Research Article

Prevalence and association of dyslipidemia with diabetic and hypertension in population of Takht-e-Nasrati, Khyber Pakhtunkhwa, Pakistan

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Abstract

This research aims to study the prevalence rate of dyslipidemia and its association with diabetics and hypertension among different gender in a population of Takht-e-Nasrati, Khyber Pakhtunkhwa, Pakistan. Analysis of the different levels of cholesterol and lipoprotein were also studied. A total of 200 individuals were evaluated for their blood lipid profiles during their visits to the laboratory. Participants who had a blood pressure of more than 140/90 mmHg were classified as hypertensive. Diabetic patients, on the other hand, were selected based on fasting blood glucose levels greater than 126 mg/dl and HbA1c values larger than 6.5 percent. SPSS-21 was used to collect and analyze the data for the Chi-square test. The result of the current study shows that a high prevalence rate of dyslipidemia 110(56%) were found in male as compared to female 90 (44%) out of a total of 200 individuals. A high prevalence rate of dyslipidemia 92 (46%) were found in age group III. Hypertension 79 (64%) were the most prevalent associated factor in dyslipidemia individuals followed by diabetic 44 (36%). HDL cholesterol levels were high 89 (46%) in male and 72 (36%) in female. Low levels of total cholesterol 82 (41%) in male and 70 (35%) in female were studied. Diabetes and hypertension are both linked to dyslipidemia. To avoid the development of cardiovascular diseases, diabetic and hypertensive individuals with dyslipidemia should be closely monitored.

Keywords; Association; Diabetics; Dyslipidemia; Hypertension; Prevalence; Takht-e-Nasrati

Introduction

All around the world, cardiovascular disorders represent the major cause of morbidity and mortality [1]. Previously

prevalent in a relatively wealthy society, these diseases are currently reported to be declining in high-income countries while

rapidly growing in many middle and low-income countries [2].

These shifting proportions of the burden of cardiovascular disease are observed along with a general epidemiological transition of the burden of disease from predominantly communicable to non-communicable diseases (NCDs), which has been observed globally, in parallel with social change and economic development [3]. The Eastern Mediterranean region's disease burden from NCDs is expected to rise from 46 percent in 2004 to 60 percent by 2020, with dyslipidemia prevalence approaching 50 percent in some areas [4].

Dyslipidemia is an abnormally high level of non-high density lipoprotein cholesterol (HDL-C) in the body. It has been observed that dyslipidemia is strongly associated with other metabolic diseases like hypertension and diabetes. In addition, these three diseases further contribute to the development of atherosclerotic heart diseases [5].

The overall burden of atherosclerotic diseases is on the rise worldwide [6]. Controlling risk factors for cardiovascular diseases will eventually lead to decreased mortality. If one knew about the prevalence of dyslipidemia in hypertensive and diabetic patients, there would be fewer mortalities as better strategies could be designed to cope with the problem [7].

The onset and progression of dyslipidemia is typically a long-term, ongoing process [8,9]. Distinct factors may play different roles in the progression of dyslipidemia. Different provinces and areas have done previous studies on dyslipidemia and associated variables [10-12]. Although studies have found an association between dyslipidemia, hypertension and diabetes mellitus, the data from the South Asian population from an epidemiological point of view is scant and large-scale investigations into the population of Takht-e-Nasrati, District Karak, are scarce. We attempted to determine the

prevalence of dyslipidemia in the population of Takht-e-Nasrati, Khyber Pakhtunkhwa, Pakistan, in this study. The goal of the research was to investigate the prevalence of dyslipidemia in diabetic and hypertensive patients.

Materials and Methods

Study area

The study lasted nine months, from September 2019 to May 19, 2020, in population of Takht-e-Nasrati at Type "C" Hospital in Takht-e-Nasrati, District Karak, Khyber Pakhtunkhwa (KPK), Pakistan.

Data collection

A total of 200 individuals were evaluated for lipid profiles and their blood lipid profiles during their visits to the laboratory. This study included patients who were 25 years old or older at the time of their visit and enrolment in the lab.

Study methodology

Personal data, including name, gender, and age, and history of disease type and clinical symptoms of lipid disorder were recorded through a questionnaire. After the recording of personal data, the individuals were then instructed to fast for at least 8 hours the next morning before undergoing venous blood sampling. A second visit was done the morning after the first visit between seven and nine o'clock. Following confirmation that participants in the study fasted for at least 8 hours overnight, their blood pressure was taken while they sat in a validated protocol with a sphygmomanometer. For blood sugar and cholesterol levels, a fasting venous blood sample of 5 mL was obtained. Participants were recorded with validated techniques for anthropometric measurements, including height, weight, and circumference of the waist.

Biochemical analysis of sample

For different cholesterol readings, blood samples were obtained and examined on a Beckman Coulter AU680 Chemistry Analyzer. An automated chemistry

laboratory technician analyzed plasma lipid levels. Analyses of lipid disorders were based on the following conditions: high total cholesterol (TC) (more than 240 mg/dl), high triglycerides (TG) (more than 200 mg/dl), high Low-density lipoproteins (LDL) (more than 130 mg/dl), and low high-density lipoproteins (HDL) (less than 40 mg/dl). The (Table 1a, b) show the technique for measuring cholesterol, triglycerides, and

HDL using a kit. All of the individuals have either hypertension or diabetes. Participants who had a blood pressure of more than 140/90 mmHg were classified as hypertensive. Diabetic patients, on the other hand, were chosen because their fasting blood glucose levels were greater than 126 mg/dl and their HbA1c values were greater than 6.5 percent. SPSS-21 was used to collect and analyses the data for the Chi-square test.

Table 1a, b. Showing kit protocol for Cholesterol, triglycerides and HDL

a			b		
Reagent	STD	Test Tube	Reagent	STD	Test Tube
R1	1000µl	1000µl	R1	500µl	500µl
Sample	x	100µl	STD	200µl	x
STD	100µl	x	Sample	x	200µl

Results

A total of 200 individuals who had dyslipidemia were included in this study. Out of 200 individuals, 110 (55%) were male and 90 (45%) were female. Male show a high rate of prevalence as compared to female (Fig. 1; Table 2).

The prevalence of dyslipidemia was also studied among different age groups of participating individuals. The minimum age of 25 years and the maximum age of 60 years were reported in this study. The mean age of all the study population were 42.05 years. Individuals are divided into four age groups; group I contains individuals having an age of 29, group II (30-39), group III (40-49), and group IV (> 50) years. Out of a total of 200 individuals, a high rate of prevalence of 92 (46%) were found in group III, followed by 50 (25%) in group IV, 47 (23%) in group II and 11 (6%) in group I (Fig. 2; Table 3).

Individuals were also distributed on the basis of association of dyslipidemia with diabetes and hypertension. Of the total 200 individuals, 123 (60%) have diabetic and hypertension. The prevalence rate of hypertension were greater 79 (64%) in individuals having dyslipidemia and 44

(36%) have diabetic disease (Fig. 3; Table 4).

A gender-wise distribution of diabetes and hypertensive diseases was also studied. Out of 200 individuals, 123 (61%) have diabetic and hypertension diseases, in which 44 (36%) individuals have diabetic and 79 (64%) have hypertension. Gender wise prevalence were checked in this study, showing a high prevalence rate of 31 (70) of diabetes in male as compared to female 13 (30%) out total 44 individuals. The prevalence rate of hypertension were also high at 42 (53%) in male as compared to female 37 (47%) out of 79 patients (Fig. 4; Table 5).

In the current study, various cholesterol level were also checked among the genders having dyslipidemia. Both high, normal and low levels of total cholesterol, HDL, LDL, and triglycerides were checked in both male and female. HDL cholesterol level were high 89 (46%) in male and 72 (36%) in female. Low level of total cholesterol of 82 (41%) in male and 70 (35%) in female were studied, confirming that HDL cholesterol levels remained high and total cholesterol levels remained low in individuals having dyslipidemia (Table 6).

Figure 1. Showing gender wise Prevalence of Dyslipidemia disease

Table 2. Gender wise distribution of Dyslipidemia

Variable	Number (N)	Percentage(%)
Male	110	55
Female	90	45
Total	200	100

Figure 2. Showing Age wise prevalence of Dyslipidemia disease

Table 3. Distribution of Dyslipidemia disease according to different Age groups

Variable	Number (N)	Percentage (%)
Group I: <29	11	6
Group II:30-39	47	23
Group III:40-49	92	46
Group IV: >50	50	25
Total	200	100

Figure 3. Showing Prevalence of Dyslipidemia association with Diabetic and Hypertension

Table 4. Distribution of Diabetics and Hypertension patients

Variable		Number (N)	Percentage(%)
Diabetics	Diabetics	44	22
	Non-Diabetics	156	78
Total		200	100
Hypertension	Hypertension	79	40
	Non-Hypertension	121	60
Total		200	100

Figure 4. Showing gender wise prevalence of diabetic and Hypertension

Table 5. Gender Wise distribution of Dyslipidemia on basis of Diabetics and Hypertension

Variable	Number (N)	(%)	Male	(%)	Female	(%)
Diabetics	44	36	31	70	13	30
Hypertension	79	64	42	53	37	47
Total	123	100	73	59	50	41

Table 6. Level of various cholesterol lipoprotein in gender

Variable	Male (N%)			Female (N%)		
	High	Normal	Low	High	Normal	Low
Total Cholesterol	22(11)	6(3)	82(41)	14(7)	6(3)	70(35)
HDL Cholesterol	89(46)	8(4)	13(7)	72(36)	8(4)	10(5)
LDL Cholesterol	28(11)	47(24)	35(18)	20(10)	52(26)	18(9)
Triglycerides	31(16)	79(40)	0	23(12)	67(34)	0

Discussion

In cardiovascular disease, hypertension, diabetes and dyslipidemia and disordered lipid profiles play a significant role. The purpose of this study was to assess the prevalence of dyslipidemia and its relationship to diabetic and hypertensive individuals in the Takht-e-Nasrati, Khyber Pakhtunkhwa, Pakistan population. A high prevalence rate of dyslipidemia was found in the male population at 110 (%) as compared to the female having prevalence rate 90 (%) out of a total of 200 individuals. A recent study conducted by Agerwal *et al.*, 2014 on gender and age wise observation of dyslipidemia showed a high rate of prevalence of 154 (50%) in male as compared to the opposite gender [13]. A high prevalence rate of dyslipidemia was found in male individuals as compared to female [14, 15].

Current research also observed age-wise prevalence of dyslipidemia. The minimum age of 25 years and the maximum age of 60 years were reported in this study. The mean age of all the study population were 42.05 years. Individuals are divided into four age groups. Of the total 200 individuals, the highest prevalence rate of dyslipidemia 92 (46%) were found in group III, followed by 50 (25%) in group IV, 47 (23%) in group II and 11 (6%) in group I. Our study shows similar findings with other studies showing

the highest prevalence rate in the > 40 age group [16-18].

The prevalence of dyslipidemia in diabetics and hypertension among different genders of individuals were also studied in the studied population. Of 200 individuals, 123 (60%) have both diabetic and hypertension disorders. The prevalence rate of hypertension was greater 79 (64%) in individuals with dyslipidemia and in 44 (36%) of those with diabetic disease. A recent study conducted by Zubair *et al.*, 2020 also shows similar results to our study. The prevalence of dyslipidemia in hypertension patients was high: 71.6%, followed by 68.1% in diabetic patients [19]. Gender-wise prevalence was checked in this study, showing a high prevalence rate of 31 (70%) of diabetics in male as compared to female 13 (30%) out total 44 individuals. The prevalence rate of hypertension was also high at 42 (53%) in male as compared to 37 (47%) in females out of 79 patients. Dyslipidemia was shown to be prevalent in hyperglycemic individuals in 89 % and 92.4 % of two investigations conducted in India [14, 20]. In diabetic patients, the prevalence of dyslipidemia was 99.13 percent in males and 89.14 percent in females, but in Jayarama's study, it was 95.40 percent and 86.75 percent for male and female, respectively [14].

In the current study, various cholesterol levels were also checked among the genders

having dyslipidemia. Both high, normal and low levels of total cholesterol, HDL, LDL and triglycerides were checked in both male and female. HDL cholesterol level were high 89 (46%) in male and 72 (36%) in female. Low levels of total cholesterol of 82 (41%) in male and 70 (35%) in female were studied, confirming that HDL cholesterol levels remained high and total cholesterol levels remained low in individuals having dyslipidemia. Our study shows persistence with other studies [18, 21-23].

Conclusion

The result of the current study concluded that a high prevalence rate of dyslipidemia was found in the studied population. The current study also shows the alarming situation of dyslipidemia and its association with diabetics and hypertension. The main causes of the high prevalence of metabolic diseases were physical inactivity and a high-fat diet. To broaden the scope of metabolic illnesses in the region, more detailed research is needed.

Authors' contributions

Conceived and designed the experiments: A Rizwan & S Attaullah. Performed the experiments: A Rizwan, M Jawad, A Wahab, F Saeed & U Siddique. Analyzed the data: M Zahid & F Ullah. Contributed reagents/materials/analysis tools: M Jawad, A Rizwan & F Ullah, Wrote the paper: M Jawad.

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