

Original Research Article

Correlation of Fetuin A level with ECG types of Acute Myocardial Infarction

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Abstract

Acute myocardial infarction is one of the commonest disease with serious complications and increasing morbidity and mortality. Coronary atherosclerosis plays a crucial role in the underlying pathophysiology. Fetuin-A is a protein which is closely linked with increased risk of cardiovascular disease, and secreted mainly by the liver, produces subclinical inflammation and insulin resistance. This study was aimed to evaluate the association of serum fetuin A level with ECG types of acute myocardial infarction.

This is a case-control study included 88 subjects divided into two groups; 44 patients with acute myocardial infarction, 36 of them with STEMI and 7 with NSTEMI. The other 44 were apparently healthy individuals taken as a control. Serum fetuin-A levels were measured by using ELISA technique. There was significant differences in serum fetuin-A levels between patients and control, (p value ≤ 0.05). The mean differences between serum fetuin-A levels and both type of AMI (STEMI and NSTEMI), were also significant (p value ≤ 0.05) where higher values observed in STEMI. This study concluded that fetuin-A level was significantly correlated with type of AMI and higher values of fetuin-A were observed in STEMI.

Key Words: Fetuin-A, AMI, ELISA technique, STEMI, NSTEMI, ECG.

الخلاصة

احتشاء العضلة القلبية الحاد سبب المضغفات المرضيه والموت بشكل واسع في العالم. احتشاء العضلة القلبية موت الخلايا القلبية التي تحدث بعد انغزالها عن الاوكسجين لفترة طويلة. حيث ان تصلب الشرايين هو الاكثر شيوعا لامراض الشرايين التاجيه. ويعد الفتوين آ البروتين الذي له علاقه وثيقه بتطور امراض القلب والشرايين ويتم افرازه عن طريق الكبد ومن خلال التجارب التي تم اجراءها على الحيوانات لوحظ ان لها علاقه مع السكري النوع المقاوم للانسولين والالتهابات الثانوية. وتهدف هذه الدراسة لتقييم مستوى الفتوين وعلاقته مع أنواع التخطيط العضلي للقلب للمرضى الذين يعانون من احتشاء عضلة القلب الحاد.

حيث تضمنت هذه الدراسة ٨٨ عينة تحوي ٤٤ من المرضى الذين يعانون من احتشاء عضلة القلب الحاد (٣٦ حالة هم STEMI و٧ حالات هم NSTEMI) و ٤٤ من الأصحاء حيث تم قياس مستوى الفتوين في مصل الدم بتقنية الاليزا. وبمقارنة مجموعة الاصحاء بمجموعة المرضى لوحظ قلة مستوى الفتوين للمرضى حيث ($P < 0.05$)، حيث لوحظ هذا في كلا النوعين STEMI و NSTEMI، ولكن نزول الفتوين في نوع STEMI يكون واضحا واعلى مما هو عليه في NSTEMI وهذا يدل على أن هنالك علاقة وثيقة بين نزول مستوى الفتوين وأنواع الاحتشاء العضلي الحاد وخصوصا في نوع STEMI.

Introduction

The term acute myocardial infarction (AMI) should be reserved to the state of myocardial necrosis and the clinical features that associated with Fetuin A [1]. Annually, about three and four million people are estimated to have an acute ST-elevation MI (STEMI) and non-ST-elevation MI (NSTEMI) respectively. The disease is seen predominantly in developed countries, however it becomes increasingly more common in developing countries [2].

In ECG finding, MI is classified as STEMI and NSTEMI, existence of a ST segment elevation on ECG or Q-wave are associated with poor prognosis [3].

There is an evidence of high risk for recurrent ischemic conditions in patients with pre-existing AMI which suggests that these population may obtain some benefit from intensive secondary prophylaxis [4].

Fetuin-A (FA) inhibit tyrosine kinase enzyme which might lead to insulin resistance in the target tissues. The reference interval of serum FA in healthy adult individuals ranges between (0.4-1) mg/mL, however at the end of childhood, the serum FA were higher than or similar to adult levels. On electrophoresis, FA dominating the alpha-2 region [5].

There is an evidence of association between FA and cardiovascular disease (CVD) resulting from insulin resistance syndrome. This association is also occurs with other markers of CVD such as high sensitive C-reactive protein (CRP). They have been found that FA is positively correlated with hCRP and higher value are associated with increased risk of MI [6].

Materials and Methods

Subjects: This is a case-control study performed between the first of December

2015 and the first of March 2016 included 88 subjects divided into two groups; 44 patients with AMI, 36 of them with STEMI and 7 with NSTEMI. The other 44 were apparently healthy individuals taken as a control. Patients were diagnosed by consultant physician at Marjan Medical City/Hilla. The patients' Meanage \pm SD was 61.29 \pm 10.85 which matched with control group (Meanage \pm SD was 56.72 \pm 9.86), furthermore the socio-demographic status between two groups was matched also. The practical part of the study was achieved at the laboratories of Department of Pathology and Clinical Biochemistry/ Babylon College of Medicine.

Ethical considerations

Legal agreements from research related offices had been taken, in addition, verbal acceptance from all participants involved in this study was undertaken.

Sample collection

From each subject enrolled in the study, about 5 ml of blood was obtained by vein puncture. The aspirated blood was put in gel separating tube, centrifuged at 6000 X g for 10 minutes. The obtained serum was stored in eppendorf and kept freezing until time of analysis.

Methods

Fetuin-A level in serum was measured by sandwich enzyme-linked immune-sorbent assay (ELISA) using a kit provided by Biorbyt / USA.

Statistical Analysis

The obtained data were analyzed by computer using SPSS program, version 19th. Descriptive data were expressed as (mean \pm SD), while level of significance between variables was determined by Chi square (X^2) and (t test). The selected level of significant for P values was less than (0.05).

Results

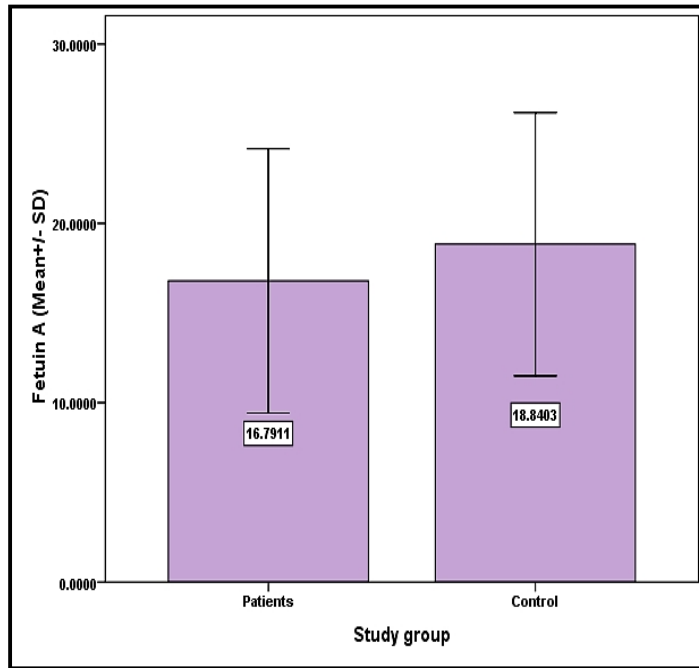


Figure 1: Comparison of patients and control by FA level. p value ≤ 0.05 is significant

The mean ± SD was 16.9 ± 3.6 ng/ml and 18.3 ± 4.41 ng/ml respectively. There was a significant difference in the level of FA between patients and control group (p value < 0.05).

Table-1 shows that the mean of FA in patients with STEMI was higher than its mean in NSTEMI. The mean ± SD was 17.23 ± 2.92 and 13.97 ± 5.89 respectively. There was a significant difference in the mean value between STEMI and NSTEMI (p value ≤ 0.05).

Table 1: Mean difference of Fetuin A level by ECG type of Myocardial Infarction

MI	Groups	No	Mean	SD	P value
	STEMI	36	17.23	2.92	0.030*
NSTEMI	7	13.97	5.89		

p value ≤ 0.05 is significant

Discussion

From pathophysiological point of view, AMI is commonly defined as a death of cardiomyocyte due to a prolonged ischemia resulting from an acute imbalance between oxygen demand supply resulting from atherosclerotic process which is in turn regarded as the hallmark of this pathophysiology [7, 8]. FA has a positive

effect in prevention of systemic calcification and inflammatory process. In the present study, The level of FA was low in patients compared with control and this agreed with Merx et al who concluded the same observation. Decreased concentration of fetuin A will produce a continuous inflammatory process which in turn affect cardiac functions by causing cardiac

calcifications and fibrosis and hence lead to involvement of CVD [9]. Furthermore, the anti-inflammatory property of FA in opposing nonspecific immune response causes macrophage deactivation, where low level of FA will produce large amounts of toxic substances such as tumor necrosis factor and consequently increase the risk of acute coronary syndrome recurrence [10].

AMI is classified based on ECG finding into STEMI and NSTEMI [3]. The mechanism of ST segment elevation or depression, dependent upon pathological type of AMI whether transmural or sub-endocardial. ST segment elevation occurs in transmural AMI which involve the whole thickness of heart muscle while depression appears on ECG when small area of sub-endocardial wall is affected. In either case, the current flow from the depolarized ischemic area to normal regions result in the appearance of ST segment elevation or depression [11,12]. In the current study most of patients involved were STEMI. The level of FA was higher in patients with STEMI than NSTEMI.

Human FA formed and secreted by liver, kidneys and many organ of human being. It exerts its effect throughout toll like receptors which are widely distributed in different tissues. It is thought that FA has pro-inflammatory and anti-inflammatory effects [13]. The higher values of FA in STEMI might be related to over expression in FA synthesis in STEMI which involve the whole thickness of myocardium or may be linked to wide spread inflammatory process in STEMI compared to NSTEMI.

Conclusions

Fetuin-A level was significantly correlated with type of AMI and high values of FA were observed in STEMI

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