Original Article

To Compare Lipid Changes in Glycemic Controlled Type 2 (NIDDM) and Glycemic Uncontroled Type 2 (NIDDM) Patients

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ABSTRACT

Background: Today diabetes is a global problem. Insulin play an inportant role in the lipid and lipoprotein metabolism. Glycemic control improves and may even normalize triglyceride and HDL cholesterol level in diabetic petients, therefore one could speculate the improvement of glycemic control beneficidly influence LDL phenolype. The degree of hyperglycemia was assesed by means of measmement of fasting blood glucose and glycosylated heamoglobin (Haemoglobin A_{1c}).

Objective: To compare the lipid profile in good glycemic controlled NIDDM type 2 with glycemic uncontrolled NIDDM type 2 and matched controls.

Study Design: Comparative study

Place and Duration of Study: This study was conducted at BMSI, JPMC, Karachi from June 2007 to December 2007.

Materials and Methods: Total 120 subject of either sex, age were included with set criteria in study and were distributed in to three groups. GroupA controls, GroupB glycemic controlled type 2 NIDDM using oral hypoglycemic drugs regularly – GroupC glycemic uncontrolled type 2 NIDDM using oral hypoglycemic drugs regularly. Lipid, lipoprotein and fasting serum sugar and HbA_{1C} were analyzed.

Result: Highly significantly increase in total chelestrol, triglycerides and LDL cholestrol, while significantly decrease in HDL cholestrol in glycemic uncontrolled type 2 NIDDM .

C**onclusion: F**asting serum glucose level and HbA_1c are useful diagnostic index for glycemic controlled and uncontrolled type 2 NIDDM – patient with glycemic uncontrolled type 2 NIDDM have greater disbances in lipid and lypoprotein metabolism which leads to atherosclerosis which futher results in coronary, cerebral and peripheral vascular occlusion

Key Words: Diabetes melltus Dyslipidemia, Glycosylated haemoglobin (HbA_{1c}).

INTRODUCTION

Today diabetes is a global problem. It is also anticipated that 75% of the world's diabetic population will be residing in developing countries. The rise is expected mostly in type 2 diabetes. In Pakistan 11.2% of people above the age of 25 years are suffering from diabetes mellitus [6] .Insulin plays an important role in the lipid and lipoprotein metabolism. Lipids and lipoprotein levels depend on the extent of insulin deficiency or insulin resistance, hyperglycemia, diet and the presence of concomitant primary and other secondary causes of hyperlipidemia [1]. While in current research, emphasis has been focused on qualitative abnormalities of plasma lipoproteins and alteration in their metabolism [5]. There is evidence of a close relationship between poor glycemic control and progression of dyslipidemia, most authorities aim for tight glycemic control especially in young patients [12]. Glycemic control improves and may even normalize triglyceride and HDL-cholesterol level in diabetic patients, therefore one could speculate that improvement of glycemic control beneficially influence LDL phenotype.[3] Intensive glycemic control does not necessarily mean multiple injection or insulin pump or have glucose monitoring 10 times a day. Intensive glycemic control means that the glycohaemoglobin, HbA_{1c} or blood glucose values are normal or near normal range, no matter how simple or how complex the treatment regimen [4].

The degree of hyperglycemia was assessed by means of measurements of fasting blood glucose and glycosylated haemoglobin (Haemoglobin A_{1c}) and integrated measure of long term blood glucose level that permits a more accurate assessment of "control" in non insulin dependent diabetic patients [21].

MATERIALS AND METHODS

120 subject were screened for this styudy. The subject were chosen from Diabetic Clinic Ward-7 JMPC, karachi and matched controls from healthy normal population. Previously diagonosed type 2 diabetes and non-diatetic subject having no history of renal, Liver , Thyroid Disease. Lactating women, persons who used lipid lowering drugs, cortricosteroids and estrogen drugs were not included in this study. The subjects were divided into three groups as non-diabetics (control)

group A, glycemic conrolled type 2 NIDDM group B, and glycemic uncontrolled type 2 NIDDM group C.

The subject were asked to come in the morning after an overnight fasting of at least 12-14 hours , about 10 ml of blood was taken from the anticubital vein , one ml of blood was saved in covered glass containing I mg/dl EDTA power, and was stored in a refrigerator at 2-8^{0}C, which was used for HbA1c estimation within 8 days Rest of blood was allowed to clot in the syringe. after 30 minuts serum was transferred from the clotted blood in the centrifuge tube.centrifugation was done for 10 minuts at 40 cycles per second.serum glucose was estimated on the same day by Enzyme calorimetic (GOD - PAP) methods, and rest of serum was presereved in plastic covered glass bottel at – 20^{o}C after proper labeling HBA1c was estimated by fast ion exchange resin separation method using kit (Clonital Cervico (BG) Italy), while serum triglyceride by Spinereact SA Spain. Moreover, LDL –Cholesterol was calculated according to Friedwalds formula.

RESULTS

Results of this study are summarized in tables 1 to 3. Total of 120 subjects, 80 Diabectic 40 non Diabetic healthy controls werer investigated during present study and were distrubuted into three groups. Table 1 shows the comparison of mean (±SEM) values of age, body mass index, systolic blood pressure and diastolic blood pressure in NIDDM patients with matched controls. Good Glycemic controlled NIDDM had a mean (±SEM) age of 53.50±1.35 years, body mass index 24.44±0.29 Kg/m^2, systolic blood pressure 116.75±2.36 Glycemic uncontrolled NIDDM had a mean (±SEM) age of 51.50±0.90 years, body mass index 23.30±0.45 Kg/m^2, systolic blood pressure 115.0±2.59 and pressuremmHg diastolic 72.25±2.36 mmHg.Control B had a mean (±SEM) age of 49.8±0.98 years, body mass index 22.70±0.34 Kg/m^2, systolic blood pressure 116.0±1.12 mmHg and diastolic blood pressure 76.25±1.39 mmHg.No significant difference of age, body mass index, systolic blood pressure and diastolic blood pressure were observed in Glycemic controlled and uncontrolled NIDDM patients with matched controls.

Table 2 shows the results of duration of disease, serum glucose and HbA_{1c} in glycemic controlled and uncontrolled patients of NIDDM with matched controls, no significant findings were observed in glycemic controlled as compared to controls.,while highly significant (P<0.001) in the levels of serum glucose and HbA_{1c} have been observed in glycemic uncontrolled NIDDM as compared to glycemic controlled NIDDM and matched controls. NIDDM. Table 3 shows the results of the total cholesterol, triglyceride, HDL-cholesterol and LDL-cholesterol in glycemic controlled and uncontrolled patients of NIDDM with matched controls.

Table No.1: Comparison of Age, Body Mass Index, Systolic Blood Pressure, Diastolic Blood Pressure in NIDDM Patients with Matched Controls (All values are expressed in Mean±SEM)

Groups	Age (Years)	Body Mass Index (Kg/m^2)	Systolic (mmHg)	Diastolic (mmHg)
Group A Control	49.8± 0.98	22.70± 0.34	116.00± 1.12	76.25± 1.39
GroupB Glycemic controlled	53.50± 1.35	24.44± 0.29	116.75± 2.36	74.25± 1.96
Group C Glycemic uncontrolled	51.50± 0.90	23.30± 0.45	115.00± 2.59	72.25± 2.36

Table No.2: Comparison of Duration of Disease, Serum Glucose and HBA_{1c} In Glycemic Controlledand Uncontrolled Patients Of NIDDM With Matched Controls (All values are expressed in Mean±SEM)

Groups	Duration of Diabetes (Years)	Serum Glucose (mg/dl)	HBA_{1c} (%)
Group A Control	-	90.55±1.61	5.31±0.11
Group B Glycemic controlled	6.20±0.37	93.65±3.75	5.38±0.14
Group C Glycemic uncontrolled	6.05±0.37	*** 260.20±15.00	*** 9.56±0.25

*** (P<0.001) when compared to respective controls

Table No.3: Comparison of total Cholesterol, Triglyceride, HDL-Cholesterol, LDL-Cholesterol in Glycemic Controlled and Uncontrolled Patients of NIDDM With Matched Controls (All values are expressed in Mean±SEM)

Groups	Total Cholesterol (mg/dl)	Trigly-ceride (mg/dl)	HDL-Cholest erol (mg/dl)	LDL-Choles-terol (mg/dl)
Group A Control	165.10± 9.48	105.35± 7.38	47.35± 1.77	101.15± 9.82
GroupB Glycemic controlled	164.85± 8.64	104.65± 9.16	42.80± 2.39	101.20± 8.05
Group C Glycemic uncontrolled	***226.50 ±12.06	***192.45 ±10.63	***29.00 ±3.08	***159.10 ±12.49

*** (P<0.001) when compared to the respective controls.

Highly significant (P<0.001) increase in the level of total cholesterol, triglyceride and LDL-cholesterol, while highly significant (P<0.001) decrease in the level

of HDL-cholesterol in glycemic uncontrolled NIDDM whereas, no significant change were observed in glycemic controlled NIDDM patients as compared to matched controls.

DISCUSSION

Diabetes mellitus predisposes to premature atherosclerosis due to dyslipidemia [10]. Accelerated atherosclerosis may be related to diabetic control as reflected by the degree of hyperglycemia and may in part be mediated by plasma lipid abnormalities. Patients with type 2 diabetes mellitus have twofold to fourfold excess risk of coronary artery disease (CAD) compared with non-diabetic patients. Indeed 75% to 80% of adult diabetic patients die of CAD [1316 17] . reported that their have been many abnormalities in blood lipids associated with diabetes mellitus because of obvious difference between IDDM and NIDDM. It is important to study these groups separately. They observed that increase in fasting plasma values of total cholesterol, triglyceride and LDL-cholesterol with increasing degree of hyperglycemia in IDDM as well as in NIDDM and also found reduction in plasma HDL-cholesterol concentration in glycemic uncontrolled IDDM and NIDDM patients. The results of present study were also in accordance with the findings of above observers as shown in table 3.

[25] . reported that to identify lipoprotein disorders, characteristics of diabetes, total cholesterol, triglyceride were determined in plasma in non obese NIDDM subjects who were classified into poorly controlled and well controlled groups based on the degree of glycemic control. They found that, in a well glycemic controlled, lipid disorders were no longer observed while in poorly glycemic controlled NIDDM, cholesterol, triglyceride were increased, because increased hyperglycemia lead to decreased LPL and LDL pathway activity induced under insufficient insulin action. Similar metabolic changes were noted in controlled and uncontrolled diabetes as shown in table 3. [13] . reported that low HDL-cholesterol and occasional LDL-cholesterol elevations commonly found in diabetic patients. For example, both the American Diabetes Association and the National Cholesterol Program recommended glycemic control as the first step in controlling diabetic dyslipidemia. There is no doubt that the principal modalities of glycemic control can improve lipid profile in selected diabetic patients. Thus diet, oral antidiabetic agents and insulin have all been shown to produce favorable changes in diabetic dyslipidemia as treated diabetics improved by lowering Triglyceride and LDL-cholesterol. [3 ,6 ,7 , 8.] Were agreed with this observation and further he observed that elevation of triglyceride also found in glycemic uncontrolled diabetes because the TG-HDL concentration is extremely complexed with numerous genes regulating the synthesis of apolipoproteins, lipids, enzymes, receptor and environment have major impact on lipoprotein metabolism. Present study has same trend as shown in tables 4 to 5. [11;14; 15;16; 17;18;21;22;23;24] reported that the most common lipid abnormalities seen in diabetic persons are elevated level of LDL-cholesterol, triglyceride and decreased HDL-cholesterol concentration in blood and these patients have preponderance of abnormalities in the composition of LDL-cholesterol is not significantly increased. In our present study, these observations also found in glycemic uncontrolled type 2 diabetics as shown in table 3.

CONCLUSION

Fasting serum glucose level and HbA_1c are useful diagnostic index for glycemic controlled and uncontrolled type 2 NIDDM – patient with glycemic uncontrolled type 2 NIDDM have greater disbances in lipid and lipoprotein metabolism which leads to atherosclerosis which futher results in coronary, cerebral and peripheral vascular occlusion.

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