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Research Article

LIPOPROTEIN (a) LEVELS IN ACUTE MYOCARDIAL INFARCTION PATIENTS ADMITTED IN INTENSIVE CARDIAC CARE UNIT OF TRIPURA MEDICAL COLLEGE: A CLINICAL STUDY TO EVALUATE LIPOPROTEIN (a) AS RISK FACTOR FOR AMI AND COMPARISION WITH HEALTHY SUBJECTS

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ABSTRACT

Lipoprotein (a) , a prominent marker of cardiovascular accident, was first described by Berg in 1963(3). Lipoprotein(a) [Lp(a)] has been considered as one of the distinguished signature in myocardial infarction and for many years.[1]. Owing to incomplete scientific evidence in clinical practice, screening for and treatment of high Lp(a) levels is primarily essential. **Aims and Objectives:** Aim of our study is **1.**To determine the level of Lp (a) in patients with acute myocardial infarction and compare it with matched healthy control group .**2.**To find out the significance of Lipoprotein (a) level among the patients of Acute Myocardial infarction (AMI) of Agartala, Tripura, North East region of India.**3.**To compare the Lipoprotein (a) level amongst the AMI patients with ethnic variability of non-tribal and tribal AMI patients of Agartala, .**4.**To find out the significance of Lipoprotein (a) level in routine investigations of AMI patients. **Materials and Methods:** Fourty two (42) patients with acute myocardial infarction were selected from a series of consecutive patients admitting in the coronary care unit (CCU) of Tripura Medical College and DR. BRAM Teaching Hospital. Lp(a) was quantified by immunoturbidiometric method. **Results:**Serum LP(a) concentration in control group is 30.50+_ 25 mg/dl with maximum 134mg/dl . In the case group AMI patient group in both male& female patients with average mean LP(a) concentration is 78.95+_45 mg/dl, the maximum value is 485 mg/ dl. **Discussion:** There is significant difference between the two group. ($p< 0.05$). LP-(a) concentration level in patients with AMI is higher than the control group. An elevated Lp(a) concentration is associated AMI and a risk factor for AMI ., suggesting that Lp(a) may play an important role in the genesis of thrombotic coronary occlusion and the occurance of AMI. **Conclusion:** So it is suggested to make LP(a) serum level determination test as a routine laboratory test for identification of risk factor for AMI and to follow proper treatment to reduce LP(a) level in serum.

Keywords: LP(a), AMI case, Total cholesterol, HDL, LDL.

1. a) INTRODUCTION

Lipoprotein (a) was first described by Berg in 1963(3) . Lipoprotein(a) [Lp(a)] has been considered a cardiovascular risk factor for many years.[1] Owing to incomplete scientific evidence, screening for and treatment of high Lp(a) levels have to date been performed principally by lipid specialists. However, during the last few years, major advances have been achieved .Lipoprotein (a) is a cholesterol–rich lipoprotein particle composed of an LDL particle and a large glycoprotein, apolipoprotein(a) [apo(a)] . It has been suggested that it is a coronary risk factor independent of increase in other serum lipids (eg.cholesterol and triglycerides), hypertension , smoking obesity and a family history of IHD (20).

Pathology

The structure of lipoprotein (a) is similar to plasminogen and tPA (tissue plasminogen activator) and it competes with plasminogen for its binding site, leading to reduced fibrinolysis. Lp(a) also carries cholesterol and thus contributes to atherosclerosis. (8, 18) In addition, Lp(a) transports the more atherogenicproinflammatory oxidized phospolipids which attract inflammatory cells to vessel walls(18,10)and leads to smooth muscle cell proliferation.(20)Serum Lipoprotein(a) and disease: High Lp(a) in blood is a risk factor for coronary heart disease (CHD), cerebrovascular disease (CVD), atherosclerosis, thrombosis, and stroke.[21] ·Lipoprotein(a) - Lp(a)[27] **Desirable**: < 14 mg/dL (< 35 nmol/l) **Borderline risk**: 14 - 30 mg/dL (35 - 75 nmol/l) .**High risk**: 31 - 50 mg/dL (75 - 125 nmol/l) .**Very high risk:**> 50 mg/dL (> 125 nmol/l) .

b) AIMS AND OBJECTIVES

- **i)** Aim of our study is to determine the level of Lp (a) in patients with acute myocardial infarction and compare it with matched healthy control group .
- **ii)** To find out the significance of Lipoprotein (a) level among the patients of Acute Myocardial infarction (AMI) of Agartala, Tripura, North East region of India.
- **iii)** To compare the Lipoprotein (a) level amongst the AMI patients with ethnic variability of non-tribal and tribal AMI patients of Agartala, .
- **iv)** To find out the significance of Lipoprotein (a) level in routine investigations of AMI patients.

c) MATERIALS AND METHODS

Patients

Fourty two (42) patients with acute myocardial infarction were selected from a series of consecutive patients admitting the coronary care unit (CCU) of Tripura Medical College and DR. BRAM Teaching Hospital ,Hapania, Agartala, Tripura West Who had the complete data including family history, laboratory findings and clinical data.

All patients and control subjects were older than 35 years old. The healthy controls were selected from subjects who underwent routine laboratory examination for check up .

Inclusion criteria in this group were: absence of a history of smoking, cardiovascular disease and and the age over 35 years old. Fourtytwo subjects with these criteria were chosen.

Blood sampling and assay

Fasting venous blood sample from all patients (the day after admission to CCU) and control subjects were collected. Blood was centrifuged for 10 minutes and the serum stored at -20°c until analyzed .

Lp(a) was quantified by immunoturbidiometric method (CRM Diagnostic system, imported and mnanufracturd by SirusBiocarepvt. Ltd., p-25, KalindiHousing Scheme, Kolkata-700089 west Bengal).

Total cholesterol, HDL –cholesterol and triglyceride were determined by enzymatic methods (by BeckmanCoultier , Auto analyser Reagent.).

Friedewald formula was used to calculate the LDL – cholesterol level.

Samples with severe hemolysis or TG more than 2000 mg/dl, were excluded. The Lp(a) samples of patients and controls were unknown for technician who measured them.

Statistical Analysis

All biochemical and clinical data were recorded prospectively.

We compared theLp(a) level of acute MI patients with those of age and sex–matched controls.

Based on manufactures instructions, Lp(a) > 30 mg / dl is the threshold value linked to its pathologic effects. We define subjects with > 30mg / dl as those with high Lp(a) and patients with LP(a) level > 50 mg /dl as very high LP(a) and examined its frequency in acute myocardial infarction .

Continuous variables were reported as mean ±1 standard deviation.

RESULTS

Summary of patients and control subjects datas has been presented in table no. 1.

Biochemical datas of serum LP(a) concentration in control group is (30.2+_ 2.5mg/dl with maximum 134mg/dl). In the case group (AMI Patient group both male& female patiens) average mean LP(a) concentration is 78.2+_5.9 mg/dl, with maximum value 485 mg/ dl. There is significant difference between the two group. (p< 0.05).

Based on the datas and LP(a) reagent manufracturer (CRM Diagnostic) direction LP(a) serum level more than 30 mg/dl is considered as threshold value. Now in the case Group (AMI patients 36/42 = 85.71%) with high LP(a) level (LP(a) > 50 mg/ dl) and control group (39/42 =92.85%) with LP(a) level equal to 30.50+_ 25 mg/dl) are statistically significant . (p value < 0.05).

The mean LP(a) in women (AMI case Group, 98.7 mg/dl) that is higher than male ((AMI case Group, 59.2 mg/dl).

The female case group has very high LP(a) concentration (14/18= 77.77% , LP(a) level > 50 mg/ dl)) and male case group (10/24 = 23.80% , group has very high LP(a) level > 50 mg/ dl). (range 19.1mg/dl to 438 mg/dl), which is statistically significant. (p value <0.01))

The LP(a) concentration level is independent of lipid profile in blood.

The mean total cholesterol, TG(triglyceride) , HDL –Cholesterol, LDL- Cholesterol, has been presented in table no .2

Table 1: Demographic data of patients and controls

	Case(AMI Patient)	Control
No.	42	42
Age (Mean)	51	55
Female /Male	18/42	24/42
T2DM	4	-
Hypertension	5	-

Table 2: Summary of lipid profile in patients and controls

	Case (AMI Patient)	Controls
LP(a)	78.2 +_ 5.9*	30.2+_ 2.5
Total Cholesterol	180.4+_ 5.0**	160.5+_3.5
LDL-Cholesterol	105.1+_ 6.0*	95.4+_4.0
HDL-Chosterol	45.4+_1.2*	51.4+_1.1
TG (Triglyceride)	140.3+_8.0*	130.6+_7.7

*P<0.05, **p<0.10

DISCUSSION

In this study serum lipoprotein(a) LP-(a) concentration were compared with Acute Myocardial Infarction (AMI) patients and healthy normal subjects.

We showed that in average LP-(a) concentration level in patients with AMI is higher than the control group.

Another important findings are that LP(a) level in women patients are higher than male group patients. The LP-(a) level in blood is independent of lipid profile's of blood. In this study because less number tribal versus non-tribal case no statistical difference can be ascertained wkich will be followed in subsequent study.

There are few studies regarding LP-(a) level in AMI. In one Indian study Singh's et al, of in 1999 has opined that Lp(a) alone could correctly discriminate a CHD individual from a control subjects by 95%. Estimating of Lp(a) together with albumin provided 99% correct discrimination between control and CHD patients..

David j. Moliterno et. al showed that elevated plasma concentration of LP-(a) are associated with coronary artery atherosclerosis in Caucasian. They also showed that African American have higher median plasma concentration than Caucasian but they do not have a greater incidence of coronary atherosclerosis. (7).

In a study by Abraham A. Ariyo it was shown that among oider in United states elevated lipoprotein (a) is an independent predictor of stroke., death from vascular disease and death from any cause in men but not in women. These data support the use of LP(a) levels in predicting these events in older men. (8)

Laron Z et al in their investigation determined the effect of Human Growth hormone (Hgh) and insulin like Growth factor –i(IGF-I) on circulating LP(a); Long term GH treatment increases and IGF- I decreases circulating leves of LP(a).it seems that LP(a) is specificallyan independent risk factor in diabetes.(11- 12).

Nogues X et al suggested a discriminant cut off of LP(a) concentration equal to 20 mg/dl or30mg/dl in enzyme immunoassay.(13).in the future there may be therapeutic method to reduce LP(a) levels which maybe proven to be useful in preventing myocardial infarction

In another study Dumitrescu L, *et. al*Prior studies of the relationship between LP(a) and ethnicity have shown inconsistent results. Lipoprotein (a) levels seem to differ in different populations. For example, in some African

populatation, Lp(a) levels are, on average higher, than other groups, so that using a risk threshold of 30 mg/dl would classify up to > 50% of the individuals as higher risk.[19-22] Some part of this complexity may be related to the different genetic factors involved in determining Lp(a) levels. One recent study showed that in different ethic groups, different genetic alterations were associated with increased Lp(a) levels.[23] In one South Indian study Rajasekhar et al on 2004., (Better assessor of coronary heart disease in south Indian population) also suggested that Lp(a) level > 25mg/dl is risk factor for CHD.

e) CONCLUSION

An elevated Lp(a) concentration is associated AMI and a risk factor for AMI ., suggesting that Lp(a) may play an important role in the genesis of thrombotic coronary occlusion and the occurance of AMI. So it is suggested to make LP(a) serum level determination test as a routine laboratory test for identification of risk factor for AMI and to follow proper treatment to reduce LP(a) level in serum.

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