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RESEARCH ARTICLE

PREVALENCE OF DYSLIPIDEMIA THROUGH SCREENING AMONG KARACHITIES

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ABSTRACT

Background: Cardiovascular diseases (CVD) are the main source of mortality and morbidity in our society with dyslipidemia contributing considerably to atherosclerosis. The study aimed to estimate the prevalence of dyslipidemia in residents of Karachi in order to design appropriate health interventions at the primary and secondary levels to reduce cardiovascular events.
Methods: Study design was transversal and conducted during the period of January to April' 2016. Five hundred subjects who were healthy and not having any disease with ≥ 25 age group were selected who had attended their regular general health check-up in OPDs of different hospital in Karachi. Dyslipidemia risk levels were concluded as per National Cholesterol Education Program (NCEP) – Adult Treatment Panel (ATP) III guiding principles.
Results: Overall 500 healthy subjects were screened for their total lipid profiles. Majority were males (61%) with average age of 48±1.3 years. Mean serum cholesterol (Total Cholesterol) (mean±SD: 181.5±40.94) and HDL-C (49.66±12.66) level were within the recommended range however; LDL-C (119.39±27.62), TG (163.4±76.28) and VLDL-C (33.6±13.12) level were to a certain degree beyond the range. Prevalence of hyperlipidemia was as follows: hyper-cholesteremia (≥240) 8.4%; hypo-HDL-C (<40), 29.4%; hyper-triglyceridemia (≥200), 15.9%; hyper-LDL-C (≥160), 8.8%.
Conclusion: The prevalence of dyslipidemia, especially hyper-VLDL, hypo-HDL and hypertriglyceridemia, was higher than other types of hyperlipidemia in residents of Karachi. Consequently, necessitating urgent preventive programs and lifestyle changes in the form of community-based intercession strategies to put off and cope up with cardiovascular risk factors.

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INTRODUCTION

Cardiovascular diseases (CVD) are the main source of mortality and morbidity globally with dyslipidemia contributing considerably to atherosclerosis (In, 2012). Owed to continuous growth of economy and sedentary life style, larger number of people suffered from atherosclerotic cardiovascular diseases (Bonow *et al*., 2002). Furthermore, with the evolution of industrialization and urbanization, the morbidity and mortality rate of such diseases increases intensely. Researchers established the fact that low-density lipoprotein cholesterol (LDL-C) is outwardly critical for cardiovascular diseases while high-density lipoprotein cholesterol (HDL-C) protects from these diseases (Anderson, 2003; Chapman *et al*., 2011).

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In recommendations of the National lipid association for patient-centered treatment of dyslipidemia, they accomplished that high level of cholesterol, with non-HDL-C and LDL-C, is a major source of atherosclerosis, the main assistant process contributory to the majority of clinical cardiovascular events (Jacobson *et al*., 2014). Dyslipidemia has been established as one of the most important modifiable risk factors for cardiovascular disease (CVD), and patients with dyslipidemia are at a 31% to 46% higher risk for coronary artery disease (Petrella *et al*., 2007). Dyslipidemia is a condition in which lipid metabolism is disrupted, leading to an abnormal amount of lipids in the blood (AlMajed *et al*., 2011). It plays a major role in the expansion and progression of atherosclerosis (Lee *et al*., 2012; Posadas-Sánchez *et al*., 2007). The typical forms of dyslipidemia include elevated triglycerides (TG), elevated low-density lipoprotein cholesterol (LDL-C), and reduced high-density lipoprotein cholesterol (HDL-C) (Lee *et al*., 2012).

The prevalence of dyslipidemia was increased intensely in the modern decade. In past years, studies were conducted to observe prevalence of dyslipidemia in Pakistan (Posadas-Sánchez *et al*., 2007; Jafar *et al*., 2005). Though, there was no research focusing on the recent trend of such prevalence among Pakistani populations. Therefore, the study objective was to bring up to date the prevalence of dyslipidemia among residents of Karachi.

Impact on society

Dyslipidemia is very common in South Asian region because of their unbalanced diet, sedentary lifestyle, lack of awareness and obesity. This research work provides real picture of lipid profile of healthy individuals of Karachi. The variability of lipid profiles among gender and different age groups were investigated. These results provide an important data on basis of which government authorities can plan and implement awareness programs for general public.

MATERIALS AND METHODS

Setting and subjects

The study setting was Karachi, a metropolitan city of Pakistan. Study design was transversal and conducted during the period of January to April' 2016. Subjects were selected by non-probability sampling. Five hundred subjects with ≥ 25 age group were selected who had attended annual general health check-up in OPDs of different hospital in Karachi.

Measurements

According to the program protocol, all subjects between 25 to 65 years old were invited to participate in the screening and undergo anthropometric measurements and a measurement of their serum lipid profile. The serum lipid profile included TC, HDL-C, LDL-C, very low-density lipoprotein (VLDL-C), and TG. Dyslipidemia risk levels were considered as stated by National Cholesterol Education Program (NCEP) – Adult Treatment Panel (ATP) III guiding principles. In our study, dyslipidemia was defined as of the presence of hypercholesterolemia (≥240 mg/dL), hypo-HDL-C (<40 mg/dL), hyper-LDL-C (≥160 mg/dL), or hyper-TG (≥200 mg/dL) as presented in Table 1 (Panel, 2002). The lipoprotein screening tests were performed after the subjects had fasted for at least eight hours.

Table 1. Recommended ranges of cholesterols for normal and dyslipidemia according to the Adult Treatment Panel III criteria

ATP III Guidelines for Lipid profile

ATP III Classification of LDL, Total, and HDL Cholesterol (mg/dL)	
LDL Cholesterol – Primary Target of Therapy	
<100	Optimal
100-129	Near optimal/above optimal
130-159	Borderline high
160-189	High
≥190	Very high
Total Cholesterol	
<200	Desirable
200-239	Borderline high
≥240	High
HDL Cholesterol	
<40	Low
≥60	High

Table 2. Demographical characteristics of study population

Characteristics	N (%)
Gender	
Male	305 (61)
Female	195 (39)
Age	48±1.3 years
Employment status	
Employed	404 (38.8%)
Unemployed	637 (61.2%)

Ethical Issues

Prior written consent was taken from the participants after explaining them about the benefits and harms of the study and their identification was kept confidential. Photographs of individuals were not taken any time. Prior permission from the laboratory administration was taken and their names were not used anywhere. The study was also carried out using the ethical standards set forth in the Helsinki Declaration of 1975.

Statistical analysis

Statistical analysis was performed using SPSS version 19.0 software. Descriptive statistics were calculated for all the variables, including continuous variables i.e. age, HDL, LDL, VLDL, TG and serum cholesterol and categorical variables i.e. gender. Differences between these groups were evaluated using Student's t-test, ANOVA. Multivariate logistic regression analyses were used to recognize independent factors of dyslipidemia amongst adults with odds ratios (ORs) and corresponding 95 % confidence intervals (CIs) was calculated. P values less than 0.05 were deemed to be statistically significant. Since the target population of screening program was between 25 and 65 years of age, the study subjects were categorized as between 25 and 40 years of age, 41 to 55 years of age, and more than 55 years of age.

RESULTS AND DISCUSSION

Dyslipidemia indicated the increased level of total cholesterol and LDL cholesterol, decreased level of HDL cholesterol and hypertriglyceridemia existing either in combination or unaccompanied (Zahid *et al*., 2008). Dyslipidemia is one of the recognized predicTable risk factors for coronary heart diseases in addition to diabetes, cigarette smoking and hypertension. However such predicTable risk factors and their related clinical manifestations are mainly averTable by a healthy lifestyle (Misra *et al*., 2013) . The current study was executed to observe the pattern of cholesterol level and also to observe prevalence of dyslipidemia in Pakistani population. It was observed that the mean cholesterol levels including LDL-C, triglyceride and VLDL-C were high than normal recommended levels. During the current study, a total of 500 subjects were screened for their total lipid profiles. Majority were males (61%). Average age of participants was 48±1.3 years (Range: 25 - 65 years). More than half were unemployed (61.2%) (Table 2). It was observed that total cholesterol (mean±SD: 181.5±40.94) and HDL-C (49.66±12.66) level were within the recommended range however; LDL-C (119.39±27.62), TG (163.4±76.28) and VLDL-C (33.6±13.12) level were to a certain degree beyond the range (Table 3). The mean cholesterol levels were statistically analyzed for differences from normal levels as most of the participants were those not receiving any anti-hyperlipidemic drug.

Table 3. Lipid profile of the study population (n=500) comparison with normal levels

Cholesterol type	Mean± (SD)	t (sig)	Mean difference	95% confidence interval
Serum cholesterol	181.5± 40.94	-10.102(0.0001)	-18.49	-22.0955--14.9005
Triglycerides	163.4± 76.28	3.929(<0.0001)	13.4	6.7018-20.1062
HDL	49.66±12.66	-8.266(<0.001)	-10.34	-11.4566--9.2314
LDL	119.39±27.62	15.696(0.001)	19.39	16.9594-21.8126
VLDL	33.6±13.12	6.136(<0.0001)	3.6	2.4553-4.7681

Table 4. Lipid profile of the study population and its association with age and gender

Cholesterol type	Gender association t (sig.)	Age association F (sig.)
Serum cholesterol	3.733(<0.0001)	2.182(0.114)
Triglycerides	3.744(0.0001)	4.735(0.009)
HDL	1.378(0.169)	7.857(0.0001)
LDL	3.806(0.0001)	1.110(0.330)
VLDL	1.968(0.051)	2.469(0.086)

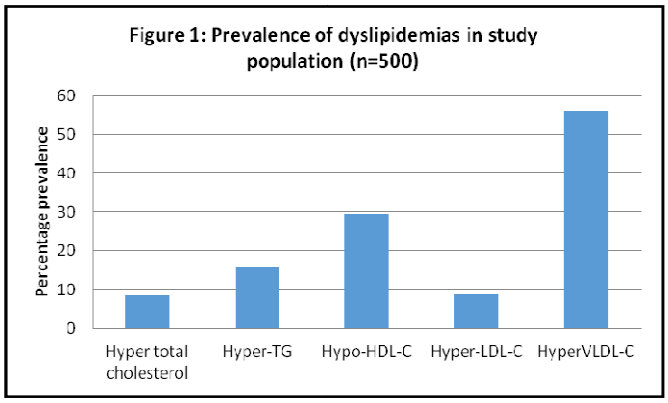
Table 5. Spearman and Pearson correlation among different types of cholesterols

Association	Spearman's correlation coefficient	Pearson correlation coefficient
Serum cholesterol vs TG	.422**	.471**
Serum cholesterol vs LDL	.893**	.865**
Serum cholesterol vs VLDL	.287**	.309**
TG vs LDL	.328**	.245**
TG vs VLDL	.887**	.925**
TG vs HDL	-.032	-.063
HDL vs VLDL	-.101*	-.119**
HDL vs LDL	-0.423	-0.501

**. Correlation is significant at the 0.01 level (2-tailed).

Population averages of TG, LDL-C and VLDL-C in mg/dL were increased from recommended levels by 13.4, 19.39 and 3.61 respectively. Average TC and HDL levels of study population were decreased by 18.5 and 10.4 (Table 3). The observed decline in HDL-C levels and incline in LDL-C levels is very alarming. Different lifestyles, access to care, and variations in dietary habits may influence the prevalence of hyperlipidemia. Other studies have found inequities in health care utilization according to demographic factors (Khader *et al*., 2010; Hassanzadeh *et al*., 2013). These inequities in health care utilization were increased from poor to rich quintiles, but non-significant in different quintiles of males and females. Being in the lowest quintile of household wealth index was associated with the lower use of outpatient health services. Statistical significant association was also observed between age and cholesterol (TG and HDL) levels ($p<0.01$). It has been reported that mostly all types of hyperlipidemias was significantly increased with the increasing age especially high TG, high LDL, and high TC (Misra, 2013). Gender was significantly associated with all types of cholesterols ($p<0.001$) except HDL and VLDL (Table 4). Risks are uniformly high in women previously reported from Pakistan (Posadas-Sánchez *et al*., 2009). Spearman and Pearson correlation was applied to observe the association among different types of cholesterols. Strong positive correlation was observed between total cholesterol and LDL-C; triglyceride with VLDL-C, moderately positive association of serum cholesterol with triglycerides. Moderately negative association was observed between HDL-C and LDL-C. Most of the correlations were significant except TG verses HDL-C and HDL-C verses VLDL-C. All the results of bivariate correlation are mentioned in Table 5. Prevalence of hypo-HDL, hyper-triglycerides and hyper-VLDL was higher in the current study (figure 1). A study from the neighboring country reported that 13.9% had hypercholesterolemia, 29.5% had hypertriglyceridemia, 72.3% had low HDL-C, 11.8% had high LDL-C levels and 79% had abnormalities in one of the lipid parameters.

Another study conducted in Mexico, reported that hypo-HDL and hyper-triglycerides were the most prevalent hyperlipidemias (Lee *et al*., 2012). Similar types of hyperlipidemia were reported in a study from Korea (Mohammadbeigi *et al*., 2013). A research reported that 48.8% had high TC level, 40.7% had high LDL-C, 40.1% had low HDL-C, 43.6% had high triglyceride levels, and 75.7% had at least one abnormal lipid level. He observed a significant association of age with high level of triglycerides, high LDL-C, and high TC. Present study results were in compliance with reports published from Iran (Roh *et al*., 2013).



Previous researches conducted in Pakistan also reported higher prevalence of hyperlipidemia than the current one (Mohammadbeigi *et al*., 2015; Jafar *et al*., 2005). Reason for such difference might be due to the fact that patients assessed in those studies were known cases of any cardiovascular abnormality. In contrast, a lower prevalence of dyslipidemia has been identified in one study from Pakistan (32.7% of adults) (Mohammadbeigi *et al*., 2015) and from Canada (14.0% of adults) (Petrella *et al*., 2007). Although our study estimated the prevalence of dyslipidemia in different age groups and the prevalence of undiagnosed dyslipidemia, it did not determine how many patients were not treated or were

inadequately treated. Moreover, dyslipidemia prevalence was not reported according to demographic characteristics such as body mass index and smoking, making further studies necessary.

Conclusion

The prevalence of dyslipidemia, especially hyper-VLDL, hypo-HDL and hypertriglyceridemia, was higher than other types of hyperlipidemia in residents of Karachi. Consequently, necessitating urgent preventive programs and lifestyle changes in the form of community-based intercession strategies to put off and cope up with cardiovascular risk factors.

Conflict of Interest

None

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