

A study of lipid profile in type 2 diabetes mellitus

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Abstract

Introduction: Diabetes mellitus is the most common metabolic disorder affecting the people all over the world. Type 2 diabetes mellitus and dyslipidemia are considered as independent risk factors for coronary heart disease and cerebrovascular disease. Aim of present study is to compare lipid profile in Type 2 diabetics and healthy controls. **Materials and Methods:** The lipid profiles and the fasting blood sugar values of 50 known diabetics and 50 healthy subjects were studied. Their serum samples were assessed for fasting blood glucose (FBG), total cholesterol (TC), triglycerides (TG), low density lipoprotein cholesterol (LDL-C), very low density lipoprotein cholesterol (VLDL-C) and high density lipoprotein cholesterol (HDL-C) by using RANDOX fully automated chemistry analyzer. **Results:** The mean age of the subjects were 22.85 and 25.11 years for the diabetic and the control groups respectively. There were 28 male and 22 female in the control group and 29 male and 21 female in the diabetic group. The levels of total cholesterol, triglycerides, LDL cholesterol and VLDL cholesterol are significantly higher in the diabetic group than in the study group. **Conclusion:** The frequencies of the high TC, high TG and high LDL-C were significantly higher in the diabetic group as compared to control group, thus indicating that diabetic patients were more prone for dyslipidemia as well as for complications related to dyslipidemias.

Key Words: Diabetes Mellitus, Dyslipidemia, Lipid profile, Lipoprotein.

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INTRODUCTION

Diabetes mellitus is a heterogeneous chronic metabolic disorder characterized by hyperglycemia and is responsible for increased incidence of microvascular and macrovascular complications by causing dyslipidemia.^{1,2} Diabetes mellitus has reached epidemic proportions globally.³ The World Health Organization (WHO) estimated that there were 135 million diabetic individuals in the year 1995 and it has been projected that this number will increase to 300 million by the year 2025.⁴ With a high genetic predisposition and high susceptibility to environmental insults, the Indian population faces a

higher risk of diabetes and its associated complications.⁵ Persistent hyperglycaemia causes glycosylation of all proteins, especially collagen cross linking and matrix proteins of arterial wall. This eventually causes endothelial cell dysfunction, contributing to atherosclerosis. The prevalence of dyslipidemia in diabetes mellitus is 95%.⁶ Lifestyle changes such as diet and exercise are very important in improving diabetic dyslipidemia, but often pharmacological therapy is needed.⁷

In view of the present scenario, this work was taken up to study the lipid profile status in patients who were having type 2 diabetes mellitus and compared with a healthy control group who were non diabetic.

MATERIAL AND METHOD

This is a prospective, observational and analytical study conducted in the department of Pathology, JNMC, Sawangi (M), Wardha from December 2014 to November 2015. The study was performed on 100 subjects in the age group between 25 – 60 years, out of them 50 were Type 2 Diabetic patients with fasting blood glucose level > 126 mg/dl and 50 were non diabetic healthy control having blood glucose level ≤ 125 mg/dl. All the patients

suffering from Type 1 Diabetes mellitus, with any overt complication of Diabetes, with any concurrent illnesses like chronic liver disease, hypothyroidism or patients on drugs like diuretics, steroids, oral contraceptives and beta blockers were excluded from the study. The study was approved by the Institutional ethics committee. Written informed consent was taken from the patients in local language. In both the patients and controls, 5 ml of blood samples was collected under all aseptic precautions after atleast 10 hour of fasting. Then fasting blood sugar and lipid profile were estimated by using RANDOX fully automated chemistry analyzer. The lipid profile of the subjects was classified, based on the ATP III model. The values of all the parameters were given in mg/dl expressed as mean ± SD. The stastical significance of the difference between the control and the study groups were evaluated by Student’s t – test.

RESULTS

The study comprised of 50 diagnosed patients of Type 2 Diabetes Mellitus and 50 healthy control, non diabetic

individual. The mean age of the subjects were 22.85 and 25.11 years for the diabetic and the control groups respectively. There were 28 male and 22 female in the control group and 29 male and 21 female in the study group. From Table no.1, it is evident that levels of total cholesterol, triglycerides, LDL cholesterol and VLDL cholesterol are significantly higher in the diabetic group than in the control group. Table no. 2 shows the frequencies of the TC, TG, HDL-C and the LDL-C concentrations in both the diabetic and the control groups according to ATP III model. From the table no.2 it is evident that, Total cholesterol, LDL cholesterol and triglycerides are statistically significant except HDL cholesterol. All the 50 healthy controls shows total cholesterol level in the desirable range (< 200 mg/ dl) while only 58% of the diabetics shows TC level < 200 mg/dl, 32% shows borderline high levels(200-239 mg/dl) and 10 % shows high total cholesterol levels (> 240 mg/dl). Similarly LDL cholesterol and triglycerides levels are higher in the diabetic group as compared to control groups.

Table 1: Showing the mean total cholesterol, triglycerides, HDL-C, LDL-C, VLDL-C and the fasting blood sugar levels which were highly significant in the diabetics as compared to those in the controls

| Parameters | Diabetics (n=50) | Control(n=50) | t value | p-value |
|---------------------------|------------------|---------------|---------|----------|
| | Mean ± SD | Mean ± SD | | |
| FBS (mg/dl) | 182.94±71.72 | 97.04±13.38 | 8.32 | 0.0001,S |
| Total Cholesterol (mg/dl) | 197.06±59.10 | 153.54±29.77 | 4.65 | 0.0001,S |
| HDL – C (mg/dl) | 38.44±4.77 | 34.78±5.76 | 3.47 | 0.001,S |
| LDL – C (mg/dl) | 123.78±44.19 | 96.60±27.88 | 3.67 | 0.0001,S |
| VLDL - C(mg/dl) | 30.80±16.93 | 22.16±10.24 | 3.08 | 0.003,S |
| Triglycerides (mg/dl) | 161.16±104.84 | 107.62±48.75 | 3.27 | 0.0001,S |

S - Significant

Table 2: showing the frequencies of the TC, TG, HDL-C and the LDL-C concentrations in both the diabetic and the control groups according to ATP III Classification

| Parameters | Diabetics (%) | Controls (%) |
|----------------------------------|---------------|--------------|
| Total Cholesterol (mg/dl) | | |
| Desirable (<200) | 29(58%) | 50(100%) |
| Borderline High (200-239) | 16(32%) | 0(0%) |
| High (≥ 240) | 5(10%) | 0(0%) |
| HDL – C (mg/dl) | | |
| Low (<40) | 27(54%) | 35(70%) |
| Borderline High (40-59) | 23(46%) | 15(30%) |
| High (≥ 60) | 0(0%) | 0(0%) |
| LDL – C (mg/dl) | | |
| Optimal (<100) | 18(36%) | 27(54%) |
| Near Optimal (100-129) | 11(22%) | 13(26%) |
| Borderline High (130-159) | 16(32%) | 10(20%) |
| High (160-189) | 2(4%) | 0(0%) |
| Very High (≥ 190) | 3(6%) | 0(0%) |
| Triglycerides (mg/dl) | | |
| Normal (<150) | 31(62%) | 42(84%) |
| Borderline High (150-199) | 11(22%) | 6(12%) |
| High (200-249) | 3(6%) | 1(2%) |
| Very High(≥250) | 5(10%) | 1(2%) |

DISCUSSION

Lipoprotein disorders of dyslipidemias are amongst the most common metabolic diseases seen in clinical practice. They are important because they may lead to number of complications including coronary heart diseases, dermatological manifestations, pancreatitis, neurological and ocular abnormalities. This study showed that there was significant dyslipidemia in Type 2 Diabetes Mellitus patients as compared to control healthy non diabetic population. The lipid and the lipoprotein profiles of the diabetics were higher than that of the controls and they were in agreement with the findings of Samatha P *et al*⁸, Amin ul haq *et al*⁹, Idogun ES *et al*¹⁰ and Albrki WM *et al*¹¹.

CONCLUSION

Dyslipidemia is a significant finding in Type 2 DM patients. Serum cholesterol, triglycerides and all types of lipoprotein are affected and this leads to increased morbidity and mortality in Type 2 DM.

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