

Study of Lipid Profile in Type-2 Diabetes Mellitus

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ABSTRACT

Background and Aim: Diabetes is the commonest metabolic disorder affecting the people all over the world. The relationship between alteration of serum lipids and vascular complications is more significant in diabetics than in the general population. The aim of the study was to determine the association between lipid profile in general and triglycerides in particular with type 2 Diabetes Mellitus with respect to age, sex and duration of Diabetes in the studied patients and to study the occurrence of vascular complications in Type 2 diabetes mellitus among the studied patients.

Materials and Methods: This study was done on patients, who were admitted to Chalmeda Anand Rao Institute of Medical Sciences Hospital during a period of June 2018 to June 2019. We prospectively collected a series of 100 patients with type 2 diabetes (T2DM) and dyslipidemia, of which 50 were type-2 diabetic patients and not on Lipid lowering agent, the remaining 50 formed healthy control group. Of these fifty study patients, thirty seven were males and thirteen were females. Serum total cholesterol (TC), serum low-density lipoprotein cholesterol (LDL-C), serum very low-density lipoprotein cholesterol (VLDL-C), serum high-density lipoprotein cholesterol (HDL-C) and serum triglycerides (TG) were assayed using enzymatic estimation kit (ERBA-Diagnostics Mannheim, GmbH, Germany)

Results: A higher percentage of dyslipidemia (92%) has been found in type-2 diabetic in present study as compared western data (60%– 80 %) the major concern with this study is the high percentage of HDL dyslipidemia (72%) while LDL was 60% similar to western data (60 – 80%)⁵. While hypertriglyceridemia of more than 200 mg/dl was seen in 48% as compared to 39% of PROCAM study.

Conclusion: Results indicate a significance increase in serum VLDL, TG and LDL along with a significant decrease in serum HDL among diabetics as compared to non-diabetics.

Keywords: Diabetes, lipids, high density lipoprotein (HDL), Very low density lipoprotein (VLDL), low density lipoprotein (LDL), total cholesterol (TC)

INTRODUCTION

Diabetes is the commonest metabolic disorder affecting the people all over the world. In type – 2 diabetes mellitus with severe hyperglycemia, the clearance rate for LDL apo-B is reduced.^[1] LDL levels in type -2 diabetes mellitus can be either increased or decreased depending upon hyperglycemia.

HDL in type-2 diabetes mellitus is usually decreased due to increased rate of HDL clearance as measured by apo-A1 and apo-A2 kinetics.^[2,3] The above mentioned lipid abnormalities will lead to microvascular and macrovascular diseases in diabetic patients.^[4]

Lipoprotein abnormalities correlated with large vessel

disease are seen in diabetics and non-diabetic populations, however atherogenesis is accelerated in diabetics.^[5]

MATERIALS AND METHODS

Study Design

Hundred consecutive cases were taken for our study of which Fifty were type-2 diabetic patients and not on Lipid lowering agent. The remaining fifty formed healthy control group. Of these fifty study patients, thirty seven were males and thirteen were females.

Study Centre

The present study was undertaken at Chalmeda Anand

Rao Institute of Medical Sciences, Karimnagar from both inpatients as well as outpatients department from a period of June 2018- June 2019.

Inclusion Criteria: All adult population with mean age of 49.62 ± 8.38 years were included in the study.

Exclusion Criteria: Cases associated with renal disease, thyroid disorders, presence of jaundice, chronic liver disease, diabetes mellitus, familial hyperlipidemia (history wise), patients under therapy with lipid lowering drugs, protease inhibitors or other drugs known to alter lipid profile were excluded from our study.

Procedure

Hundred consecutive cases were taken for our study of which Fifty were type-2 diabetic patients and not on Lipid lowering agent. The remaining fifty formed healthy control group. Of these fifty study patients, thirty seven were males and thirteen were females. In all the above cases detailed clinical examination was done considering the inclusion and exclusion criteria. Fasting blood samples

from all the diabetic patients as well as controls were collected early morning between 8.00 AM to 9.00 AM. Serum total cholesterol (TC), serum low-density lipoprotein cholesterol (LDL-C), serum very low-density lipoprotein cholesterol (VLDL-C), serum high-density lipoprotein cholesterol (HDL-C) and serum triglycerides (TG) were assayed.

Ethics Approval

This study was reviewed and approved by the Institute Ethics Committee, CAIMS, Karimnagar.

RESULTS

Table 1: Age and Sex Distribution

Age in years	Males	Percentage	Females	Percentage	No.
30-39	5	10%	2	4%	7
40-49	13	26%	4	8%	17
50-59	16	32%	5	10%	21
60-69	3	6%	2	4%	5

Table 2: Mean and Standard deviation observed in the Study

Parameter	Total (Diabetics)	Male (Diabetics)	Female (Diabetics)	Control Non- Diabetics)
Age In Years	49.62 ± 8.38	49.21 ± 8.77	50.76 ± 7.36	50.84 ± 9.04
Duration of				
Diabetes In Years	6.69 ± 5.30	6.71 ± 5.39	6.61 ± 5.26	---
Fbs (Mg/Dl)	183.4 ± 53.37	180.05 ± 52.80	192.92 ± 55.97	108.62 ± 10.80
Total Cholesterol				
(Tc)Mg/Dl	207.62 ± 49.79	199.29 ± 43.52	231.30 ± 60.15	163.66 ± 18.21
Triglycerides				
(Tg)Mg/Dl	224.64 ± 117.87	231.02 ± 123.49	206.46 ± 102.47	100.78 ± 17.78
Ldl (Mg/Dl)	122.04 ± 46.18	113.62 ± 7.79	146 ± 55.05	97.30 ± 17.39
Hdl (Mg/Dl)	35.64 ± 9.0	32.97 ± 7.79	470.92 ± 9.90	50.82 ± 25.14

A total of 50 patients suffering from type-2 diabetes were studied and the percentage elevation of total cholesterol among diabetics was 34% (Total Cholesterol more than 200 mg/dl) and Triglycerides was 64% (more than 150 mg/dl) HDL was 72% (HDL less than 40 mg/dl) and LDL was 60% (LDL more than 100 mg/dl), 92% of the 50 diabetics had dyslipidemia.

DISCUSSION

The present study consisted of 50 patients of type-2 diabetes who were known cases, already on treatment or freshly diagnosed but not on lipid lowering agents attending either the OPD, diabetic clinic and admitted cases were studied for the prevalence of dyslipidemia.

An interestingly higher percentage of dyslipidemia (92%) has been found in type-2 diabetic in present study as compared western data (60%– 80%) the major concern with this study is the high percentage of HDL dyslipidemia (72%) while LDL was 60% similar to western data (60 – 80%). While hyper triglyceridemia of more than 200 mg/dl was seen in 48% as compared to 39% of PROCAM study.

Low HDL < 35 mg/dl was seen in 50% while PROCAM study showed only 27% although patients with diabetes tend to have high triglycerides levels than non-diabetics some studies suggest that diabetics are not generally hyper triglyceridemic (more than 200 mg/dl).^[6]

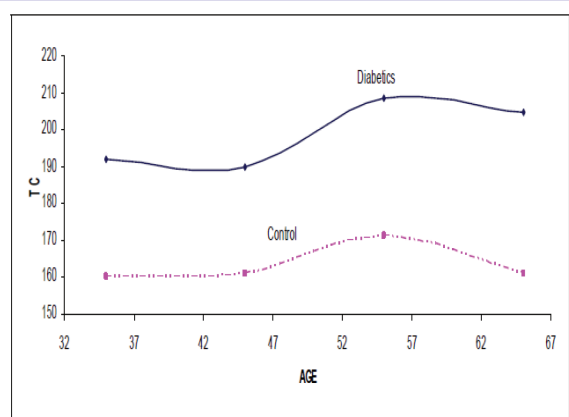


Figure 1 : Shows graphical representation of total cholesterol variation in type-2 diabetics and control with respect to age

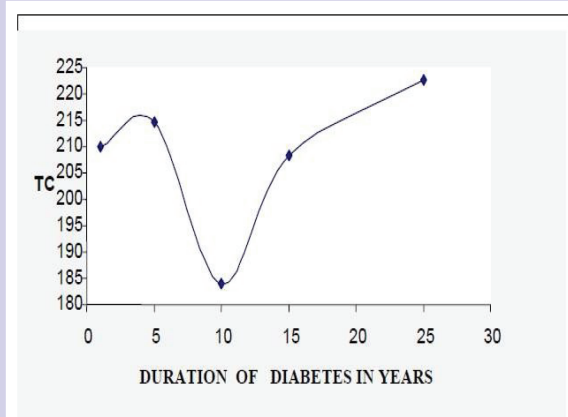


Figure 2 : Shows the graphical representation of variation of total cholesterol with respect to duration of diabetes

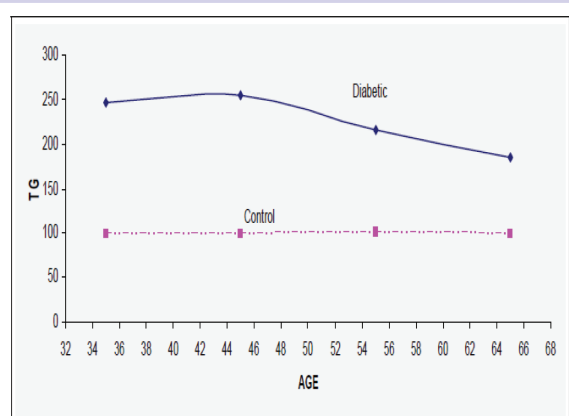


Figure 3 : Shows graphical representation of triglycerides variation in type – 2 diabetics and control with respect to age

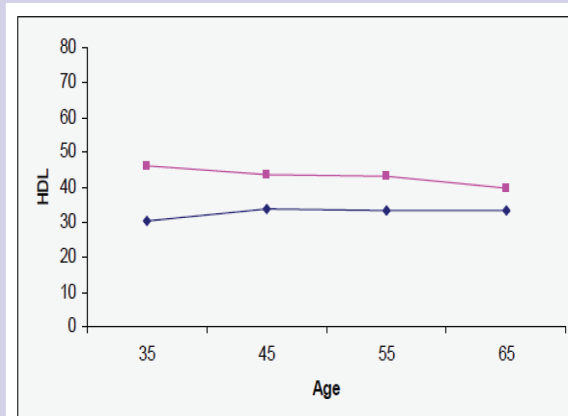


Figure 4 : Shows graphical representation of HDL variation in type – 2 diabetics and control with respect to age

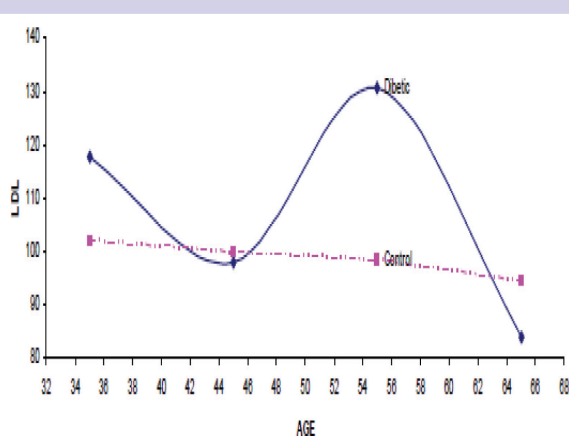


Figure 5 : Shows graphical representation of LDL variation in type – 2 diabetics and control with respect to age

In San Antonio Heart Study (1998) the median triglyceride level was 200 mg/dl and less than 5% diabetic women and 15% of diabetic men had TG levels more than 400 mg/dl where as in present study 6% of patients had TG level more than 400 mg/dl. The median LDL level was 130 – 140 mg/dl and only 25% of subjects and LDL levels of more than 155 mg/dl where as in this study 20% of the subjects had LDL more than 155 mg/dl.^[12]

In Indian studies, Udawat et al (2001) reported dyslipidemia in 89% of type-2 diabetic patients, comparable to 92% of present study, LDL hyperlipoproteinemia more than 100 mg/dl in 73% was comparable to 60% in present study. HDL dyslipidemia less than 35 mg/dl among 58% (Udawat et al) which is comparable to 50 % in present study. Hyper triglyceridemia (more than 200 mg/dl) were reported.^[13]

The UKPDS study showed that the coronary artery disease was significantly associated with increased concentration of lower density lipoprotein decreased HDL concentration and increased TG concentrations.^[14]

The earlier Indian studies have also compared the lipid profile in diabetic and non-diabetics. Bhu et al (1998) observed higher levels of cholesterol and LDL level in diabetics whereas Hardas et al 1991 found only higher triglycerides levels in diabetics.^[15, 16]

Kodali et al (1991) reported the prevalence of hyperlipidemia in 34% of type 2 diabetic subjects whereas hyperlipidemia was labeled when total cholesterol was more than 275 mg/dl and TG was more than 175 mg/dl.^[17]

Walia et al (1999) observed hypercholesterolemia in 43.6%, hypertriglyceridemia in 52.5%, HDL dyslipidemia in 42% and LDL dyslipidemia in 29.9% where dyslipidemia was labeled when total cholesterol > 200 mg/dl, HDL is less than 40 mg/dl, TG more than 150 mg/dl and LDL more than 140 mg/dl. In present study 26% was the LDL dyslipidemia noticed taking LDL value more than 140 mg/dl. The difference between the present study and the above two studies is probably due to the different cut off values taken for labeling dyslipidemia.^[18]

Recent studies conducted by Mathura K C 2005 revealed most common dyslipidemia as TG increased in 73.3% and HDL reduction in 66.7% and LDL increased in 66.7% with total cholesterol raised among 46.7%.^[19]

Diaz Gravalos G J. A spanish studies in 2006 has showed 80.2% of increased total cholesterol when TG was more than 100 mg/dl. However in the present study higher total cholesterol, TG, LDL and Lower HDL levels were documented in diabetics as compared to non-diabetics and in comparison with NCEP ATP-III guidelines.^[20]

Another US-based population study, the Framingham Offspring study, found that the prevalence of hypertriglyceridaemia (>2.75 mmol/L) was 23% in 120 men with diabetes compared with 9% in 1,878 controls (p5.5 mmol/L) was not more prevalent in men with diabetes (1.1% v 1.5% in controls), but was more prevalent in women with diabetes (11% v 0.2% in controls, p2.3 mmol/L) in 48% of 42 men with diabetes compared with 22% of 32 men with impaired glucose tolerance (IGT) and 15% of 136 controls (p=0.008). Elevated triglycerides were found in 52% of 54 women with diabetes compared with 26% of 70 women with IGT and 11% of 187 controls (p=0.0001).

Overall studies show that the crude prevalence of elevated triglycerides levels in people with diabetes is approximately 30% which is some 3-fold higher than the

prevalence in people without diabetes.

CONCLUSION

Type -2 diabetes mellitus causes alteration in the lipid profile associated with various vascular complications. 50 type-2 diabetic patients (males = 37 and female = 13) not on lipid lowering agent were compared to 50 healthy patients who were selected randomly from the patients relatives and hospital staff. The fasting blood samples of all the type-2 diabetics as well as controls were collected and serum lipid profile was assayed.

Results indicate a significance increase in serum VLDL, TG and LDL along with a significant decrease in serum HDL among diabetics as compared to non- diabetics. Total cholesterol, TG and LDL was increased among 34%, 64% and 60% of the study group when cutoff values were taken as TC>200 mg/dl, TG>150 mg/dl and LDL>100 mg/dl. HDL was reduced among 72% of the study subjects when HDL<40 mg/dl was taken as cutoff values.

The alteration of lipid metabolism of type-2 diabetics has raised a serious medical concern with respect to vascular complications like coronary artery disease, cerebrovascular diseases and the recommendation of greater routine evaluation of serum lipid profile and its treatment among both newly detected and old cases of type-2 diabetes mellitus strongly suggested.

CONFLICT OF INTEREST:

The authors declared no conflict of interest.

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