AJMAS
https://journal.utripoli.edu.ly/index.php/Alqalam/index eISSN 2707-7179

Original article

Evaluation of Lipid Parameters in Diabetic and Non-Diabetic Acute Myocardial Infarction Patients in Al-Bayda

Fathia Hussien*[1], Kasem Abdinibi[2]

[1]*Department of Physiology, Faculty of Medicine, University of Omer AlMukhtar, Al-Bayda, Libya*
[2]*Department of Mathematic, Faculty of Science, University of Omar Al-Mukhtar, Al-Bayda, Libya*

ARTICLE INFO

Corresponding Email. *Kozomoahmed121@gmail.com*

Received*: 01-06-2023*
Accepted*: 18-06-2023*
Published*: 21-06-2023*

Keywords*. Diabetes Mellitus, Acute Myocardial Infarction, Cardiac Marker, Lipid Profile.*

ABSTRACT

Aims*. This study aimed to evaluate lipid profile in diabetic and non-diabetic acute myocardial infarction (AMI) patients.* ***Methods****. Retrospective cross-sectional analysis of clinical and laboratory data was extracted from hospital records of Al-Bayda Medical Center, recorded data for 140 subjects, divided into two groups (Non-diabetic AMI, N-AMI; and Diabetic AMI, D-AMI). Biochemical data such as fasting plasma glucose (FPG), glycated hemoglobin HbA1c, systolic and diastolic blood pressure, total cholesterol (TC), triglycerides (TG), low-density lipoprotein (LDL), high-density lipoprotein (HDL), TC/HDL, LDL/HDL ratios, and data for cardiac markers Troponin-I (TnI), C-reactive protein (CRP) along with the patient's age and gender, were also taken from file system.* ***Results****. D-AMI individuals had high level of TC, TG, LDL, and low level of HDL in comparison to N-AMI individuals.* ***Conclusion****. The current tudy showed elevated lipid marker in D-AMI patients compared to N-AMI patients. These results will be helpful for clinicians in therapy of MI patients with DM.*

Cite this article. *Hussien F, Abdinibi K. Evaluation of Lipid Parameters in Diabetic and Non-Diabetic Acute Myocardial Infarction Patients in Al-Bayda. Alq J Med App Sci. 2023;6(2):327-330. https://doi.org/10.5281/zenodo.8066599*

INTRODUCTION

Diabetes mellitus (DM) increases the incidence of cardiovascular diseases (CVDs) and increases the risk of CVD-induced mortality in diabetic subjects compared to non-diabetic subjects [1,2]. Hyperglycemia promotes reactive oxygen species (ROS) ROS-induced complications of heart by reacting with lipids, protein, and DNA, this oxidative damage is rescued by myocardial antioxidants [3]. Several studies depicted that antioxidants functioning is diminished in diabetic subjects [4], which may further augment the oxidative stress-induced pathogenesis of Acute myocardial infarction AMI [5]. Diabetes, dyslipidemia, hypertension, family history, obesity, and smoking are well documented risk factors for the development of AMI [6]. Coronary artery disease (CAD) contributed to myocardial infarction (MI) and heart failure, attributed to most of the mortalities around the globe [7-9]. Acute myocardial infarction (AMI) is associated with obstruction of coronary artery, myocardial ischemia leading to myocardial necrosis and generation of (ROS) [10]. The purpose of the study was to assess the lipid parameters and cardiac activity in diabetic and non-diabetic AMI patients.

METHODS

Study design and setting

Retrospective cross-sectional study was accomplished at Al-Bayda Medical Center, and the protocol was approved by the Research Ethics Committee (REC) of Omer Al Mukhtar university in Al-Bayda. The data were collected by reviewing hospital records of Al-Bayda Medical Center. The inclusion period was from January 2023 to April 2023. Biochemical data such as FPG, HbA1c, systolic and diasystolic blood pressure, Serum levels of TC, TG, LDL, HDL and cardiac markers TnI, CRP, along with age and gender, diabetes history of acute myocardial infarction AMI and

co-morbidities, AMI diagnosis was based on a history of chest pain, ECG changes, and elevated cardiac enzymes [10,11], were also taken from the file system. 70 subjects (42males and 28 females) were with normal blood glucose level and AMI (non-diabetic and AMI, N-AMI), and 70 subjects (37males and 33females) were with diabetes and AMI (Diabetic and AMI, D-AMI).

Statistical analysis

Analysis of study data was performed by SPSS (Statistical Package for Social Sciences) version 23. Mean ± SD was mentioned for quantitative values. Frequency and percentages were mentioned for qualitative variables. The Student's *t*-test was used to compare the mean of age, systolic & diastolic BP (mm Hg), TC, HDL, LDL, TG, HBA1c, fasting blood glucose and cardiac markers TnI, CRP, between diabetic and non-diabetic AMI patients. A p-value ≤ 0.05 was considered as significant.

RESULTS

Patient demographics characteristics, presented in Table 1 divided into, non-diabetic with AMI (70 subjects); and D-AMI group, diabetic with AMI (70 subjects). N-AMI patients had mean age of 60 ± 10 years, whereas D-AMI patients had mean age 55 ± 9 years. Fasting blood glucose (FBG) and HbA1c levels were significantly high in D-AMI group ($p < 0.001$) compared with N-AMI. Systolic blood pressure (SBP) and diastolic pressure (DBP) were high in D-AMI compared with N-AMI

Table 1. Patient demographics characteristics

Characteristics	N-AMI group (70)	D-AMI group (70)	P value
Male/Female (n)	42/28	37/33	
Age (years)	60 ±10	55 ± 9	<0.001
FBG (mg/dL)	80± 10	130± 9	<0.001
HbA1c (%)	5.3 ± 2.3	9.7 ± 1.4	<0.001
SBP	130 ± 20	165 ± 19	<0.001
DBP	80 ± 12	90 ± 11	<0.001

All values are mean ± SD. p value for D-AMI versus N-AMI. D-AMI, diabetic and myocardial infarction; DBP, diasystolic pressure; FBG, fasting blood glucose; HbA1c, glycated hemoglobin; N, normal; NAMI, non-diabetic and myocardial infarction; SBP, systolic pressure

Alterations in levels of all the lipid constituents among all groups are presented in Table 2. D-AMI group showed significant increase in TC (280.2 ± 13.4 mg/dL), TG (300.4 ± 16.5 mg/dL), LDL (288.5 ± 21.2 mg/dL) levels compared to that of N-AMI group for TC (236.3 ± 10.4 mg/dL), TG (227.6 ± 21.5 mg/dL), LDL (244.5 ± 22.2 mg/dL), Whereas, D-AMI group showed significantly lower level of HDL (25.2 ± 6.0 mg/dL) in comparison to N-AMI group (30.7 ± 1.6 mg/dL). Also, D-AMI subjects showed high value of TC/HDL and LDL/HDL ratios compared to N-AMI.TnI level was also found significantly high in D-AMI patient (4.2 _ 0.4 ng/mL) than N-AMI group (1.5 _ 0.3 ng/mL). D-AMI patients had significantly higher level of CRP (8.6 ± 0.5 mg/L) as compared to N-AMI (4.3 ± 0.5 mg/L) patients.

Table 2. Cardiovascular parameters

Characteristics	N-AMI group (70)	D-AMI group (70)	p-Value
Total cholesterol (TC)	236.3 ± 10.4 mg/dL	280.2 ± 13.4 mg/dL	< 0.05
Triglycerides (TG),	227.6 ± 21.5 mg/dL	300.4 ± 16.5 mg/dL	< 0.05
Low-density lipoprotein (LDL)	244.5 ± 22.2 mg/dL	288.5 ± 21.2 mg/dL	< 0.05
High-density lipopro-tein (HDL)	30.7 ± 1.6 mg/dL	25.2 ± 6.0 mg/dL	< 0.05
Troponin-I (TnI)	1.5 ± 0.3 ng/mL	4.2 ± 0.4 ng/mL	< 0.05
C-reactive protein (CRP)	4.3 ± 0.5 mg/L	8.6 ± 0.5 mg/L	< 0.05

DISCUSSION

AMI is initiated by myocardial ischemia due to enhanced production of ROS, [5] activation of proinflammatory reactions, [12] impaired functioning of antioxidants, [13] and increased lipid peroxidation [14]. All these events elicit

the activation of plaque, coronary blockage and ultimately heart attack. There are numerous risk factors associated with the development of AMI, such as diabetes, dyslipidemia, hypertension, smoking, obesity, advancing age, etc., [10]. Bartels et al. [15] reported that diabetes increases the risk of CVD in diabetic subjects compared with non-diabetic subjects. The present study, presented the effect of hypertension, diabetes, and dyslipidemia in D-AMI patients. Type 2 diabetes was found to alter lipids and lipoproteins utilization and induce atherogenic dyslipidemia [16,17], results show significantly higher levels of TC, TG, and LDL however; low level of HDL in D-AMI patients, and this suggests an important role of atherogenic dyslipidemia in the development of AMI in diabetic subjects. Atherogenic dyslipidemia favors the oxidative modification of proteins along with lipids specially LDL and thus induces a local and systemic inflammatory responses [18,19] is detected by measuring the CRP level. Indeed, CRP is systemic inflammation marker and gives prognostic information of cardiovascular events such as atherosclerosis and CAD [20,21].

In this study, increased CRP was found in D-AMI patients compared to N-AMI. Heart contractility is evaluated by measuring the myocar-dial tissue specific protein Trop I, involved in cardiac contractility. Previous studies indicated that Trop I is highly sensitive and specific marker of myocardial damage and therefore used as a diagnostic marker for AMI [22]. In this study, significantly raised level of Trop I was found in D-AMI patients compared to N-AMI patients indicating that cardiac muscle cell death increases in diabetic subjects. Current study indicates the significance of atherosclerosis and its associated complications such as dyslipidemia and inflammation in D-AMI patients.

CONCLUSION

This study demonstrates a significant increase in cardiac markers such as Trop I and CRP in D-AMI patients compared to N-AMI. These results will be helpful for clinicians in therapy of MI patients with DM.

Limitation of study

Following limitation should have to be considered for interpretation of the study: The recorded data were collected in a short time period.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

REFERENCES

1. Kalofoutis C, Piperi C, Kalofoutis A, et al. Type II diabetes mellitus and cardiovascular risk factors: current therapeutic approaches. Exp Clin Cardiol. 2007;12:17–28.
2. Ansley DM, Wang B. Oxidative stress and myocardial injury in the diabetic heart. J Pathol. 2013;229:232–241.
3. Lu Z, Xu X, Hu X, et al. PGC-1 alpha regulates expression of myocardial mitochondrial antioxidants and myocardial oxidative stress after chronic systolic overload. Antioxid Redox Signal. 2010;13:1011–1022.
4. Jimenez-Osorio AS, Picazo A, Gonzalez-Reyes S, et al. Nrf2 and redox status in prediabetic and diabetic patients. Int J Mol Sci. 2014;15:20290–20305.
5. Di Filippo C, Cuzzocrea S, Rossi F, et al. Oxidative stress as the leading cause of acute myocardial infarction in diabetics. Cardiovasc Drug Rev. 2006;24:77–87.
6. Boyer NM, Laskey WK, Cox M, et al. Trends in clinical, demographic, and biochemical characteristics of patients with acute myocardial infarction from 2003 to 2008: a report from the American Heart Association get with the guidelines coronary artery disease program. J Am Heart Assoc. 2012;1:e001206.
7. Ezekowitz JA, Kaul P, Bakal JA, et al. Declining in-hospital mortality and increasing heart failure incidence in elderly patients with first myocardial infarction. J Am Coll Cardiol. 2009;53:13–20.
8. Bui AL, Horwich TB, Fonaro. Epidemiology and risk profile of heart failure. Nat Rev Cardiol. 2011;8:30–41.
9. Nabel EG, Braunwald E. A tale of coronary artery disease and myocardial infarction. N Engl J Med. 2012;366:54–63.
10. Kasap S, Gonenç A, Sener DE, Hisar I. Serum cardiac markers in patients with acute myocardial infarction: oxidative stress, C-reactive protein and N-terminal probrain natriuretic Peptide. J Clin Biochem Nutr. 2007;41:50–57
11. Herring N, Paterson DJ. ECG diagnosis of acute ischaemia and infarction: past, present and future. QJM. 2006;99:219–230.
12. Gruzdeva O, Uchasova E, Dyleva Y, et al. Insulin resistance and inflammation markers in myocardial infarction. J Inflamm Res. 2013;6:83–90
13. Surekha RH, Srikanth BB, Jharna P, et al. Oxidative stress and total antioxidant status in myocardial infarction. Singap Med J. 2007;48:137–142.
14. Heinecke JW. Oxidative stress: new approaches to diagnosis and prognosis in atherosclerosis. Am J Cardiol. 2003;91:12A–16A.

15. Bartels DW, Davidson MH, Gong WC. Type 2 diabetes and cardiovascular disease: reducing the risk. J Manag Care Pharm. (2 suppl A):2007;(2 suppl A):S2–S15.
16. Krauss RM. Lipids and lipoproteins in patients with type 2 diabetes. Diabetes Care. 2004;27:1496–1504.
17. Farmer JA. Diabetic dyslipidemia and atherosclerosis: evidence from clinical trials. Curr Atheroscler Rep. 2007;9:162–168.
18. Stocker R, Keaney Jr JF. Role of oxidative modifications in atherosclerosis. Physiol Rev. 2004;84:1381–1478.
19. Galkina E, Ley K. Immune and inflammatory mechanisms of atherosclerosis. Annu Rev Immunol. 2009;27:165–197.
20. Calabro P, Golia E, Yeh ET. CRP and the risk of atherosclerotic events. Semin Immunopathol. 2009;31:79–94.
21. Paradela-Dobarro B, Raposeiras-Roubin S, Rodino-Janeiro BK, et al. Statins modulate feedback regulation mechanisms between advanced glycation end-products and C-reactive protein: evidence in patients with acute myocardial infarction. Eur J Pharm Sci. 2013;49:512–518.
22. Tiwari RP, Jain A, Khan Z, et al. Cardiac troponins I and T: molecular markers for early diagnosis, prognosis, and accurate triaging of patients with acute myocardial infarction. Mol Diagn Ther. 2012;16:371–381.

تقييم معاملات الدهون في مرضى احتشاء عضلة القلب الحاد السكري وغير السكري في البيضاء

فتحية حسين *[1] ، قاسم عابدينبي[2]

[1]قسم علم وظائف الأعضاء ، كلية الطب ، جامعة عمر المختار ، البيضاء ، ليبيا.
[2]قسم الرياضيات كلية العلوم جامعة عمر المختار البيضاء ليبيا.

المستخلص

أهداف الدراسة. هدفت هذه الدراسة إلى تقييم ملف الدهون في مرضى السكري وغير المصابين باحتشاء عضلة القلب الحاد .(AMI) **طريقة الدراسة**. تم استخراج تحليل المقطع العرضي بأثر رجعي للبيانات السريرية والمخبرية من سجلات المستشفى لمركز البيضاء الطبي ، والبيانات المسجلة لـ 140 شخصًا ، مقسمة إلى مجموعتين AMI) غير السكري ، N-AMI؛ و AMI السكري . (D-AMIالبيانات البيوكيميائية مثل الجلوكوز في بلازما الصيام (FPG) ، الهيموجلوبين السكري HbA1c ، ضغط الدم الانقباضي والانبساطي ، الكوليسترول الكلي (TC) ، الدهون الثلاثية (TG)، البروتين الدهني منخفض الكثافة (LDL) ، البروتين الدهني عالي الكثافة (HDL) ، / TCتم أيضًا أخذ نسب HDLو LDL / HDL وبيانات العلامات القلبية Troponin-I (TnI) والبروتين التفاعلي C (CRP) جنبًا إلى جنب مع عمر المريض ونوعه من نظام الملفات. **النتائج**. كان لدى أفراد D-AMI مستوى عالٍ من TC و TG و LDL ومستوى منخفض من HDL مقارنة بأفر .N-AMI **الخلاصة**. أظهر tudy الحالي علامة دهنية مرتفعة في مرضى D-AMIمقارنة بمرضى .N-AMI ستكون هذه النتائج مفيدة للأطباء المعالجين لمرضى MI المصابين بمرض السكري.

الكلمات الدالة. داء السكري ، احتشاء عضلة القلب الحاد ، علامة القلب ، الدهون.