

Study of Lipid Profile Parameters in Type 2 Diabetes Mellitus PatientsSandeep U¹, Meghna Mohan², Kiran D R.³¹Associate Professor, Department of Medicine, Karuna Medical College, Vilayodi, Palakkad, Kerala²Associate Professor, Department of Medicine, Karuna Medical College, Vilayodi, Palakkad, Kerala³Professor, Department of Medicine, Karuna Medical College, Vilayodi, Palakkad, Kerala

Received: 25-08-2023 / Revised: 28-09-2023 / Accepted: 30-10-2023

Corresponding Author: Dr Meghna Mohan

Conflict of interest: Nil

Abstract

Dyslipidaemia is one of the common disorders which is seen in most of the diabetes patients, which causes cardiovascular disorders. This study was conducted to compare the lipid profile of diabetic patients and healthy controls. The patients admitted 50 representative cases with H/O Type 2 DM are taken as subjects for the study. Age and sex matches 50 non diabetic are taken as controls. Lipid profile and HbA1c was estimated. Total cholesterol, LDL, VLDL, Triglycerides, HbA1c were high in diabetics subjects as compared to normal control subjects. HDL was higher in normal control subjects. The difference between the control and the study groups was high and it was highly significant. The frequencies of the high TC, high TG and high LDL-C levels were higher in the diabetic group, thus indicating that diabetic patients were more prone for dyslipidaemia, which could cause cardiovascular disorders.

Keywords: Lipid Profile , Type 2 Diabetes Mellitus.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Diabetes mellitus (DM) is the most common metabolic disorder affecting the people worldwide. Even though diabetes has been known since antiquity, only in the last few decades new discoveries have provided great hopes to minimize morbidity and mortality. It is estimated that for one diagnosed diabetes there is undetected diabetes. The diabetic ketoacidosis was major fatal complication of diabetes has virtually come down with advent of insulin (American Diabetes Association, 2014) [1]. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction and disturbance in failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels (World Health Organization, 2005)[2]. Patients with type-2 diabetes have increased risk of cardiovascular disease associated with atherogenic abnormalities and dyslipidemia. Coronary artery disease, especially myocardial infarction is the leading cause of morbidity and mortality worldwide as well as hyperglycemia and atherosclerosis are related in type-2 diabetes (Vries et al., 2014)[3]. Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence (age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult

population. This reflects an increase in associated risk factors such as being overweight or obese. Over the past decade, diabetes prevalence has risen faster in low and middle-income countries than in high-income countries (World Health Organization, 2016)[4]. The most common symptom of diabetes is no symptom and by the time the disorder is diagnosed, an abnormal lipid profile, hypertension and retinal changes may be already present often. Diabetes is associated with a greater risk of mortality from cardiovascular disease (CVD) which is well known as dyslipidaemia, which is characterized by raised triglycerides, low high density lipoprotein and high small dense low density lipoprotein particles. It may be present at the diagnosis of type 2 Diabetes mellitus and is a component of the metabolic syndrome. Abnormal serum lipids are likely to contribute to the risk of coronary artery disease in diabetic patients [5] and the determination of the serum lipid levels in people with diabetes is now considered as a standard of the diabetes care [6]. Abnormal lipid profiles and lipoprotein oxidation (especially LDL-C) are more common in diabetes and are aggravated with a poor glycaemic control. The measurement of the lipid profile of diabetic patients is needed to investigate how their lipid metabolism is affected by diabetes, as they have

different genetic compositions and lifestyles. Hence, the present work was taken up to assess the lipid profile of a randomly selected group of adult diabetic patients and to compare them with that of the controls.

Material and Methods

The subjects for the study are selected from patients who are admitted to tertiary care hospital. The patients admitted 50 representative cases with H/O Type 2 DM are taken as subjects for the study. Age and sex matches 50 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. The blood samples were drawn in the fasting state. The venipuncture was done in the cubital fossa. Tourniquet was used but was released just before sampling to avoid artificial increase in the concentration of serum lipids. About 10 ml of blood was drawn using perfectly dry and sterile syringes, and the blood was transferred to dried glass vials.

Inclusion Criteria

- Patients with Type 2 DM of more than 40 years

- Duration of diabetes more than 4 years.

Exclusion Criteria

- Type 2 diabetes patients with concomitant diseases or condition affecting the lipid levels such as hypothyroidism, on lipostatic drugs, and thiazides.
- A detailed history and careful physical examination
- Routine blood and urine examination
- Biochemical analysis for
 - Fasting blood sugar (FBS) and post prandial blood sugar (PPBS), Fasting serum triglycerides (TGs), Total cholesterol (TC), High-density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) was estimated
 - HbA1c

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. P value was calculated.

Results:

Table 1: Age groups of study subjects

Age groups (Years)	Males	Females
41-50	06	03
51-60	17	02
61-70	12	03
71-80	03	02
>80	01	01
Total 50 subjects	39 males	11 females

Table 2 : Lipid Profile parameters in study subjects

Parameters	Diabetic subjects n=50 mean \pm SD	Normal subjects n=50 mean \pm SD	P value
Cholesterol mg/dl	170.24 \pm 20.12	142.62 \pm 16.84	<0.001
HDLmg/dl	41.24 \pm 2.6	50.24 \pm 3.50	<0.001
LDL mg/dl	110.24 \pm 36.80	65.24 \pm 25.6	<0.001
VLDL mg/dl	36.70 \pm 3.4	26.45 \pm 3.8	<0.001
Triglycerides mg/dl	180.24 \pm 16.4	130.48 \pm 21.42	<0.001
Hba1c %	8.24 \pm 2.60	4.82 \pm 0.48	<0.001

<0.001 highly significant

39 subjects were males and 11 females. 19 subjects were from age group 51-60 years. Total cholesterol, LDL, VLDL, Triglycerides, Hba1c were high in diabetic subjects as compared to normal control subjects. HDL was higher in normal control subjects. The difference between the control and the study groups was high and it was highly significant, p value <0.001.

Discussion

Type 2 DM has emerged one of the most common causes of dyslipidemic vascular complications are

believed to be critical for prognosis of DM and there development, in turn, is believed to depend on several factors such as duration, degree of control, and dyslipidemia in diabetes. It is been found that Type 2 DM suffer from dyslipidemia intune leading to various vascular complication (All Bright et al. 1989). Several workers in India (Ajagnakar and Sathi et al. 1989; Vaishnava et al. 1989; Shankar et al.) have reported that in the incidence of diabetes is greater in male then females. In our study, it is observed that 39 were males ,11 were females. This study has shown that TG, TC, LDL-C, and VLDL-

C, the lipid profile are higher significantly in diabetes than and HDL-C was significantly lower in diabetics than control groups. According Fredrick et al. 1994, Michel et al. 1989, in Type 2 DM there is significant elevation of TG, VLDL-C, and decreasing in HDL-C. Our study has shown similar results except for TC, LDL-C which are significantly elevated. The reasons for increasing TC LDL-C are increasing in the incidence of the obesity, sedentary life lack of physical activity, the diet, and risk factors like hypertension. Diabetic patients have many complications which include elevated levels of LDL-C and triacylglycerols, low levels of HDL-C and a preponderance of abnormalities in the composition of the smaller, dense particles [7]. In the present study, the results showed that the lipid and the lipoprotein profiles of the diabetics were higher than that of the controls and that they were in agreement with the findings of Idogun et al., [8] and Albrki et al., [9].

Abnormal serum lipids are likely to contribute to the risk of coronary artery disease in diabetic patients and the determination of the serum lipid levels in people with diabetes is now considered as a standard of the diabetes care [10]. Abnormal lipid profiles and lipoprotein oxidation (especially LDL-C) are more common in diabetes and are aggravated with a poor glycaemic control. The measurement of the lipid profile of diabetic patients is needed to investigate how their lipid metabolism is affected by diabetes, as they have different genetic compositions and lifestyles. Hence, the present work was taken up to assess the lipid profile of a randomly selected group of adult diabetic patients and to compared them with that of the controls.

Conclusion

From this study, it was evident that DM has a real impact on lipid metabolism. This was substantiated by the fact that all the lipid fractions were elevated

in diabetes when compared to healthy controls. Hence, hyperlipidemia is quite common in diabetes and hypertriglyceridemia is the most common abnormality.

References

1. American Diabetes Association. Diabetic retinopathy (Position Statement), *Diabetes Care.*, 2014; 27(1): 584.
2. World Health Organization. Diabetic nephropathy (Position Statement), *Diabetes Care*, 2005; 27(1):579.
3. De Vries, F.M., Kolthof, J., postma, M.J, Denig, P., and Hak, E., efficacy of standard and intensive statin treatment for the secondary prevention of cardiovascular and cerebrovascular events in diabetes patients, 2014; 9(11): e1 11247.
4. World Health Organization. (2016) Diabetic and Key Facts. <https://www.who.int/newsroom/fact-sheets/detail/diabetes> 30 October.
5. Miller M. The epidemiology of triglycerides as a coronary artery disease risk factor. *Clin. Cardiol* 1999; 22 (Suppl. II):111-16.
6. The American Diabetes Association. The management of dyslipidemia in adults with diabetes. *Diabetes Care* 1999; 22 (Suppl. I):S56-S59.
7. Haffner SM. Management of dyslipidemia in adults with diabetes. *Diabetes Care* 1998; 21: 9(1):1600-78.
8. Idogun ES, Unuigbo EI, Ogunro PS, Akinola OT, Famodu AA. Assessment of the serum lipids in Nigerians with type 2 diabetes mellitus complications. *Pak. J. Med. Sci. (Part 1)* 2007; 23(5):708-12.
9. Albrki WM, Elzouki AN Y, EL-Mansoury ZM, Tashani OA. Lipid profiles in Libian type 2 diabetes. *J.Sci.Appls* 2007; 1(1):18-23.
10. The American Diabetes Association. The management of dyslipidemia in adults with diabetes. *Diabetes Care* 1999; 22 (Suppl. I):S56-S59.