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Research Paper

Nutritional screening of middle aged Indians with special emphasis on Lipoprotein (a) levels for risk prediction of cardio-vascular diseases

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ABSTRACT : Cardio-vascular diseases (CVD) account for high morbidity all over the world. Risk factors include age, sex, hypertension, smoking, diabetes, high LDL and low HDL cholesterol levels. Elevated lipoprotein (a) is an emerging independent risk factor in the development of cardio-vascular diseases. The study aimed at assessing the risk factors in the development of cardio-vascular diseases, with emphasis on elevated lipoprotein (a) levels in middle aged Indians (40-60 years).A standardized score based questionnaire was used to calculate the total cardio-vascular risk. Biochemical analysis was done using a fully automated analyzer. Biochemical analysis revealed that lipoprotein (a) and cholesterol levels in all the subjects (n=40) were higher than normal, indicating their being at higher risk of cardio-vascular diseases. About 62.5 per cent of the subjects had Lp(a) levels higher than normal. Women had higher Lp (a) levels as compared to men. Lp(a) was seen to be highly correlated with triglyceride levels. Increased knowledge of the role of Lp(a) as a risk factor for CHD would be of great benefit. Because Lp(a) is genetically determined, we also recommend further studies to examine the relationship between family history of CHD and Lp(a) levels.

KEY WORDS : Cardio-vascular disease, Nutritional screening, Risk factors, Lipoprotein (a) [Lp(a)], Middle aged Indians

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Cardio-vascular diseases (CVD) are caused by disorders of the heart and blood vessels and includes coronary heart diseases (CHD), cerebro-vascular disease (stroke), raised blood pressure, peripheral artery disease, congenital heart disease and heart failure. Projections to the year 2020 indicated an increase in the number of CVD cases, majority from such cases will be from developing countries including India (WHO, 2002)

Among non-communicable diseases (NCDs), CVD is the leading cause of death and ischemic heart disease (IHD) and strokes are the major contributors to CVD. Worldwide, 80 per cent of deaths from CVD now occur in low and middle-income countries. Thus, there is a special and urgent need for data and treatment strategies concerning CVD in low and middle income countries (Alwan *et al.*, 2010).

The role of lipoprotein (a) in the pathogenesis of CHD has been subject to recent debate. Several clinical and epidemiological studies have shown an association between elevated levels of Lp(a) and the occurrence of acute CHD events. Most convincingly, results from the lipid research clinic demonstrated Lp(a) to be an independent predictor of future nonfatal myocardial infarction and CHD death in hyperlipemic men 35 to 59 years of age (Schaefer *et al.*, 1994).

Lp(a) is made up of apolipoprotein B-100 (the apolipoprotein of LDL cholesterol) disulfide linked to apolipoprotein(a), a large and polymorphous glycoprotein with structural homology to the fibrinolytic proenzyme plasminogen. This structural homology has led to the hypothesis that Lp(a) may represent an important link between atherosclerosis and intra-vascular thrombosis. Indeed, several *in vitro* studies have demonstrated that Lp(a) competes with plasminogen for binding sites on endothelial cell surfaces. Lp(a) may promote atherosclerosis when oxidized Lp(a) particles are engulfed by macrophages, causing their

transformation into foam cells within the arterial wall (Haijar *et al.*, 1989).

Nevertheless, a meta-analysis of prospective studies indicated that plasma Lp(a) concentration is an independent risk factor for CHD in both men and women. Recently, the prospective epidemiological study of myocardial infarction (PRIME), a cohort study that included 9133 men from France and Northern Ireland with no history of CHD or use of hypolipidemic drugs, confirmed Lp(a) as a predictor of CHD risk. (Luc *et al.*, 2002). By keeping this in view, the present research was undertaken to study the correlation between lipoprotein (a) levels and cardio-vascular diseases especially in middle aged Indians (40-60 years)

■ RESEARCH METHODS

Selection of respondents:

The present study was aimed at assessing the risk factors for screening the middle aged Indian population aged 30 to 60 years with special emphasis on Lp(a) levels. A total of 40 subjects were selected using convenience sampling technique for the present piece of research out of which 20 were men and 20 were women.

Data collection :

Assessment of risk factors included anthropometric assessment, biochemical assessment, dietary assessment and risk factors score which were calculated using a standardized questionnaire.

The total cardio-vascular risk scores were categorized as under:

Low risk	-88-220
Moderate risk	101-220
High risk	221-350
Very high risk	351 and above

These scores took into account family history, stress, diabetes, exercise habits, smoking, alcoholism, sleep patterns and other aspects of life style of the subjects. Biochemical assessment included analysis of serum fasting cholesterol (CHOD-PAP), triglycerides, LDL, HDL and Lipoprotein (a). All the tests were conducted in the same standardized pathological laboratory using a fully automated analyzer (XL-300 Transasia).Quantitative determination of Lp(a) was done by turbidemetric immunoassay in which the measurement of antigen-antibody reaction was done by the end-point method (Levine *et al.*, 1992).

Statistical analysis:

Statistical analysis of collected data was done with respect to calculation of mean, standard deviation, t-test, per cent deviation and correlation coefficient (Kothari,1990). Correlation was used to assess the association between Lp(a) level and CHD risk. Results of the study are presented as under.

■ RESEARCH FINDINGS AND DISCUSSION

The study aimed at assessing the risk factors for screening the middle aged Indian population aged 30 to 60 years with special emphasis on Lp(a) levels. A total of 40 subjects were selected for the present piece of research out of which 20 were men and 20 were women. The average age of the subjects was 50±5 years. Results of anthropometric data revealed that in subjects 40-50 years, 60 per cent men and 50 per cent women had normal BMI, 20 per cent men were in Grade I obesity and 20 per cent men in Grade II obesity (Table 1). The effect of body mass index (BMI) on coronary heart disease (CHD) risk is attenuated when mediators of this risk (such as diabetes, hypertension and hyperlipidaemia) are accounted for (Logue *et al.*, 2011).

Patients had significantly higher levels of total cholesterol and triglycerides and lower levels of HDL cholesterol levels indicating their being at high risk of CVD (Table 2).

Results of Table 2 revealed that about 62.5 per cent of the subjects had Lp(a) levels higher than normal. The mean value of Lp(a) in subjects (n=40) was 43.7±25mg/dl. As shown (Fig. 1), Lp (a) levels were found to be significantly higher in women subjects (51.7±28.4) than in men (35.8±20.9). Lp(a) was found to predict significant CAD and to be a better predictor

Table 1 : Percentage of subjects under different BMI category

BMI ranges(kg/m^2)	40-50 Yrs		50-60 Yrs	
	Men (n=20)	Women (n=20)	Men (n=20)	Women (n=20)
<20 Thin	0%	0%	0%	0%
20-25 Normal	60%	50%	50%	20%
25-30 Grade I obesity	20%	40%	50%	60%
>30 Grade II obesity	20%	10%	0%	20%

Table 2 : Biochemical data of the subjects

	Lipoprotein (a) (mg/dl)	Cholesterol (mg/dl)	Triglycerides (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
Normal values	0-30	<200	50-160	35-80	0-100	10-50
Mean ± S.D. (n=40)	43.7±25**	197.8 ± 36.5*	124.3 ± 49.9*	48.3 ± 8.5	83.3 ±1 8.6*	26.2 ± 26.2*

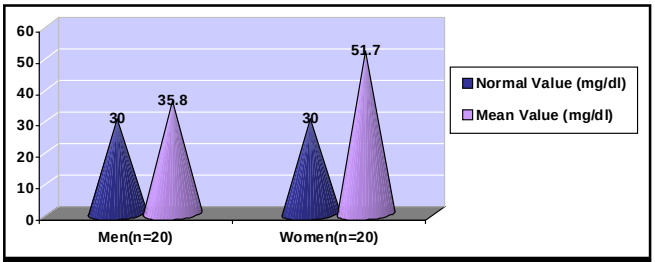

Fig. 1 : Lp (a) Levels in men and women subjects

in women than in men. A strong correlation was seen between the triglyceride and cholesterol levels, triglyceride and LDL levels, triglyceride and VLDL levels,LDL and VLDL levels, cholesterol and LDL levels, cholesterol and VLDL levels ($P<0.01$). Data clearly revels that all the subjects were at an increased risk of CVD. Lp(a) was seen to be highly correlated with triglyceride levels ($P<0.05$).

Conclusion:

In summary, the results suggest that cardio-vascular diseases can be multifactorial. Study has shown an association between elevated levels of Lp(a) and the occurrence of acute CHD events in both men and women. However, women had higher Lp (a) levels as compared to men. Lp(a) was seen to be highly correlated with triglyceride levels. Because Lp(a) is genetically determined, we also recommend further studies to examine the relationship between family history of CHD and Lp(a) levels. Increased knowledge of the role of Lp(a) as a risk factor for CHD would be of great benefit. High-risk population would be more easily identified and could possibly be treated for other existing risk factors.

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