Non Alcoholic Fatty Liver Disease in Patients with Acute Myocardial Infarction

Ibrahim A. Boufaris and Ali A. Fadella

Department of Medicine, Faculty of Medicine, Omar Almukhtar University, Albaida Libya
ali.aref67@yahoo.com

Abstract: Background: Patients with Non-alcoholic fatty liver disease NAFLD might be at greater risk of cardiovascular disease (CVD) than those without NAFLD, This study was aimed to establish the relationships between NAFLD and coronary heart disease. **Methods:** Thirty eight (38) cases of acute myocardial infarction (ST-elevation myocardial infarction STEMI and non ST- elevation myocardial infarction NSTEMI) were recruited. Abdominal ultrasonography was performed, Two groups of participants (with and without NAFLD) were compared Logistic regression was used to analyze correlations between the incidence of NAFLD while controlling for conventional cardiovascular risk factors. **Results:** Showed that NAFLD was an independent risk factor for coronary heart disease after adjusting coronary risk factors such as diabetes, hypertension, smoking, dyslipidemia, and gender by multiple analysis. **Conclusion**: Our study showed that NAFLD was associated the presence of CAD and not just one aspect of obesity or metabolic syndrome.
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1. Introduction

Non-alcoholic fatty liver disease (NAFLD) is currently the most common cause of abnormal liver function tests observed in hepatology practice. It affects approximately 20-33% of general population, with up to 75% diabetics and 95% of obese persons likely to have NAFLD.(1-6)

NAFLD is characterized by fatty infiltration affects > 5% of hepatocytes, without a history of excessive alcohol intake (< 20g/day), and without evidence of other causes of liver disease.

The disease spectrum of NAFLD includes varying severity of liver histology from simple steatosis to non-alcoholic steatohepatitis (NASH) to cirrhosis, and an increased risk of hepatocellular carcinoma.(7-11)

Metabolic syndrome (MetS) is a cluster of cardiovascular disease risk factors characterized by abdominal obesity, raised fasting blood glucose (type 2 diabetes), elevated triglycerides, reduced high density lipoprotein cholesterol (HDL-C), and hypertension. NAFLD is a clinicopathological syndrome that is a strongly associated with the major components of the metabolic syndrome (MetS), which supports that NAFLD may be the hepatic manifestation of the MetS.(12-17)

Patients with NAFLD might be at greater risk of cardiovascular disease (CVD) than those without NAFLD, which might reflect the coexistence of underlying MetS risk factors. However research strongly suggests that NAFLD is associated with increased CVD risk, this suggests that NAFLD may be a marker and also an early mediator of atherosclerosis.(18-24)

This study was carried out to establish the relationships between NAFLD and MetS in patients with acute myocardial infarction.

2.Material and Methods

Participants were selected from patients admitted to coronary care unit, Al-Thoura Central Teaching Hospital, Al-Baida. Thirty eight (38) cases of acute myocardial infarction (ST-elevation myocardial infarction STEMI and non ST- elevation myocardial infarction NSTEMI).

Subjects with the following conditions were excluded from the study: patients with history of alcohol consumption, history of liver disease (viral, autoimmune, genetic, and drugs), heart failure, renal disease, active infections, malignancy, receiving drugs induced fatty liver (steroids, estrogens, diltiazem, tamoxifen) and those had a positive test for hepatitis B or C were excluded.

A standard 12-lead ECG. Brief history and complete clinical examination was carried out, blood samples were obtained immediately after admission for analysis of: cardiac enzymes (Troponin, CPK, CK-MB, AST, and LDH). Acute myocardial infarction was diagnosed on the basis of the following criteria: chest pain > 20 minutes, typical ECG changes (ST-elevation or ST- depression), and rise of serum cardiac enzymes concentration (CK-MB, Troponin).

Clinical variables included age, sex, smoking status, body mass index (BMI), waist circumference, alcohol consumption diabetes mellitus, history of hypertension, triglycerides (TG), total cholesterol (TC), high-density lipoproteins HDL, low-density lipoproteins (LDL), alanine aminotransferase (ALT),

alkaline phosphatase, FBS, urea and creatinine. All blood samples were tested in the same laboratory in the morning after an overnight fasting.

Hypertension was defined as systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥ 90 mmHg or using antihypertensive medications. Diabetes was defined as fasting blood sugar ≥ 126 mg/dL or using glucose lowering medications (oral agents or insulin). For obesity body mass index (BMI) was used. The ones who had BMI ≥30 kg/m^2 were stated as obese.

Abdominal ultrasonography was performed shortly before the patient was discharged and by a radiologist who did not have information about the patient. The presence of a fatty liver was identified by characteristic echo patterns such as a diffuse increase in the echogenicity of the liver compared with that of the kidney according to conventional criteria.

Patients with 3 or more of the following 5 criteria were regarded as having MetS. criteria of the International Diabetes Federation (IDF):

1-Abdominal obesity: waist circumference of ≥ 94 cm for men and ≥ 80 cm for women, 2- Elevated triglycerides of ≥ 150 mg/dl or patient on specific drug treatment, 3- Reduced HDL-C of < 40 mg/dl for males and < 50 mg/dl in females or patient on specific drug treatment, 4- Elevated BP ≥ 130 mmHg for systolic and/or ≥ 85 mmHg for diastolic or patient on specific antihypertensive drug treatment, 5- Elevated fasting blood glucose of ≥ 100 mg/dl or patient on specific drug treatment.

Two groups of participants were compared by the unpaired *t*-test and the chi-square test. Logistic regression was used to analyze correlations between the incidence of NAFLD or the metabolic syndrome while controlling for conventional cardiovascular risk factors. Unadjusted and adjusted odds ratios and 95% CI were calculated. Data are expressed as means± SD for continuous variables. The SPSS statistical package, version 11.0. was used for all statistical analyses, and a *P* value < 0.05 was considered statistically significant.

3. Results

Out of 38 cases of acute myocardial infarction screened for NAFLD, 24 (63.2%) were found to be positive for NAFLD.

NAFLD subjects were compared with a group without NAFLD, 14 (36.8 %). The mean age of patients with NAFLD and without NAFLD were similar (51±9 vs. 50±11).

Gender (male/female), hypertension, smokers, renal function and liver function tests were similar in both groups.

Waist circumference, BMI, diabetes mellitus were significantly higher (*P* value < 0.05) in NAFLD group. Total cholesterol, triglycerides, LDL were significantly higher in NAFLD group, while HDL cholesterol was lower in NAFLD group than without NAFLD group (*P* value < 0.05).

Table-2 showed that NAFLD was an independent risk factor for coronary heart disease after adjusting coronary risk factors such as diabetes, hypertension, smoking, dyslipidemia, and gender by multiple analysis.

Table-1: Clinical, biochemical, and NAFLD in patients with acute myocardial infarction

	With **NAFLD** **N= 24**	Without **NAFLD** **N= 14**	***P* value**
Age (years)	51±9	50±11	NS
Sex (n) male/female (%)	15/9 (62.5%)	9/5 (64.2%)	NS
BMI (kg/m²)	30.9±1.2	24.8±2.4	< 0.001
Waist circumference (cm)	108.5±2.3	89.0±4.1	< 0.001
Hypertension (n) (%)	19 (79.1%)	11 (78.5%)	NS
Diabetes mellitus (n) (%)	17 (70.8%)	8 (57.1%)	< 0.001
Total cholesterol (mg/dl)	209.62±43.2	191.92±24.3	0.0013
Triglyceride (mg/dl)	164.72±45.83	137.22±68.72	0.0013
LDL (mg/dl)	127.7±16.3	119.57±19.4	0.0002
HDL (mg/dl)	35.34±5.1	39.62±9.03	0.0023
Metabolic syndrome (n) - (%)	11 (45.8%)	4 (28.5%)	< 0.001
Smokers (n) (%)	10 (41.6%)	6 (42.8%)	NS
Urea (mg/dl)	28.45±17	25.6±11	NS
ALT (IU/L)	28.13±14.3	26.45±17.1	NS

Data are expressed as means± SD; (n)-(%)=proportions and percentages. NS=not significant.

Table-2: Adjusted multivariate logistic regression analysis OF various risk factors for coronary heart disease

	Adjusted odds ratio	95% Confidence interval	*P* value
Age	1.o78	0.802 – 1.673	0.746
BMI	0.986	0.912–1.064	0.703
Diabetes mellitus	3.243	0.046–2.642	0.232
Hypertension	0.353	0.046–2.634	0.311
Smoking	0.968	0.101–1.575	0.102
Dyslipidemia	4.132	0.762–17.40	0.076
NAFLD	3.67	1.010–17.430	0.012 *

* Statistically significant

4. Discussion

NAFLD was present in 63.2% of 38 acute myocardial infarction patients we studied. There were a strong association between NAFLD and metabolic syndrome which indicate that NAFLD may be the hepatic manifestation of metabolic syndrome.(12) Metabolic syndrome components as waist circumference, BMI, triglycerides, and HDL were related to NAFLD.

NAFLD was an independent risk factor for coronary heart disease after adjusting coronary risk factors such as diabetes, hypertension, smoking, dyslipidemia, and gender by multiple analysis. It had been demonstrated that NAFLD was an independent risk factor for ischemic heart disease and that abdominal sonographic examination was very helpful for the evaluation of risks associated with ischemic heart disease, especially in overweight subjects.(25)

Limitations of the study:

A relatively small number of patients, and the diagnosis of NAFLD was not confirmed by liver biopsy

In conclusion:

Our study showed that NAFLD was associated the presence of CAD and not just one aspect of obesity or metabolic syndrome. Thus hepatic ultrasound examination routinely may perform for patients with suspected CAD, and improving NAFLD are also beneficial in improving cardiovascular risk profile,and reducing cardiovascular morbidity and mortality.

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