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RESEARCH ARTICLE

PREVALENCE OF DYSLIPIDEMIA IN ASYMPTOMATIC YOUNG ADULTS ATTENDING A MHC IN A TERTIARY HOSPITAL IN CHENNAI

*Sneha Thomas, Sudagar Singh, R. B., Damodharan, J. and Siva Prakash

Sri Ramachandra Medical College and Research Institute, Porur, Chennai 600116, Tamilnadu, India

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ABSTRACT

Study Objectives: To study the prevalence of dyslipidemia in young asymptomatic non-diabetic adults and to determine and correlate the significance of associated risk factors.

Patients: This was a cross sectional study consisting of consecutively selected 500 asymptomatic non-diabetic adults aged between 20-40 years who presented themselves for a routine master health check up to Sri Ramachandra Medical Centre, Chennai from September 1st 2011 - August 30th 2012. Patient information was collected with the help of the questionnaire after obtaining an informed consent and it included details such as; age, gender, anthropometric measurements, lifestyle related factors, clinical & family history, glucose and lipid analysis.

Results: In our study, out of the 500 asymptomatic young adults approximately 149 adults were found to have dyslipidemia by our broad case definition. Our study showed that elevated serum lipids were more prominent in 31-40 year age group as compared to ≤ 30 years, which means the risk of dyslipidemia increases as the age advances. Dyslipidemia was found most significant amongst the alcoholic and the smokers (p value being significant < 0.05). Prevalence was more in males indicating Indian men being at a higher risk for dyslipidemia. Body mass index correlated with hypertriglyceridemia (p value - 0.045). The pattern of dyslipidemia correlated significantly with the history of alcohol consumption and smoking.

Conclusion: Dyslipidemia is more prevalent in young asymptomatic adults (31-40 years age group). Low HDL-Cholesterol was the most common pattern of dyslipidemia found being common among ≤ 30 years age group and history of alcohol consumption and smoking history contributed significantly towards the prevalence of dyslipidemia. BMI also predicted the prevalence of hypertriglyceridemia. Increase in the age also predicted the prevalence of hypertriglyceridemia in our study. Combination of lifestyle therapies and therapeutic intervention would help us in treatment and management of dyslipidemia.

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INTRODUCTION

Cardiovascular diseases (CVD) are the most prevalent cause of death and disability in both developed as well as developing countries. South Asians around the globe have the highest rates of Coronary Artery Disease (CAD). According to National Commission on Macroeconomics and Health (NCMH), a government of India undertaking, there would be around 62 million patients with CAD by 2015 in India and of these, 23 million would be patients younger than 40 years of age. According to the WHO, Every year about 35 million deaths occur due to Non Communicable Diseases (NCDs). About 80% of these deaths occur in low and middle - income countries. Most of the conditions, which cause death can be treated with essential medicines that need to be taken lifelong. Unfortunately access to these chronic disease medicines is generally poor in most low and middle - income countries.

*Corresponding author: Dr. Sneha Thomas,
Sri Ramachandra Medical College and Research Institute, Porur,
Chennai 600116, Tamilnadu, India

People who die prematurely from non-communicable diseases die from preventable heart disease, stroke, diabetes, cancer and asthma as a result of increased levels of exposure to tobacco use, unhealthy diet, physical inactivity and the harmful use of alcohol; and importantly ineffective and inequitable health care services for people with non-communicable diseases. Within the group of CVDs, the primary and secondary prevention of ischemic heart disease and ischemic cerebrovascular disease (e.g. ischemic stroke and transient ischemic attacks) rely on similar measures, including a healthy diet, use of aspirin and statins, smoking cessation, hypertension and adequate glycemic control which in turn reduce the burden of dyslipidemia. The focus of WHO is to try to ensure that the priority NCDs are urgently accorded greater attention in the health and development policies of poor nations and on global aid agendas. CAD is usually due to atherosclerosis of large and medium sized arteries and dyslipidemia has been found to be one of the most important contributing factors.

It has long been known that lipid abnormalities are major risk factors for premature CAD. Studies on the pattern of associated risk factors are very much needed. Current ATP III guidelines recommend lipid screening in all adults > 20 years of age; to be tested once every 5 years. In this study we consider such asymptomatic young individuals and ascertain the prevalence of dyslipidemia and the associated significant risk factors in a tertiary care set up.

MATERIALS AND METHODS

This was a cross sectional study, which consisted of consecutively selected 500 asymptomatic non - diabetic adults after consideration of both the inclusion and the exclusion criteria. They were adults who presented themselves for a routine master health check up to Sri Ramachandra Medical Centre, Chennai from September 1st 2011 - August 30th 2012. Patients included were asymptomatic young adults aged 20 - 40 years. Patients with past history of dyslipidemia and/or on treatment for the same, known cases of diabetes mellitus and with history of prior renal, thyroid, cardiac disease or malignancies were excluded. Patient information was collected with the help of the questionnaire after obtaining an informed consent and it included details such as; Age and gender along with anthropometric measurements such as body weight, height, BMI, waist circumference, hip circumference and waist to hip ratio, lifestyle related factors (smoking status, alcohol consumption and dietary pattern), clinical history (hypertension, diabetes, ischemic heart disease, medication profile and family history of diabetes, hypertension, ischemic heart disease) along with family history. Blood samples were collected after an overnight fast of 8 -10 hours.

Glucose and Lipid Analysis

The analyses were carried on an automated clinical chemistry analyser. Serum glucose, was measured by GOD – POD (Glucose oxidase - peroxidase) end point Trinder's method. Total cholesterol was measured using the cholesterol oxidase test. Triglycerides were measured using the enzymatic method. HDL and LDL cholesterol was measured using the direct homogenous method. And a complete clinical examination was done.

Definitions and preferred cut off values

To classify the participants as cases with dyslipidemia, we referred to National Cholesterol Education Program (NCEP) – Adult Treatment Panel (ATP) III Guidelines. According to these standard guidelines, hypercholesterolemia is defined as a TC > 200mg/dL, LDL - C as > 100mg/dL, hypertriglyceridemia as TG > 150mg/dL and HDL - < 40 mg/dL. Dyslipidemia is defined by presence of one or more than one abnormal lipid concentration. All known cases of diabetes mellitus were excluded from our study and they were defined by referring to the ADA (American Diabetic Association) guidelines⁶⁴. Participants with fasting blood glucose > 126mg/dL were considered as having diabetes mellitus. Definition of smoker as defined by the CDC (Center for Disease Control) guidelines of quantification of smokers :Non - smoker - never smoked or have smoked <100 cigarettes in their lifetime, former smoker - have smoked >100 cigarettes in their lifetime, but is a non - smoker now, current smoker - have smoked greater than > 100 cigarettes in their lifetime and continue to smoke.

Quantification of alcohol consumption was done based on an article published in Stroke 2001:32:1939-46

(*Alcohol consumption and MRI findings* in Stroke 2001:32:1939-46): Abstainer is one who never consumed alcohol and former drinkers were quantified as – individuals who used to consume alcohol but now is an abstainer, consuming less than 1 drink in a week, consuming less than 7 drinks in a week, consuming in between seven to fifteen drinks in a week, consuming greater than 15 drinks in a week. Comorbidities of the patient (past history) were grouped individually. Family comorbidities (Father and Mother's history) were also grouped in the similar method based on the parent's comorbidities individually and together. Dietary habits were grouped as vegetarians and non-vegetarians. Exercise habits were grouped based on the WHO guidelines as individuals who never exercised, exercised < 150mins/week and > 150mins/week. Body Mass Index was grouped based on the WHO criteria.

Statistical Analysis

The collected data was analysed with SPSS 16.0 version. To describe the data descriptive statistics mean, S.D were used. In bivariate analysis to find the significance difference between the independent samples t-test was used, to predict the model the logistic regression was used. In both the above statistical tools the probability value $P < 0.05$ is considered as a significant level.

RESULTS

In 500 asymptomatic adults studied, the mean age was 31.12 years. The mean height was 169.95 cms. The mean weight was 70.55 kgs. The mean waist circumference was 32.37 cms. The mean hip circumference was 37.15 cms. The mean BMI was 24.362 kg/m². The mean waist to hip ratio was 0.8. The mean cholesterol level was 177.94. The mean HDL was 44.92. The mean TG was 142.77. The mean LDL was 96.32. The mean FBS was 102.63

Gender Distribution

Out of the 500 asymptomatic adults, 315 (63%) were males and 185 (37%) were females.

Age Range

Out of the 500 participants, 124 ie; 24.8% were in between the age groups 20 – 25. 88 ie; 17.6% were in between the age group 26 – 30. 136 ie; 27.2% were in between the age group 31 – 35. 152 ie; 30.4% were in between the age group 36 – 40.

Comorbids

Out of the 500 participants in the study after having excluded known diabetics, 484 (96.8%) of them had no known comorbids at the time of examination and 14 (2.8%) of them were known hypertensives on treatment. 1 (0.2%) was a known bronchial asthmatic on treatment and 1 (0.2%) of them had a past history of pulmonary tuberculosis and had completed treatment for the same.

Dietary Habits

Out of the 500 adults – 409 ie; 81.8% were non-vegetarians and the remaining 91 ie; 18.2% were vegetarians

Quantification of Alcohol Consumption

When comparing and quantifying the alcohol consumption habits (male and female included); 421 (84.2%) of the study population were abstainers. 8 (1.6%) consumed less than 1 drink per week. 32 (6.4%) consumed 1 – 7 drinks per week. 36 (7.2%) consumed 7 – 15 drinks per week. 3 (0.6%) consumed greater than 15 drinks per week.

Smoking Habits

When comparing smoking habits, out of the 500 adults – 434 (86.8%) were non smokers, 52(10.4%) were current smokers and former smokers were 14 (2.8%). Out of 52 current smokers, 2 were female participants.

Exercise

Out of the 500 participants, 447 did not exercise ie; 89.4%. 52 of them exercised less than 150 minutes per week ie; 10.4%. Only 1 participant exercised more than 150 minutes per week ie; 0.2%

BMI

Out of the 500 participants, 311 ie; 64.2% had a BMI within normal. 169 ie; 33.8% had a BMI in between 25 – 29.9. 10 ie; 2% had a BMI in between 30 – 34.9. 1 ie; 0.2% had a BMI in between 35 – 39.9

Cholesterol

406 ie; 81.2% had cholesterol levels less than 200. 70 participants ie; 14% had cholesterol levels in between 200 – 239. 24 participants ie; 4.8% had cholesterol levels above 240.

Triglycerides

Out of the 500 asymptomatic subjects, 403 had their triglyceride levels less than 150 ie; 80.6%. 39 had levels in between 150 – 199 ie; 7.8%. 55 had levels in between 200 – 499 ie; 11%. 3 had TG levels greater than 500 ie; 0.6%

HDL

Out of 500 asymptomatic adults, 165 had their HDL levels less than 40 ie; 33%. 335 had HDL levels greater than 40 ie; 67%

LDL

Out of the 500 participants, 341 ie; 68.2% had LDL levels less than 100. 66 ie; 13.2% had LDL levels in between 100 – 129. 70 ie; 14% had LDL levels in between 130 – 159. 22 ie; 4.4% had LDL levels between 160 – 189. And 1 ie; 0.2% had LDL level greater than 190.

DISCUSSION

This study is a step towards evaluating the lipids and glucose levels in asymptomatic young adults attending the master health check up in a tertiary care center and identifying these risk factors of coronary artery disease. The study reveals the

pattern of hypercholesterolemia, hypertriglyceridemia and abnormally high, low density lipoprotein (LDL) Cholesterol and low High density lipoprotein (HDL) Cholesterol levels which are well-known risk factors for cardiovascular diseases in all age groups. Overall prevalence of dyslipidemia in various studies ranged from 10 - 75% (Dyslipidemia in Asian Indians, ?). In our study, out of the 500 asymptomatic young adults approximately 149 adults were found to be dyslipidemic. In terms of percentage 29.8% adults were found to be dyslipidemic. 100 were males ie; 20% and 49 were females ie; 9.8%.

Our results are consistent with the previous cross-sectional study conducted among urban population who attended annual general health check-ups in P.D. Hinduja National Hospital¹ and a cross sectional study conducted at Tirupati², wherein increased prevalence of dyslipidemia in young adults was found to be one of the major contributors of Coronary artery disease (CAD). Our study showed that elevated serum lipids were more prominent in 31-40 year age group as compared to ≤ 30 years, which means the risk of dyslipidemia increases as the age advances. In our study 11 adults ie; 2.2% were found to be diabetics ie; they were newly diagnosed. Enas *et al* in Coronary artery disease in Indians (CADI) study reports the prevalence of diabetes to be three to six times higher among south Asians than Europeans, Americans and other Asians³. In our study dyslipidemia was found most significant among the alcoholic and the smokers (p value being significant < 0.05). This result was consistent with a previous study by Gupta BK *et al* (Gupta *et al.*, 2007). In our study the low HDL cholesterol was the most common pattern of dyslipidemia observed (33%). This finding is consistent with Jaipur Heart Watch-2, Jaipur Heart Watch -3 studies and a cross sectional study conducted at Tirupati. Low HDL-Cholesterol levels are stronger predictor of occurrence and reoccurrence of Myocardial Infarction (MI) and stroke and are also associated with premature and severe Coronary Artery Disease (CAD) (Enas *et al.*, 1992).

Oxidative modification of LDL-Cholesterol is a key process of atherosclerosis. Elevated LDL-Cholesterol has been recognized as the primary risk factor for CAD by the National Cholesterol Education Programme (NCEP) Adult Treatment Panel (ATP) III. Comparing our data with a study conducted on similar lines (Prevalence of Dyslipidemia in Young Adult Indian Population, 2008), lead to the observation that in both the studies, dyslipidemia was more in males indicating Indian males being at higher risk (Soysal *et al.*, 2005). Diet with high fat and high 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 (Sawant *et al.*, 2008). Besides, it also involves overcooking of food, which results in destruction of nutrients like 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 (Enas *et al.*, 2003).

Some studies have shown a positive association between lipid levels and measures of adiposity (Misra *et al.*, ?; Hu *et al.*, 2000) whereas other studies have failed to detect such a relationship (Walton *et al.*, 1995; Chumlea *et al.*, 1992). In our study, body mass index correlated with hypertriglyceridemia (p value 0.045). These findings were consistent with previous

studies by Chada, *et al.* (Chadha *et al.*, 2006), Misra *et al.* (?) and Sayeed *et al.* (2003). BMI has been widely used as an indicator of total obesity; its limitations are clearly recognised by its dependence on race (Asians having large percentages of body fat at low BMI values), and age. As compared to BMI, Waist circumference (WC) and WHR have been used as markers of central body fat. The strength of association of WHR and WC with dyslipidemia has been variable in different studies (Chadha *et al.*, 2006; Ho *et al.*, 2001; Chehrei *et al.*, 2007). In our study the pattern of dyslipidemia correlated significantly with the history of alcohol consumption, which was consistent with the previous study done by (William *et al.*, 1977) where alcohol consumption was positively associated with HDL cholesterol level in all populations, in our study alcohol consumption correlated significantly with all types of lipid elevation. In our study, smoking history also significantly correlated with dyslipidemia. This finding was consistent with previous studies done by (Rastogi *et al.*, 2001) (Sinha *et al.*, 2002), and (Tilwani *et al.*, 2003) in India.

A study by Khurana. M and associates on lipid profile in cigarette smokers and tobacco chewers showed HDL cholesterol to be lower in smokers ($p = 0.001$) as well as in tobacco chewers ($p = 0.001$) than the controls. Both smokers and tobacco chewers had higher value of total cholesterol, low density lipoproteins cholesterol, very low density lipoproteins cholesterol and triglycerides as compared to non smokers, non-tobacco chewers group. It was also noted smoking and tobacco chewers have an equal and comparable adverse effect on lipid profile and therefore raising cardiovascular risk. One of the reasons postulated for this correlation is that alcoholics and smokers are thought to consume a diet rich in fat and cholesterol and poor in fiber and cereals.

Conclusion

Dyslipidemia is more prevalent in young asymptomatic adults, being more common among 31-40 years age group. Low HDL- Cholesterol was the most common pattern of dyslipidemia found being common among ≤ 30 years age group. In this study history of alcohol consumption and smoking history contributed significantly towards the prevalence of dyslipidemia. BMI predicted the prevalence of hypertriglyceridemia in our study population. Increase in the age also predicted the prevalence of hypertriglyceridemia in our study. Combination of lifestyle therapies ie; enhanced physical activity, dietary modification and therapeutic intervention would help us in treatment and management of dyslipidemia.

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