

Evaluation of Dyslipidaemia among Different Age Groups in Urban South Indians

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ABSTRACT

BACKGROUND

The significant reason for morbidity and mortality in industrialised countries is coronary artery disease. Globally, it is considered as one of the major public health problems. There is emerging evidence of premature coronary artery disease occurring in Asian Indians at least 10 years earlier as compared to other ethnic groups. The most important atherosclerotic risk factor is dyslipidaemia. Recent studies have reported that Total Cholesterol (TC), Low Density Lipoproteins (LDL), Triglycerides (TG) levels have increased among young urban population over a 20-year period. Hence, this study was carried out to find out the prevalence of dyslipidaemia among different age groups in urban South Indian population.

METHODS

This study is a descriptive cross-sectional study conducted among patients visiting the OPD of Department of General Medicine. The study subjects were divided into 3 groups as per age as 18 - 40 years, 41 - 60 years and > 60 years by involving 1989 subjects of whom 532 were in 18 - 40 years age group, 522 were in 41 - 60 years age group and 935 were over 60 years of age. In this study, fasting serum lipid profile was estimated.

RESULTS

The study revealed higher prevalence of dyslipidaemia in the group < 60 years. Statistically significant difference in mean was found with cholesterol, LDL, and triglycerides in the age group of 18 - 40 years and more than 60 years. Statistically significant difference was not found between 18 - 40 years and 40 - 60 years for HDL. Mean serum cholesterol was high in the age group 18 - 40 years. The highest mean triglycerides were found in the age group of 41 - 60 years. The highest mean HDL levels were found in the above 60 years age group.

CONCLUSION

Higher percentage of dyslipidaemia was found in the age groups less than 60 years. It is also the need of the hour to devise comprehensive strategy for awareness programme for periodically screening of all age groups.

KEY WORDS

Dyslipidaemia, Cholesterol, Low Density Lipoproteins, Cholesterol & Triglyceride

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BACKGROUND

An established risk factor for cardiovascular diseases is the elevated blood lipid level. Globally, 4.5 % of total deaths are due to high total cholesterol levels.¹⁻⁴ The major contributing determinant in the development of ischemic heart diseases, stroke and other vascular diseases is dyslipidaemia. According to National Cholesterol Education Programme (NCEP) dyslipidaemia is defined as hypercholesterolemia (serum cholesterol > 200 mg / dL), hypertriglyceridemia (serum triglyceride > 150 mg / dL) and high LDL cholesterol (LDL cholesterol > 130 mg / dL). Studies have documented that by 2020, India will bear burden of 60 % of the world's cardiovascular disease.⁵

A distinctive pattern of dyslipidaemia with lower HDL-cholesterol, increased TG levels and higher proportion of small dense LDL-C are seen in India and there are no large population studies to evaluate the magnitude of dyslipidaemia problem in India. The prevalence of Coronary Heart Disease (CHD) is found to be around 3 - 4 % in rural areas and a six-fold rise among the adults above 20 years of age found between the years 1960 and 2000 in urban areas. Adverse change in the lipid profile associated with urbanization associated with lifestyle with increased saturated fat consumption and decreased physical activity. The pathophysiology & key independent amendable risk factor for cardiovascular disease is closely linked to dyslipidaemia^{6,7,8}

The detection, evaluation and treatment guidelines for high blood cholesterol in adults was developed by National Cholesterol Education Programme (NCEP). Cardiovascular morbidity and mortality get reduced due to effective control of blood lipid levels. Hence, understanding of the various aspects of the lipid profile and the significance of each of the parameters is very essential part of the management of CHD and who are at risk of CHD.^{9,10} Appropriate planning of health care resources for prevention of both primary and secondary cardiovascular diseases can be ensured by estimation of prevalence of dyslipidaemia.⁶

The study was planned to find out the lipid profile patterns and prevalence of dyslipidaemia in South Indian urban population between the age groups 18 to more than 60 years.

METHODS

This is a descriptive cross-sectional study conducted on 1989 patients who visited the outpatient department of General Medicine as study subjects. Study subjects were categorised into three groups: Group I: Consisting of 18 to 40 years of age, Group II: 41-60 years of age and Group III: More than 60 years of age. Subjects included in this study were more than or equal to 18 years of age of either sex., patients who volunteered to participate in this study. Subjects excluded were adults with known history of coronary heart diseases / terminally ill patients / suffering with acute or chronic illness / patients with less than 18 years of age / on medication with hypolipidemic drugs.

With aseptic precautions the blood samples were collected in the morning from the median cubital vein after a fasting

period of 10 - 12 hours for lipid profile assay into dry tubes (BD Vacutainer). Informed consent was obtained from the study subjects as part of health screening before the collection of the blood sample. Ethical clearance was obtained from the Institutional ethics committee prior to this study.

Estimation of fasting lipid profile: After an overnight fasting, 5 ml of venous blood was drawn after taking aseptic precautionary measures and allowed to clot at room temperature. Centrifugation was carried out at 3000 rpm for 10 minutes. For separation of serum from the blood. The serum was analysed for total cholesterol by CHOD-POD (end point), triglycerides by enzymatic (GPO-PAP), LDL cholesterol & HDL Cholesterol by Homogenous Method and Direct Measurement by using autoanalyzer within one hour of collection.

Statistical Analysis

Statistical analysis was performed with SPSS software version 22. Mean, standard deviation, and standard error were determined for each study group. Univariate analysis was carried out using Pearson Chi-square test and comparison of differences in mean in these groups was analyzed using students t-test and calculated. P-value of < 0.05 was considered as statistically significant t- test.

RESULTS

In this study, fasting lipid profile was estimated among different age groups in the urban population of South India. 1989 patients were endorsed to participate in the study as subjects. The subjects were categorised into 3 groups. Group 1 consisted of study participants in the age group of 18 - 40 years, Group 2 consisted of study participants in the age group of 41 - 60 years and Group 3 consisted of study participants in the age group of more than 60 years. Out of which 532 were 18 to 40 year of age, 522 were between 41 - 60 year of age and 935 were over 60 years. The sociodemographic profile of the study subjects was collected. 70 % of the study subjects were found to be male. Fasting lipid profile of all study subjects included total cholesterol, triglycerides, LDL cholesterol & HDL cholesterol.

Lipid Profile	Age Group	N	Mean ± SD	P Value
Total Cholesterol	1	532	181.48 ± 41.31	0.00
	3	520	153.81 ± 40.2	
LDL Cholesterol	1	532	116.45 ± 34.6	0.00
	3	522	89.53 ± 13.3	
Triglyceride	1	532	145.85 ± 32.3	0.00
	3	521	123.36 ± 15.2	
HDL Cholesterol	1	532	36.85 ± 9.5	0.123
	3	522	37.82 ± 11.0	

Table 1. Differences in Lipid Profile in Various Age Groups

*P value ≤ 0.05 is statistically significant.

Mean Group-1 age less than 40 years & Group-3 age more than 60 years

Tabulated the results of all 3 groups, with cholesterol < 200 mg / dL and > 200 mg / dL, HDL > 45 mg / dL and < 45 mg / dL, triglycerides < 150 mg / dL and > 150 mg / dL, LDL < 100 mg / dL and > 100 mg / dL. Statistically significant difference was found in mean cholesterol, LDL cholesterol and triglycerides between age groups of < 40 and > 60 years. No statistically significant difference found between < 40-year age group and 41 to 60 years age group (Table 1). Among the 3

groups highest mean serum total cholesterol was observed in age group of 18 to 40 years. Mean HDL was highest in > 60 yrs. age group, highest mean triglyceride level 147.21 was found between 41 - 60 years age group and mean LDL were high in 18 to 40 years age group as indicated in Fig 1 to 4.

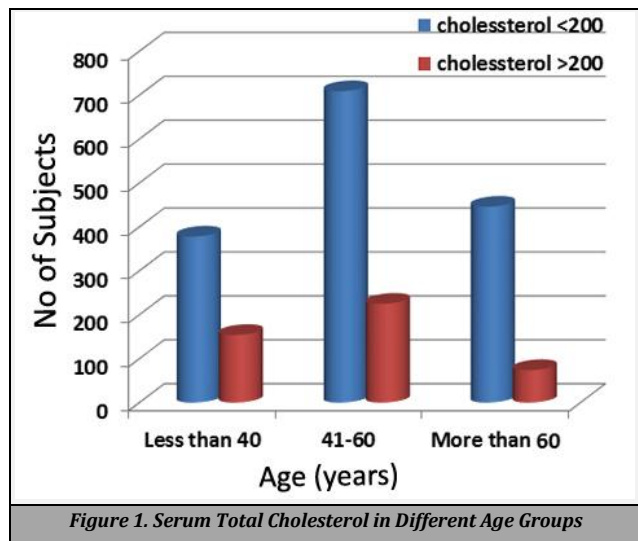


Figure 1. Serum Total Cholesterol in Different Age Groups

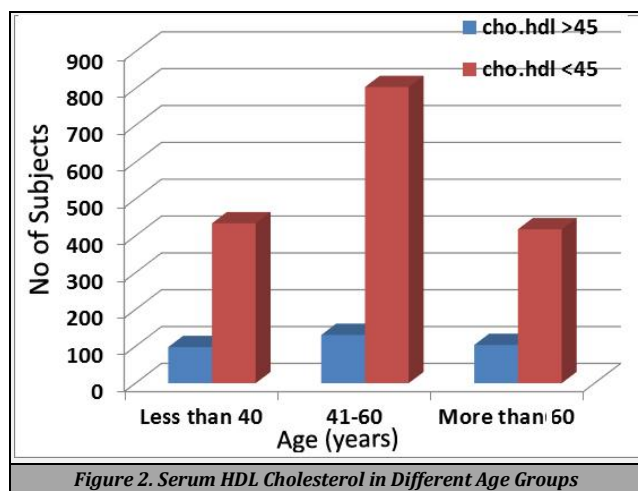


Figure 2. Serum HDL Cholesterol in Different Age Groups

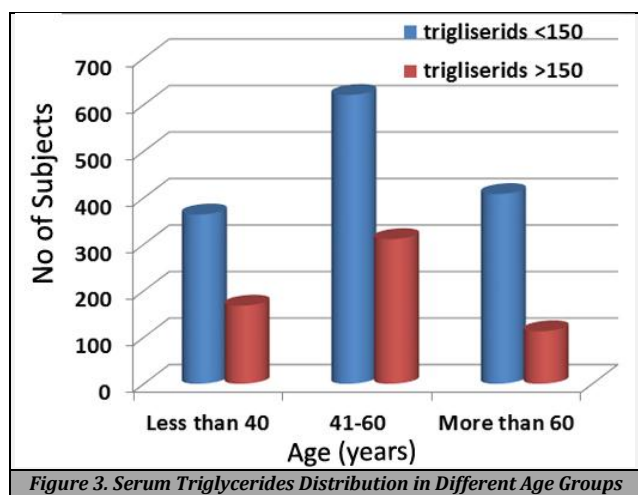


Figure 3. Serum Triglycerides Distribution in Different Age Groups

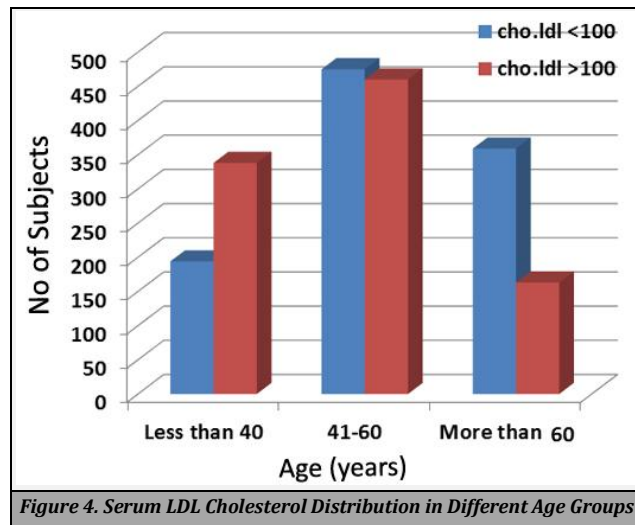


Figure 4. Serum LDL Cholesterol Distribution in Different Age Groups

DISCUSSION

Cardiovascular risk assessment is done by lipid profile evaluation by estimating the biochemical parameters such as serum total cholesterol (TC), triglycerides (TG), low density lipoprotein-cholesterol (LDL-C) and high-density lipoprotein cholesterol (HDL-C). Evidences indicate that increased concentration of serum total cholesterol (TC), triglycerides (TG), low density lipoproteins-cholesterol (LDL-C) and decreased high density lipoprotein cholesterol (HDL-C) accelerate the development of atherosclerotic plaque.^{11,12,13}

In this study the prevalence of hypercholesterolemia (> 200 mg / dL), high LDL (> 130 mg / dL) were observed in the age groups of < 40 years and hypertriglyceridemia (> 150 mg / dL) was observed between the age groups of 41 - 60 years. Lower HDL < 40 mg / dL was observed in < 60 years age group.

Cross sectional studies have indicated that total cholesterol and LDL-cholesterol levels tend to elevate with age in young age and middle-aged adults and decrease in participant's ≥ 65 years of age. However, in most of the cross sectional, prospective studies HDL cholesterol levels do not vary with age in both men and women,^{14,15,16,17,18,19} which is in accordance to this study, which showed linear association between the extent of dyslipidaemia and lesser age. There was no statically significant difference found between the prevalence of dyslipidaemia among males and females. The predominance of dyslipidaemia was high in 18 to 40 years age group.

This cross-sectional study results are concordant with the prospective study of Ferrara A et al,²⁰ which showed statistically significant reductions in serum total cholesterol, LDL cholesterol and HDL cholesterol among males and females. The reduced capacity for the removal of LDL by the liver, probably due to reduced hepatic LDL receptor expression and / or increased intestinal absorption of cholesterol is seen with increase in LDL with age. Mixed results are found according to previous studies.

For example, significant negative correlation found between Total and LDL cholesterol and age in Honolulu Heart Program study conducted in elderly Japanese American men but in the case of Framingham Offspring study they showed positive correlation between Total and LDL cholesterol and

age. The variation in the results of these studies may be due to the variation in the age groups inclusion criteria. The age group was between 71 and 93 yrs. in the Honolulu Heart Program while the age group was below 60 years in case of Framingham Offspring study.^{21,22,23} The hypothesis of increase in cholesterol levels with increase in age until the sixties but starts to decrease beyond that age supported by the findings of the present study, which indicated the tendency of decrease in both total cholesterol and LDL cholesterol with age.²⁴ Many studies were conducted in nineties but in this study more than 60 years age group were involved to evaluate the pattern of change in lipid profile in elderly people and to evaluate if these changes would be the risk factors for coronary heart diseases.²⁵

Recent report of cross-sectional study from Cardiovascular Health study found that HDL cholesterol levels were increased in men not in women, but most of the cross-sectional studies have not found HDL cholesterol levels varying with age. Which is similar to the results of this study which indicated increased HDL cholesterol in more than 60 years age group compared to other age groups.

Statistically significant elevation of mean serum total cholesterol was found in urban than rural participants, though there was higher concentrations of Mean serum LDL Cholesterol and Triglycerides, the difference was not statistically significant, and the most frequent dyslipidaemia found was abnormally low HDL cholesterol in the urban participants when compared to rural participants. A study was conducted by Sabir et al. to find out the plasma lipid profile levels in rural urban difference and prevalence of dyslipidaemia in Huasa Fulani of North Western Nigeria.²⁶

Consumption patterns, smoking status, stress levels, physical activity are the risk factors for dyslipidaemia. Consumption of cholesterol in the diet increases the blood levels of cholesterol depending on the body's ability to compensate by synthesizing less cholesterol. While triglycerides in the body are influenced by carbohydrate and obesity, free radicals also cause the disruption of lipid profile by increasing the lipid peroxidation of LDL leading to formation of atheromatous plaque.²⁷

Dyslipidaemia being a considerable and adaptable risk factor, early screening and detection and treatment can prevent the risk of Coronary artery disease among younger population.

Limitations

An observational and cross-sectional in nature of the study was primary limitation of this study. Other age groups with less than 18 years also should have been considered for the study instead of 18 to more than 60 years. Unable to document an association of physical activity, diet and other potential factors on blood lipoprotein levels in the study subjects. Future extensive studies with more potential factors and larger participant groups are required to confirm our results.

CONCLUSIONS

Lifestyle factors which are very important, and which affect the serum lipid profile include composition of diet, body weight and physical activity. Thus, crusade to improve the

lifestyle factors, balanced diet, with efforts to increase physical activity may be essential to effectively reduce the cardiovascular disease risk and screening of all age groups including young population can prevent development of CAD. Early detection and interventions will help in preventing morbidity and mortality due to CAD.

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