



## Dyslipidemia in Adult Age Group of Selected Population

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### ABSTRACT

**Background:** Cardiovascular diseases (CVD) are the major cause of morbidity and mortality in our society with dyslipidemia contributing significantly to atherosclerosis. Thus measurement of plasma lipids would help in identifying people at risk for CVD. The goal of this study was to ascertain the prevalence of Dyslipidemia among young adult population in urban India. **Material and Methods :** Around 1805 subjects with  $\geq 40$  age group were selected from a population. Health status was evaluated by physical check ups, complete fasting lipid profiles and blood glucose levels. Dyslipidemia risk and impaired blood sugar levels were determined as per National Cholesterol Education Program (NCEP) – Adult Treatment Panel (ATP) III guidelines and American Diabetes Association (ADA) respectively. **Results:** The prevalence of dyslipidemia was observed to be higher in males than in females. Among participants who had a total Cholesterol (TC) concentration  $\geq 200$ mg/dl, 38.7% were males and 23.3% were females. High density lipoprotein cholesterol (HDL-C) was abnormally low in 64.2% males and 33.8% in females. The increase of prevalence of hypercholesterolemia and hypertriglyceridemia was more prominent in 31-40 age group than in  $\leq 30$  age group. **Conclusion:** The low percentage of adults with controlled lipid concentrations suggests that there is a need for awareness programs for the prevention and control of Dyslipidemia and impaired blood sugar levels.

### KEYWORDS

#### INTRODUCTION

Cardiovascular diseases (CVD) are the most prevalent cause of death and disability in both developed as well as developing countries.<sup>1</sup> South Asians around the globe have the highest rates of Coronary Artery Disease (CAD).<sup>2</sup> 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.<sup>3</sup> 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 factor.<sup>4</sup> As it has long been known that lipid abnormalities are major risk factors for premature CAD,<sup>6,2</sup> studies on the prevalence of these risk factors are urgently needed. In this retrospective study, we report the prevalence of dyslipidemia in young adult Indian population.

#### MATERIALS AND METHODS

Around 1805 healthy individuals were selected from the Medical database which included, demographics (age, gender), anthropometric measurements (relative body weight, height), lifestyle related factors (smoking status, alcohol consumption, diet and physical activity) and clinical findings (hypertension, diabetes, ischemic heart disease, medication profile and family history). Blood samples were collected by venipuncture after an overnight fast for 12-14 hours. Venous blood was collected in plain and fluoride bulbs for measurement of serum lipids and glucose respectively.

**Serum Lipid and Glucose Analysis:** The analysis was carried on an automated clinical chemistry analyzer; Beckman Synchron Lx20. Serum glucose was measured by oxygen rate method employing a Beckman oxygen electrode (glucose oxidase). TC, low density lipoprotein cholesterol (LDL-C), HDL-C and triglyceride (TG) concentrations were measured by International

Federation of Clinical Chemistry (IFCC) approved enzymatic methods. Beckman reagents and calibrators were used for the analysis. HDL-N and LDL-N are directly estimated by ready to use stable liquid reagents. Control sera were included in each batch of samples analyzed. Definitions and Preferred Cutoff Values For serum lipids, we referred to NCEP - ATP III Guidelines.<sup>4,5</sup> According to these standard guidelines, hypercholesterolemia is defined as TC  $>200$ mg/dl, LDL-C as  $>100$ mg/dl, hypertriglyceridemia as TG  $>150$ mg/dl and HDL-C  $126$ mg/dl or who were on medication for diabetes was considered as having diabetes mellitus.

**Statistical Analysis:** The statistical analysis was performed using the SPSS (version 13.0). Lipid and glucose levels were expressed as the mean  $\pm$  SD. The data was further categorized according to age group and gender. The normality of the data was checked by the Shapiro-Wilk procedure. As the underlying data distribution is non-normal, Mann Whitney U test was applied to test the relationship of independent and dependent variables. Pearson's chi square test was applied in comparisons of independent and dependent proportions. Odds ratio (OR) and 95% confidence interval (CI) was calculated to find out the significance of the data. A p value  $<0.05$  was considered deemed significant. Prevalence of dyslipidemia by means of its determinants was calculated using the prevalence rate formula: number of patients per total number of all subjects at the time of study multiplied by 100. Results were expressed as percentages.

#### RESULTS

The study population was comprised of 1805 subjects that included 1128 males and 677 females and the clinical features of the subjects are shown in (Table 1). On applying NCEP and ADA guidelines we found out that nearly 80% of the subjects had atleast one abnormal parameter. Increased levels of fasting and postprandial blood glucose, hypercholesterolemia, hy-

pertriglyceridemia and increased levels of LDL-C were found to be more in males. Similarly decreased HDL-C levels were again found to be more in males. On further comparing between males and females according to age we found significantly increased levels of fasting blood glucose, postprandial blood glucose, hypercholesterolemia, hypertriglyceridemia, low HDL, and high LDL to be in 31-40 year old males and females than in  $\leq 30$  year old males and females. There were no significant differences in low HDL concentration between age groups in males and females. The prevalence of elevated fasting and postprandial blood glucose, hypercholesterolemia, hypertriglyceridemia, low HDL, and high LDL were significantly higher in males than in females (34.1% vs. 22.1%, 13.2% vs. 8.1%, 38.6% vs. 23.3%, 42.6% vs. 17.2%, 64.2% vs 33.8%, 74.3% vs. 61.2%) respectively.

**Table 1 : Clinical characteristics of study population**

		N	MEAN $\pm$ S.D
FBS	Males	1125	103.51(27.972)
	Females	675	96.72 (19.808)
	Total	1800	100.96(25.430)
PPBS	Males	1060	120.53 (62.752)
	Female	644	106.93 (34.963)
	Total	1704	115.39(54.349)
TC	Males	1128	191.90 (43.304)
	Females	677	177.22 (34.825)
	Total	1805	186.39 (40.946)
TG	Males	1128	162.88 (99.074)
	Females	677	107.08 (64.639)
	Total	1805	141.96 (91.804)
HDL-C	Males	1124	37.34 (8.227)
	Females	677	44.58 (10.758)
	Total	1801	40.06 (9.899)
LDL-C	Males	1128	122.117(38.058)
	Females	677	111.22 (31.110)
	Total	1805	118.03 (35.991)

**DISCUSSION** This study is a step towards evaluating the lipids and lipoproteins and glucose levels in health urban Indian population. 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 cardiovascular diseases in all age groups. Our results are consistent with the previous cross-sectional study conducted among selected industrial population wherein increased prevalence of dyslipidemia in young adults was found to be one of the major contributors of CVD.<sup>6</sup> Increased prevalence of high fasting glucose and serum lipids were more prominent in 31 – 40 age group as compared to  $\leq 30$  years which means the risk of dyslipidemia increases as the age advances. In our study we observed, both fasting and postprandial impaired glucose levels to be more in 31-40 age group males and of these 7% were found to be actually diabetic i.e. they were either on some medication or were newly diagnosed. This means the remaining subjects with impaired blood glucose levels are on their way to develop diabetes, which is an important risk factor for CAD. 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 Asian's than Europeans, Americans and other Asians.<sup>2</sup> 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.<sup>7</sup> Also in a Chennai based hospital study, it was shown that around 75% of patients with myocardial infarction (MI) had TC levels  $<200$ mg/dl indicating that the threshold for the TC levels above which it poses a risk for CAD is low in Indians.<sup>8</sup> The crude prevalence of hypertriglyceridemia differs between the age groups and it was higher in men than in women. The contributing factor for hypertriglyceridemia in

our population could be our diet rich in carbohydrates.<sup>9</sup> High TG levels have been associated with increased levels of small dense LDL which are considered to be highly atherogenic.<sup>10</sup> Increased prevalence of low HDL has been reported earlier by Enas et al. who found that only 4% of Asian Indian men and 5% Asian Indian women had optimal HDL levels.<sup>11</sup> Low HDL-C levels are stronger predictor of occurrence and reoccurrence of MI and stroke and are also associated with premature and severe CAD.<sup>12</sup> Oxidative modification of LDL-C is a key process of atherosclerosis and elevated LDL-C has been recognized as primary risk factor for CAD by NCEP – ATP III.<sup>13</sup> In our study increased LDL-C has been found to be contributing majorly to dyslipidemia irrespective of age and gender. On comparing the prevalence of dyslipidemia and impaired blood glucose (IBG) levels between males and females, we observed it to be higher in males suggesting this group at higher risk of dyslipidemia, which in turn can lead to increased risk of developing CAD. Comparing our data with a Turkish study conducted on similar lines, lead to the observation that in both the studies, prevalence of dyslipidemia was more in males but the percentage prevalence in our population was higher indicating Indians being at higher risk.<sup>14</sup> 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 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.<sup>15</sup> The influence of diet on Dyslipidemia was best seen in the Canadian study wherein 3 groups: a control group, a group that was administered statin and a group with dietary modification was included. The lipid levels were checked at baseline and again after 4 weeks. A drastic reduction in lipid levels was observed in statin and dietary modified groups as compared to control group. However, between the two they did not vary much.<sup>16</sup> This means therapeutic intervention i.e. statin and dietary interventions seems to have the same effect, and the latter seems to be a more viable option.

#### CONCLUSIONS :

This study revealed the increased prevalence of dyslipidemia to be more prevalent in 31-40 year males, suggesting that this group is at increased risk of developing CAD leading to young infarcts. Combination lifestyle therapies i.e., enhanced physical activity and dietary modification and therapeutic intervention<sup>17,18</sup> would help us in treatment and management of dyslipidemia.

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