Changes in Lipid Profiles According to Body Mass Index in Individuals Coming to a Tertiary Care Hospital

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A B S T R A C T

Objective: The aim of this study was to quantify dyslipidemia among people with different Body mass index.

Patients and Methods: This cross-sectional study was performed in the Pathology Department of Pakistan Institute of Medical Sciences, Islamabad. A total of 198 participants were enrolled in the study. All the participants were above 20 years of age coming as caretakers to the patients coming to OPD and indoor departments. People under 20 years, with cardiac diseases and those reluctant to give consent were excluded from the study. The outcomes were measured in the form of quantification of dyslipidemia among different classes of Body mass index (BMI).

Results: The mean age of the participants was 34.9 ± 9.4 years with predominance of male participants, 141 (71.2%). The overall frequency of dyslipidemia was 56.1%. The main finding was that 51 (42.5%) individuals with normal BMI also had dyslipidemia. Out of 38 overweight cases 32 (84.2%) were found to be associated with dyslipidemia (p-value = <0.001).

Conclusion: From the above study, it is evident that dyslipidemia is not only associated with obese or overweight individuals, but also in individuals with normal BMI. This shows that normal BMI individuals are also at risk of developing cardiovascular disorders and should be routinely screened for dyslipidemia.

Keywords: BMI, Cardiovascular disorders, Dyslipidemia, Lipid profile.

Introduction

Dyslipidemia means the abnormal quantity of lipid circulating in the blood. These lipids include triglycerides, phospholipids, and cholesterol. The most common dyslipidemia is hyperlipidemia, which is an elevation in the lipids in blood. Two major contributing factors in this regard are diet and lifestyle.[1] The commonly used classification of dyslipidemia is increased total cholesterol, increased Low Density Lipids (LDL), increased Triglycerides (TC) and decreased High Density Lipids (HDL).[2] For the screening of dyslipidemia, a lipid profile is required which is a panel of blood tests that serve as a screening tool for abnormalities in total lipids and approximate risk of developing cardiovascular disease and other diseases.[2] Dyslipidemia is among the most

common risk factor for atherosclerotic disease and cardiovascular diseases.[2] Dyslipidemia is very much prevalent in the region of South Asia and this region is more prone to have increased levels of total cholesterol (TC), triglycerides (TG) and high density lipoprotein cholesterol (HDL-C).[2,3] Dyslipidemia is a common finding in obese population and increased levels of lipid parameters in blood are associated with atherosclerotic plaque formation.[4]

This study was planned to determine the changes in lipid profiles of healthy individuals coming as attendants with the admitted patients in Pakistan Institute of Medical Sciences, Islamabad. The aim of the study was to categorize the population according to BMI and at the same time investigating their lipid profile to assess their association.

Patients and Methods

This cross-sectional study was conducted in the Department of Pathology, Pakistan Institute of Medical Sciences, Islamabad for the duration of 6 months. Total 198 healthy individuals after taking informed consent were enrolled in the study. Sample size was calculated through WHO calculator by using alpha error=5%, confidence level=95% and anticipated population=84.8%.[2] Sampling technique was non-probability consecutive sampling. All the adults aged 20 or more and either gender, who came as caregivers with OPD visiting patients were enrolled in the study. Individuals less than 20 years, with known cardiac disease or other chronic morbidity and patients who refused to give the consent were excluded from the study. The blood samples were taken from study subjects under aseptic measures. Lipid parameters including total cholesterol (TC), LDL-C (low density lipoprotein cholesterol), HDL-C (high density lipoprotein cholesterol) and TG (triglycerides) were measured in the laboratory. The results were noted on the study performa. SPSS version 12.0 was used to enter and analyze the data. Descriptive statistics were used to calculate mean and standard deviation from continuous variables like age, height, weight, BMI and lipid parameters. Frequency and percentages were collected for categorical variables like sex, family history of diabetes, hypertension, smoking habits and dyslipidemia. Chi-square test was applied to find out the association of BMI with dyslipidemia. A p-value of <0.05 was considered statistically significant.

Results

A total of 198 healthy individuals were enrolled in this study to determine their lipid profile. The mean age of all the subjects was 34.9 ± 9.4 years. Most of the study participants 68 (34.3%) were between the age 31 to 40 years, followed by 46 (23.2%) between 26 to 30 years (Table 1).

Table 1: Demographic characteristics of participants (n=198)		
Variables	Number	Percentage
Age (years)		
20-25	36	18.2
26-30	46	23.2
31-40	68	34.3
41-50	33	16.6
51 or above	15	7.5
Family h/o diabetes		
Yes	63	31.8
No	135	68.2
Family h/o hypertension		
Yes	67	33.8
No	131	66.2
Smoking		
Yes	53	26.8
No	145	73.2

The predominant gender of this study was males i.e. 141 (71.2%) and females were 57 (28.8%). Considering anthropometric measurements mean height was found to be 3.0 ± 0.3 m[2]. The average weight came out to be 68.2 ± 8.5 Kg. Using these parameters; the average BMI came out to be 22.6 ± 2.5 Kg/m^{2}. Among the study subjects, 63 (31.8%) patients had a family history of diabetes. Hypertension was more prevalent i.e. 67 (33.8%) among patients. Apart from these, there were 53 (26.7%) smokers in the study (Table 1). The lipid profile of the patients was also analyzed. The mean LDL-C was 83.0 ± 32.1 mg/dl. Similarly, the average HDL-C was 39.4 ± 8.8 mg/dl and TG was 155.9 ± 94.5 mg/dl. The total cholesterol was found to be 154.5 ± 37.4 mg/dl. Out of the total 198 cases, 14 (7.1%) had increased levels of LDL-C i.e. greater than 130mg/dl. A part of population also had decreased levels of HDL-C i.e. in 102 (51.5%) subjects having less than 40mg/dl of HDL-C. A total of 18 (9.1%) had raised levels of total cholesterol. Increase in

triglycerides level was observed in 80 (40.4%) individuals. Considering the BMI of the study patients, out of the total 198 subjects, 120 (60.6%) had BMI within normal range (18.9 to 24.5%), 38 (19.2%) were overweight (24.6 to 30%) whereas 40 (20.2%) were obese (greater than 30%) in this study. It was noticed that out of 120 cases with normal BMI, majority i.e. 69 (57.5%) had normal lipid levels. This shows that even the population with normal BMI may be at a risk of developing CVD. Dyslipidemia was a common finding in overweight and in obese individuals (Table 2).

Positive family history of diabetes, hypertension and smoking habit was significantly related to dyslipidemia. Large number of smokers were also significantly found to be dyslipidemic (Table 3). The overall prevalence of dyslipidemia collectively came out to be 56.1% with 111 cases being dyslipidemic.

age presentation may be due to different geographical regions according to developed and underdeveloped countries.

In this study, we found that male gender was more prevalent i.e. 71.2% among the study subjects. Humayun A et al[6] found a similar trend in their study. The study by Shah AZA et al[2] also showed this inclination towards the male gender. Opposite finding i.e. female preponderance was seen in a study by Sherpa LY et al[3]. The male dominance may be due to the fact that in majority of the cases, the attendants coming with the patients are usually male, so that may be the reason behind this. The overall prevalence of dyslipidemia was found to be in 56.1%. The most surprising fact about this study was that out of 120 individuals with normal BMI, 51 (42.5%) had dyslipidemia. This clearly shows that dyslipidemia may be seen in non-obese individuals and people with normal BMI may be vulnerable to dyslipidemia. In this study, about 32% of

Table 2: Association of BMI categories with dyslipidemia among participants (n=198)				
BMI categories	Lipid profile		Total	p-value
	Dyslipidemia (n=111)	Normal lipids (n=87)		
Normal; n(%)	51 (42.5)	69 (57.5)	120 (60.6)	0.01
Over weight; n(%)	32 (84.2)	6 (15.8)	38 (19.2)	<0.001
Obesity; n(%)	28 (70.0)	12 (30.0)	40 (20.2)	<0.001

Table 3: Predictors of dyslipidemia among participants (n=198)				
Variables	Lipid profile		Total	p-value
	Dyslipidemia (n=111)	Normal lipids (n=87)		
Family h/o diabetes; n(%)	43 (68.1)	20 (31.9)	63 (31.8)	<0.001
Family h/o hypertension; n(%)	48 (71.6)	19 (28.4)	67 (33.8)	<0.001
Smoking; n(%)	41 (77.3)	12 (14.0)	53 (26.7)	<0.001

Discussion

This study was conducted to find association of dyslipidemia in different BMI categories in order to assess the relative risk of developing cardiovascular disorders in our community. The region of South Asia has been shown to be more susceptible to develop cardiovascular disorders. Due to increased burden of CVD in population, we planned to assess the population at risk. It is a well-known fact that a sufferers of dyslipidemia are at a great risk of developing CVD. The current study showed the average age of the participants was34.9 ± 9.4 years. More than 80% of the cases were between 20-40 years of age. A study done by Sherpa LY et al[3] reported mean age of their participants to be 48 years. This difference in the

overweight individuals had dyslipidemia and 70.0% of obese participants had dyslipidemia. Our findings are somewhat comparable to the findings of Humayun A et al[6] reporting in their study that a significant population of otherwise normal and healthy adults are at the verge of developing dyslipidemia. Considering the lipid parameters and comparing it with other studies, decrease in HDL-C was observed in (51.5%) individuals as compared to Shah SZA et al who noted 46% individuals with decreased HDL-C, both these findings are comparable. The huge difference was seen in LDL-C levels, in our study, 7.1% of the individual had increased LDL-C levels whereas in Shah SZA et al study, almost one-third population had high LDL-C levels. So prevalent feature of dyslipidemia in

this study was decreased HDL-C levels. Similarly, Mohanna et al[12] also observed low HDL-C levels in 30.4% individuals and hypercholesterolemia in 34.3% cases.

Evidence from literature suggest that all these features of deranged lipid profile i.e. increased TG, LDL-C, TC and decreased HDL-C are atherogenic.[13] Thus in order to prevent cardiovascular diseases, these risk factors should be taken care of.[14] BMI should be part of routine medical checkup which would give us an estimate of obesity in a population. Studies have shown that obesity is related to dyslipidemia, which eventually leads to cardiovascular disorders.[15] This study gives us alarming outcomes in which the normal BMI people are also found to be at risk of developing CVD. So based on the findings of the current study, one can say that the lipid profile to assess dyslipidemia should be done in people irrespective of their BMI levels. Chances of occult dyslipidemia may be there in otherwise healthy and even non-obese people. Therefore, these people should be targeted for screening for dyslipidemia before development of heart diseases.

Conclusion

Dyslipidemia or deranged lipid profile is the most common risk factor for developing CVD. From this study, it was observed that 56.1% individuals who were otherwise healthy had dyslipidemia. It is not limited to obese and overweight individuals and a person with normal BMI can also present with dyslipidemia. The most common derangement observed was decreased HDL-C and increased TG.

Recommendations

People with normal BMI should also have routine check-up for lipid profile. The healthcare professionals should spread awareness about dyslipidemia in population.

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