A comparative study of Creatine Kinase-MB and Troponin levels among diabetic and non diabetic patients with Acute MI

AWAIS ANWAR¹, HASAN AKBAR KHAN², SAMRA HAFEEZ³, KANWAL FIRDOUS⁴

ABSTRACT

In diabetic patients myocardial infarction (MI) is a major cause of death. Weak metabolic control is very common in diabetic patients with MI and if blood glucose levels are not controlled with different treatments may produce medical complications. Hyperglycemia, CK-MB and troponin levels are very important biomarkers for the assessment of MI. The blood glucose (325.56±23.6), CK-MB (350.6±95.23) and Tropanin (6.16±2.23) levels in diabetics individuals showed P<0.001 significant results.

Key words: Myocardial infarction (MI),Creatine kinase (CK),Tropanin.

INTRODUCTION

Commonly myocardial infarction (MI) or acute myocardial infarction (AMI) is called heart attack and it occurs by the blockages of blood supply to a part of the heart (Agarwall., 2009). When supply of blood stops to the heart it causes damaging of the heart muscle. There are many symptom of MI but the most common is chest pain or which may travel into the shoulder, arm, back, neck, or jaw (Aghaishahsavan., 2006). This type of pain always starts from the center or left side of the chest and remains for few minutes. The onset of symptoms in myocardial infarction (MI) is usually gradual, over several minutes and rarely instantaneous. In the case of angina, chest pain is also possible (Alsaraj F 2009).

Diabetes mellitus (DM) is a metabolic disease in which the glucose levels increase in the blood (Buehler et al., 2013). Diabetes mellitus is a abnormality in the biological system in which pancreas not producing required amount of insulin to the body or the cells of the body not responding properly to the insulin produced (Chou., 2008). The most common symptoms of high blood glucose levels in the body are frequent urination, increased thirst, and hunger (Dandon et al., 2007). Diabetes may cause many medical complications like diabetic ketoacidosis and nonketotic hyperosmolar coma etc. Other serious long-term complications of DM are cardiovascular disease, stroke, chronic kidney failure, foot ulcers, and damage to the eyes. There are three main types of diabetes mellitus (Gufstasson et al., 2007). Type 1 DM results from the pancreas's failure to produce enough insulin. Type 2 DM starts when the insulin resistance occurs and the third type produced in pregnant ladies without any diabetic history due to the stress (Kosaka et al., 2005).

Creatine kinase (CK) is an intracellular enzyme found its high quantity in skeletal muscles, myocardium, and brain; smaller amounts also occur in other visceral tissues. A CK-MB test is used as biological parameter in MI (Zeller et al., 2005). In the case of MI its concentration in the blood increases than the normal levels. Different researchers found that creatine kinase levels increases due to heart damage or skeletal muscle damage (Lakschevit et al., 2011). CKMB levels increase with myocardial damage.

Troponin is a complicated of three regulatory proteins i.e., troponin C, troponin I, and troponin T that is integral to muscle contraction in skeletal muscle and cardiac muscle, but not smooth muscle (Mazzone 2007). Troponin tests are applied commonly to diagnose heart attack and rule out other conditions with similar signs and symptoms (Roper et al., 2001). Either a troponin I or troponin T test can be performed; usually a laboratory will offer one test or the other. The concentrations are different, but they basically provide the same information (Rosenbloom et al., 1999).

MATERIAL AND METHODS

Total 55 Individuals were selected in the current study, 5 individuals out of them were control while the remaining all were with myocardial infarction. 25 individuals were diabetic where as 25 individuals were non diabetic and they were divided into A, B and C groups. In Group A all individuals were diabetic with MI and in Group B all individuals were non diabetic with MI. Experimental procedures were conducted with Enzymatic kits for the estimation of Cardiac Enzymes i.e., CK-MB and Troponin-T from the blood samples. All collected information was entered in SPSS. These values being quantitative, t-
test was applied for estimating significance. A p-value of 0.05 or less was considered significant.

RESULTS

Diabetic and non diabetic myocardial pts were taken in this study. 50(100%) of patients, had discordant cardiac marker results. Diabetes mellitus had significant effect on patients. Higher enzyme levels of both CK-MB (350.6±95.23) and Tropanin (6.16±2.23) in diabetic pts (325.56±23.6) were concluded as compared with (105.8±35.13) and (4.26±1.53) in non diabetic pts (148.25±33.4) respectively. Both diabetic and non diabetic patients with MI had high troponin and CK-MB levels and shown significant (p<0.001) changes as compared control.

Table 1: control Individuals (n=5)

<table>
<thead>
<tr>
<th>Group A (Variables)</th>
<th>Mean±SD</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose levels mg/dL (Random)</td>
<td>120.30±43.6</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>CK-MB levels ng/ml</td>
<td>5.50±1.83</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>Tropanin levels ng/ml</td>
<td>0.01±0.63</td>
<td>P&lt;0.001</td>
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Table 2: Diabetic individuals with MI. (n=25)

<table>
<thead>
<tr>
<th>Group B (Variables)</th>
<th>Mean + SD</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose levels mg/dL (Random)</td>
<td>325.56±23.6</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>CK-MB levels ng/ml</td>
<td>350.6±95.23</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>Tropanin levels ng/ml</td>
<td>6.16±2.23</td>
<td>P&lt;0.001</td>
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Table 3: Non diabetic individuals with MI (n=25)

<table>
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<tr>
<th>Group C (Variables)</th>
<th>Mean + SD</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose levels mg/dL (Random)</td>
<td>148.25±33.4</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>CK-MB level ng/ml</td>
<td>105.8±35.13</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>Tropanin levels ng/ml</td>
<td>4.26±1.53</td>
<td>P&lt;0.001</td>
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DISCUSSION

It had seen in number of studies, the diabetic individuals have more risk factor of MI than non diabetic individuals. Different studies stated that during acute MI the levels of cardiac enzymes i.e. CK-MB and tropanin increase in the blood (Schwarz,.2011). The prognosis of such patients with discordance varies based on the individual study and timing of follow-up (Weckbach,.2009). In another study evaluating the frequency and outcomes of discordant cardiac marker results showed that CK-MB and tropanin levels increased in patients with MI. In another study which was conducted on 300 patients shown significant changes in CK-MB and tropanin levels respectively (Wong 2006).

The motility rate increased in diabetic patients with MI and has very high troponin and CK-MB levels than normal values. In the current study a strong association of cardiac enzymes i.e. CK-MB and troponin had seen in diabetic and non diabetic patients with MI. The patients of Group B have 325.56±23.6 blood glucose, 350.6±95.23 CK-MB and 6.16±2.23 tropanin levels respectively. While patients of Group C have 148.25±33.4 blood glucose, 105.8±35.13CK-MB and 6.42±1.53tropanin levels. All the results are significant P<0.001.

REFERENCES
