DISTRIBUTION MODEL OF SERUM LIPOPROTEIN (A) CONCENTRATION IN A HEALTHY IRANIAN POPULATION LIVING IN KHUZESTAN PROVINCE, IRAN. 2004.

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Abstract
Based on many epidemiologic studies, lipoprotein (a) [Lp(a)] with its peculiar structural properties was proposed as independent, risk factor for cardiovascular and thrombotic cerebral events. Since, genetic effect plays a paramount role in determining the final serum concentration, the reference serum concentration for this particle exhibits a wide variation among different population and even within a family. In order to prevent its pathologic effect which has been related to its high serum concentration it is a prerequisite to determine its serum concentration distribution model in a particular population before any therapeutic measure is arranged. To accomplish this goal a group of 350 healthy volunteers living in southern province of Khuzestan, Iran, were analyzed for their Lp (a) serum concentration employing and isoform- insensitive ELISA technique. The obtained result showed skewed distribution toward lower concentration ranging from 3 to 53 mg/dL with mean, median and standard deviation as 14.42, 12.0 and 8.46 mg/dL.

Introduction

A lipid- rich plaque, athroma, formed by foam-cell within the walls of medium and large arteries is the halmark of the chronic multifactorial atherosclerosis process which underline many forms of vascular diseases (1,2,3). Among the most effective groups of risk factor in this regard are the plasma lipoproteins including lipoprotein (a) (4,5). This highly resistant lipoprotein to drug therapy with its peculiar structure contains a protein moiety, apoprotein (a), with a unique structure (6,7) which is strikingly homologous to plasminogen (8). Based on this similarity, Lp (a) is supposed to interfere with the physiological process of fibrinolysis and thereby stabilizing the formed clots causing thrombotic events (9,10,11,12).

Also by its LDL-like subunit, Lp (a) can potentiate atherosclerotic process (13,14). Therefore it is suggested that this particle, in an elevated serum concentration, can function as an independent risk factor for cerebral (15,16,17,18) and myocardial events (19,20,21). Thus in order to control the serum level of this genetically polymorphic (22,23) lipoprotein it is essential to clarify the distribution model of its serum concentration before any interventional measure can be perpetuated. In this work the serum Lp (a) levels in a group of healthy volunteers selected from Iranian Ahvaz population were measured by apo (a) isoform-insensitive Enzyme Linked Immuno Sorbent Assay [ELISA] procedure. Up to this time this type of research is the first to be accomplished in

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the southern province of Khuzestan in Iran.

Materials and methods

A group of 305 healty volunteers (200 males and 105 females) aged 20-25 years with no history of hypertension, hyperlipidaemia, diabetes mellitus, renal failure, smooking, cardiovascular and cerebrovascular events were selected from population resident in southern province of Khuzestan, Iran. Fasting serum samples were drawn and kept frozen at -20°C for analysis. Serum concentrations of Lp (a) were measured employing apo (a) isoform- insensitive Enzyme Linked Immuno Sorbent Assay (ELISA) kit distributed by Immuno. Ltd. Co. Germany. The results were analysed by non-parametric method. The significancy

of the sample was determined according to the criteria stated by Bishop et al. (31).

Results and discussion

The obtained results for serum concentration of Lp (a) and its frequency distribution are shown in Table 1. The observed frequency distribution of Lp (a) which covers a range of 3-53 mg/dL concentration was highly skewed towards the lower concentrations (Fig. 1) with 5% of the total cases positioned above the proposed cut-off point of 30 mg/dL. No sex (χ^2=2.71, χ^2=3.841, p=0.1) and ethnic (χ^2=0.038, χ^2=3.841, 0.9>p>0.5) significant differences were detected in this study (Table 2). The ranking position of the obtained mean concentration for serum Lp (a) in this study among other ethnics is shown in Fig. 2.
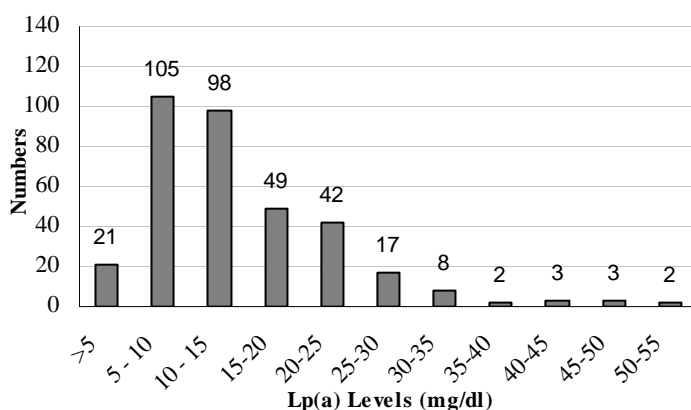

Fig. 1: Frequency distribution of Lp (a) serum concentration in the investigated healthy group (n=305).

Table 1: The observed frequency in the investigated healthy group (n=305)

	Observed absolute frequency	Percentage of the observed frequency
<5 mg/dL	18	6.0 %
5-10 mg/dL	98	32.0 %
10-15 mg/dL	91	30.0 %
15-20 mg/dL	37	12.0 %
20-25 mg/dL	30	10.0 %
25-35 mg/dL	22	7.0 %
>35<53 mg/dL	9	3.o %
Total	305	100 %

Mean= 14.42 mg/dL
Median= 12.0 mg/dL
Standard deviation= 8.46 mg/dL

Due to its peculiar structure (6,7) Lipoprotein (a) [Lp(a)] has been introduced as independent risk factor for thrombotic and premature heart disease (9,10,11). The proposed cut-off point for the above-mentioned pathogenecity was suggested to be 30 mg/dL (24,25). This lipoprotein particle appears to be highly polymorphic in size due to accumulation of more than 30 alleles on apoprotein (a) [apo(a)] gene locus situated on The chromosome 6 (26,27). Therefore it is predicatable that its serum concentration remain fairly constant throughout an individual's life, meanwhile exhibits highly variable serum concentration among different individuals and ethnics as reported to be ranging from 7 to 21.3 mg/dL with the exception of Sudanese with a mean of 45.7 mg/dL (6,28,29). Therefore any investigation concerning the pathogenecity of lipoprotein (a) and its diagnostic value in atherosclerotic and thrombotic complications should be preceded by clarification of its serum concentration distribution model in a particular population.
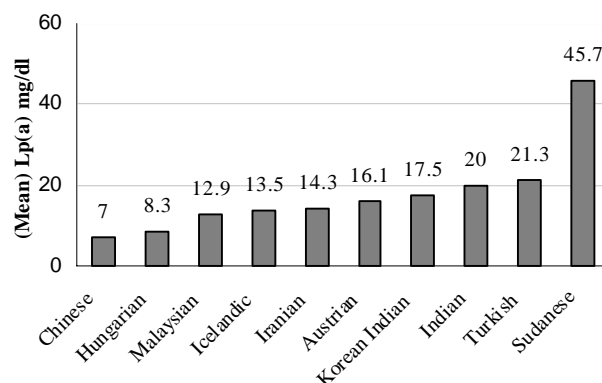

Fig. 2: Mean levels of Lp(a) among the different ethnics.

Table 2: Distribution of serum concentration of Lp(a) in different ethnics and sex (Total number=305)

Distribution Pattern	Sex		Ethnics	
	Male	Female	Persian	Arab
Cases With [Lp(a)]* over the observed median level 12.0 (mg/dL)	50 % (n=100)	60 % (n=63)	48.4 % (n=122)	45.9 % (n=45)
Cases with [Lp(a)] below the observed median level (12.0 mg/dL)	50 % (n=100)	40 % (n=42)	51.6 % (n=130)	44.1 % (n=53)
		N.S		N.S
Cases with [Lp(a)] over the cut-off point of 30.0 g/L		5 %**		

N. S: No Sex (χ^2=2.71, χ^2=3.841, p=0.1) and ethnics (χ^2=0.038, χ^2=3.841, 0.9>p>0.5) significant differences were detected.
* Serum concentration of Lipoprotein (a)
** Percentage from the total investigated cases

The obtained results in this work covering a range of 3-53 mg/dL were skewedly distributed towards the lower concentration with 5% of the total investigated cases situated above the cut-off point of 30.0 mg/dL in both male and female groups. The absence of sex difference in this investigation is confirmed with the other reports in this respect (30,31). Although the nature of the observed skewness in serum concentration of Lp (a) in this study is in harmony with the other reports (30) the distribution of the obtained results around the proposed cut-off point show some discrepancy with the other investigations (14).

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