Pattern of plasma lipoprotein (a) in Sudanese patients with coronary artery disease

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Abstract:
Coronary artery disease is one of the leading causes of death world wide. lipoprotein(a) [Lp (a)] is a cholesterol rich plasma lipoprotein. Its structure and composition closely resembles low density lipoproteins (LDL). Elevated Lp (a) is the most common familial lipoprotein disorder in patients with premature Coronary Artery Disease (CAD).
Objective: To study the pattern of plasma LP(a) levels in Sudanese patients who presented with coronary artery disease [CAD].
Material and Methods: This is a case control study. 30 patients randomly selected from a pool of 624 patients admitted to the coronary care unit [C.C.U] in Elshaab Teaching Hospital with acute coronary syndrome in the period from April 2004 to July 2005 while 30 patients with non ischaemic cardiac problems admitted to the same hospital were randomly selected as a matched control group. Serum LP(a), cholesterol and low-density lipoprotein cholesterol (LDL-C) concentrations were determined using the conventional enzymatic colorimetric methods.
Results: LP(a), cholesterol and LDL levels were all significantly high in patients with CAD [P <0.005, 0.003 and 0.001 respectively]. Lp(a) is also high in patients blew 60years of age. High LP(a) correlates with high cholesterol, LDL and other risk factors. The role of Lp(a) as an independent risk factor is less well established as 3 (20%) patients only of the 15 patients with no other risk factors had high LP(a) level.
Conclusion: This study demonstrated significant Lp(a) level in patients with other risk factors of CAD [including cholesterol and LDL].
Key words: Lipoprotein A, Coronary artery disease

Introduction

Coronary artery disease [CAD] is one the leading causes of death for both men and women world wide[1]. CAD risk increases with age, obesity and certain diseases such as diabetes, hypertension, high serum cholesterol level, high level of low-density lipoprotein (LDL) in the blood and with certain social habits such as smoking[2]. Inherited factors may also increase the likelihood of developing CAD[3].

Lipoprotein a [Lp (a)] is a cholesterol rich plasma lipoprotein which was first identified as plasma antigen in **1963** by Berg [4]. Its structure and composition closely resemble low density lipoproteins (LDL).

The plasma concentration of Lp (a) is mostly genetically determined [5]. Elevated Lp (a) is the most common familial lipoprotein disorder in patients with premature CAD [6]. High levels of Lp(a) are associated with significantly increased risk in subjects under 60 years but may be of less significance in the elderly patients[7]. Lp (a) level increases with age and in patients with renal insufficiency, nephritic syndrome and kidney transplantation [8]. However, in a brief study done in Sudan, the levels of lipoproteins were found to be relatively low/normal in patients with chronic renal diseases and that was attributed to diet and possibly genetic factors[9]

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This study had determined the pattern of plasma Lp(a) in Sudanese patients who presented with coronary artery disease CAD

Material and methods

This is a case control study. The study group [group I] included 30 patients randomly selected from a pool of 624 patients admitted to the coronary care unit [C.C.U] in Elshaab Teaching Hospital with acute coronary syndrome in the period April 2004 to July 2005 while 30 patients with non ischaemic cardiac problems admitted to the same hospital were randomly selected as a matched control group [group II].

All patients provided a complete medical history, had through clinical examination and routine laboratory investigations.

Serum Lp(a), cholesterol and low–density lipoprotein cholesterol (LDL-C) concentrations were determined using the conventional enzymatic colorimetric methods. The cut off figures for elevated markers were taken as follows:

- >30 mg for Lp(a).
- >240 mg for Cholestrol.
- >160 mg for LDL.

Results were analyzed using Statistical Package for Social Sciences (SPSS) personal computer programme.

Results

The age in group I ranged between 40 and 80 years while that of group II was between 41 and 78 yreas. Men represented 76% and 67% in

the two groups respectively. There were no significant differences in the mean age values or sex distribution between the two groups [Table I].

Table I : Age and sex Distribution of the studY groups:

	Study group		Control group	
Age in years	Male	Female	Male	Female
<60	9	1	8	2
>60	14	6	12	8
Total	23	7	20	10

Group I showed significantly higher levels of the three biochemical markers (Lp (a), cholesterol and LDL) than group II (Table 2).

Table 2:The Biochemical Data In The Studied Group.

High level of	Study group	Control group	P value
S. Lp(a)	14	3	0.005
S. cholestrol	8	1	0.003
S. LDL	7	1	0.001

Lp (a) was found to be more prevalent in patients with CAD than cholesterol and LDL [47% and 27% respectively], however there was a strong correlation between the high level of the three markers as 75% of the patients with high cholesterol and LDL has also high level of Lp(a) (Tables 2 and 3).

Table 3: The correlation between LP(a) and Cholestrol level

	High LP(a)	Normal LP(a)
High Cholestrol	6	2
Normal Cholestrol	8	14

There was high prevalence of elevated Lp(a) levels in female gender (71%). It is also high in patients blew 60 years of age (70%) and in those with more than one risk factor (73%) [Tables 4 and 5].

The most prevalent risk factors were hypertension and diabetes while smoking is the least frequent one [Table 6].

Table4: The percentage of the significant LP(a) level among the different variables

Percentage	total	High level	Variable
39%	23	9	Male
71%	7	5	Female
70%	10	7	60years<
35%	20	7	>60years
73%	15	11	Risk factor
20%	15	3	No Risk factor

Table 5: The correlation between significant LP(a) levels and the different variables.

P value	LP (a) <30	LP (a) >30	Variable
14	9	Male	0.005
2	5	Female	
3	7	60years<	0.003
13	7	>60years	
4	11	Risk factor	0.002
12	3	No Risk factor	

Table 6:: Number of patients in group 1 with traditional risk factors.

Number of patients	Traditional Risk Factors.
7	Diabetes mellitus
8	Hypertension
2	Smoking

Discussion

Lp (a) level is genetically determined. The normal range of Lp (a) in human varies in different ethnic groups. The normal range in Caucasians is similar to that in Asians. However people of African descent have demonstrated normal range that are twice higher than Caucasians. Native American and Mexican populations have normal ranges that are half of the Caucasians populations [10].

This study demonstrated significant high levels of Lp(a) in Sudanese patients with CAD and showed positive correlation between Lp(a) and the other risk factors (including high levels of Cholestrol and LDL) which is in keeping with the multi factorial etiology of CAD[11]

70% of our patients who were <60years of age in the study group showed significant high levels of Lp(a). This fining may be consistent with the results of Kostner and other workers who reported that Lp(a) may be an important initiator

and promoter, as well as an early marker for the premature CAD[11,12]. Significantly high levels of Lp(a) were seen in 5[71%] of the females compared to 9[39%] of males.

Our study demonstrated that 20% of the patients with CAD, who had no other risk factors had significantly high Lp(a) levels (table 4). It also showed that the prevalence of high Lp(a) in group I is more than that of cholesterol and LDL (table3). These findings may suggest a role for Lp(a) as an independent risk factor which keeps with the work of Sandkamp [12]. The same result was observed in the Framingham Offspring Study [7] However, these results contrast, the Physicians Health Study and Quebec Cardiovascular Study [13,14] . These differences in reports could be attributed to differences in sample collection, storage and type of Lp(a) assays. A recent meta-analysis[15], including 27 published prospective studies (18 population- based and 9 with pre existing CAD) and involving 5436 cases with mean follow up of 10 years, demonstrated a moderate and independent association of Lp(a) and CAD.

Conclusion

This study suggests that Lp (a) level is significantly high in patients with CAD and those blew 60years of age. It is associated with other risk factors and correlates with Cholestrol and LDL levels. The sample size is rather small to suggest that it is an independent risk factor (although it was significantly high in 20% of the patients who had no other risk factor).

Further studies are needed to address the significance of Lp(a) in patients with CAD blew 60 years of age who has no other risk factors.

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