ORIGINAL ARTICLE

HYPERTRIGLYCERIDEMIA AS A RISK FACTOR FOR CORONARY HEART DISEASE IN YOUNGER PAKISTANI POPULATION

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ABSTRACT

Background: Coronary Heart Disease (CHD) is a leading cause of morbidity and mortality all over the world. Pakistanis suffer from CHD at younger ages. Current preventive guidelines focus mainly on lowering low density lipoproteins and elevating high density lipoproteins. Hypertriglyceridemia is presently reemerging as one of the important isolated risk factor and therapeutic targets for CHD. The aim of this study was to establish an association of hypertriglyceridemia with CHD in younger patients in Pakistan.

Material & Methods: It was a comparative cross sectional study carried out at Punjab Institute of Cardiology Lahore from October 2009 to June 2010. This study included 32 patients with CHD of age 21-45 years. They were compared with 32 age and sex matched healthy controls. Fasting levels of triglycerides, high density lipoproteins, total cholesterol, and low density lipoproteins were measured in all the subjects. Data was analyzed by using SPSS version 16.0.

Results: Statistically significant difference ($p=0.002$) was observed in the mean concentration of triglycerides between the CHD patients (156.9 ± 69.5 mg/dl) and controls (112.2 ± 37.9 mg/dl). Similarly significant difference in the mean concentration of high density lipoproteins was also observed in the two groups ($p=0.003$). While levels of total cholesterol and low density lipoproteins were not significantly high in patients as compared to controls. Odds ratio for association of hypertriglyceridemia with CHD was calculated to be 3.8.

Conclusion: The present study indicates strong association between increased levels of triglycerides and CHD in younger Pakistani patients.

KEY WORDS: Coronary Heart Disease; Triglycerides; High density lipoproteins; Low density lipoproteins.

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INTRODUCTION

Coronary Heart Disease (CHD) has become the most common cause of death in the whole world both in the developed and developing countries.[1] Indo Asians are those people who have ancestral origin in the Indian subcontinent where 1.6 billion people live. This region constitutes about one fifth of world's population. The Indo Asian people have the highest rates of CHD among all ethnic groups, and similarly they suffer from acute myocardial infarction (AMI) at younger ages as compared to the people from other countries.[2] Pakistani population has high risk of CHD in the world. One fourth of middle aged Pakistanis have prevalent CHD.[3]

There are various traditional or conventional or major risk factors for CHD including dyslipidemia, smoking, diabetes mellitus, hypertension, family history of CHD, and advancing age.[4]

Dyslipidemia is elevation of plasma total cholesterol (TC), triglycerides (TG), low density lipoproteins cholesterol (LDL-C), or low high-density lipoprotein cholesterol (HDL-C) levels.[5]

Over the past decades numerous studies have identified elevated LDL-C levels and low HDL-C levels as key dyslipidemic risk factors for CHD. Current preventive guidelines focus mainly on lowering LDL-C and elevating HDL-C. But a large number of individuals experienced CHD events even after lowering LDL-C levels up to 70-100 mg/dl and increasing HDL-C levels. This led researches to think over other correctable risk factors for CHD such as high levels

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of triglycerides, non-high-density lipoprotein (HDL) cholesterol i.e. TC minus HDL, apolipoprotein B, insulin resistance and visceral fat.

According to European Society of Cardiology/ Early stage Assessment (ESC/ESA) and Joint European guidelines on the management of dyslipidemia, hypertriglyceridemia is an important risk factor for CHD. This team believes that high triglycerides levels should be given more careful consideration for earlier treatment in order to prevent CHD. As one of the modifiable CHD risk factors, elevated triglycerides level is now presently reemerging as one of the important therapeutic targets.[6, 7]

Plasma triglycerides are mainly derived from dietary sources but a small amount of TG is also formed and secreted by the liver. Dietary TG after absorption from the small intestine are secreted into the lymphatic system and then enter into the systemic circulation as chylomicrons through the thoracic duct bypassing the liver. Fatty acids released from adipose tissue and from TG stores in the human body are taken up by the liver and are synthesized into Very Low Density Lipoproteins (VLDL).[8]

Hypertriglyceridemia refers to an elevated level of triglycerides in the blood. According to the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) guidelines, a normal triglyceride level is <150 mg/dl, borderline high level is 150-199 mg/dl, high level is 200-499mg/dl, and very high level is >500mg/dl.[9]

Although many studies showed relationship of increased TG levels with atherosclerosis and hence CHD because of its association with other risk factors for CHD like metabolic syndrome, obesity, prothrombotic and proinflammatory biomarkers, and type 2 diabetes mellitus, its independent association with CHD is controversial.[10,11]

So keeping all these facts in mind we aimed to assess the association of hypertriglyceridemia with CHD in younger Pakistani patients.

MATERIAL AND METHODS

It was a comparative cross sectional study of nine months duration from October 2009 to June 2010 conducted at Punjab Institute of Cardiology (PIC) Lahore.

The study protocol was approved by the Ethical Committee of Postgraduate Medical Institute, Lahore and Advanced Studies and Research Board of University of Health Sciences, Lahore. Written informed consent forms were signed by all the study subjects before their enrollment in the study.

Two groups of subjects were made. Group I: comprised of 32 patients of age 21-45 years, admitted in PIC for the first time with ST segment elevation myocardial infarction (STEMI), Non ST segment elevation myocardial infarction (Non STEMI) or unstable angina. Diagnosis was made on the basis of typical chest pain history, electrocardiographic (ECG) changes, and elevated levels of cardiac enzymes, creatinine kinase (CK), CK-MB, Troponin I and Troponin T. Group II: Comprised of 32 healthy control subjects of age 21-45 years, recruited from (ETT) Exercise Tolerance Test department of PIC with negative ETT report. In both the groups smokers, hypertensive, subjects with past history of CHD, family history of premature CHD, history of diabetes mellitus, having chest discomfort not of cardiovascular origin, and abnormal renal functions were excluded from the study. Five ml of blood was collected from each subject of the study after 12 hours fast, by standard aseptic technique. The blood was transferred into centrifuge tubes and was allowed for clotting at room temperature for 25-60 minutes and was then centrifuged at 3000 rpm for 10 minutes. The serum thus obtained was transferred into properly labeled tubes and stored at 2-8°C for further analysis. The fasting serum TC, TG, and HDL-C levels were measured using standard kits by Slim Chemistry Analyzer while LDL-C levels were measured by Friedewald formula.

The obtained data from the two groups were entered into computer using SPSS version 16.0. Student's t test for independent samples was used to know significant difference of means between controls and patients. Odds ratio (OR) was calculated to know significant association between hypertriglyceridemia and CHD by using 2x2 contingency table. Formula used was: $OR = a \times d / b \times c$. The p-value < 0.05 was considered statistically significant.

RESULTS

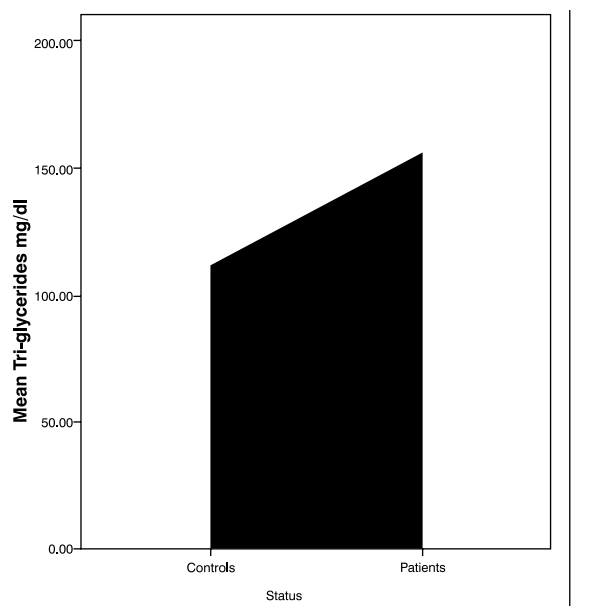

Figure: 1: Comparison of triglycerides levels between CHD patients and controls

Table 1: Comparison between CHD Patients and controls.

	Groups		
Variables	**Patients (Mean ±SD)**	**Controls (Mean ±SD)**	**p-value**
TC (mg/dl)	184.8 ± 38	180.5 ± 20.5	0.58
TGs (mg/dl)	156.9 ± 69.5	112.2 ± 37.9	0.002
HDL-C(mg/dl)	37.1 ± 7.2	42.3 ± 6.3	0.003
LDL-C (mg/dl)	115 ± 30.2	114.4 ± 20.5	0.93

Table 2: Contingency table for calculation of Odds Ratio (OR).

	Triglyceride (mg/dl)	**CHD patients (number)**	**Controls (number)**	**Odds Ratio (OR)**	**95% Confidence Interval**	**p-value**
Total subjects = 64	≥ 150mg/dl	a) 15	c) 6	3.8	1.24 to 11.8	0.02
	< 150mg/dl	b) 17	d) 26			

Total 64 subjects fulfilling the inclusion and exclusion criteria were investigated. Out of these 32 were patients admitted in PIC with the first episode of MI or Unstable angina. Other 32 subjects were age and sex matched healthy controls. The mean age of patient group was 37.2± 6.2 years while that of control group was 34.2±5.9 years. The mean ± SD serum total cholesterol level was184.8±38 mg/dl in CHD patients and 180.5±20.5 mg/dl in controls. p-value was 0.58. The mean serum triglycerides level of CHD patients and controls was 156.97±69.5 mg/dl and 112.28±37.9 mg/dl respectively. p-value was 0.002. Statistical significant difference was also observed in mean concentration of HDL-C in CHDpatients and controls. The mean serum HDL-C concentration in CHD patients and controls was 37.1±7.2 mg/dl and 42.37±6.3 mg/dl respectively (p-value 0.003) The mean serum LDL-C level was 115±30.2 mg/dl in CHD patients and 114.4±20.5 mg/dl in controls (p=0.93). In this study 15 CHD patients had TG concentration above normal level i.e. ≥ 150 md/dl, while 17 patients had normal TG levels i.e. <150 mg/dl. On the other hand in control group only 6 subjects had TG level ≥ 150 mg/dl while 26 had TG level <150 mg/dl. Odds ratio (OR) thus calculated was 3.8 (95% CI: 1.24-11.8) with a significance level of p-value = 0.02.

DISCUSSION

Since last few decades elevated LDL-C levels and low HDL-C levels are considered as key dyslipidemic risk factors for CHD and current preventive guidelines also focus mainly on lowering LDL-C and elevating HDL-C. But a large number of individuals experienced CHD events even after lowering LDL-C and increasing HDL-C levels. This led researches to pay attention to other modifiable risk factors for CHD such as hypertriglyceridemia, non-high-density lipoprotein (HDL) cholesterol, apolipoprotein B, visceral fat, and insulin resistance. As one of the correctable CHD risk factors, hypertriglyceridemia is presently reemerging as one of the important therapeutic targets.[6,7]

In our study mean level of triglycerides was significantly high in CHD patients as compared to controls (p-value=0.002). These results are in agreement with those reported in other studies. Aydoganet al[12]in Turkey in a study on 42 CHD patients and 23 controls showed that mean triglyceride level in patients and controls was 167mg/dl and 119mg/dl respectively which were significantly high in patients as compared to controls.

Another study conducted in India by Gupta et al[13] showed significantly high levels of triglycerides in different age group patients with CHD when compared with normal controls. According to other studies conducted by Iqbal et al[14] in Pakistan and Garg et al[15] in India showed that hypertriglyceridemia and low HDL levels are major lipid abnormalities in Asians patients suffering from AMI. These findings are in accordance with our study findings.

In our study, to know significant association between Hypetriglyceridemia and CHD, the calculated odds ratio was 3.8 reflecting that persons with hypertriglyceridemia were 3.8 times more at risk of getting CHD. Our results are in accordance with study conducted by Panwar et al[16] in which odds ratios was 3.62.

In our study the level of HDL was significantly low in CAD patientsas compared to controls (p= 0.003). This is in accordance with the study conducted by Iqbal et al.[14] in Pakistan which showed that hypertriglyceridemia and low HDL levels are major lipid abnormalities Pakistani patients suffering from AMI.

The levels of TC and LDL-C in our study were not significantly high in CHD patients when

compared with controls p-value was 0.58 and 0.93 respectively. These results were in agreement with the studies conducted by Jahromi et al[17] and Vondrakova et al[18].

CONCLUSION

This study concludes that serum triglycerides level was significantly high in CHD patients as compared to controls & there was a significant association between hypertriglyceridemia and CHD. Therefore it can be inferred that elevated level of serum triglycerides is a strong risk factor for CHD in younger Pakistani population. It is suggested that classical clinical pattern of lipid modifying treatment should be changed and high TG level should be recognized as an important target for therapy. Hypertriglyceridemia should be treated.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.

AUTHORS' CONTRIBUTION

Conception and Design:	AI
Data collection, analysis & interpretation:	AI, SZ, AR, RJ, SA
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