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A COMPARATIVE STUDY OF LIPIDS IN LATE COMPLICATION OF DIABETES

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ABSTRACT

An attempt is made in the present study to find out whether there is correlation between blood sugar value and severity of complications. There is no statistically relationship between degree of hyperglycemia and occurrence of late complication. However the advantages of ideal glycemic and lipid control in a diabetic individual can be prevent the further complication. Controversial reports are available regarding the role of glycemic control over complication diabetes. Several reviews concluded that there is a definite relationship between hyperglycemia and complication. However some of the recent studies indicate poor correlation between degree of hyper glycemia and severity of diabetic nephropathy, neuropathy and retinopathy.

INTRODUCTION

Diabetes mellitus is a syndrome characterized by chronic hyperglycemia and distribution of carbohydrate, fats and protein metabolism associated with absolute of relative deficiencies in insulin secretion or insulin action. Diabetes tends to run in families and associated with accelerated atherosclerosis and predispose to certain specific vascular abnormalities including retinopathy, nephropathy and neuropathy. It is now a leading cause of adult blindness, renal failure, gangrene, myocardial infarction and store. There is also lessening of resistance to infection especially if the diabetes is poorly controlled. Diabetes Mellitus is a very common cause of secondary lipoproteinemia. The most common abnormality seen in diabetes is hyper triglyceridemia, which is due to an increase in the level of VLDL (1).

Diabetes mellitus is a multi-factorial disease that has a significant impact on the health, quality of life expectancy of patients, as well as on the health care system. A survey on worldwide reported that presently there are more than 150 million diabetic patients and the number is expected to grow to more than 300 million people in the year 2025 (2). Diabetes is characterized by hyperglycemia together with biochemical alterations of glucose and lipid metabolism (3). These traits are hypothesized to be responsible for the changes in the circulatory and tissue lipids, that in turn play an important role in the development of micro- and macro-vascular complications (4).

Hyper triglyceridemia occurs in both IDDM and NIDDM when untreated and reverts to the normal state with therapy to control hyperglycemia. HDL levels very depending on the type of diabetes, the degree of triglyceridemia the treatment and the presence or absence of other factors, such as obesity and medication, HDL levels frequently are dispersed in Non Insulin Dependent Diabetes (5).

Treatment of NIDDM with oral agents or insulin also increases HDL Levels. Any therapy that reduces hyperglycemia will lead to improvement in VLDL levels in both types of diabetes patients. Hypertriglyceridemia appears to be the most important lipid related cardiovascular risk factor in diabetes in association with low level of HDL. Treatment of the IDDM result in normalization of HDL levels (6).

HDL is decreased in diabetes in the presence of hyper triglyceridemia. This is in part due to exchange of cholesteryl esters in the HDL core for the triglycerides. When defects in VLDL catabolism result in decreased transfer of un-esterified cholesterol to HDL, HDL levels falls as a result of its increased catabolism (7). Hyperlipidemia is also frequently seen in the patients with renal failure. There is a block in cholesterol ester transfer in diabetes, which is

thought to result from the high free cholesterol content of LDL and VLDL particles in diabetes. HDL cholesterol levels may also be further reduced in NIDDM due to elevated hepatic lipase activity which is thought toe be involved in HDL catabolism.

Diabetes has an increase risk for all manifestations of atherosclerosis including coronary, cerebro-vascular and peripheral vascular disease (8). Insulin has been shown to partially regulate LDL receptor binding and internalization resulting in the decreased LDL catabolism and rise in plasma LDL concentration in insulin deficiency (9). TG levels in an independent risk in cardiovascular disease. Patients with diabetes mellitus have an increased risk of premature atherosclerosis which may be due to in part to increased oxidisability of LDL (10).

METHODOLOGY

One hundred and fifty cases of diabetes with other complications and fifty case of diabetes without any complication were selected for this study. Fifty normal persons were used as control all the test groups are belongs to NIDDM. The patients and the normal person included in the study belonged to 33 to 65 years of age. The sample from the patients was collected from Medical College, Thanjavur.

The venous blood samples were drawn for the estimation of blood glucose, blood urea, serum Creatinine. The 12 hours fasting sample was collected for the estimation of serum cholesterol, triglycerides and HDL cholesterol.

Detail of each group:

All the cases selected for the study are grouped into five groups

Group -1 – normal

Group -2 - diabetic patient with nephropathy

Group – 3 - Diabetic patients ulcereties (Diabetic foot)

Group - 4- diabetic without any other complication

Group1- normal 25 persons were studied in this group among 25, 20 male and 5 are female.

Group2: diabetic patient with nephropathy, 25 persons were studied in this group among the twenty five 22 are male and 3 are female.

Group3: Diabetic patients ulcereties (Diabetic foot) 25 persons were studied in this group among the twenty five 21 are male and 4 are female.

***Group* 4**: diabetic without any other complication 25 persons were studied in this group among the twenty five 23 are male and 3 are female. The nature and duration of treatment given to the patients and the habits of the patients were noted.

RESULT AND DISCUSSION

The results of the present study are given in the table1 to table 6. Diabetic mellitus is a complex metabolic disorder, the diagnosis of diabetic mellitus is usually easy; but it is difficult to predict the course and complication because of wide variety of influence such as metabolic, hormonal genetic and socio economic.

Blood sugar:

In this study it is observed that the blood sugar level (table-1) is elevated in the all the test groups when compared to the normal control group.

TABLE 1: Shows random blood sugar values in mgs/100 ml in normal control group (Group-1)and test groups.

	Group 1	**Group 2**	**Group 3**	**Group 4**
Mean	85.00	163.2	215	206
S.E	4.46	9.13	19.46	52.01
Range	65 - 110	120 - 230	120 - 335	100- 300
As % of control	-	192	247	242
Level of significance	-	0.05	0.05	0.05

Vascular disease was directly influenced by metabolic derangements reflected by carbohydrate intolerance based on the contention that capillary basement membrane thickening is related to the duration of carbohydrate intolerance. With improved glycemic control, there is thinning of thickened capillary basement membrane (11). Regarding the effect of blood glucose on late complication literature shown that slight hyper glycemia could cause near maximum risk and progressive increase of hyper glycemia could result only little change on complication of diabetes (12). Many others factor both genetic and environmental have cost important influence and determining the risk and rate of several long term complication in diabetes.

Lipids in diabetic complication:

The lipoprotein profile of an individual with NIDDM is the results of a number of a different influence and represents a more complex picture than in IDDM (13). The exact sequence of events is still not well understood, but it is becoming increasingly clear those lipid disturbances occurs early in the process and indeed are predicted of the development of NIDDM.

Serum cholesterol:

In this study it is observe that, there is no statistically significant elevation in serum cholesterol level between the control group and test groups except Group -2 (Table -2). And also there is no significance correlation between blood sugar level and serum cholesterol level. (Table -3) The total cholesterol and low density lipoprotein levels however, were not statistically different between normal and diabetic persons observed no significance difference in total cholesterol.

TABLE -2 Shows the serum cholesterol level in mgs / 100 ml in normal control group and in test groups

	Group 1	Group 2	Group 3	Group 4
Mean	193	253.5	212	235
S.E	9.7	9.13	13.7	11.8
Range	152-248	210-340	152-252	178 - 315
As % of control	-	131	109	121
Level of significance	-	0.05	N.S	N.S

TABLE -3 Shows the correlation between blood sugar and lipid profile:

	Group 2	Group 3	Group 4
Blood sugar (mg / dl)	142- 164	169 - 245	100- 234
Serum cholesterol (mg / dl)	224- 320	145 – 252	315 - 244
Serum tri glycerides (mg / dl)	105 – 193	75 -116	109- 204
Serum HDL cholesterol (mg / dl)	38 – 54	40 – 64	44- 54
Serum LDL cholesterol (mg / dl)	134 - 256	83 - 184	108- 241

Serum triglycerides:

In our study it is observed that there is an elevation in serum tri glycerides level in Group-2 (Diabetic nephropathy) and Group -4 (diabetic without any other complications) Table -4. and also no correlation between blood sugar level and serum tri glycerides level (Table -3). Elevation of tri glycerides and depression of HDL cholesterol appear predominant in NIDDM, with some but not all (14). The hyper triglyceridemia is largely examined by both increased hepatic production and decreased clearance via lipoprotein lipase of glycerides.

TABLE 4 Shows the serum triglycerides level in mgs / 100 ml. in normal control group and in test groups.

	Group 1	**Group 2**	**Group 3**	**Group 4**
Mean	103	138.7	102	149
S.E	± 5.4	± 8.52	± 9.21	± 8.02
Range	73- 120	93 - 174	75-163	109 -200
As % of control	-	134	106	144
Level of significance	-	0.05	N.S	0.05

Serum HDL Cholesterol

In our study statistically there is no significant decrease in serum HDL cholesterol level in test group when compared with normal group (Table -5). And also there is no significant correlation between blood sugar level and serum HDL cholesterol level (Table -3). Studies on different population shows decreased HDL in NIDDM. This has been seen particularly in native Indian population predominant, however generally an HDL cholesterol difference is thought to be a major component of the female protection against cardiovascular disease seen in general population. In conclusion increasing of triglycerides and depression of HDL cholesterol appear predominant in NIDDM with some, but not all (15).

TABLE -5 Shows serum HDL cholesterol level mgs / 100 ml in normal control group and in test groups

	Group 1	Group 2	Group 3	Group 4
Mean	52.9	48.1	50.4	49
S.E	±1.11	± 1.47	±1.43	±8.02
Range	48 -60	38 – 54	40 -54	42-54
As % of control	-	92	98	94
Level of significance	-	N.S	N.S	N.S

Serum LDL:

The serum LDL level is increased in Group -2 when compared with (Table -6) and also there is no correlation between blood sugar level and serum LDL level. Total cholesterol and low density lipoprotein are not statistically different in diabetic individual and non diabetic individual (16). The increased level LDL cholesterol is due to decreased catabolism of LDL in liver. Decreased catabolism in diabetic individual is also due to increased glycosylation of LDL apoprotein.

TABLE -6 Shows serum LDL cholesterol level mgs / 100 ml in normal control group and in test groups

	Group 1	Group 2	Group 3	Group 4
Mean	119	177.6	110	151
S.E	±11.54	± 12.43	±12.69	±14.20
Range	80- 176	134- 256	83 – 184	106 – 229
As % of control	-	149	116	131
Level of significance	-	0.05	N.S	N.S

In group -2 and group-4 although the increased level LDL is 149 and 131 percent respectively over the control, the difference is not statistically significant this is so because of the large variation in the LDL cholesterol with in these groups.

An attempt is made to find out whether degree of glucose intolerance is related to the late complications of diabetes. The most important questions for doctors and patients is whether the risk complications can be altered by careful control of glycemia for decades after the discovery of insulin is still unanswered. An attempt is made in the present study to find out whether there is correlation between blood sugar value and severity of complication.

CONCLUSION

The blood glucose level is elevated in all diabetic groups. There is no significant correlation between blood sugar level and serum lipid level. Diabetes can affect all the major lipoproteins as a result of insulin deficiency, insulin resistance and hyperglycemia. This may lead to hyperlipidemia. Hence the lipid abnormality in diabetic individual should be identified and treated to prevent cardiovascular complication.

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