Research Article

Study of lipid profile in diabetes mellitus type-II

Dube Sushil Panditsingh[1*], S D Kaundinya[2], S U Mungal[3], Uddhav Mane[4]

{[1,3]Assistant Professor, Department of Physiology} {[4]Assistant Professor, Department of Anatomy} Dr SCGMC Nanded, Maharashtra, INDIA.
[2]Professor and HOD, Department of Physiology, Grant Medical College, Mumbai, Maharashtra, INDIA.
Email: drsushilsingh99@gmail.com

Abstract

Introduction: In long standing Diabetes Mellitus (DM), there are various complications such as Microvascular (e.g. retinopathy, neuropathies) Macrovascular (e.g. stroke, MI) and neuropathic (diabetic neuropathy). DM associated dyslipidemia is major factor responsible for development of Macrovascular complications. **Aims and Objectives**: Aim of present study is to determining lipid profile in patients with type II DM so as to assess the correlation between disordered lipid profile (dyslipedemia) and progression of disease (i.e. Type II DM) or it's complications. Material and Methods: Study group consist of 60 DM type II patients who were further divided into complicated DM (having complications) and Uncomplicated DM group. Control group consist of 30 age matching healthy subjects. Lipid profile i.e. serum cholesterol, LDL, VLDL, HDL of both study and control group was estimated by calorimeter. **Result:** The result showed that Lipid profile was increased in study group as compared to control group. Complicated DM patients group have increased level of serum Cholesterol, TG, LDL, VLDL and decreased level of HDL as compared to Uncomplicated DM patient group **Conclusion:** The present study demonstrates that a definite correlation existed between disordered lipid profile and development of chronic complication (especially macroangiopathic) in Type 2 DM patients. Hence timely intervention and appropriate treatment is necessary in diabetic dyslipedemia cases to avoid complications.
Keywords: Diabetes Mellitus, Dyslipidemia, Lipid Profile.

*

Address for Correspondence:
Dr. Dube Sushil Panditsingh, Ashirwad Niwas, Sharda Nagar, Nanded-431605, Maharashtra, INDIA.
Email: drsushilsingh99@gmail.com
Received Date: 03/05/2015 Revised Date: 11/05/2015 Accepted Date: 14/05/2015

Access this article online

Quick Response Code:

Website: www.statperson.com

DOI: 16 May 2015

INTRODUCTION

Diabetes Mellitus (DM) is probably the fastest growing metabolic disease in the world. The incidence of diabetes mellitus in human population has reached epidemic proportion worldwide at a rapid rate[1]. DM is group of metabolic disease characterized by chronic hyperglycemia resulting from defect in insulin secretion, insulin action or both.[2] Symptoms are marked hyperglycemia including polyuria, polydypsia, wight loss sometimes with polyphagia and blurred vision.[2] More than ninety percent of cases are of type II DM, paralleling in the incidence of obesity. Type II DM is heterogeneous group of disorder characterized by variable degree of insulin resistance, impaired insulin secretion & increased glucose production.[3] It is called more a disease of 'lipid' than of carbohydrate metabolism. Obesity, particularly visceral or central is vary common in Type II DM.[1] In long standing DM, there are various complications such as Microvascular (e.g. retinopathy, neuropathies) Macrovascular (e.g. stroke, MI) and neuropathic (diabetic neuropathy). The ultimate cause for Microvascular and neuropathic complication is chronic hyperglycemia[1]. However, not all type of complications depend on chronic hyperglycemia, particularly atherosclerotic and neurological lesion.[4] The atheroganetic dyslipedemia associated with DM is characterized by hypertriglyceridemia, increase in VLDL and increase in LDL and decrease in HDL[5]. Dyslipedemia and hypertension play important role in development of Macrovascular complication like coronary artery disease, peripheral vascular disease and cerebrovascular diseases[6]. The purpose of present study is that by determining lipid profile in patients with type II DM so that the quick and necessary intervention can be made to avoid future complication related to dyslipedemia. In present study, serum cholesterol, LDL, VLDL and HDL have been

How to site this article: Dube Sushil Panditsingh, S D Kaundinya, S U Mungal, Uddhav Mane. Study of lipid profile in diabetes mellitus type-II. *International Journal of Recent Trends in Science and Technology* May 2015; 15(1): 132-136 http://www.statperson.com (accessed 18 May 2015).

measured in type II DM patients, in order to assess the correlation between disordered lipid profile (dyslipedemia) and progression of disease (i.e. Type II DM) or it's complications.

MATERIAL AND METHODS

The present study was conducted in Grant Medical College & Sir J.J.Group of Hospitals, Mumbai. The study was done to determine lipid profile in patients with type II DM so that further complications related to dyslipedemia can be decreased. All subjects were between the age group 35-60 years, including both sexes, male as well as female. The type 2 DM patients were selected from the diabetic clinic, J .J. Hospital, Mumbai. The diagnostic criteria for DM issued by National Diabetes Data Group and WHO was applied as follows.

1. Symptoms of DM and random blood glucose concentration 200mg percent OR Fasting plasma glucose is 126 mg percent OR Two hour plasma glucose is 200 mg percent during oral glucose tolerance test.

All the patients were maintained on antidiabetic treatment like oral hypoglycemic drugs, diet and exercise. None of the patient was having injectable insulin for the control of blood sugar neither they were taking antilipid drugs. Study population was divided into three groups containing 30subjects in each group. During selection of subjects following exclusion criteria was applied to all three groups.

1. History of smoking, alcoholism and Hypertension.
2. Subjects with obesity.
3. Patients having antilipid treatment.

Group I: It consist of 30 healthy subjects selected from staff members of Grant medical College.

Group II: It consists of 30 patients having Uncomplicated type 2 DM.

In This group, type 2 DM patients were selected such that none of them was suffering from diabetic related complications like coronary artery disease, peripheral vascular disease. Retinopathy etc. These complication were ruled out by related investigations like fundoscopy, ECG, urine test for microalbuminuria

Group III: This group consists of 30 patients having complicated type 2 DM. In this group, type 2 DM patients having various complications like diabetic retinopathy, diabetic neuropathies, CHD, Hypertension were included. Written consent and ethical committee approval was taken. Under all aseptic precautions, intra-cubital venous blood sample for serum analysis for lipid profile was collected from the subjects (Group I, Group II, Group III) at least after eight hours of fasting. The sera separated by centrifuge machine were used for estimating lipid profile i.e. serum cholesterol, LDL, VLDL, HDL by calorimeter. Data of lipid profile were presented as the Mean ± Std. Deviation for each of the parameter. Data was analyzed by using statistical software Open Epi Version 3.03a for percentages and unpaired 't' test. The level of significance was determined at less than 0.05.

OBSERVATIONS AND RESULTS

The present study was done to measure lipid profile i.e. serum Cholesterol, LDL,VLDL, HDL in type 2 DM patients and compare results with normal healthy subjects in order to assess the correlation between disordered lipid profile (Dyslipedemia) and progression of disease or it's complications. The major factors affecting lipid levels like cigarette smoking, alcoholism, obesity and hypertension were eliminated from the study group so as to avoid influence of these factors directly on lipid profile and on the complications due to dyslipedemia.

Table 1: Mean age in control (Group I), Uncomplicated DM (Group II), Complicated DM (Group III)

Groups	Mean Age (Years)
I (Control)	44.03
II (Uncomplicated DM)	42.83
III (Complicated DM)	55.93

Table 2: Comparison of Lipid Profile in control (Gr. I) and Uncomplicated DM (Gr. II)

Lipid Profile	Group	No. of patients	Mean	Std Deviation	p value
Serum Cholesterol	Control	30	171.70	30.534	$p < 0.05$
	Uncomplicated DM	30	246.20	54.464	
TG	Control	30	122.50	27.952	$p < 0.05$
	Uncomplicated DM	30	148.13	63.310	
HDL	Control	30	48.47	8.080	$p > 0.05$
	Uncomplicated DM	30	44.93	10.954	
LDL	Control	30	104.63	29.566	$p < 0.05$
	Uncomplicated DM	30	170.37	53.498	
VLDL	Control	30	25.33	5.148	$p < 0.05$
	Uncomplicated DM	30	30.40	13.029	

Table 2.Comparison of different parameters of serum lipid profile between control (Gr. I) and uncomplicated DM Patients (Gr. II).It was found that mean ± S.D. of serum Cholesterol, triglyceride, LDL,VLDL & HDL in Control (Gr. I) were 171.70 ± 30.534, 122.50 ± 27.952, 104.63±29.566, 25.33±5.148, 48.47±8.080 respectively. While Mean± S.D of serum Cholesterol, triglyceride, LDL,VLDL & HDL in Uncomplicated DM (Gr.II) were found to be 246.20±54.46, 148.13±63.31, 170.37±53.50, 30.40±13.02 & 44.93±10.95 respectively. This demonstrate that average concentration of serum Cholesterol, triglyceride, LDL & VLDL were increased significantly in Uncomplicated DM group (Gr. II) as compared to control group (Gr.I) which is statistically significant ($p < 0.05$). The average concentration of HDL was decreased in Uncomplicated DM group (Gr.II) as compared to control group (Gr.I), though the decrease in HDL concentration was not statistically significant ($p > 0.05$).

Table 3: Comparison of Lipid Profile in control (Gr.I) and Complicated DM (Gr. III)

Lipid Profile	Group	No. of patients	Mean	Std Deviation	p value
Serum Cholesterol	Control	30	171.70	30.534	p < 0.05
	Complicated DM	30	290.67	57.231	
TG	Control	30	122.50	27.952	p < 0.05
	Complicated DM	30	192.77	93.523	
HDL	Control	30	48.47	8.080	p > 0.05
	Complicated DM	30	43.20	7.631	
LDL	Control	30	104.63	29.566	p < 0.05
	Complicated DM	30	209.27	55.800	
VLDL	Control	30	25.33	5.148	p < 0.05
	Complicated DM	30	38.53	18.717	

Table 3 showed comparison of different parameters of serum lipid profile between control (Gr. I) and Complicated DM Patients (Gr. III).It was found that mean ± S.D. of serum Cholesterol, triglyceride, LDL, VLDL & HDL in Control (Gr. I) were 171.70 ± 30.534, 122.50 ± 27.952, 104.63±29.566, 25.33±5.148, 48.47±8.080 respectively. While Mean± S.D of serum Cholesterol, triglyceride, LDL,VLDL & HDL in Complicated DM (Gr. III) were found to be 290.67±57.23, 192.77±93.52, 209.27±55.80, 38.53±18.72 & 43.20±7.63 respectively. This demonstrate that average concentration of serum Cholesterol, triglyceride, LDL & VLDL were increased significantly in Complicated DM group (Gr. III) as compared to control group (Gr.I) which is statistically significant ($p< 0.05$). The average concentration of HDL was decreased in Complicated DM group (Gr.III) as compared to control group (Gr. I), though the decrease in HDL concentration was not statistically significant ($p> 0.05$).

Table 4: Comparison of Lipid Profile in Uncomplicated DM (Gr.II) and Complicated DM (Gr. III)

Lipid Profile	Group	No. of patients	Mean	Std Deviation	P value
Serum Cholesterol	Uncomplicated DM	30	246.20	54.464	p> 0.05
	Complicated DM	30	290.67	57.231	
TG	Uncomplicated DM	30	148.13	63.310	p> 0.05
	Complicated DM	30	192.77	93.523	
HDL	Uncomplicated DM	30	44.93	10.954	p>0.05
	Complicated DM	30	43.20	7.631	
LDL	Uncomplicated DM	30	170.37	53.498	p> 0.05
	Complicated DM	30	209.27	55.800	
VLDL	Uncomplicated DM	30	30.40	13.029	p> 0.05
	Complicated DM	30	38.53	18.717	

Table 4 showed comparison of different parameters of serum lipid profile between Uncomplicated DM Patients (Gr. II) and Complicated DM Patients (Gr. III).It was found that mean ± S.D. of serum Cholesterol, triglyceride, LDL, VLDL & HDL in Uncomplicated DM (Gr. II) were 246.20±54.46, 148.13±63.31, 170.37±53.50, 30.40±13.02 & 44.93±10.95 respectively. While Mean± S.D of serum Cholesterol, triglyceride, LDL,VLDL & HDL in Complicated DM (Gr. III) were found to be 290.67±57.23, 192.77±93.52, 209.27±55.80, 38.53±18.72 & 43.20±7.63 respectively. This demonstrate that average concentration of serum Cholesterol, triglyceride, LDL & VLDL were increased in Complicated DM group (Gr. III) as compared to Uncomplicated DM (Gr. II). Though the increase was not statistically significant ($p> 0.05$).The average concentration of HDL was decreased in Complicated DM group (Gr.III) as compared to Uncomplicated DM (Gr. II), though the decrease in HDL concentration was not statistically significant ($p> 0.05$).

Table 5: Showing mean duration of disease in Gr II and Gr III

Group	N	Mean duration of disease (Years)	Std. Deviation
Uncomplicated DM (Gr. II)	30	3.80	1.44
Complicated DM (Gr. III)	30	9.70	2.65

Table 6: Showing Patients with Microvascular and Macrovascular complication in Group III

Group	N	Microvascular	Macrovascular
Complicated DM (Gr. III)	30	03(10%)	27(90%)

DISCUSSION

In present study, Diabetic patients show significant increase in serum Cholesterol, TG, LDL and VLDL with decrease in serum HDL when compared with control group. The average concentration of serum Cholesterol, triglyceride, LDL & VLDL were increased and the average concentration of HDL was decreased in Complicated DM group (Gr. III) as compared to Uncomplicated DM (Gr. II). This study results are in agreement with study done by Bhalla Kapil et al, they found significantly elevated lipid levels in diabetic group when compared with study subjects but comparison of mean values of complicated and uncomplicated group reveals (though higher in complicated) that the difference between two groups was not statistically significant. Results supporting our study are also observed by others. McKenney JM and Taskinen MR found that in DM lipid disorder most often encountered are increased VLDL, LDL and low levels of HDL. Ginsberg HN et al found that diabetics have abnormal plasma lipid and lipoprotein concentration which is characterized by increased plasma VLDL, decreased HDL. Whereas Goldberg RB found LDL and total cholesterol levels of diabetic patients were similar as that of non diabetics but triglyceride levels were usually higher in those with diabetics. Oki JC observed that hypertriglyceremia combined with reduced HDL is the most common dyslipedemia associated with patients with type 2 DM .But essentially any pattern of dyslipedemia may be present. This significant increase in serum concentration of total cholesterol and LDL cholesterol clearly suggest that the risk of developing various complications related to dyslipedemia was definitely increased in diabetics. Laakso M found that increased total cholesterol is powerful risk factor for CHD in Type 2 DM patients and high total TG and low HDL may be ever stronger risk factor for CHD in Type 2 DM patients than non-diabetics. Taha D observed that increased risk of coronary artery disease in patients with type 2 DM is partly due to the lipoprotein abnormalities associated with DM. Falko JM et al reported that in type 2 DM there is increased risk of cardiovascular disease due to dyslipedemia which is characterized by low HDL and increased TG rich LDL. Markel M also found that increased LDL and decreased HDL significantly increases athrogenesis and cardiovascular risks in DM. In present study,90% patients of complicated group were suffering from Macrovascular complications mainly cardiac related complications like hypertension, IHD, angina pectoris whereas 10% of total patients were suffering from microvascular and other complications like Retinopathy, neuropathy. Goldberg R B stated that Atherosclerosis accounts for around 80% of all morbidity caused by diabetes and for most hospitalization necessitated by the complications of diabetes[10]. Falko J M found that combined approaches with diatery fibers or other agents with anti-lipid drugs to reduce cardiovascular complication caused by dyslipidemia in DM[14]. The possible reason for high serum cholesterol in diabetes may be due to decrease muscular exercise or inhibition of cholesterol catabolism. Also Lipoprotein Lipase enzyme, which removes TG from VLDL is activated leading increased level of VLDL,LDL and TG in DM. The Negative relationship between HDL and LDL leads to decreased HDL in DM or in addition there may be increased catabolism of HDL[1].

CONCLUSION

The present study demonstrates that a definite correlation existed between disordered lipid profile and development of chronic complication (especially macroangiopathic) in Type 2 DM patients. About 90% of Type 2 DM patients with systemic complications were suffering from cardiovascular events. This shows that significant relationship between cardiovascular morbidity and dyslipedemia in Type 2 DM patients. Hence timely intervention and appropriate treatment is necessary in diabetic dyslipedemia cases to bring back the serum lipid profile to near normal levels in order to prevent or decrease future long term complications related to it. Lastly, present study suggest that further detailed studies are also required to know the influence of various other factors like smoking, obesity, alcohol etc. affecting serum lipid profile and to obtain more precise correlation between dyslipedemia and DM and also to evaluate the effect of anti-lipid therapy in case of DM.

REFERENCES

1. William F. Ganong, Review of Medical Physiology, 21St Edition; 357-358,345-346,306-308; 340,310-311.

2. Classification of diabetes WHO, Definition, Diagnosis, Classification of Diabetes Mellitus and its complication.
3. Harrison's Principle of Internal Medicine, 16th Edition, 2nd Volume; 2152,2157,2162,2167.
4. Bhalla Kapil et al. Glycosylated protein and serum lipid profile in complicated and uncomplicated NIDDM patients Indian Journal of Clinical Biochemistry,1995,10(2),57-61.
5. Watson KE,Horowitz B N,Matson G. Lipid abnormalities in insulin resistance states. Rev. Cardiovascular Med. 2003; 4(4); 228-36.
6. Garber. Attenuation cardiovascular risk factors in patients with type 2 diabetes mellitus. Am Fam Physician 2000 Dec 15; 62(12)2633-42, 2645-46.
7. Mckenney J M. Understanding and treating dyslipidemia associated with NIDDM and hypertension. Pharmacotherapy 1993; Jul-Aug; 13(4); 340-52.
8. Ginsberg H N, Tuck C. Diabetes and dyslipedemia. Fail Monit, 2001, 2(1):14-20.
9. Taskinen M R.Diabetic dyslipidemia. Atheroscler Suppl.2002 May ;3(1): 47-56
10. Goldberg R B. Hyperlipidemia and cardiovascular risk factors in patients with type 2 diabetes. Am J Manag Care 2000Aug; 6(13); 682-91.
11. Oki J C. Dyslipidemia in Patients with diabetes mellitus. Classification and risks and benefits of therapy. Pharmacotherapy 1995 May –June; 15(3); 317-37.
12. Laakso M. Dyslipidemia, morbidity and mortality in NIDDM. J Diabetes Complication, 1997Mar-Apr; 11(2):137-41.
13. Taha D. Hyperlipidemia in children with type 2 diabetes mellitus, I Paed Endocrino Metabolism 2002 April; 15 Suppl; 1:505-7.
14. Falko JM et al. Cardiovascular disease risk of the type 2 diabetes mellitus and metabolic syndrome, Focus on aggressive management of dyslipidemia. Curr Diabetes Rev. 2005 May; 1(2):127-35.
15. Merkel M. Diabetes Dyslipidemia; beyond LDL. Dtch Med Wochenschr.2009 May; 1349(20); 1067-73.

Source of Support: None Declared
Conflict of Interest: None Declared