LIPID PROFILE IN MIDDLE CLASS BENGALI POPULATION OF KOLKATA

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ABSTRACT

Fasting samples of 1396 apparently healthy, middle class Bengali population of Kolkata, West Bengal were tested for total cholesterol, triglycerides, high density lipoprotein cholesterol, low density lipoprotein cholesterol and very low density lipoprotein cholesterol, over a period of three years. The values obtained were (in mg/dl) 190 ± 33 , 132 ± 42 , 53 ± 10 , 116 ± 30 and 21 ± 7 respectively. When these subjects were grouped according to the age and sex, no appreciable difference were observed between most of the groups. Triglyceride was found to be low and HDL cholesterol was high in women below 30 years when compared with men of similar age. Beyond 60 years, cholesterol level as well as low density lipoprotein cholesterol was found to be gradually increased in case of women. Besides these changes, other minor differences were not statistically significant. It is suggested that the lipid values of the present study should be taken as a base parameters and the clinical evaluation be made on the basis of these finding.

KEY WORDS

Lipid profile, lipoproteins, lipid triad index, epidemiological study.

INTRODUCTION

Cardiovascular diseases are the major cause of death in our society. The ability to prevent the development of atherosclerosis or, alternatively, to decrease established atherosclerotic plaques, often referred to as regression, has major implications for public health. Whereas the incidences of coronary artery disease (CAD) were halved in the West in the past 30 years, the rates doubled in India with no signs of downturn. It appears that the CAD epidemic could explode in parallel with affluence and urbanisation in rural villages unless the gravity and magnitude of the problem is recognised and immediate action is taken. (1). Thus a re-assessment of plasma lipids in a modern population become a necessity to recognize the defects in our health strategies.

The validity of the lipid hypothesis has been debated for more than 40 years. The relation between total cholesterol (TC) and low density lipoprotein cholesterol (LDL-C) levels and the incidence of CAD

and peripheral vascular disease (PVD) is now well established (2). Epidemiological studies have shown parallel, age-related trends of atherosclerotic lesions in the abdominal aorta, carotid, and coronary arteries (3). But the debate regarding the cut off values of lipid parameters remained. It was thought that norms for lipoproteins in control subjects cannot have a rigid cut off values because values obtained for one population may not be relevant in other populations due to factors like socio-economic, geographic conditions, races, eating habits, age and sex (4). Naturally the plasma lipid values of different populations from different regions were reported to have separate cut off values for separate population. The diversity in the findings though attributed to socio-economic status, nature of diet /dietary fat and genetic preponderance, the different methodology adopted also could not be ignored. In the light of guidelines suggested by National Cholesterol Education Program (NCEP) of USA it was also necessary to establish a normal reference intervals for plasma lipids in Indians (5). The plasma lipid evaluation in Indian Bengali population was carried out with this purpose.

MATERIALS AND METHODS

A 3-years retrospective study of 1396 normal apparently healthy subjects of Kolkata from middle

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to moderate income Bengali families of various age groups of either sex with no known manifestation of any disease or evidence of metabolic abnormalities hypertension or coronary disorder were investigated for complete lipid profile. Subjects with history of smoking or consumption of liquor or taking oral contraceptive drugs were excluded from the study. Exclusion criteria based on laboratory examinations were followed. Serum triglyceride(TG)>195mg/dl values were not considered for the study(6).

Blood samples were drawn irrespective of seasonal variations, throughout the year from all these subjects, who had fasted for minimum 12 hours before venepuncture. Serum was separated and all samples were analysed within 6 hours of collection in our laboratory. Serum cholesterol and triglyceride (TG) were estimated by enzymatic methods using diagnostic kits (Accurex Biomedical). HDL-C was measured in the serum after a precipitation with phosphotungstic acid in presence of magnesium chloride(7). VLDL-C and LDL-C were estimated using the formula of Friedewald (8) with modification of Bachorik (9). Quality control was maintained using quality control sera of Technicon (Bayer Corporation, USA). The laboratory values of serum lipids were compiled and analysed using appropriate statistical methods(10)The intraassay and interassay coefficient of variations for these investigations were found to be between 4% to 6% which is well within the recommended range ,suggested by NCEP (5).

RESULTS AND DISCUSSION

Table 1 shows the mean values and standard deviation (SD) of cholesterol and triglyceride in serum and the three major fraction of lipoproteins i.e, HDL- C, LDL-C and VLDL-C in the various age and sex-wise values of healthy subjects. Mean values of triglyceride and total cholesterol and cholesterol in HDL, LDL, and VLDL fraction for all the 1396 subjects were 132.0 ± 42.2 , 189.7 ± 33.3 , 52.9 ± 10.1 , 115.6 ± 29.8 and 21.1 ± 6.5 mg/dl respectively. In 998 males the values were 133.4 ± 41.3 , 189.7 ± 31.1 , 51.7 ± 9.9 , 116.5 ± 27.6 and 21.7 ± 6.4 mg/dl respectively and 398 females the values were 128.5 ± 44.1 , 189.8 ± 38.2 , 55.9 ± 9.8 , 113.4 ± 34.8 and 19.7 ± 6.6 mg/dl respectively. No difference was observed in TG level between the male and female population and in different age group except in 20-30 years group where the females showed a significant lower level ($P < 0.001$), VLDL-

C levels followed the same pattern. Though the average HDL-C was significantly higher in female ($P < 0.001$), the same change was not observed beyond 60 years. The females showed high TC levels beyond 60 years ($P < 0.01$), which was further increased beyond 70 years ($P < 0.001$) with a concomitant increase in LDL-C.

The normal reference intervals for plasma lipids have been presented. High HDL-C levels in females below 60 years probably protect them from CAD. The gradually increase in TC and in later stage in LDL-C beyond 60 years, could place the females on more vulnerable position compared to males in relation to CAD. When compared with the data available from other regions of India (4,11,12), no difference between these values in relation to vegetarian or non-vegetarian diet was observed. The present parameters also did not differ much when compared with that in other population reported in recent years (4,11,12). 3044 elderly Japanese – American men from Honolulu Heart Program showed the mean concentration of their lipid patterns were as follows : TC 189, HDL-C 51, LDL-C 109 and TG 147 mg/dl (13). This report follows a similar pattern as in some of the foreign countries as well as the present study (12). The life style of the middle-class population has considerably changed in this decade and a uniform pattern has emerged throughout India. Probably the public awareness regarding the dietary role on atherosclerosis, the status of saturated and unsaturated fat and health consciousness has put the population of different regions in the same platform. It is suggested that the lipid values of the present study should be taken as a base parameters and the clinical evaluation be made on the basis of these finding ignoring the meagre reference values of Indian population reported earlier. For predicting the risk factors for CAD, relative ratios of different fractions of plasma lipids, along with the main parameters are gaining importance. The TG and HDL-C ratio has been related to LDL-C size pathophysiology and relevant with regard to the risk of clinical vascular disease. A cut-off value of 1.33 has been reported where >1.33 is suggestive of presence of higher percentage of small LDL particles (14). In our study , this ratio has been found to be 1.00-1.13. Since small LDL-C were more prone to oxidation leading to atheromatous lesions, This TG /HDL-C ratio could help the clinicians for better monitoring of CAD patients.

A lipid tetrad index has been proposed to quantitate

the total burden of dyslipidemia in a population . It is derived by the product of total cholesterol, triglycerides and lipoprotein (a) [Lp(a)] divided by HDL-C(15). The role of Lp (a) and their levels in different age group is still to be ascertained in our country. However, it is proposed that a simpler lipid triad index also can give us an idea about the extent of dyslipidemia. In a recent observation, it has been

found that this index in a control group is much lower when compared with angiographically assessed CAD patients whether the Lp(a) is taken into account or not (16). Considering the present study, the study at Gujrat (11) and at Rajasthan (12), it can safely presumed that the lipid triad index should be around 500 or less in our population. This can be the basis for the assessment of dyslipidemia.

Table 1
Distribution of Lipid profile fraction in various age groups.
(Data, expressed as mg/dl are mean $\pm$ S.D.)

Age group (year)	Sex	No.	TC	HDL-C	LDL-C	VLDL-C	TG
21-30	Male	36	169.6 $\pm$ 31.4	49.5 $\pm$ 10.1	97.8 $\pm$ 27.1	23.3 $\pm$ 5.8	138.1 $\pm$ 37.2
	Female	34	168.1 $\pm$ 27.1	57.5 $\pm$ 8.9	94.2 $\pm$ 42.0	16.4 $\pm$ 6.2	100.7 $\pm$ 39.4
31-40	Male	132	178.4 $\pm$ 31.7	52.2 $\pm$ 11.6	104.2 $\pm$ 28.7	22.0 $\pm$ 6.4	136.2 $\pm$ 40.1
	Female	85	175.5 $\pm$ 47.7	54.0 $\pm$ 10.8	100.4 $\pm$ 36.7	21.1 $\pm$ 6.0	130.5 $\pm$ 38.6
41-50	Male	326	194.5 $\pm$ 28.2	51.9 $\pm$ 9.8	120.8 $\pm$ 25.9	21.9 $\pm$ 5.7	135.4 $\pm$ 36.0
	Female	108	194.3 $\pm$ 30.7	59.6 $\pm$ 4.9	114.8 $\pm$ 31.2	19.9 $\pm$ 6.1	130.4 $\pm$ 40.8
51-60	Male	306	194.9 $\pm$ 32.2	51.8 $\pm$ 10.2	121.8 $\pm$ 26.3	21.7 $\pm$ 7.1	134.6 $\pm$ 45.1
	Female	92	196.4 $\pm$ 29.9	55.4 $\pm$ 9.5	199.9 $\pm$ 27.6	21.1 $\pm$ 6.1	133.3 $\pm$ 38.5
61-70	Male	146	186.7 $\pm$ 29.5	51.6 $\pm$ 8.1	113.8 $\pm$ 27.5	21.3 $\pm$ 6.3	128.2 $\pm$ 43.1
	Female	62	199.2 $\pm$ 43.6	53.6 $\pm$ 13.2	122.8 $\pm$ 36.2	22.8 $\pm$ 7.2	134.5 $\pm$ 49.9
71 and above	Male	52	180.2 $\pm$ 28.2	50.5 $\pm$ 8.5	109.5 $\pm$ 25.6	20.2 $\pm$ 7.1	117.5 $\pm$ 45.1
	Female	18	204.4 $\pm$ 27.7	49.5 $\pm$ 6.6	136.3 $\pm$ 19.9	18.6 $\pm$ 7.9	115.5 $\pm$ 49.8
Total	Male	998	189.7 $\pm$ 31.1	51.7 $\pm$ 9.9	116.5 $\pm$ 27.6	21.7 $\pm$ 6.4	133.4 $\pm$ 41.3
	Female	398	189.8 $\pm$ 38.2	55.9 $\pm$ 9.8	133.4 $\pm$ 34.8	19.7 $\pm$ 6.6	128.5 $\pm$ 44.1
Overall		1396	189.7 $\pm$ 33.3	52.9 $\pm$ 10.1	115.6 $\pm$ 29.8	21.1 $\pm$ 6.5	132.0 $\pm$ 42.2

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