

ANALYSIS OF EFFECT OF LIPID PROFILE ON CONTROLLED/UNCONTROLLED DIABETES MELLITUS AND EVALUATING LINK BETWEEN DIABETES, DYSLIPIDAEMIA AND CORONARY ARTERY DISEASE

Nileshwari Vala*, Gitesh Dubal**,

*Associate Professor, **Tutor, Department of Physiology, Shri M. P. Shah Medical College, Jamnagar 361 008

Background & objectives: With triad of diabetes, dyslipidaemia and coronary artery disease on rise WHO and IDF coined term called metabolic syndrome encompassing all three components. Hence it's imperative to study effects of lipid profile abnormalities not only on diabetes mellitus but also with coronary artery diseases.

Methods: In total, 50 cases of Type 1 DM, 50 cases of Type 2 DM, 50 cases of control were included in present study which was conducted at Guru Gobindsinh Hospital, Jamnagar by Physiology department, M. P. Shah medical college, Jamnagar, Gujarat, India. History taking and clinical examination were conducted to identify associated coronary diseases. Apart from FBS and urine sugar, lipid profile (i.e. S. Cholesterol, S. Triglyceride, S. HDL, S. VLDL, S. LDL) was done using enzymatic colorimetric tests. Prior consent was taken from patients.

Results: In type 1 DM, uncontrolled diabetes patients had higher level of S. Cholesterol, S. Triglyceride, S. VLDL and S. LDL and low level of HDL compared to controlled diabetes patients. Similar results were obtained in Type 2 DM as well. In Type 1 DM, 5 out of 50 cases were having coronary diseases associated with DM while in Type 2 DM nearly 18 cases out of 50 were having associated coronary condition indicating that CAD is more associated with Type 2 than Type 1 DM. **Interpretation & conclusion:** Incidence of CAD in male and female patients in present study was 22 & 11 respectively and nearly 33% population had CAD with DM. Similar observations were found in Mrunalini et al⁸ study with 33% and Lento S. et al⁶ study with 39.09%. High mortality in DM is mainly associated with cardiovascular complications which are in turn because of high blood sugar, dyslipidaemia and other associated blood coagulation and vascular factor deficiencies or abnormalities.

Key Words: Diabetes mellitus, Coronary artery diseases, Dyslipidaemia, Metabolic Syndrome.

Author for correspondence: Dr. Gitesh Dubal, Department of Physiology, Shri M. P. Shah Govt. Medical College, Jamnagar – 361008.e- mail: giteshdubal@gmail.com

Introduction:

Diabetes mellitus can occur either due to lack of insulin or lack of action of insulin on peripheral cells. High blood sugar level is being associated with insulin resistance. Recent studies show that insulin resistance is found to be associated with abnormal plasma lipoproteins¹. DM was found to be associated with hypercholesterolemia, essential hypertension and thus WHO² (World Health Organization) and IDF³ (International Diabetic Federation) started using the term "Metabolic Syndrome" to encompass all three components. Thus it's imperative to find how much effect lipid profile abnormalities have diabetes mellitus in controlled and uncontrolled state. Also how much dyslipidaemia has links between diabetes mellitus and coronary artery syndrome.

Material and Methods:

Present study was conducted by Physiology department, Shri M. P. Shah Govt. medical college, Jamnagar and research was carried out at Shri Guru Gobindsinh Govt. Hospital, Jamnagar. In total

of 100 diabetic cases were included in study out of which 50 cases were of Type 1 DM and 50 cases were of Type 2 DM. Another 50 cases were included as healthy, normal volunteers in age group of 13 to 75 yrs. as control corresponding to similar age group in Type 1 and Type 2 DM. They were of comparable age, sex and physical activity. They were non-smoker, not taking tobacco and free from any other metabolic or organic disorder. Age, sex, duration of diabetes mellitus, family history of diabetes and detailed drug history was recorded. Exclusion criteria were: diabetic keto acidosis, diabetic nephropathy, hypothyroidism, obstructive liver diseases, acute hepatitis, SLE, Lymphoma, Multiple myeloma, pregnancy, pancreatitis, porphyria and renal diseases. Prior consent was taken from patients and information sheet regarding details of study was given. History taking and clinical examination was carried out for all cases in to find patients with coronary artery diseases and following lab investigations were performed: Urine sugar, FBS, Total cholesterol, Serum triglyceride, Serum HDL, Serum LDL, Serum

VLDL and PP2BS. Blood was collected using venepuncture before meal (FBS) and after 2 hours of meal (PP2BS). FBS sample was also used for lipid profiling. Enzymatic calorimetric method was used for lipid profile estimation. For blood sugar estimation enzymatic glucose oxidase peroxidase method was used.

Result:

Following tables will show lipid profile in controlled and uncontrolled DM in both Type 1 and Type 2. Also a table showing association of diabetes, dyslipidaemia and coronary artery disease will be shown.

TYPE 1 DM					
Diabetes Mellitus	Mean S. Cholesterol (mg%)	Mean S. Triglyceride (mg%)	Mean S. HDL (mg%)	Mean S. VLDL (mg%)	Mean S. LDL (mg%)
Uncontrolled (48)	214.27	142.02	48.56	28.64	137.06
Controlled (2)	190.63	120.34	50.90	25.07	115.71

Table 1: Effect of diabetes control on lipid profile in Type 1 DM

TYPE 2 DM					
Diabetes Mellitus	Mean S. Cholesterol (mg%)	Mean S. Triglyceride (mg%)	Mean S. HDL (mg%)	Mean S. VLDL (mg%)	Mean S. LDL (mg%)
Uncontrolled (40)	286.22	257	34.90	51.49	192.82
Controlled (10)	277.81	246.01	39.42	49.04	188.99

Table 2: Effect of diabetes control on lipid profile in Type 2 DM

In both Type 1 DM and Type 2 DM values of S. cholesterol, S. Triglyceride, S. LDL & S. VLDL were high, serum HDL was low in subjects with uncontrolled status in contrast to controlled subjects.

Type 1 DM			Type 2 DM		
AGE	MALE	FEMALE	AGE	MALE	FEMALE
40-49	1	1	40-49	2	0
50-59	2	1	50-59	6	4
-	-	-	60-69	3	1
-	-	-	>70	1	1
Total	3	2	Total	12	6
TOTAL = 5			TOTAL = 18		

Table 3: Diabetes, Dyslipidaemia & Coronary artery diseases

From above mentioned table it is clear that coronary artery diseases are more common in type 2 diabetes mellitus with significant incidence after 4th decade of life & more common in males.

Incidence of CAD was maximum in 50-59 age group in the both types of diabetes. All the patients having diabetes with CAD and significant lipid profile abnormalities in from of increased level of LDL, triglyceride & decreased level of HDL.

Discussion:

It is evident in present study that value of Serum lipids is high in uncontrolled diabetes in comparison of controlled subjects of both Type 1 & Type 2 DM. Similar observations were in T Salamanderis et al⁴ & Valverko AH. et al⁵ studies in Type 1 DM & Type 2 DM respectively.

Changes in lipid profile and diabetes are directly relates to control glycototoxicity of hyperglycaemia, insulin deficiency & insulin resistance are key to abnormal lipid profile in diabetes.

Incidence of coronary artery disease (CAD) in diabetic patients in present study for males & females is 22 & 11 respectively. With 33% (33/100 cases) having coronary artery disease we can predict that nearly one third diabetic patients suffer from associated coronary diseases also. Similar observations were found in Lento S. et al⁶

study in which out of 1059 cases 253 were males and 161 were females suffering from coronary diseases. Also in this study 39.09% (414/1059 cases) were having associated CAD along with DM. In another study of Bahia L et al⁷, 55 cases were included in study and out of that 16 were males and 8 were females suffering from CAD with DM thus totalling around 24 out of 55 making nearly 44% cases suffering from CAD and DM simultaneously. Also in Mrunalini Kulkarni et al⁸ study 33% incidence of CAD was observed out of 5963 patients and in D-Pabloz PL et al⁹ study 21% incidence of CAD was observed.

Significant increase in incidence of coronary artery disease was attributed to high plasma glucose level, high triglyceride, high level LDL & low level HDL. Mechanism of accelerated atherosclerosis in patients with diabetes mellitus is complex. Exact mechanism is not known but following are probable contributing factors: increase level of -- LDL, platelet aggregation, Thromboxane A2 synthesis, clotting factor 8, VWF factor and tissue plasminogen activator inhibitor & decrease level of – HDL, endothelin-1, Nitric Oxide level in aorta.

The overall picture emerging from this study is that diabetic patients are likely to have abnormal lipid profile, irrespective of Type 1 DM or Type 2 DM. Lipid profile can be corrected with good glycaemic control, physical exercise & diet modification.

Conclusion:

The complications like cardiovascular in DM play major role in diabetes related mortality. The important impact of dyslipidaemia on these complications requires undivided attention throughout the course of disease. Subjects with Type 1 DM have onset of diabetes at early age while with Type 2 DM have onset at later age. Mainly Type 2 DM subjects have relation with risk factor such as positive family history & obesity. While Type 1 DM subjects usually have no relation with such risk factors. Type 2 DM subjects are dyslipidaemic, which is characterized by elevated Triglyceride, S. cholesterol, s. LDL, S. VLDL with low HDL such dyslipidaemia is not significant in Type 1 DM subjects. Control of diabetes play significant role in alteration of lipid profile, as subjects with uncontrolled diabetes mellitus are more dyslipidaemia than those of controlled. Increase in incidence of CAD in individuals with Type 2 DM is

attributed to high plasma glucose level, high triglyceride level, high LDL level & low HDL level.

References:

1. Website: <http://care.diabetesjournals.org/content/27/6/1496>
2. Website: http://apps.who.int/iris/bitstream/handle/10665/66040/WHO_NCD_NCS_99.2.pdf;jsessionid=8DD10EE0FF056AD83F5590FB15B91D11?sequence=1
3. Website: <https://www.idf.org/e-library/consensus-statements/60-idfconsensus-worldwide-definition-of-the-metabolic-syndrome.html>
4. T Salamanderis C, Panagiotopoulos S, Allen T. J. et al. Long term Intra individual variability of serum lipids in patients with Type 1 & 2 diabetes: Journal Diabetes complications 1998; 12: 208-14.
5. Valverkov AH, Chtup R. Ficker L. Et al. Complementary insulin therapy improves blood glucose & serum lipid parameters in Type 2 DM. Exp. Clin. Endocrinal Diabetes 1997; 105 Sup. II 74-7.
6. Lento S., T. Ronnema, S.M. Haffner et al. Dyslipidemia and hyperglycemia and coronary heart diseases in middle aged patients with type 2 diabetes mellitus. Diabetes 1997; 46: 1354-1359.
7. Bahia L., Gomes M.R., da Cruzpdi M. et al Coronary artery diseases, microalbuminuria & Lipid profile in patient with type 2 diabetes mellitus, Archives of Brazil Cardiology 1999; 73: 11-22.
8. Mrunalini Kulkarni, Peter D. Reven Heart Protection Study, Current Diabetes Report; 2002; 69-73.
9. Dc Pablos P. L., Martinez J., Martinez M.P. et al, Prevalance of Micro & Macro albuminuria in a Canadian Population of type 2 DM. Diabetes Metabolism 1998; 24: 337-43.

Disclosure: No conflicts of interest, financial, or otherwise are declared by authors