AJMAS
https://alqalam.utripoli.edu.ly/science/ eISSN 2707-7179

*Original article*

# The Association between Coronary Artery Disease and Hypertriglyceridemia in Libyan Adults: A Cross-Sectional Study

**Razk Abdalgwad[1]*, Ahmed Balha[1], Ali Fadhlullah[2]**

[1]*Department of Internal Medicine, Faculty of Medicine, University of Omar El mukhtar, Derna –Libya.*

[2]*Department of Internal Medicine, Faculty of Medicine, University of Omar El mukhtar, Albayda –Libya*

**ARTICLE INFO**

* **Razk Abdalgwad:** *Department of Internal Medicine, Faculty of Medicine, University of Omar El mukhtar, Derna –Libya.*
*rezeghamad@gmail.com*

***Received:*** *20-03-2021*
***Accepted:*** *30-04-2021*
***Published:*** *01-05-2021*

**Keywords:** CAD, Hypertriglyceridemia, Libyan Adults, Lifestyle, Medications.




**ABSTRACT**

***Background and aims.*** *Hypertriglyceridemia is increasingly prevalent multifactorial disease and one of the leading causes of coronary artery disease (CAD). We aimed to explore the relationship between the development of CAD and hypertriglyceridemia in Libyan adults.* ***Methods****. A retrospective cross-sectional study was conducted in a cohort of Libyan adults diagnosed with CAD. Participants were divided into groups with high and normal serum triglycerides levels. The likelihood occurrence of CAD in patients with hypertriglyceridemia was determined by using the Bayesian one sample test.* ***Results****. In general, 97 patients with established CAD were eligible for this study. 81 (83.5%) had elevated serum triglyceride levels as compared to only 16 (16.5%) with normal serum triglyceride levels, respectively. The mean age of the entire cohort was 60 ± 11.89 years. 53 (54.6%) of patients were females, and 44 (45.4%) were males in the entire cohort, respectively. Hypertriglyceridemia was significantly associated with CAD development.* ***Conclusion****. Amongst a cohort of Libyan patients with established CAD, we have found that there was a significant association between the occurrence of CAD and hypertriglyceridemia.*

***Cite this article:*** *Abdalgwad R, Balha A, Fadhlullah A. The Association between Coronary Artery Disease and Hypertriglyceridemia in Libyan Adults: A Cross-Sectional Study. Alq J Med App Sci. 2021;4(1):170-173.* https://doi.org/10.5281/zenodo.5774139

## INTRODUCTION

Hyperlipidemia is a pathological state which is characterized by elevated levels of serum lipids and triglycerides (TGs), subsequently resulting atherosclerosis, coronary heart disease, hypertension, myocardial infarction and stroke. The clogged arteries (due to the deposition of lipids) and released endogenous cell mediators in hyperlipidemic state exaggerate the myocardial ischemic injury [1].

A number of studies have shown that hyperlipidemia, in addition to well-known role in promoting atherosclerosis in the blood vessels, may directly affect the heart, leading to increased ischemia/reperfusion injury and weakened response to cardiac protective interventions such as ischemic preconditioning and post conditioning [2]. In the absence of obvious coronary artery stenosis, long-term hyperlipidemia leads to the accumulation of

cardiac lipids and affect cardiac function and electrophysiological activity [2,3].

Hypercholesterolemia decreases coronary blood flow reserve and capillary density, induces apoptosis of capillary endothelial cells and ultimately leads to impaired left ventricular (LV) function. It is advocated that hypercholesterolemia may have an impact on the change of membrane lipid bilayer, the regulation of intracellular calcium ions and isoform expression patterns of myosin heavy chain, making the myocardium more sensitive to exogenous damage (such as hemodynamic overload, myocardial ischemia, diabetes) [4]. Moreover, analysis of the Kaiser Permanente Heart Study and Framingham Heart Study cohorts showed significant associations between cholesterol levels and the risk for cardiovascular mortality in individuals with and without a history of CAD [5,6]. Therefore, the aim of the current study was to examine the relationship between hypertriglyceridemia and CAD amongst Libyan adults.

## METHODS

### *Study design and settings*

We have retrospectively examined the association between CAD and hypertriglyceridemia in a cohort of Libyan patients with established CAD who were attending the cardiac clinic at Al Wahda Teaching Hospital, Derna city. Data was retrospectively gathered from patients' medical records. We have included males and females' patients aged > 30 years old. Also, we have collected information regarding patients' triglyceride levels in the blood. We have divided patients into two groups according triglyceride levels as following: group of hypertriglyceridemia and CAD, and group of normal triglycerides with CAD.

### *Statistical analysis*

We have used SPSS version 22 to conduct all analysis. Descriptive statistics was used in the interpretation of demographic data of patients. The categorical variables were interpreted as numbers and percentages, while continuous variables were interpreted as means and standard deviations. Pearson's chi-square test was used to compare the categorical data between hypertriglyceridemia and normal triglyceride groups, while independent-sample t-test to compare the continuous data between the two groups. Bayesian one sample test was used to predict the possibility of occurrence of CAD amongst the group with hypertriglyceridemia.

## RESULTS

We have 97 patients who had CAD and were included in this analysis. Of these, 81 (83.5%) had elevated triglyceride levels in the blood, while only 16 (16.5%) with normal triglyceride levels in the blood. The mean age for the group of hypertriglyceridemia was 60.82± 12.25, while for those with normal triglyceride levels was 57.81 ± 10.1(P=0.395), respectively. 47 (48.4%) were females, and 6 (6.2%) were males in the group of hypertriglyceridemia, while only 34 (35.1%) were females and 10 (10.3%) (P= 0.132) were males in group of normal triglyceride levels, respectively (Table 1).

It appears that the greater proportion of patients who had elevated triglycerides in the blood suffer from CAD at 81 (83.5%), as compared to only 16 (16.5%) (P = 0.002) of patients with normal triglycerides and diagnosed with CAD, respectively. The difference in percentages is 67% higher for patients with hypertriglyceridemia suggesting that high levels of triglycerides in blood is a risk factor for CAD. Moreover, the percentage of females who had CAD in the group of hypertriglyceridemia was higher than those who were in the group of normal triglyceride levels at 47 (48.4%) and 6 (6.2%) (P= 0.132), respectively. Similarly, the proportion of males with CAD was greater in the hypertriglyceridemia group than in the normal triglyceride group at 34 (35.1%) and 10 (10.3%) (P= 0.132), respectively. Also, there is an increased risk of developing CAD amongst males and

females in hypertriglyceridemia group by an odds ratio of 2.3[0.764-6.95]. The percentages of CAD in those who aged < and > 60 years old were greater in the hypertriglyceridemia group at 42 (43.3.2%) and 39 (40.2%) as compared to those in the normal triglyceride group at 9 (9.3%) and 7 (7.2%) (P= 0.747), respectively. There is an increased risk of developing CAD amongst those who aged < and > 60 years old in hypertriglyceridemia group by an odds ratio of 0.84 [0.285-2.466].

***Table 1. Demographic patient characteristics and association between CAD and Hypertriglyceridemia.***

| Parameters | All patients | Hypertriglyceridemia group | Normal triglyceride group | *P*-value |
|---|---|---|---|---|
| N (%) | 97(100%) | 81(83.5%) | 16(16.5%) | - |
| Female | 53(54.6%) | 47(48.4%) | 6(6.2%) | 0.132 |
| Male | 44(45.4%) | 34(35.1%) | 10(10.3%) | |
| Age (years) | 60±11.89 | 60.82±12.25 | 57.81±10.1 | 0.359 |
| Age groups (years):<br><60 years old<br>>60 years old | <br>51(52.6%)<br>46(47.4%) | <br>42(43.3.2%)<br>39(40.2%) | <br>9(9.3%)<br>7(7.2%) | 0.747 |
| CAD | 97(100%) | 81(83.5%) | 16(16.5%) | 0.002* |

*Values are presented as mean ± SD for continuous variables. Comparisons between groups with continuous variables were made using independent samples t test.*
*Proportions with categorical variables were compared using Pearson's Chi-square test.*
**Denote that the P-value was reported from Bayesian one sample test.*
*N (%: Numbers and percentages, CAD: Coronary Artery Disease. All patients diagnosed with CAD.*

## DISCUSSION

In this study, amongst a cohort of Libyan patients with established CAD we have found that high serum triglyceride levels were significantly associated with the occurrence of CAD. Similar results have been reported in several studies on hypertriglyceridemia as a risk for CAD development. For instance, in a recent study isolated hypertriglyceridemia was reported to be associated with increased rates of CAD events, and also this study highlighted that although isolated hypertriglyceridemia was relatively common, awareness and control were underestimated [7]. Some European guidelines have indicated that elevated triglycerides increase the risk of CAD [8,9]. A meta-analysis was conducted by Liu et al., investigating over sixty prospective research studies, this analysis reported that elevated triglyceride in the bloodstream, or inability to eliminate triglyceride from the blood can lead to increased risk for future cardiovascular events [10].

This study has a number of important limitations. Firstly, the retrospective nature of the study, therefore the future study would focus in a prospective design on the relationship between CAD and hypertriglyceridemia possibly in the similar cohort of patients. Secondly, the smaller sample size and this makes the results of this study would not be generalized to the general population. Though, the significant outcomes of the study may add valuable and sufficient knowledge to the previous studies on hypertriglyceridemia as an important risk factor for the development of CAD.

In conclusion, in Libyan patients diagnosed with CAD, hypertriglyceridemia was found to be significantly related to the development of CAD. Maintaining triglyceride within normal levels via medications and healthy lifestyle may contribute to improvement of cardiovascular health.

### *Disclaimer*

The article has not been previously presented or published, and is not part of a thesis project.

### *Conflict of interest*

We declare that we have no competing interests.

### *Author contributions*

All authors contribute equally in this manuscript.

### *Abbreviations*

CAD: Coronary Artery Disease; N (%): Numbers and percentages; SPSS: Statistical Package for the Social Sciences; TGs: Triglycerides.

### *Data availability statement*

The data can be made available upon request.

### *Acknowledgments*

We would like to acknowledge all our patients who participated in this study.

## REFERENCES

[1] Balakumar P, Babbar L. Preconditioning the hyperlipidemic myocardium: fact or fantasy? Cellular Signalling. 2012;24(3):589-95.

[2] Pathak RK, Mahajan R, Lau DH, Sanders P. The implications of obesity for cardiac arrhythmia mechanisms and management. Canadian Journal of Cardiology. 2015;31(2):203-10.

[3] Fenk S, Fischer M, Strack C, Schmitz G, Loew T, Lahmann C, et al. Successful weight reduction improves left ventricular diastolic function and physical performance in severe obesity. International heart journal. 2015;56(2):196-202.

[4] Fauchier L, de Labriolle A. Cholesterol levels and cholesterol lowering in idiopathic dilated cardiomyopathy. European heart journal. 2005;26(18):1931; author reply -2.

[5] Castelli WP, Wilson PW, Levy D, Anderson K. Cardiovascular risk factors in the elderly. The American journal of cardiology. 1989;63(16):12-9.

[6] Rubin SM, Sidney S, Black DM, Browner WS, Hulley SB, Cummings SR. High blood cholesterol in elderly men and the excess risk for coronary heart disease. Annals of internal medicine. 1990;113(12):916-20.

[7] Saadatagah S, Pasha AK, Alhalabi L, Sandhyavenu H, Farwati M, Smith CY, et al. Coronary Heart Disease Risk Associated with Primary Isolated Hypertriglyceridemia; a Population - Based Study. Journal of the American Heart Association. 2021;10(11):e019343.

[8] De Backer G, Ambrosioni E, Borch-Johnsen K, Brotons C, Cifkova R, Dallongeville J, et al. European guidelines on cardiovascular disease prevention in clinical practice; third joint task force of European and other societies on cardiovascular disease prevention in clinical practice (constituted by representatives of eight societies and by invited experts). European Journal of Preventive Cardiology. 2003;10(4):S1-S10.

[9] Association BH, Association BD. Joint British recommendations on prevention of coronary heart disease in clinical practice: summary. BMJ. 2000;320(7236):705-8.

[10] Liu J, Zeng FF, Liu ZM, Zhang CX, Ling WH, Chen YM. Effects of blood triglycerides on cardiovascular and all-cause mortality: a systematic review and meta-analysis of 61 prospective studies. Lipids in health and disease. 2013;12:159. Epub 2013/10/30. doi: 10.1186/1476-511x-12-159.