years and age range was 21-75 years.

Table 2: Comparison of Blood sugar in case and controls.

FBS(mg/dl)	Case (n=100)	Control (n=100)	p-value
Mean ± SD	175.6 ± 44.23	91.25 ± 12.32	<0.05

The FBS levels in all the diabetics were significant (p<0.05) as compare to control.

Table 3 : Comparison of Hb1Ac in case and controls.

Hb1Ac(%)	Case (n=100)	Control (n=100)	p-value
Mean ± SD	7.52 ± 1.23	5.12 ± 0.62	<0.05

The Hb1Ac levels in all the diabetics were significant (p<0.05) as compare to control.

Table 4: Comparison of biochemical parameters in case and controls.

Parameters	Case (n=100)	Control (n=100)	p-value
Total cholesterol in mg/dl (Mean±SD)	163.8 ± 39.23	157.23 ± 26.35	>0.05
LDL in mg/dl (Mean±SD)	93.12 ± 26.54	91.23± 27.58	>0.05
HDL in mg/dl (Mean±SD)	34.25 ± 9.12	52.32± 10.23	<0.05
Triglycerides in mg/dl (Mean±SD)	182.32± 59.35	136.23 ± 23.15	<0.05

There was significant difference in mean HDL, Triglycerides level in diabetic and control patients

(p<0.05) There was no significant difference in LDL, Cholesterol level in Diabetic and control patients (p>0.05).

Discussion

Mean age in diabetic patients was 45.36± 10.23 years and control patients was 46.48± 11.05 years and age range was 21-75 years. These values were similar to those reported by Kumar et al¹¹.

In our study the FBS levels in all the diabetics were significant (p<0.05) as compare to control similar result were observed by BhallaKapil et al.¹²

This study also demonstrates the typical diabetic dyslipidemia which is characterized by low HDL, high triglyceride. Various national and international epidemiological studies on lipid profile have also shown this pattern of dyslipidemia.¹³⁻¹⁴

No significant difference was observed in total cholesterol and absolute LDL levels in cases and controls in this study. Even if the absolute concentration of LDL cholesterol is not significantly increased; there is typically a preponderance of smaller, denser LDL particles, which possibly increases atherogenicity (atherogenic dyslipidemia). These changes are due to increased free fatty acid flux secondary to insulin resistance.¹⁵

Conclusion

We conclude that there is a high prevalence of high degree of elevated lipid and lipoprotein levels among the diabetic patients showing that they are more prone to these abnormalities

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