Research Article

Status of serum lipid profile in young population in rural area

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ABSTRACT

Background: In all over the world, cardiovascular diseases (CVD) are widespread and growing problem nowadays. High concentration of lipid profile is the strongest risk factor for this. Researches indicated that atherosclerotic process of CVD begins early in life and progressive throughout life. If early diagnosis (<40 years) can be made, disease may be present in adult age. Not many researches are conducted in rural area related to this. The present study is an attempt to contribute in research to minimize the risk of CVD by evaluating lipid profile in early ages in rural area. **Objective**: The objective of this study is to evaluate the status of serum lipid profile in young age group according to age and gender in rural area. **Methods and Materials**: It is an observational prospective study carried out in the Department of Biochemistry, a rural hospital in Wardha Maharashtra. We selected 10,096 patients in previous 2 years. The study population comprised of 1829 subjects of <40 years of age that included 1036 males and 793 females. Patients divided with regard to the age group (15–30 years and 31–40 years) and gender. Statistical analysis was done using descriptive and inferential statistics using one-way ANOVA. **Results**: On applying the National Cholesterol Education Program and Adult Treatment Panel guidelines, we found out that nearly 85% of the subjects had at least one abnormal parameter. Prevalence of dyslipidemia is more in the age group of 31–40 years. High (>250 mg/dl) total cholesterol level is found in 7.9% population, and two-thirds of the population (64.7%) had low high-density lipoprotein. **Conclusion**: Values are quite significant in relation to age group. Early detection of deranged lipid profile should be done. We should perform periodic checkups from the age of 20 years to prevent cardiovascular risk.

KEY WORDS: Younger Age Group; Lipid Profile; Cardiovascular Risk Factors; Rural Area

INTRODUCTION

Cardiovascular diseases (CVDs) are currently the leading cause of death globally, accounting for 21.9% of total deaths, and are projected to increase to 26.3% by 2030.[1]

Global burden of disease estimated that, in India, the total percentage of death due to CVD below 70 years of age is 52% as compared to those who live in developed nations where it is 23% only. The prevalence rate varies with the age, as the younger age group of 18–24 years, it is only 4% and rises to 60% after 65 years.[2] CVD is often thought to be a problem of wealthy, industrialized nations. Indeed, nearly 30% of all deaths in low- and middle-income countries are attributable to CVD, and more than 80% of CVD-related deaths worldwide now occur in low- and middle-income countries.[3] By the year 2020, India will bear 60% of the world's cardiovascular disease burden. There were 2.3 million CVD-related deaths in India in 1990 and 2.8 million in 2002, and it is expected to cause an alarming 5 million deaths by 2020. This is perhaps due to rapid epidemiological transition, increased life expectancy, lifestyle changes, and genetic predisposition of Indians to atherosclerotic coronary heart disease (CHD).[4]

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According to the National Commission on Macroeconomics and Health (NCMH), a Government of India undertaking, there would be around 62 million patients with coronary artery disease (CAD) by 2015 in India, and of these, 23 million would be patients younger than 40 years of age.[5]

Recent figures suggest that CVDs have outgrown the barriers of gender, locale, and economic status. Moreover, it is affecting the productive population imposing a huge socioeconomic burden. Future forecasts predict a continuing trend in the coming decades, where CVDs will lead to major loss of the human resource pool of the country. At this rate, being one of the youngest nations in the world, India is set to lose its productive population to CVD morbidity and mortality projecting a setback to the economy in an otherwise beneficial phase of demographic transition.[6]

Adverse lipid profile is one of the major risk factors for CAD and myocardial infarction.[7] Lipid disorder is a major causal risk factor, which acts independently, for the progression of CAD.[8] In many situations, the concentrations of these lipids and/or lipoproteins are not in normal amounts in the human body, in what is known in the scientific literature as dyslipidemia. Studying the lipid profile (total cholesterol [TC] biochemical determinations - TC, high-density lipoprotein [HDL]-Cholesterol, triglyceride (TG), and low-density lipoprotein [LDL]-Cholesterol) has been an activity of great value for considering that dyslipidemia is a factor of great importance for the development of atherosclerosis.

Dyslipidemia has been closely linked to the pathophysiology of CVD and is a key independent modifiable risk factor for CVD.[9]

While Indians are known to have a unique pattern of dyslipidemia with lower HDL-C, increased TG levels, and higher proportion of small dense LDL-C, there have been no large-scale representative studies on dyslipidemia to assess the magnitude of the problem in India. The estimation of the prevalence of dyslipidemia will ensure proper planning of healthcare resources for both primary and secondary prevention of CVDs. This article will report on the lipid patterns and prevalence of lipid abnormalities of the rural Indian population. Among adults over 20 years of age, the estimated prevalence of CHD is around 3–4% in rural areas and 8–10% in urban areas, representing a two-fold rise in rural areas and a six-fold rise in urban areas between the years 1960 and 2000.[10]

The burden of CVD is shifting from the richer and better-educated sections to the poorer and less-educated section.[11] Peoples of rural area are not much aware about this. The present study is an attempt to contribute in research to minimize the risk of CVD by evaluating lipid profile in early ages in rural area.

MATERIALS AND METHODS

It is an observational prospective study carried out in the Department of Biochemistry, JNMC and AVBRH, Sawangi (M), Wardha.

We selected a total of 10096 patients who attended outpatient department for any disease and undergone for lipid profile examination in previous 2 years. The study population comprised of 1829 subjects of <40 years of age that included 1036 males and 793 females.

Patients divided with regard to the age group (15–30 years, and 31–40 years) and gender. Children <15 years of age were excluded from the study.

Percentage distribution of the total study population according to the lipid profile classification was calculated.

Furthermore, percentage distribution of men and women was also separately calculated.

The serum lipid analysis was carried on an automated clinical chemistry analyzer using enzymatic method.

Cutoff Values

For serum lipids, we referred to the National Cholesterol Education Program (NCEP) and Adult Treatment Panel III (ATP III) guidelines. According to these standard guidelines, hypercholesterolemia is defined as TC >200 mg/dl, increase LDL-C as >100 mg/dl, hypertriglyceridemia as TG>150 mg/dl, and increase HDL-C <40 mg/dl. Dyslipidemia is defined by the presence of one or more than one abnormal serum lipid concentrations.

Statistical Analysis

Statistical analysis was done using descriptive and inferential statistics using one way-ANOVA, multiple comparison: Tukey's test and z-test for difference between two means, software used in the analysis was SPSS 22.0 version and EPI-INFO 6.0 version, and $P < 0.05$ is considered as the level of significance.

RESULT

The study population was comprised of 1829 subjects that included 1036 males and 793 females. On applying NCEP and ATP guidelines, we found out that nearly 85% of the subjects had at least one abnormal parameter [Figure 1].

The study population divided into two groups, first is the age group of 15–30 years and second group is the age group of 31–40 years. Further divided according to gender. Age-specific prevalence of risk factors of dyslipidemia among males and females has been done presented in Table 1.

Prevalence of dyslipidemia is more in the age group of 31–40 years. Borderline TC level is found in 16.2% population and high (>250 mg/dl) TC level is found in 7.9% population which is slight more in males as shown in Table 2.

Nearly two-thirds of the population (64.7%) had low HDL. Females had better HDL level than males as presented in Table 3.

Similarly, half of the population had borderline LDL and 9.6% population had high (>160 mg/dl) LDL level. High LDL found more in females [Table 4].

High TG level was found in nearly 16% population, and nearly, 15% population had borderline TG which is also more in males [Table 5].

Percentage distribution of study sample, according to NCEP, ATP III16, 17 recommended normal. Desirable levels of lipids were calculated. A higher percentage of women than men had normal lipid profile.

Table 1: Age-specific prevalence of risk factors of dyslipidemia among males and females

Characteristics	Age group	
	<30 years (%)	31–40 years (%)
Hypercholesterolemia	Males (19.7)	Males (25.7)
	Females (16.6)	Females (23.7)
Hypertriglyceridemia	Males (23.04)	Males (35.9)
	Females (22.9)	Females (26.1)
Low HDL	Males (57.04)	Males (65.4)
	Females (56.11)	Females (64.3)
High LDL	Males (44.7)	Males (52.1)
	Females (36.42)	Females (58.9)

P<0.05

Table 2 : Percentage distribution of different levels of TC (mg/dl) in two genders in the age group of 31–40

Sex	Normal (<200)	Borderline (200–239)	High (>240)
Male	74.1	17.4	8.3
Female	86.1	16.2	7.5
Total	75.07	16.9	7.9

Table 3: Percentage distribution of different levels of HDL (mg/dl) in two genders in the age group of 31–40

Sex	Low (<40)	Higher better (40–59)	Best (>60)
Male	65.02	33.9	1.01
Female	64.30	34.8	0.21
Total	64.70	34.33	0.65

DISCUSSION

Dyslipidemia is one of the major risk factors of CAD, which can be modified either by proper life style changes or medical management This study is aimed toward evaluating the lipids and lipoproteins levels in health rural Indian population as they are not much aware about this. The study reveals the prevalence of hypercholesterolemia, hypertriglyceridemia, and abnormally high LDL-C and low HDL-C levels which are well-known risk factors for CVD in all age group, and increased prevalence of dyslipidemia in young adults was found to be one of the major contributors of CVD.[12] The present study was conducted among 1829 subjects of the age group of <40 years at a rural hospital for dyslipidemia.

The study of lipid profile in general population is important to identify the lipid profile and the distribution of different lipid levels in society, especially in rural areas.

Increased prevalence of high serum lipids was found in both age groups but more prominent in 31–40 age group as compared to <30 years which means the risk of dyslipidemia increases as the age advances. The high prevalence of hypercholesterolemia, hypertriglyceridemia, and low HDL, in our 31–40 years age group is a major cause of concern. It has been observed that, in comparison with western population, a relatively lower level of cholesterol appears to predispose Indians to CAD.[13]

In our study, total prevalence of hypercholesterolemia, hypertriglyceridemia, low HDL, and high LDL in this age group is 24.8%, 31.5%, 64.7%, and 55.5%, respectively.

A study done on Turkish children between age group of 2 and 10 years by Toprak *et al*.,[14] and they concluded that all

Table 4: Percentage distribution of different levels of LDL (mg/dl) in two genders in the age group of 31–40

Sex	Normal (<100)	Borderline (100–159)	High (>160)
Male	47.0	43.9	8.1
Female	40.7	47.4	11.6
Total	44.2	45.5	9.6

Table 5: Percentage distribution of different levels of TG (mg/dl) in two genders in the age group of 31–40

Sex	Normal (<150)	Borderline (150–199)	High (>200)
Male	64	17.6	18.3
Female	73.8	12.02	14.1
Total	68.3	15.1	16.4

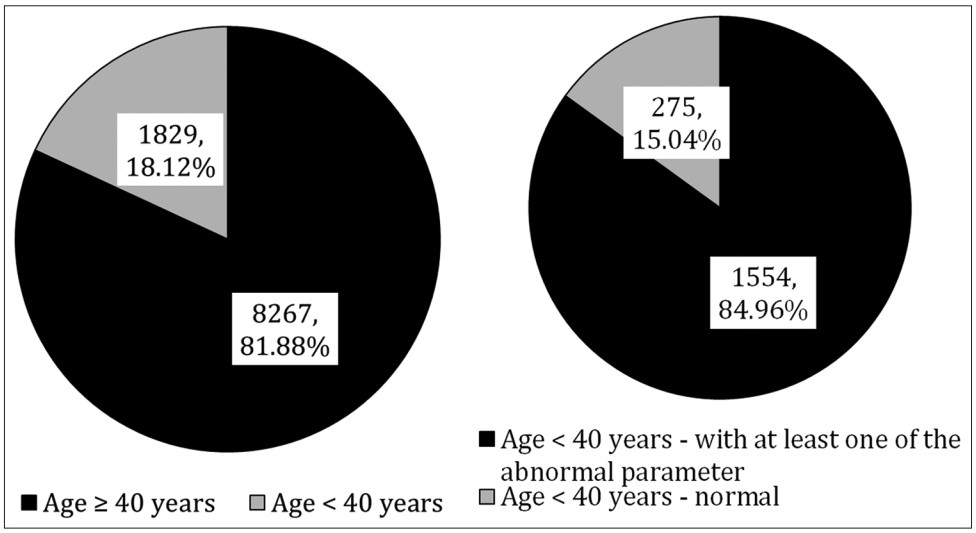

Figure 1: Distribution of the patients according to age

the parameters of lipid profile are not so high up to this age group. A study on Nepalese population by Limbu *et al.*[15] shows that almost all lipid levels were higher between the age group of 41 and 60 years.

Another study was done by de Freitas *et a*l.[16] on university students of Fortazela, Brazil, between the age group of 18 and 30 years. They observed that high levels of TG, TC, and LDL-c were found in 23.0%, 9.7%, and 5.9% of the university students, respectively. HDL-C had diminished values in 12.0% of the subjects and was significantly associated with a sedentary lifestyle. It is clear by above studies that changes in lipid profile are seen in early ages and the value increased as the age become advance.

A similar study was done by Sawant *et a*l., in Hinduja Hospital, Mumbai. The prevalence of dyslipidemia was observed to be higher in males than females. Among participants had higher TC concentration was 42.6% in males and 23.3% in females, HDL-C was abnormally low in 77.6% in males and 66% in females. This was more prominent in the age group of 31–40 years than in <30 years of age.[17]

In comparison with young population of urban area, rural population are in less risk of dyslipidemia. Children who live in rural areas have healthier eating habits, play more in open air, and are more active in daily life while a child living in an apartment (in urban areas) usually spends his/her time on the computer and have more tendency to eat fast food. The eating habits of children in our region should also be considered as they usually consume natural foods and fresh vegetables, especially in rural areas.

Almost all the above studies lead to the observation that the prevalence of dyslipidemia was more in males than females. The increase in serum cholesterol in mostly due to lack of exercise and ingestion of fatty meals which are rich with cholesterol. In spite of that females are protected by increased level of estrogen that affects plasma lipid and exerts beneficial effect on carbohydrate metabolism.[18] The percentage prevalence in our population was higher,indicating Indians being at higher risk compared to western countries. Diet with high fat and calorie intake and lack of physical activity would be the major culprits of dyslipidemia in our population. References have shown that our diets are rich in saturated fats. Besides, it also involves overcooking of food which results in destruction of nutrients such as folate, deep frying, and refrying in the same oil leading to trans fatty acids formation which probably contributes to increase of dyslipidemia in our population.[19]

In our country, assessment of cardiovascular risk profile among children will allow the physicians to pay attention to early screening of children for cardiovascular risk factors. Therefore, knowing the prevalence and the risk groups is important.

Limitations

Some limitations of this study must be acknowledged. First, the study sample was hospital based rather than population based, and second, this is an observational study, so the medical history of patients is not available; this may be subjected to referral bias. Despite these limitations, the current study featured many positive attributes. This study involved a well-characterized and sufficiently large sample.

CONCLUSION

India is in the grip of a CHD epidemic with increasing prevalence rates in both rural and urban areas as a result of epidemiological transition. A higher prevalence of hyperlipidemia is found in early age and both the genders. It is a matter of concern and has to be addressed by regular

screening in early age and health education to create awareness among population and to motivate to modify the risk factors by combination lifestyle therapies, i.e., enhanced physical activity and dietary modification and therapeutic intervention.[20,21]

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