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Medicine

A CLINICAL STUDY TO EVALUATE THE CORRELATION OF LIPOPROTEIN AND ACUTE CORONARY SYNDROME

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ABSTRACT

Background Indians have a high prevalence of coronary heart disease (CHD) in early age as compared to other ethnic groups. Risk factors associated with young acute coronary syndrome (ACS) patients differ from those in the elderly.

Material &Method This case control study included 60 patients having ACS. Clinical features, risk factor profiles of these patients were studied and compared with 30 control patients having no history of ACS.

Results Serum Lipoprotein was raised in both males and females ACS patients (p>0.05) i.e.Serum Lp(a) levels were not affected by gender of the patient. 71% of cases of ACS had significantly high Lp(a)(>30mg/dl) as compared to 23% in control cases (p value < 0.01).The mean serum Lp(a) level in cases of ACS was 45.96±24.07 which is significantly higher than control value of 23.7±8.46 (p value < 0.01). Lp(a) level were found to have a graded association with ACS, with increase of ACS incidence with higher values of Lp(a). High serum Lp(a) values were present in 87% (21/24) diabetic patients suffering from ACS which was significantly higher than non diabetic patients suffering from ACS 61% (22/36) (p value < 0.01).

Conclusion In present study it was concluded that serum Lp(a) levels were significantly raised in ACS patients as compared to healthy controls(45.96 + 24.07, Vs. 23.7 + 8.46; p < 0.001). Serum Lp(a) levels had a graded association with ACS and its effects were significantly increased in presence of Diabetes Mellitus(high blood sugar) , high BMI(>25 kg/m2), high LDL-cholesterol and high TOTAL-/HDL-cholesterol ratio (>3.5).Thus high serum Lp(a) >30 mg/dl is an independent risk factor for ACUTE CORONARY SYNDROME.

KEYWORDS : Acute Coronary Syndrome, Cardiovascular risk factors, lipoprotein (a)

INTRODUCTION

Acute coronary syndrome (ACS) is a life threatening condition resulting in high morbidity and mortality and hence requires emergent therapeutic interventions. ACS is a part of part of coronary artery disease apart from stable angina. ACS is subdivided in ST-elevation myocardial infarction (STEMI), Non ST-elevation myocardial infarction (NSTEMI) and unstable angina (UA). [1,2] Coronary artery disease (CAD) was defined by WHO in 1982 as "impairment of heart function due to inadequate blood flow to the heart compared to its needs caused by obstructive changes in the coronary circulation of heart".[3] In most of the cases the underlying pathology is the rupture or erosion of coronary arterial plaque complicated by thrombosis, embolization and obstruction to myocardial perfusion.[2] Mostly obstruction is due to atherosclerosis and some factors influencing the atherogenesis called risk factors. The development of the concept of "risk factors" and their relationship to the incidence of coronary artery disease evolved way back from the prospective and epidemiological studies in the United States and Europe.[4,5]

Evidence shows that male and female migrants from Indian subcontinent have a higher mortality from CAD than the native white population.[6,7] The overall age standardized mortality ratio **(SMR)** for CAD in Asian Indian males compared to whites was 313 per cent higher in age group 20-29 years,[8] as compared to only 36 percent higher, at all ages in United Kingdom (UK). The prevalence of CAD is not homogeneous within India and is twofold higher in South than the North of India. Akin to the North-South divide, an urban rural divide also exists within the subcontinent.

So, present case control study was designed to evaluate the prevalence of lipoprotein(a) excess and its association with other lipid fractions as a risk factor for acute coronary syndrome in India.

METHOD

The study was conducted in Department of Medicine of Gajra Raja Medical College and J.A. Group of Hospitals Gwalior. The study included the patients admitted with the symptoms of acute coronary syndrome in ICU after taking informed consent of the relative of the patients. The normal healthy controls, matched for age & sex were taken from Medical and Paramedical staff after taking their informed consent for the participation in the study. he study included the patients admitted with the symptoms of acute coronary syndrome in ICU after taking informed consent of the relative of the patients. The normal healthy controls, matched for age & sex were taken from Medical and Paramedical staff after taking their informed consent for the participation in the study.

Inclusion criteria:

- Patients admitted with acute coronary syndrome
- Diagnosis of acute coronary syndrome made by ECG/ Biochemical markers.

Exclusion criteria:

- Patient with complications such as DIC/Liver disease
- Patient with nephrotic syndrome or renal parenchymal disease
  Patient with any terminal or disabling illness

ESTIMATION OF LIPOPROTIEN (A)

Specimen collection

1. Blood samples were taken from anticubital vein of the patient after overnight fasting.
2. Similar procedure was also be adapted for controls.
3. 10ml of fasting blood sample was taken.
4. For isolation of plasma from blood cells or clots, the sample were centrifuged at 2000 rpm at 4 degree centigrade for about 20 min, and aspirated into tubes preflushed with nitrogen and the immune assay was performed.

Specimen sample is diluted 200 times. 10 microlit of such a sample is taken and to it is added 100 microlit of 100 times diluted sample diluent. The well is washed 4 times after being incubated for 120 min at 37 degree centigrade. To it is added 100ul of 100 times diluted conjugate and again the well is incubated for 60min at 37 degree centigrade. The wells are again washed 4 times and 100ul of substrate is added and is incubated for 30min. at 20 degree centigrade. The reaction is stopped by adding 100 ul of Sulphuric acid and the absorbance is read at 450 mm for 15 min.

Six standard samples of different strengths are supplied with kit and standard graph is made by these values. The wavelength is plotted on Y- axis (vertical) and Lp (a) value on X-axis (horizontal). The absorbance of each specimen is recorded and its corresponding Lp (a) value is noted from the graph obtained previously.

RESULTS

On comparing case and control groups mean age, and male female ratio is comparable and statistically not significant.(p > 0.05)

STEMI was the most common ECG feature present in the ACS patients and accounted for 54/60 (90%) of the total cases, out of them 34(57%) were Anterior Wall MI and 20 (33%) were Inferior Wall MI. The prevalence of NSTEMI/UA was present in 6/60 (10%) of the total ACS patients studied (Table 1). The prevalence of NSTEMI was 7% and UA was 3% only.

Table -1 Diagnosis wise case distribution

Diagnosis	Case group (n=60)	
	Number	Percentage
STEMI – AWMI	34	57%
– IWMI	20	33%
NSTEMI	4	7%
Unstable angina	2	3%

In the total population studied, smoking was the most prevalent traditional risk factor (29/60 = 48.33%), while tobacco chewing was having prevalence of 41.66%. BMI more than 24.9 is having incidence of (23/60) 38%.

The next most prevalent CardioVascular Risk Factor(CVRF) in the entire ACS group was high lipoprotein a [Lp(a)] (43/60 = 71.66%), (Table 2) However the prevalence was more in younger age group (17/60=28.33%) in age <30 years as compared to age > 60 years (15/60=25%). Serum Lp(a)>30mg/dl values are more in male cases (39/53=72%) as compared to male controls 6/26=23% ($p<0.001$; highly significant).(Table 3) Mean Lp(a) level was also having higher prevalence in ACS group (45.96 ± 24.07) as compared to control group (23.7 ± 8.46). P value <0.001 (Table -4)

Table - 2 Percentage of high Lp(a) >30mg/dl in case & control groups

Parameter	Case group (n=60)		Control group (n=30)		P value
	Number	Percentage	Number	Percentage	
Lp(a) >30mg/dl	43	71%	7	23%	<0.001

Increased serum Lp(a) is present in 71% (43/60) cases as compared to only 23% (7/30) in controls ($p<0.001$; highly significant rise).

Table No. 9 Comparison of serum Lp(a) level in case & control group

Parameter	Case group (n=60)		Control group (n=30)		P value
	Mean	SD	Mean	SD	
Serum Lp(a)	45.96	24.07	23.7	8.46	<0.001

DISCUSSION

Significantly higher percentage of cardiovascular deaths occurs in younger people in the developing world than in developed countries.[9] Our study compared the difference in serum Lp(a) level and studied its association with other lipid fractions as a risk factor for CAD in the two groups.

Some important observations made in this study are as follows: Firstly, young ACS patients having LP(a) levels more than 30 mg/dl are mostly males(39/53=72%) and STEMI is the most common form of ACS. Secondly, smoking does not affect the LP(a) level in ACS patients although Serum Lp(a) levels were raised in both groups. Thirdly, among the emerging CVRFs, serum Lp(a) level was found to be significantly higher in the younger group(17/60=28.33%). Serum Lp(a) was significantly raised in ACS patients with high serum LDL (> 130 mg/dl) and high total cholesterol/HDL ratio (>3.5) i.e. $p<0.05$ this means the effects of serum Lp(a) are magnified in presence of high serum LDL cholesterol and raised total cholesterol/HDL ratio and may be associated with increased disease severity in younger patients. The fact that ACS occurs more in males than females has been reported previously in the literature.[10] In a recent study, researchers have found that young women who are current smoker and obese are more likely to suffer from ACS.[11] In our study, seven patients in ACS group were female, and five of them had BMI >24.9 and diabetes.

The Lp(a) concentrations in diabetes are largely based on small studies and are conflicting. Larger studies and those including apo(a) phenotype analysis suggest that Lp(a) concentrations are not different from those in patients without diabetes, or are at most only moderately raised in patients with insulin dependent diabetes.However, there is evidence that Lp(a) concentrations are raised in patients with diabetes associated renal function impairment. Furthermore, atherosclerotic complications in patients with diabetes are associated with higher Lp(a) concentrations.[12]

CONCLUSION

Thus conclusion of the present study is that serum Lp(a) levels are significantly raised in ACS patients as compared to healthy controls($45.96 + 24.07$, Vs. $23.7 + 8.46$; $p < 0.001$). Serum Lp(a) levels had a graded association with ACS and its effects are significantly increased in presence of Diabetes Mellitus(high blood sugar) , high BMI(>25 kg/m2), high LDL-cholesterol and high TOTAL-/HDL-cholesterol ratio (>3.5).Thus high serum Lp(a) >30 mg/dl is an independent risk factor for ACUTE CORONARY SYNDROME.

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