

Original Research Article

Lipid profile pattern in controlled and uncontrolled diabetic patients in a tertiary care centre

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ABSTRACT

Background: Diabetes Mellitus is a metabolic disorder characterized by hyperglycemia with disturbances of carbohydrate, lipid as well as protein metabolism virtually affecting every organ in the human body. Dyslipidemia is a group of biochemical disorders, which is frequently seen in diabetic individuals. Dyslipidemia associated with diabetes has a major role in atherosclerosis and cardiovascular complications.

Methods: This cross-sectional study was conducted in diabetic patients visiting OPD of Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly over a period of 6 months. A total of 320 patients were randomly selected for the study and divided into 2 groups depending on HbA1c levels.

Results: BMI of controlled diabetics was 26.2 ± 1.91 kg/m² and of uncontrolled was 27.56 ± 4.36 kg/m² respectively with a statistically significant p value. Total Cholesterol levels in controlled group was 185.63 ± 52.32 mg% and 217.83 ± 61.33 mg% in uncontrolled group with a p value of 0.0005 which is highly significant. Same was seen in triglyceride and VLDL levels in controlled group which was 173.88 ± 101.77 mg% and 31.5 ± 12 mg% respectively and 203.33 ± 83.7 mg% and 40.67 ± 17.66 mg% in uncontrolled group respectively.

Conclusions: The diabetic patients with poor glycemic control had statistically significant high values of Total Cholesterol, Triglycerides, VLDL levels and significant low HDL Levels. Good glycemic control can result in improvement in the lipid panel and the patients can be prevented from the high cardiovascular and neurological risk.

Keywords: Dyslipidemia, Diabetes, Triglyceride

INTRODUCTION

Diabetes Mellitus is a metabolic disorder characterized by hyperglycemia with disturbances of carbohydrate, lipid as well as protein metabolism, virtually affecting every organ in the human body. Urbanization, physical inactivity and exponential population growth are major risk factors for developing diabetes mellitus. It is estimated that over the next three decades, the increase in the people with diabetes will be more in developing countries than developed countries.¹ Complications of diabetes mellitus are mainly grouped into two categories,

i.e., microvascular (neuropathy, retinopathy and nephropathy) and macrovascular (cardiovascular and neurological complications).² Presence of microvascular complications at the time of diagnosis of diabetes mellitus are showing increasing trend in India. Early detection of microvascular complications and its treatment at this time by intensive therapy can prevent progression of these complications and hence morbidity and mortality among patients. Dyslipidemia is a group of biochemical disorders, which is frequently seen in diabetic individuals. Dyslipidemia associated with diabetes has a major role in atherosclerosis and cardiovascular complications.³

All the components of the dyslipidemia, i.e. low HDL, raised Triglycerides and LDL levels have shown to be atherogenic. The glycemic control in diabetic patients is directly associated with the mortality of patients. According to studies, each unit increase in HbA1c increases the relative risk for any cardiovascular event by 1.18. HbA1C<7 is taken as controlled diabetics.⁴

Due to high prevalence of diabetes and poor knowledge to patients about its associated diseases like dyslipidemia, obesity has led to increase in the complications of diabetes. To decrease the risk of cardiovascular and cerebrovascular complications and mortality, timely detection and treatment of Dyslipidemia is essential. The present study aims to find the correlation between the glycemic control and dyslipidemia in patients of diabetes.

METHODS

This cross-sectional study was conducted in diabetic patients visiting OPD of Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly over a period of 6 months from 1st April 2019 to 31 October 2019 after the approval from ethical committee.

A total of 320 patients were randomly selected for the study. HbA1c levels were done in all the patients and they were divided into controlled and uncontrolled diabetes according to HbA1c<7 and HbA1c>7 respectively as per the ADA Guidelines.⁴ A short history with general and systemic examination was done. BMI of each patient was estimated with height and weight and all patients were subjected to laboratory investigations of lipid profile and sugar levels which was done after 8 hours of overnight fasting and thereafter a post prandial sugar was also monitored in each patient.

Inclusion criteria

- Age >18 years <65 years.
- Patient satisfying ADA criteria for diabetes.

Exclusion criteria

- Age <18 years.
- Not on lipid lowering therapy.
- History of coronary artery disease.
- History of stroke.
- Patients of chronic kidney disease and chronic liver disease.
- Patients on Renal replacement therapy.
- History of hypothyroidism or patients on thyroxine supplementation.

All the data collected was entered and analyzed using SPSS Software and p value was calculated.

RESULTS

The study sample consisted of 320 patients with 190 having controlled diabetes and 130 uncontrolled diabetic patients. The mean age of controlled diabetics was 50±13.34 years and of uncontrolled diabetics was 52.69±11.89 years. BMI of controlled diabetics was 26.2±1.91 kg/m² and of uncontrolled was 27.56±4.36 kg/m² respectively with a statistically significant p value. As seen in Table 1 in controlled diabetics, fasting blood sugar level mean was 114.56±16.85 mg% and in uncontrolled diabetics, it was 116±44.96 mg% and post prandial blood sugar level was 182.11±24.85 mg% and 261.47±62.23 mg% respectively with a statistically significant p value of 0.0001 in both the categories.

Table 1: Biochemical profile of controlled and uncontrolled groups.

| | Controlled Group-HbA1c<7% n=190 | Uncontrolled Group-HbA1c>7% n=130 | p value |
|--------------------------|------------------------------------|--------------------------------------|---------|
| Age (Years) | 50±13.34 | 52.69±11.89 | N/A |
| BMI (kg/m ²) | 26.2±1.91 | 27.56±4.36 | 0.007 |
| FBS (mg%) | 114.56±16.85 | 116±44.96 | 0.001 |
| PPBS (mg%) | 182.11±24.85 | 261.47±62.23 | 0.001 |
| H/O Smoking | 20% | 20% | N/A |
| H/O Hypertension | 33.6% | 60% | N/A |

Table 2: Comparison of lipid profile in controlled and uncontrolled groups.

| | Controlled group HbA1C<7% n=190 | Uncontrolled group HbA1C>7% n=130 | p value |
|-------------------------|------------------------------------|--------------------------------------|---------|
| Total Cholesterol (mg%) | 185.63±52.32 | 217.83± 61.33 | 0.0005 |
| Triglycerides (mg%) | 173.88±101.77 | 203.33±83.7 | 0.055 |
| HDL (mg%) | 40.23±13.15 | 34.41± 9.49 | 0.0026 |
| VLDL (mg%) | 31.53±12 | 40.67±17.66 | 0.0001 |
| LDL (mg%) | 116.71±40.63 | 114.5±51.84 | 0.760 |

History of smoking was found equally (20%) in both the groups mainly in male patients, whereas history of hypertension was present in 33.6% patients of controlled group and 60% patients of uncontrolled group.

Table 2 demonstrates total cholesterol levels in controlled group was 185.63 ± 52.32 mg% and 217.83 ± 61.33 mg% in uncontrolled group with a p value of 0.0005 which is highly significant.

Same was seen in triglyceride and VLDL levels in controlled group which was 173.88 ± 101.77 mg% and 31.5 ± 12 mg% respectively and 203.33 ± 83.7 mg% and 40.67 ± 17.66 mg% in uncontrolled group respectively with a significant p values in both the categories.

Similarly, HDL levels in controlled group was 40.23 ± 13.15 mg% and 34.41 ± 9.49 mg% in uncontrolled group with a significant p value of 0.0026.

In contrast, LDL levels in controlled and uncontrolled diabetics was 116.71 ± 40.63 mg% and 114.5 ± 51.84 mg% respectively with a non-significant p value of 0.760.

DISCUSSION

Type 2 diabetes mellitus is an important risk factor of dyslipidemia and it worsens with the poor glycemic control. The main etiology of dyslipidemia in diabetes is elevated levels of free fatty acids due to insulin resistance which worsens with the poor glycemic control. The goal of management aims at a good glycemic control and control of lipid profile to prevent the atherogenic cardiovascular and neurological complications.⁵

The mechanism of dyslipidemia in type 2 diabetes is explained on the basis of insulin resistance which alters the lipoprotein lipase to hepatic lipase ratio which results in decreased HDL-cholesterol levels. Depleted cholesterol esters from HDL is due to increased activity of cholesterol ester transfer protein (CETP) which decreases HDL-cholesterol.⁶

The increase in triglyceride levels in hyperglycemic patients involves reduction of lipoprotein lipase (LPL) activity. It has been noted that LPL activity is significantly lower in patients with type 2 diabetes mellitus.⁷ It hydrolyses triglycerides of chylomicrons and very low density lipoproteins (VLDL). The free fatty acid enters into glycogen rich hepatocytes and triggers triglyceride synthesis, which in turn leads to synthesis and secretion of VLDL-cholesterol.⁸

According to the results of the present study, the diabetic patients with poor glycemic control had statistically significant high values of Total Cholesterol, Triglycerides, VLDL levels and significant low HDL Levels.

An important first step is to educate physicians in the optimal use of combination therapies.⁹ Current guidelines

now consider diabetes to be a coronary heart disease risk equivalent so it is now important that clinicians to place greater emphasis on overall control of dyslipidemia in these patients.^{10,11} It has been observed that among those with an LDL of ≥ 100 mg/dl, only 17% patients are on lipid-lowering treatment, which indicate requirement of significant improvement in the treatment of these patients.

Controlled clinical trials have proven in the past that weight reduction can favorably affect all components of dyslipidemia (as well as all components of the metabolic syndrome). A meta-analysis of 70 randomized controlled studies of an 11- to >52-week duration assessed the effect of a substantial loss of weight by dieting alone on the blood lipid profile of obese men and women. The average weight loss across studies was 16.6 kg or -16.8% of initial body weight which resulted in significant improvement in lipid profile.¹²

Statins are being used to effectively reduce CVD risk in patients with Type 2 diabetes mellitus. However, significant risk of CVD remains despite statin therapy. Combination statin-fibrate therapy offers the potential of addressing multiple lipid abnormalities comprising diabetic dyslipidemia.¹³

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Ethical approval: The study was approved by the Institutional Ethics Committee

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