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PREVALENCE AND PATTERN OF DYSLIPIDEMIA AMONG HYPERTENSIVE ADULTS IN DISTRICT SWAT

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Abstract

Background: Hypertension and dyslipidemia are both effective, modifiable risks factors in cardiovascular disease (CVD) with a threatening synergistic impact. Although non-communicable diseases are high on burden in Pakistan, limited data of dyslipidemia patterns among hypertensive populations, including District Swat has not been available in the region. Objective: This research paper had to find out the prevalence and trend of dyslipidemia among hypertensive adulthood in the District Swat. Methodology: It was a cross-sectional study that took place at the Saidu Teaching Hospital Swat whereby 250 adults with hypertension were recruited. Sociodemographic and clinical were assessed, and fasting lipids analyzed. Dyslipidemia was identified according to National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III). Results: Dyslipidemia was common with 78.0 percent. Low high-density lipoprotein cholesterol (HDL-C) (62.8 percent), high low-density lipoprotein cholesterol (LDL-C) (48.4 percent), hypertriglyceridemia (45.2 percent) and high total cholesterol (41.6 percent) were the most prevalent lipid abnormalities. The most common pattern was combined dyslipidemia (two or more abnormalities) (52.4%), and the most common was the occurrence of low HDL-C and high LDL-C (28.0%). Obesity (95.5% vs. 54.4% in obese and normal-weight, respectively)

and male sex (83.6% vs. 72.1% in males and females, respectively) had a significant influence on dyslipidemia. Conclusion: District Swat has a high prevalence of dyslipidemia characterized by atherogenic patterns of low HDL-C and combined lipid abnormalities amongst hypertensive adults. This is a strong indication of a high-risk factor in the area of public health and the necessity of an integrated approach to management, such as regular lipid screening and aggressive lifestyle and clinical drug treatment to reduce the risk of CVD in such a group.

INTRODUCTION

Heart disease is one of the key societal health concerns globally. High blood pressure and high cholesterol are amongst its numerous causes, which are some of the main risk factors that can be avoided (1). They are much more likely to cause heart attack and stroke when they co-exist in an individual, compared to when they do not. The prevalence of non-communicable diseases (NCDs) in the world is ever-increasing, with cardiovascular diseases (CVDs) leading in the field of the epidemic (2). Hypertension and dyslipidemia are some of the most powerful and common causes of CVDs among the numerous risk factors (3). Hypertension, which is a pathologic disorder of prolonged blood pressure elevation, presents hemodynamic stress to the vascular endothelium on a chronic basis (4). Dyslipidemia, a condition caused by blood lipid imbalance, including high levels of total cholesterol, triglycerides, low-density lipoprotein cholesterol (LDL-C), or dropped levels of high-density lipoprotein cholesterol (HDL-C), is an immediate cause of atherosclerotic plaque (5).

The presence of these two ailments is especially harmful. They tend to group together as the metabolic syndrome and to work in synergy in accelerating the atherosclerotic pathogenesis, resulting in a significantly greater risk of coronary artery

disease, cerebrovascular accidents, and peripheral arterial disease (6). The importance of this interrelationship is such that the majority of clinical guidelines provided on hypertension management suggest the routine lipid profiling (7).

Dyslipidemia and hypertension are some of the health conditions in Pakistan that are overwhelming in numbers due to such factors as urbanization, change of diet, and heredity (8). Nonetheless, regional differences are usually concealed by national data. District Swat, which is a territory of the Khyber Pakhtunkhwa province that has its own socio-cultural and dietary customs, is a population with specific health issues (9). So far there is lack of sufficient data that examines specific patterns of lipid profiles in the hypertensive population of this district (10). Such a fine-grained comprehension of which pattern of dyslipidemia is the most common, i.e., whether it is high LDL, low HDL, or high triglycerides, can give way to even more effective and localized measures in both primary and secondary prevention (11). The proposed study was aimed to eradicate this gap in knowledge by examining the prevalence and the pattern of dyslipidemia that exists among hypertensive adults in District Swat.

METHODOLOGY

This was a cross-sectional study that was done over a period of six months at the Cardiology outpatient department of Saidu teaching hospital Swat which is one of the major tertiary care hospitals in the district Swat. The population of the study included adult patients aged 18 and above who were diagnosed with hypertension. The convenience sampling approach was adopted to recruit the participants until the desired sample size was obtained. An estimated 250 individuals were approximated to be the minimum sample size which was computed using OpenEpi software with a prevalence of dyslipidaemia of 65 percent, a 95 percent confidence level and a 5 percent

margin of error which was assumed. A reported history of chronic liver or renal disease, taking lipid-lowering therapy, pregnancy and secondary hypertension were all excluded to prevent the possibility of confounding (12).

A structured proforma was used to collect data which focused on sociodemographic data, clinical features, and laboratory results. The information related to age, sex, weight, height, body mass index, waist circumference, smoking status, family history of cardiovascular disease, and duration of hypertension was obtained in terms of each participant. The blood pressure readings were done using a calibrated mercury sphygmomanometer after the subject had relaxed in a period of five minutes. An overnight fast of 1012 hours was followed after which, a 5mL sample of the venous blood was collected under aseptic condition in order to assess a lipid profile. A total of cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C) were assessed as laboratory measurements and were determined using Electrochemiluminescense Assay (CLIA) on a Cobas c500 analyzer (13). Operational definitions that were used in the research were based on accepted clinical guidelines. Hypertension was termed when systolic blood pressure is 140mmHg or greater or diastolic blood pressure is 90mmHg or greater or is taking antihypertensive medication. Dyslipidaemia was identified based on the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) criteria, i.e., an increase in the level of total cholesterol (more than 200mg/dL), triglycerides (more than 150mg/dL), LDL-C (more than 130mg/dL), or a decrease in HDL-C (Less than 40mg/dL in men and Less than 50mg/dL in women The specific patterns of dyslipidaemia that were used to be identified and analyzed in the study, such as isolated high LDL-C, isolated low HDL-C,

and combined dyslipidaemia, were aimed at explaining the most widespread lipid abnormalities of the cohort (14).

To analyze the data, the Statistical Package of the Social Sciences (SPSS) version 26.0 was used to input and run the information. The summarisation of the characteristics of the research population and the calculation of the general prevalence of dyslipidaemia was done with the use of the descriptive statistics, such as means, standard deviation, frequencies, and percentages. The prevalence was in percentage with a 95% confidence interval. The Chi-square test is an inferential statistics that was used to test the relationship between dyslipidaemic patterns and categorical variables like sex and obesity. All tests were tested with a p-value of less than 0.05 which was considered to be statistically significant.

RESULTS

A total of 250 hypertensive adults were enrolled in the study. The mean age of the participants was 52.4 ± 10.7 years, with a range of 28 to 75 years. The sociodemographic and clinical characteristics of the study population are summarized in Table 1. There was a nearly equal gender distribution, with males comprising 51.2% (n=128) of the sample. The majority of participants (68.4%, n=171) were found to be either overweight (BMI 25-29.9 kg/m^2; 42.0%, n=105) or obese (BMI $\geqslant$30 kg/m^2; 26.4%, n=66). A positive family history of cardiovascular disease was reported by 34.8% (n=87) of the participants, and 28.0% (n=70) were current smokers.

TABLE 1: BASELINE CHARACTERISTICS OF THE STUDY POPULATION (N=250)

Characteristic	Value
Age (years), Mean ± SD	52.4 ± 10.7
Gender, n (%)	
Male	128 (51.2%)
Female	122 (48.8%)
BMI Category, n (%)	
Normal (18.5-24.9 kg/m^2)	79 (31.6%)
Overweight (25-29.9 kg/m^2)	105 (42.0%)
Obese (⩾30 kg/m^2)	66 (26.4%)
Family History of CVD, n (%)	87 (34.8%)
Smoking Status, n (%)	
Current Smoker	70 (28.0%)
Non-Smoker	180 (72.0%)
Duration of Hypertension (years), Mean ± SD	5.8 ± 4.2

PREVALENCE OF DYSLIPIDEMIA

It found that the prevalence of dyslipidemia was 78.0 percent in adults with hypertension (n=195; 95%=72.5-82.8). Table 2 shows the details of the prevalence of individual lipid

abnormalities. The most common form was low high-density lipoprotein cholesterol (HDL-C), 62.8 percent (n=157) of respondents. This was accompanied by high low-density lipoprotein cholesterol (LDL -C; 48.4%, n=121), hypertriglyceridemia (45.2%, n=113), and total cholesterol (41.6%, n=104).

TABLE 2: PREVALENCE OF INDIVIDUAL LIPID ABNORMALITIES (N=250)

Lipid Parameter	Abnormal Cut-off	n (%)	95% CI
Low HDL-C	<40 mg/dL (M), <50 mg/dL (F)	157 (62.8%)	56.5% - 68.8%
High LDL-C	>130 mg/dL	121 (48.4%)	42.1% - 54.7%
High Triglycerides	>150 mg/dL	113 (45.2%)	39.0% - 51.5%
High Total Cholesterol	>200 mg/dL	104 (41.6%)	35.5% - 47.9%

PATTERNS OF DYSLIPIDEMIA

The pattern of dyslipidemias analyses indicated that isolated lipid abnormalities were not as frequent as combined ones. The single pattern that was most common was isolated low HDL-C, which was found in 16.0% (n=40) of the respondents. The most common pattern of all was combined dyslipidemia, i.e. the presence of two or more lipid abnormalities that were observed in 52.4% (n=131) of the dyslipidemic patients. In this group, low HDL-C and high LDL-C was the most prevalent, and 28.0% (n=70) of the entire cohort was found to have it.

TABLE 3: PATTERNS OF DYSLIPIDEMIA AMONG HYPERTENSIVE ADULTS (N=250)

Pattern of Dyslipidemia	n (%)
Isolated Dyslipidemia	**64 (25.6%)**
Isolated Low HDL-C	40 (16.0%)
Isolated High LDL-C	14 (5.6%)
Isolated High TG	10 (4.0%)
Combined Dyslipidemia	**131 (52.4%)**
Low HDL-C + High LDL-C	70 (28.0%)
Low HDL-C + High TG	45 (18.0%)
High LDL-C + High TG	16 (6.4%)
No Dyslipidemia	55 (22.0%)

ASSOCIATION OF DYSLIPIDEMIA WITH DEMOGRAPHIC AND CLINICAL FACTORS

The Chi-square test of statistical analysis was performed and significant relationship between dyslipidemia and some demographic variables was found. The incidence of dyslipidemia was also higher in the obese (95.5%) than the normal weight (54.4%) ($p = 0.001$). There was also a remarkable correlation with the gender because dyslipidemia was more common in males (83.6%) than in females (72.1%) ($p = 0.024$). Nevertheless, the statistically significant relationship between dyslipidemia and smoking status ($p = 0.215$) or family history of CVD ($p = 0.108$) could not be found.

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TABLE 4: ASSOCIATION OF DYSLIPIDEMIA WITH SELECTED VARIABLES

Variable	Category	Dyslipidemia Present, n (%)	p-value
Gender	Male	107/128 (83.6%)	0.024
	Female	88/122 (72.1%)	
BMI Category	Normal	43/79 (54.4%)	<0.001
	Overweight	87/105 (82.9%)	
	Obese	63/66 (95.5%)	
Smoking Status	Smoker	59/70 (84.3%)	0.215
	Non-Smoker	136/180 (75.6%)	
Family History of CVD	Yes	74/87 (85.1%)	0.108
	No	121/163 (74.2%)	

DISCUSSION

The aim of the cross-sectional study was to find out the prevalence and trend of dyslipidemia among hypertensive adults in the District Swat. The most significant result of our research is that the prevalence of dyslipidemia is extremely high, and in the population of hypertensives considered, it was 78.0%. It means that a significant percentage of patients with hypertension in this area also have an abnormal lipid profile, and they are exposed to a greatly increased risk of atherosclerotic cardiovascular diseases.

Our study had a prevalence of 78.0 which is consistent with the findings in other parts of Pakistan and South Asia, but it falls on the higher end of the reported range. A study conducted on hypertensive patients and reported a dyslipidemia prevalence rate of 72.5% whereas the prevalence rate given by another study was 69.8% (15, 16). We might explain our slightly higher number by the differences in the diet, the amount of physical activity and the genetic predisposition peculiar to the population of District Swat. Its prevalence is so high that this fact stresses the prevalence of this comorbid condition and outlines a severe public health issue. It goes a long way to indicate that lipid profiling must become an unquestionable part of the regular clinical check-up of all hypertensive patients in this area.

About the distribution of personal lipid abnormalities, low HDL-C was the most common impairment and it covered 62.8 percent of the respondents. This was preceded by high LDL-C (48.4%), high triglycerides (45.2%) and high total cholesterol (41.6%). Atherogenic dyslipidemia predominates the low HDL-C and is prevalent in conditions of hypertension where much is said to be in the metabolic syndrome. This has also been noted in research conducted in India and Ethiopia where low HDL-C was the predominant lipid malady, which was usually related to a nutritional changing practice characterized by a diet rich in simplified carbohydrates and saturated fats and poor exercise (17, 18). Low HDL-C is of special concern since the prevalence of low HDL-C is an indication of a dysfunction in the reverse cholesterol-carrying system, one of the major protective mechanisms against atherosclerosis.

Patterns of dyslipidemia analysis showed that combined dyslipidemia (dyslipidemia with two or more) was much more prevalent (52.4%), compared to isolated (25.6) varieties. Low HDL-C and high LDL-C was the most common, occurring in

28.0 of the whole cohort. This is a very atherogenic synergist combination, since it entails not only over-delivery of cholesterol to the arterial wall (high LDL- C) but also under-removal (low HDL-C). This observation is consistent with a study conducted in North India, which also found that combined dyslipidemia is the most prevalent pattern among hypertensives and they either happen in cluster rather than isolated situations (19). Such a trend demands a more aggressive and complex treatment method which in many cases necessitate combination of drug therapy and changing lifestyle habits.

In our study, a strong correlation between dyslipidemia and selected demographic as well as clinical determinants was also detected. A good and statistically significant correlation was noted with BMI whereby dyslipidemia prevalence increased as one got obese (54.4 percent in normal-weight group and 95.5 percent in obese group, $p < 0.001$). This gradient effect highlights the primary role of obesity, especially visceral adiposity, in causing lipid metabolism disruptions by means of insulin resistance and enhanced free fatty acid flux. Moreover, there was a strong gender difference since dyslipidemia was more common in males (83.6) than in females (72.1) ($p = 0.024$). This is in agreement with various studies and it is usually explained by cardioprotective properties of estrogen of pre-menopausal women and disparities in body fat distribution and other lifestyle factors such as smoking (20). In contrast to other sources, the statistically significant association with smoking status or family history of CVD was not found. Other factors such as obesity might be too dominant and hence the absence of association between smoking and obesity.

CONCLUSION

This research study is a revelation that dyslipidemia (78.0%) is high in hypertensive adults in District Swat, highlighting a high comorbidity burden increasing cardiovascular

risks in this group. The highest prevalence of lipid abnormalities was low HDL-C (62.8%), high LDL-C, hypertriglyceridemia, and high total cholesterol. The most common pattern was combined dyslipidemia especially low HDL-C and high LDL-C, which indicates a very atherogenic lipid pattern that requires holistic management. The presence of significant relations between dyslipidemia and obesity and male gender supported the role of modifiable risk factors and gender specific predispositions in lipid metabolism disorders. Such a high rate of dyslipidemia among this hypertensive group demands that regular lipid screening should be incorporated into regular hypertensive treatment in the area. Lifestyle changes and prompt drug treatment are acutely required as targeted public health strategies to reduce the increasing cardiovascular disease in District Swat.

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