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Original Research Article

Significance of lipoprotein(a) in diabetic chronic renal failure

Vasanthan M.*

Department of Biochemistry, SRM Medical College Hospital and Research Centre, SRM University, Kattankulathur, Tamilnadu, India

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***Correspondence:**
Dr. Vasanthan M.,
E-mail: vasanthan.doc@gmail.com

ABSTRACT

Background: Diabetes mellitus, is a metabolic disease with an alarming prevalence worldwide. When uncontrolled, this can result in diseases such as chronic renal failure by various atherogenic factors including lipoprotein(a). Aim was to estimate the level of lipoprotein(a) in diabetic chronic renal failure patients and to correlate with healthy controls.
Methods: 30 non-diabetic subjects and 30 diabetic CRF patients were included in the study. Lipoprotein(a) was estimated by immunoturbidimetric method and the other parameters by their respective methods in biochemistry auto-analyzer.
Results: It was found from the study that there is a positive correlation of lipoprotein(a) levels with the duration of diabetes and was progressive with the diabetic complications.
Conclusions: Lipoprotein(a) is responsible for atherogenic events in CRF patients.

Keywords: Chronic renal failure, Lipoprotein(a)

INTRODUCTION

Diabetes mellitus, is a metabolic disorder. Impaired insulin secretion, insulin resistance are the reasons behind. The disease is characterized by increased glucose concentration in blood and leading to complications if uncontrolled.

Chronic renal failure (CRF) is the reduction in kidney function more than 3 months and diabetes being the most common cause.

Lipoprotein(a), is a lipoprotein subclass, rich in cholesterol and was first described by Berg in 1963.[1] Lp(a) contains a low-density lipoprotein (LDL) cholesterol particle which is attached to apolipoprotein(a), a glycoprotein.[2]

METHODS

60 subjects attending a private medical college and hospital at Chennai participated in the study. Study individuals were divided into 2 groups.

- Group A - 30 age and sex matched healthy controls
- Group B - 30 diabetic chronic renal failure patients, of age group 40-50 years.

After the approval by the institutional research and ethical committee, written informed consent was obtained from all the participants enrolled. Demographic data, age, gender, duration of diabetes, general history and medications were recorded. Fasting blood samples were collected. The concentrations of Lp(a), fasting blood sugar (FBS) and HbA1c were measured.

Table 1: Methods of estimation.

Parameter	Method
Lp(a)	Immunoturbidimetry
FBS	Glucose oxidase-peroxidase
HbA1c	Fluorescence enzyme immunoassay

Patients with estrogen depletion and hypothyroidism were excluded from the study.

RESULTS

The study population comprised of a total of 60 individuals and of these, Group-A were 30 healthy controls and Group-B were 30 diabetics with chronic renal failure.

The biochemical study parameters were analysed with the help of statistical product and service solutions (SPSS) 17 software.

The results of biochemical parameters for Group-A are as follows. Lp(a) concentration was 10.29±1.2888mg/dl (mean and standard deviation). The mean and standard of FBS and HbA1c are 88.9±11.598 mg/dl and 4.39±0.5592% respectively.

The results of biochemical parameters for Group-B are as follows. Lp(a) concentration was 51.1±11.26 mg/dl (mean and standard deviation). The mean and standard of FBS and HbA1c are 162.73±28.29 mg/dl and 7.99±0.59 % respectively.

Table 2: Results of Group-A.

Parameter	N	Minimum	Maximum	Mean	Standard Deviation
Lp(a) mg/dl	30	8.1	12.6	10.29	1.2888
FBS mg/dl	30	71	109	88.90	11.598
HbA1c %	30	3.5	5.4	4.390	0.5592

Table 3: Results of Group-B.

Parameter	N	Minimum	Maximum	Mean	Standard Deviation
Lp(a) mg/dl	30	31.6	69.3	51.097	11.2604
FBS mg/dl	30	125	214	162.73	28.285
HbA1c %	30	7.0	8.9	7.987	0.5888

To find out which group means differ and the statistical significance, Tukey's honest significant difference test was used. By constructing the confidence interval for all pair wise differences of the group means, we can identify which means significantly differ from one another.

The results obtained clearly show increased concentration of all the three parameters lipoprotein(a), fasting blood glucose and HbA1c in Group B (diabetic chronic renal failure) when compared to the healthy controls, with significance of $p<0.05$.

Table 4: Tukey's honest significant difference test.

Dependent variable	Group	Group	Mean difference (A-B)	Std. error	Significance	95% confidence interval	
						Lower bound	Upper bound
Lp(a)	A	B	-40.807*	1.808	0.000	-45.12	-36.50
FBS	A	B	-73.833*	5.254	0.000	-86.36	-61.30
HbA1c	A	B	-3.597*	0.150	0.000	-3.95	-3.24

DISCUSSION

The study was done on diabetic chronic renal failure patients. Between the study group and the control group, the biochemical parameters like fasting blood sugar (FBS) and glycated haemoglobin (HbA1C) differed significantly. Serum lipoprotein(a) was also estimated in patients under the two groups to show the significance of atherosclerotic pathogenic effect of the same. FBS and HbA1C levels were measured to assess short term and

long term glycemic control respectively. The difference in mean values between the two groups was statistically significant (P<0.05). Hence, long term glycemic control was significantly proportional to the Lp(a) concentration in controls-Group A and Group B- diabetics with CRF. This suggests that long term glycemic control is directly related to the complications of diabetes.

Salonen EM et al, illuminates the binding property of Lp(a) to fibronectin and the mechanism of atherosclerosis.[3] Lp(a) inhibits binding of plasminogen (PLG) to the cell surface by accumulating in the vessel wall. This in turn, reduces the plasmin generation, thereby increasing the clot formation. This PLG inhibition also promotes proliferation of smooth muscle cells. There are other studies conducted worldwide showing the significantly high Lp(a) among renal patients and also the early possibilities of coronary heart diseases development because of the proatherogenic effect of the increased Lp(a) supporting present study.[4-9]

CONCLUSION

The results of this study and previous studies provide ample evidence that Lp(a) is increased in diabetic CRF compared to the normal Lp(a) in non-diabetic controls. The present study observed that there is positive correlation of Lp(a) concentration with the duration of diabetes and is progressive with the diabetic complications.

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