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The Evaluation Of Cardiac Markers In Myocardial Infarction Patients

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ABSTRACT

Background: Sudden cardiac death due to acute myocardial infarction (MI) is the most prevalent cause of death in young and adults. MI is a life threatening condition that needs emergency diagnosis and early treatment in the emergency room. Some researchers look for various clinical markers, which would help early diagnosis of the disease.
Aim: In the present study, our aim was to investigate the lipid profile and cardiac enzymes in MI patients in Al- Quwayiyah region of Saudi Arabia.
Materials and methods: This study included total 38 patients with MI and 46 age and sex matched healthy controls. Various lipid profile parameters and cardiac enzymes like Creatinine phosphokinase (CPK), Creatinine kinase- MB (CK- MB), lactate dehydrogenase (LDH), Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) levels were measured and compared. This study was conducted in Al- Quwayiyah General Hospital, Saudi Arabia.
Results: The significantly increased levels of cardiac enzymes ($P<0.001$) in MI patients when compared to control groups.
Conclusion: The present study illustrated that assessing of lipid profiles and serum cardiac enzymes are the markedly very useful as it may serve as a useful monitor to judge the prognosis of the MI patients.

KEYWORDS Myocardial infarction, lipid profiles, cardiac enzymes.

1. INTRODUCTION

Myocardial infarction (MI) or acute myocardial infarction (AMI), commonly known as a heart attack occurs when blood flow stops to part of the heart causing damage to the heart muscle. MI is the most important consequences of coronary artery disease (CAD). Hence CAD is sometimes called "The Captain of the men of death". Cardiovascular disease (CVD) has been defined as "Impairment of heart function due to inadequate flow of blood to the heart compared to its need cause by obstructive changes in the coronary circulation to the heart". Nowadays, vascular disease is the leading cause of death and disability in the world. According to the latest census, the mortality rate dropped from 17.9 % in 2008, 16.3 % in 2009 and 16.7 % in 2010 published by the Saudi ministry of health [1, 2].

The global rise in MI is driven by both urbanization and its related lifestyle modifications. There are several firmly established risk factors for MI such as hypertension, obesity, smoking, dyslipidemia, diabetes mellitus, metabolic syndrome; excess body weight and sedentary lifestyle play a major role in the occurrence of MI. The pathogenesis of MI is multi factorial however, several studies have implicated impaired lipid metabolism as one of the crucial factors in the development of the disease [3].

Creatine phosphokinase (CPK) is an enzyme found mainly in the heart, brain, and skeletal muscle. An elevated level of creatine kinase is seen in heart attacks, when the heart muscle is damaged. Creatine kinase- MB (CK- MB) is mainly located in heart. Since CK-MB is also present in small quantities in skeletal muscle. Increased CK-MB can usually be detected in someone with a heart attack about 3-6 hours after the onset of chest pain [4].

Cardiac markers are used to evaluate heart function. Therefore, the aim of the present study was to investigate the activity of cardiac enzymes such as Creatinine phosphokinase (CPK), Creatinine kinase- MB (CK- MB), lactate dehydrogenase (LDH), Aspartate aminotransferase (AST), Alanine aminotransferase (ALT) and lipid profile levels were measured in patients with MI and compared with normal healthy controls.

2. MATERIAL AND METHODS

2.1 Study design:

Descriptive cross sectional study in design. Patients included in the present study were all admitted to Intensive coronary care unit (ICCU) or attending the Outpatient department (OPD) of medicine of the Al- Quwayiyah General Hospital, Saudi Arabia. The study was taken during the period of September 2014 to April 2015.

2.2 Selection of patients:

Consecutive 38 patients with MI of both the sexes (20 males and 18 females) they were between 45—60 years. The criteria for the diagnosis for MI was based on a prolonged chest pain, characteristic of 12 leads electrocardiogram (ECG) changes, echocardiography and clinical history. Those patients whose body mass index (BMI) was >30 were considered as obese. 46 healthy volunteers both age and gender matched considered as controls. Subjects suffering from other known case of liver disease, viral disease, bone disease, diabetes, inflammatory illness, pregnancy and lactating mothers were excluded from the study. All participants gave written informed consent and this study was approved by the ethical and scientific research committee.

2.3 Sample collection and Biochemical analysis:

Blood samples were obtained after an overnight fast. 6 ml of

plain blood was collected from each subject, the serum was carefully separated by centrifugation at 3000 x g RPM for 15 minutes and transferred to micro tubes and stored at + 4^0 C before analysis. The biochemical parameters such as lipid profiles, AST, ALT and cardiac enzymes like CPK, CK- MB and LDH levels were done by using fully automated biochemistry analyzer (Cobas Integra 6000 and Cobas C501 from ROCHE diagnostics, Germany) with ready to used kits.

3. STASTISTICAL ANALYSIS

All values are expressed as mean ±SD. The SPSS for windows 17.0 was used for statistical analysis. Differences between the mean were calculated by analysis of variance (ANOVA) test. Student t- test was used to estimate the significant difference between the groups. The level of significance was considered when p value <0.05.

4. RESULTS

In the present study the number of obesity and hypertensive were significantly high in the MI patients compared to controls. The clinical characteristic of the MI patients and normal subjects are presented in Table 1

The biochemical parameters like serum total cholesterol, triglycerides, and LDL-c were significantly increased, whereas decreased levels of HDL-c in MI individuals when compared to controls (p<0.001) (Table 2). Cardiac enzymes like AST, ALT, CPK, CK- MB and LDH levels were significantly higher in MI patients than normal subjects (*P*<0.001) respectively as shown in Table 3.

5. DISCUSSION

The MI remains the first cause of death worldwide including KSA. Numbers of research have shown that classical and extrinsic factors such as smoking, high cholesterol level and high blood pressure have a significant role in the pathogenesis of MI. Our data showed that prevalence of smoking, obesity, hypertension was significantly higher in MI patients compared to controls. The lower incidence of MI as seen in females probably due to the protective effect of estrogens [5].

Hypercholesterolemia is the presence of high levels of cholesterol in the blood. It is not a disease but a metabolic dearangement that can be secondary to many diseases and can contribute too many forms of disease, most notably cardiovascular disease. It is closely related to the terms "Hyperlipidemia" (elevated levels of lipids) and "Hyperlipoproteinemia" (elevated levels of lipoproteins) [6]. Hypercholesterolemia and triglyceridemia are independent risk factor that alone or together can accelerate the development of CVD and progression of atherosclerotic lesions. HDL may be protective by reversing cholesterol transport, inhibiting the oxidation of LDL and by neutralizing the atherogenic effects of oxidized LDL. Several authors have been reported that increased levels of lipids in MI patients. In the present study we also observed increased levels of Cholesterol, Triglycerdies, LDL-C and decreased HDL-C in MI patients [7].

MI is a life threatening condition that needs emergency diagnosis and early treatment in the emergency room. The diagnosis of MI as traditionally based on the characteristic of clinical history, ECG abnormalities and increased serum concentrations of cardiac marker enzymes. Measurement of serum enzymes such as CPK, CK- MB, LDH, SGOT and SGPT as a reflection of damage to myocardial muscle cells still play an important role in the diagnosis of MI. So in our study, we observed increased levels of SGOT and SGPT in MI patients compared to controls as similar to other authors [8]. In clinical practice, measurement of LDH, CPK and CK- MB level in serum is routinely used to detect myocardial ischemia. So many authors revealed that increased levels of LDH, CPK and CK- MB in MI patients [9, 10]. Similarly, we also observed increased levels of LDH, CPK and CK- MB in MI patients when compared to controls. The laboratory parameters are of major importance in monitoring cause of infarction and in estimating its size nowadays highly playing important role in diagnosis of AMI.

6. CONCLUSION.

The present study illustrated that assessing of lipid profiles and serum cardiac enzymes are the markedly useful in determining the patients of acute myocardial infarction and it is very useful as it may serve as a useful monitor to judge the prognosis of the patients.

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Table 1. Demographic characteristic of the study subjects

Particulars	Controls (n= 46) Mean ±SD	Myocardial Infarction (n= 38) Mean ±SD
Age (yrs)	52.1 ± 4.2	53.1 ± 5.1*
Sex (male / female)	25 / 21	20 / 18*
BMI (kg/m^2)	23.8 ± 3.0	28.1 ± 4.4*
HTN %	8 %	42 %*
Smokers	5 %	52 %*
Family history of CVD	-----	29 %*

The values are mean ± Standard deviation (SD), *P<0.001, highly significantly compared to

controls. BMI= Body mass Index, HTN= Hypertension, CVD= Cardiovascular disease.

Table 2. Lipid profile parameters of the MI patients and controls

Particulars	Controls (n= 46) Mean ±SD	Myocardial Infarction (n= 38) Mean ±SD
Total Cholesterol (mg/dl)	149.0 ± 19.3	229.0 ± 21.5*
Triglycerides (mg/ dl)	99.2 ± 20.1	199.8 ± 17.8*
HDL-C (mg/ dl)	52.9 ± 4.1	39.3 ± 6.5*
LDL-C (mg/ dl)	103.2 ± 13.4	183.0 ± 18.0*

* P<0.001, highly significantly compared to controls. HDL-C=High density lipoprotein,

LDL-C = Low density lipoprotein,

Table 3. Serum enzymes and Cardiac markers in MI patients and healthy controls

Particulars	Controls (n= 46) Mean ±SD	Myocardial Infarction (n= 38) Mean ±SD
AST (U/ L)	21.2 ± 4.5	101.1 ± 10.2*
ALT (U/ L)	29.1 ± 3.7	92.8 ± 11.7*
CPK (U/ L)	79.1 ± 5.9	211.2 ± 9.7*
CK- MB (U/ L)	17.5 ± 2.9	82.3 ± 3.9*
LDH (U/ L)	181.5 ± 5.7	332.2 ± 10.5*

*P<0.001,highly significantly compared to controls. AST=Aspartate aminotransferase, ALT= Alanine aminotransferase, CPK= Creatinine phosphokinase, CK-MB= Creatinine kinase-MB, LDH= Lactate dehydrogenase.

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