



Research Article

Comparative Study of Lipoprotein (A) Level in Patients of Acute Coronary Syndrome with Type II Diabetes and Non Diabetics in a Tertiary Care Hospital of Central India

Authors

Dr Amita Gupta¹, Dr Rajeev Lohokare², Dr Purnima Dey Sarkar³

Department of Biochemistry, Mahatma Gandhi Memorial Medical College, Indore, M.P., 452001

Corresponding Author

Dr Amita Gupta

Address: 6, Nandgoan, Nandvihar, Near Girdhar nagar, Indore, M.P., 452001

Mobile No. 8109145378, 8223068877, Email: amita.guptagmc@gmail.com

Abstract

Objective: To compare the lipoprotein (a) level in type II diabetics and non diabetics with acute coronary syndrome.

Materials and Methods: A total of 80 subjects including 40 patients with type II diabetes as cases and 40 non diabetics as control admitted in ICU matched for age and sex included in the study. Serum FBS, TG, cholesterol, LDL, HDL and serum Lp (a) in both the groups were measured. Statistical analysis was performed using SPSS software.

Results: Lp (a) level was significantly higher ($p < 0.001$) in diabetics as compared to control group.

Conclusion: Study concluded that increased serum Lp(a) concentration might be a risk factor in type II diabetic patients for coronary artery disease.

Keywords: Lipoprotein (a), type II diabetes, Acute coronary syndrome.

Introduction

Among the most common chronic disorders of modern times, diabetes mellitus (dm) remains unique because of its multisystem ramifications. Multiple factors like hypertension, dyslipidemia, insulin resistance, hyperinsulinemia, glucose intolerance and obesity, particularly central obesity, has been termed “metabolic syndrome”^(1,2), which is a powerful determinant of type II DM and cardiovascular disease⁽³⁾.

Coronary artery disease (CAD) has a multi factorial origin, including hereditary and acquired

risk factors which may be the direct cause of the disease or merely associated with it. Changes in lipid metabolism play a relevant role in the progression of atherosclerosis and the laboratory assessment of lipoproteins is of fundamental importance to diagnose and treat this condition. Lp(a) has been reported to be an independent risk factor for premature CAD and other thromboembolic disorders⁽⁴⁻⁷⁾. The present study was undertaken to find out the association of Lp(a) with acute coronary syndrome found in type 2 diabetic patients.

Methodology

For the present cross-sectional study, Forty Type 2 diabetic patients and forty non diabetic patients admitted with acute coronary syndrome were selected after matching for age and sex, during the study period. Patients with angina, occurring at rest (CCS class IV) of duration more than 30 minutes, but within 24 hours from onset of angina were included in the study. Diabetes was ruled out in non diabetic group with fasting and 2-hr post prandial blood glucose measurement. Patients presenting 24 hrs after occurrence of angina, angina secondary to extra cardiac causes. (eg. Anaemia, thyrotoxicosis), Patients who were currently on drugs which may alter serum levels of Lp (a) eg. Oral contraceptive pills, cholesterol lowering agents, aspirin, hormone replacement therapy, antiepileptics)⁽⁸⁻¹⁰⁾, Prediabetic patients were excluded from both groups.⁽¹¹⁾, All type of renal failure patients including diabetic nephropathy⁽¹²⁾ were excluded from the study.

Lipoprotein (a) level was studied in these patients. The study protocol was approved by the institutional ethical committee and an informed consent was taken by all the subjects.

Collection of Data & Analytical Methods

In the present study eighty acute coronary syndrome patients, who were divided in to two separate age and sex matched groups; one with type 2 diabetes mellitus and one without Diabetes mellitus, were selected during the study period as per the inclusion and exclusion criteria. A detailed history (with emphasis on angina/angina like symptoms) was taken and a detailed physical examination was done as per the proforma .Blood sample was taken. All diabetics are of type II diabetes mellitus, currently on oral hypoglycemic agents. In non diabetic group diabetes mellitus was ruled out by fasting and post prandial blood glucose. In all 80 patients serum Lp(a) level and lipid profile was estimated. Serum was analyzed in automated analyzer for total cholesterol (TC enzymatic CHOD-PAP), triglycerides (TG enzymatic GPO-PAP), HDL-C (precipitation

method) and fasting blood sugar (FBS enzymatic (GOD-POD). LDL-c was calculated by Friedewald formula. Lipoprotein (a) analyzed by automated analyzer whose kit was based on principle of turbidimetry.

Statistical Analysis

Data was maintained on excel spread sheet. Analysis was performed using SPSS software. Descriptive data were expressed as mean, standard deviation, and range of all variables. Results were presented as mean \pm S.D. Means of data in patients and controls were compared using the independent t-test. Differences were considered statistically significant at $p < 0.05$ & highly significant at $p < 0.001$.

Results

Out of 40 patients of type II diabetes mellitus, there were 12 females and 28 male and among 40 non diabetic controls 16 were female & 24 were male. The difference in Lipoprotein(a) levels between cases and control were statistically highly significant. Triglycerides shows a significant increased level as compared to control. Difference in HDL-C between the two groups was non significant.

Table 1: Gender based Distribution of the Subjects

Sex	Control (N=40)	Case(N=40)
Male	24(60%)	28(70%)
Female	16(40)%	12(30%)
Total	40(100%)	40(100%)

This table shows that out of 40 control 60% were males and 40% were females whereas in cases 30% were females and 70% were males.

Table 2: Comparison of biochemical parameters between Control and Diabetic Patients

Parameters (mg/dl)	Controls (N=40) (Mean \pm S.D)	Cases (N=40) (Mean \pm S.D)	P- Value*
Total Cholesterol	167.8 \pm 31.89	192.1 \pm 42.67	< 0.001
Triglycerides	145.85 \pm 51.90	168.97 \pm 72.26	< 0.05
LDL-C	92.21 \pm 27.16	111.26 \pm 36.60	< 0.001
HDL-C	32.06 \pm 6.83	29.58 \pm 8.30	>0.05
Lipoprotein (a)	18.33 \pm 11.09	26.01 \pm 12.45	< 0.001

*P value < 0.001 was taken as statistically highly significant.

Above table shows comparison of biochemical parameters between control and cases of type II

diabetes, it shows highly significant increased level of lipoprotein (a), total cholesterol and LDL-C as compared to control. Triglycerides shows a significant increased level as compared to control. Difference in HDL-C between the two groups is non significant.

Discussion

Different factors have been found to be responsible for an increased prevalence of CAD in DM. One of these are the elevated levels of serum Lp(a)⁽¹³⁾. Our study has revealed that Lp(a) levels were significantly elevated in type II dm patients. In diabetes mellitus, 67% of deaths are due to coronary artery disease. Framingham heart study showed that CAD, acute myocardial infarction and sudden death is 1-5 fold increased in diabetes patients⁽¹⁴⁾. The ratio between male and female patients in both controls and cases were proportionate in all the studies. Gender bias is also removed as both the groups are matched.

In the present study, Lp(a) values varied from 5 to 57mg/dl. Type-2 diabetic patients had higher Lp(a) level as compared to non diabetic patients. The difference of means was statistically highly significant ($p < 0.001$). This was comparable with Mohan et al, Neki et al, and Salehi et al⁽¹⁴⁻¹⁶⁾. In the present study, considering the optimal cut off points at 15mg/dl, 76% of type-2 diabetic patients had Lp (a) > 15mg/dl, compared to 21% of non diabetic patients.

Various studies state that there is no increase of Lp(a) concentration in patients with type II DM. However in the present study we found that LP(a) levels were increased in type II DM patients which is in agreement with the studies of Ramirez LC et al.⁽¹⁷⁾. Serum levels of Lp(a) have been shown to correlate with presence, extent and severity of coronary artery disease. PROCAM studies shows that high level of lp(a) is an independent risk for CAD.

In the later stages of type 2 DM, insulin secretion declines, with progressive loss of beta cells as well as worsening of the glycemetic control. The

risk of cardiovascular mortality and morbidity also increases with longer duration of DM⁽¹⁸⁾.

The concentration of glycosylated Lp(a) is increased in the circulation of diabetic subjects. It is evident that glycosylation prolongs the half-life of lipoproteins and likewise for Lp(a). This can lead to elevated levels of Lp(a) in diabetic individuals⁽¹⁹⁾. Patients with type 2 diabetes and insulin resistance are at a markedly increased risk of atherosclerosis, and because strict control of glycemia has proved beneficial in reducing microangiopathy but not macroangiopathy, the treatment of diabetic dyslipidemia should be aggressive.

Microalbuminuria is known to be a predictor of increased risk of cardiovascular disease and early mortality in diabetes. Also Lp(a) levels are elevated in patients with microalbuminuria, and Lp(a) is a known risk factor for cardiovascular disease. Thus, elevated Lp(a) may be one of the factors responsible for increased incidence of cardiovascular disease in diabetic patients with microalbuminuria.

One of the risk factors in long standing DM may be increasing Lp(a) levels. The association of Lp(a) levels in DM has been a matter of some controversies. The major reasons for the discrepant results of the prospective studies have been attributed to the variation in study design, collection and storage of samples, methods used for statistical analysis and population differences that reflect the known ethnic variability in the distribution of Lp(a) levels and Apo(a) size isoforms⁽²⁰⁾.

Conclusion

Type-2 diabetic patients have higher level of Lp(a) during acute coronary syndrome when compared to non diabetic group. Elevated Lp(a) in type -2 diabetic patients contribute to the accelerated atherogenic state, causing major adverse cardiac events.

Study concluded that increased serum Lp(a) concentration might be a risk factor in type II diabetic patients for coronary artery disease. The

possible pathogenetic role of Lp(a) in diabetes and the cardiac events deserves to be further studied.

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