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Original Article

Hypertriglyceridemia in Patients with Ischaemic Heart Disease

Muhammad Kamran Khan[1], Muhammad Zubair[2], Ambreen Gul[3], Muhammad Tariq[4], Momina Haq[5] and Maria Faiz[6*]

[1]Department of Medicine, Lady Reading Hospital, Medical Teaching Institution, Peshawar, Pakistan
[2]Department of Pathology, Saidu Medical College/Saidu Group of Teaching Hospitals, Swat, Pakistan
[3]Department of Chemical Pathology, Peshawar Medical College, Riphah International University, Islamabad, Pakistan
[4]Department of Histopathology, Jinnah Medical College, Peshawar, Pakistan
[5]Department of Physiology, Peshawar Medical College, Peshawar, Pakistan
[6]Department of Health, Institute of Cardiology, Peshawar, Pakistan

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***Corresponding Author:**
Maria Faiz
Department of Health, Institute of Cardiology, Peshawar, Pakistan
mariafaiz30@gmail.com

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ABSTRACT

Cardiovascular Diseases (CVD) have been the main cause of mortality in non-communicable diseases. Managing hypertriglyceridemia is crucial for lowering the risk of cardiovascular disease. **Objective:** To find out the frequency of increased triglycerides in the local population of patients with ischemic heart disease. **Methods:** A descriptive study design was conducted from October 16, 2020, to April 15, 2021, at the Lady Reading Hospital Department of Medicine in Peshawar. A total of 182 patients were enrolled using non-probability consecutive sampling calculated by WHO sample size calculator, with ages being of 20 years and 60 years, irrespective of gender. The presence or absence of hypertriglyceridemia was stratified according to different age groups, gender, height, weight, Body Mass Index (BMI), presence/absence of hypertension, diabetes and smoking history and a level of 150 mg/dl was deemed necessary to confirm the existence of hypertriglyceridemia. Post-stratification chi- squared test was applied in which a p-value of ≤0.05 was considered significant. **Results:** The average age, weight, height and BMI were 50 ± 7.5 years, 75.14 ± 5.8 kg, 172.89 ± 6.4 cm and 25.204 ± 2.29 kg/m^2 respectively. Patients with the history of diabetes, hypertension and smoking were 32.4%, 47.3%, and 40.1% accordingly and when comparing these parameters with hypertriglyceridemia produced highly significant results (p-value 0.001- 0.002). **Conclusions:** It was concluded that patients with history of smoking, hypertensions and BMI of more than 25kg/m^2 are more likely to have hypertriglyceridemia, and hence more likely to be linked to cardiovascular events.

INTRODUCTION

The most frequent fatalities in non-communicable diseases are now because of cardiovascular disease (CVD), with the World Health Organization (WHO) reporting a total of 17.6 million deaths because of CAD [1]. Heart disease, cancer and accidents are the top three causes of death between 2011 and 2018 in a United States (U.S) based study, with 600,000 or more deaths per year from each of these three diseases, cancer and heart disease are likely to continue to be the top two causes, respectively and serve as a sobering reminder of the ongoing social challenges posed by these non-communicable diseases [2]. In a similar instance, ischemic heart disease accounted for 22.7% of fatalities in Pakistan and 27.4% of deaths in India in 2021 [3]. An increase in triglycerides in the blood is referred to as hypertriglyceridemia [4, 5]. Patients with type II diabetes mellitus frequently have hypertriglyceridemia, which has been linked to an increased risk of ischemic heart disease [6, 7]. Triglyceride rich in Very Low-Density Lipoproteins (VLDL), chylomicrons and similar fragments known to be associated with athrosclerosis [8]. Hypertriglyceridemia is one of the risk factors for coronary heart disease in the younger Pakistani population [9]. Consequently, managing hypertriglyceridemia is crucial for lowering the risk of

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cardiovascular disease [10]. In patients with increased triglycerides, medications that lower triglycerides and triglycerides-rich lipoprotein cholesterol may be beneficial to the cardiovascular system [11, 12]. Tobacco consumption, diet of higher saturated fats and less physical activity have been associated with deaths in non-communicable diseases with global mortality being 7.2 million, 3.9 million and 3.2 million respectively; additionally, alcohol consumption, hypertension, hyperglycemia and hypercholesterolemia attributed to 0.32 million, 9.4 million, 3.4 million and 2.0 million global deaths respectively [13]. However, there is scarcity of data regarding the frequency of hypertriglyceridemia in our local population.

We aimed to find out the frequency of increased triglycerides in the local population of patients with ischemic heart disease.

METHODS

A descriptive design was used in the study, which was conducted from October 16, 2020, to April 15, 2021, at the Lady Reading Hospital Department of Medicine in Peshawar, after the approval from the Ethical Review Board (IRB) with Reference Number 459/LRH/MTI. A sample size of 182 with a 95% confidence level and a 5% margin of error were calculated using the WHO sample size methodology. The sample selection process involved non-probability consecutive sampling, with a focus on patients with ischemic heart disease between the ages of 20 years and 60 years, irrespective of gender. After taking written informed consent, a total of 182 patients were enrolled if their medical history suggested they had ischemic heart disease and had symptoms such as chest discomfort, shortness of breath treated with nitrates and confirmed by a coronary angiography, exercise tolerance test, or electrocardiogram. Based on the measurement of triglycerides in the patient's fasting blood sample, hypertriglyceridemia was diagnosed. A level of 150 mg/dl was deemed necessary to confirm the existence of hypertriglyceridemia. The data were analyzed using SPSS version 23.0. Frequencies and percentages were used to describe categorical variables. Mean and standard deviation were calculated for the numerical variables. The presence or absence of hypertriglyceridemia was stratified according to different age groups, gender, height, weight, Body Mass Index (BMI), presence/absence of hypertension, diabetes and smoking history. Post-stratification chi- squared test was applied in which a p value of ≤0.05 was considered significant.

RESULTS

Among the total 182 patients, the average age, weight, height and BMI were 50 ± 7.5 years, 75.14 ± 5.8 kg, 172.89 ± 6.4 cm and 25.204 ± 2.29 kg/m^2 respectively. The gender, age groups and BMI of patients are represented in table 1, with history of diabetes mellitus, hypertension, smoking and hypertriglyceridemia also being represented as shown in table 1.

Table 1: Distribution of Different Parameters in the Study Population

S.No.	Variables		Frequency (%)
	Category	Sub-Category	
1	Gender	Male	136 (74.7)
		Female	46 (25.3)
2	Age Groups	20-40 Years	26 (14.3)
		41-60 Years	156 (85.7)
3	BMI (Kg/m^2)	Healthy (18-25)	84 (32)
		Overweight (25.1-30)	92 (11)
		Obese (>30)	6 (4)
4	Hx of Diabetes Mellitus	-	59 (32.4)
5	Hx of Hypertention	-	86 (47.3)
6	Hx of Hypertriglyceridemia	-	73 (40.1)

BMI-body mass index,
Hx-history

Although comparing age groups, gender and history of diabetes with hypertriglyceridemia did not produce any significant results, yet comparing history of other study parameters produced highly significant (p-value 0.001-0.002) results, represented as shown in table 2.

Table 2: Comparison of Hypertriglyceridemia with the Study Parameters

S.No.	Variables		Hypertriglyceridemia		p-Value
			Present	Absent	
1	Gender	Male	59	77	0.310
		Female	24	22	
2	Age Group	20-40	8	18	0.101
		41-60	75	81	
3	Diabetes	Present	22	37	0.119
		Absent	61	62	
4	Hypertension	Present	57	29	0.001
		Absent	26	70	
5	Smoking	Present	22	51	0.001
		Absent	61	48	
6	BMI	Healthy (18-25Kg/m^2)	31	53	0.002
		Overweight (25.1-30Kg/m^2)	52	40	
		Obese (>30Kg/m^2)	6	0	

BMI-body mass index

DISCUSSION

The association between triglyceride rich particles and coronary ischemic disease was reported for the first time by Gofman and colleagues when they reported a significant increase in the concentration of triglyceride-rich lipoprotein particles in patients with Ischemic Heart Disease (IHD) aged 40 to 59 years compared with age and sex-matched control subjects [14]. In this study, 45.6% of patients with ischemic heart disease had hypertriglyceridemia. The findings of this investigation are

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somewhat better than those of Aryal B and associates' study, which revealed hypertriglyceridemia in 36.48% of ischemic heart disease patients [12]. The higher percentage of male candidates (74.7%) in this study compared to Aryal B *et al.*, study (64% male participation) may be the reason for the higher percentage of hypertriglyceridemia [12]. The distribution of ischemic heart disease in the population is substantially influenced by gender. Gheisari, F *et al.*, show that men had a higher risk of ischemic heart disease than women, with a male to female ratio of 19.1% to 14.2% [15]. Despite the inability of this study to show a significant correlation between hypertriglyceridemia (p-value 0.310), male patients were more likely than female patients to have higher lipid levels because of social, cultural and religious restrictions on physical activity, women in our society burn less calories than men do. This could be the cause of their higher cholesterol levels. Although there was no significant correlation found in this study between age and hypertriglyceridemia (p-value 0.101), there was an increasing trend in the prevalence of hypertriglyceridemia as people aged. Of the 83 hypertriglyceridemia patients in total, 75 patients (90.36%) belonged to the 40-60 age range. Growing older and adopting a more sedentary lifestyle could be the cause of this decrease in physical activity. The decrease in hormone levels that protect against IHD after the age of 50 has an additional effect in female patients. Dyslipidemia prevalence varied considerably with age in a cross-sectional study by Cho SM *et al.*, An increased odds ratio (OR = 2.31, p-value 0.008) for dyslipidemia was seen in the elderly group [16]. A significant correlation between smoking and hypertriglyceridemia was found (p-value 0.001). There has never been a thorough investigation of how smoking and quitting affect lipoprotein levels in a sizable modern smoker population. Two randomized controlled trials found that quitting smoking enhanced HDL-C, total HDL, and large HDL particles even in the face of weight gain, notably in women. LDL or LDL size was not impacted by quitting smoking. Reductions in the risk of cardiovascular disease upon quitting smoking may be partially mediated by increases in HDL [17]. Through risk factors such raised fasting plasma triglycerides, high LDL cholesterol, low HDL cholesterol, elevated blood glucose and insulin levels, and high blood pressure, obesity raises the risk of cardiovascular disease [18]. Similar outcomes were seen in this investigation as well, obesity and hypertriglyceridemia were found to be positively correlated in patients with ischemic heart disease (p-value 0.002). Cardiovascular diseases mediated by triglycerides have been associated with aortic valve stenosis and adverse cardiac remodeling, hence lifestyle modification and pharmacotherapy should be directed towards hypertriglyceridemia and its treatment should reasonably be cost effective [19, 20].

CONCLUSIONS

Hypertriglyceridemia is a frequent finding in patients presenting with ischemic heart disease. It was more commonly observed in patients with advanced age irrespective of the gender of the patient. Patients with history of smoking, hypertension and BMI of more than 25kg/m^2 are more likely to have hypertriglyceridemia.

Authors Contribution

Conceptualization: MKK
Methodology: MKK, MZ, AG, MH
Formal analysis: MKK, MZ, AG, MT, MF
Writing, review and editing: MKK, MZ, AG, MT, MH, MF

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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