Evaluation of serum concentration Interleukins in Patients with Myocardial Infarction by ELISA Technique.

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ABSTRACT

To evaluate the serum concentrations of proinflammatory cytokines interleukin (IL-1, IL-6, IL-8, IL-18), tumour necrosis factor α (TNF-α), C-reactive protein (CRP), and anti-inflammatory cytokine interleukin 10 (IL-10) regulatory in patients with AMI, and to assess the correlation between anti-inflammatory and pro-inflammatory cytokines in AMI.

Thirty patients (13 women and 17 men) with (AMI) enrolled in this study and 30 as control group (10 women and 20 men). There aged varied between 40-60 years old. In this study were measured serum levels of proinflammatory cytokines interleukin (IL-6, IL-1, IL-18, and IL-8), TNF-α, and anti-inflammatory cytokine interleukin 10 (IL-10) in both patient and in control groups by using ELISA technique.

Serum levels of interleukine-6, IL-1α, IL-8, and IL-18, CRP, and TNF-α were significantly higher whereas serum IL-10 L level in AMI patients in compares with control group.

This study shows a significantly increase in IL-1, IL-18,IL-6,andIL-18 and decrease in IL-10 in the circulation of AMI.

Keywords: Acute Myocardial Infarction, Interleukins, and cytokines.
Evaluating the Level of Salivary Interleukins Using ELISA in Patients Suffering from Acute Myocardial Infarction


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Abstract
In this study, we evaluated the levels of interleukins (IL-1α, IL-6, IL-8, IL-18), tumor necrosis factor α (TNF-α), and the inflammatory protein CRP in the patients suffering from acute myocardial infarction using ELISA, and evaluated the relationship between the anti-inflammatory interleukins and interleukins in acute myocardial infarction in 30 patients (13 male and 17 females) compared to a control group of 30 patients (10 male and 20 females) aged 40-60 years.

The results showed that the levels of IL-6, IL-1α, IL-8, and IL-18 were higher in patients suffering from acute myocardial infarction compared to the control group. Meanwhile, the level of IL-10 in the patients group was lower than the control group.

This study shows a significant increase in IL-1, IL-18, IL-6, and a decrease in IL-10 levels in patients suffering from acute myocardial infarction.

Keywords: Acute myocardial infarction, interleukins, cytokines.

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1. Introduction

Acute myocardial infarction is myocardial necrosis occurs when blood flow stops to a fragment of the heart leading to the damage of the cardiac muscle. The last decade its part in the focus of attention immunological from cardiologists [1]. AMI is associated with an inflammatory process. The signs of inflammation are inspected as well possible tools for predicting cardiovascular risk. Reperfusion of infarcted myocardium and ischaemia due to inflammatory response to injury is linked with the stimulation of IL-6 and TNF-α, which is complicated in recruiting and motivation of inflammatory cell, encourages the liver to yield CRP and which have adverse inotropic impact interceded by nitric oxide synthase in myocardium[2].

The aim of research was to assess the levels of anti-inflammatory and pro-inflammatory cytokines in AMI.

2. Subjects and Methods

Thirty patients (13 women and 17 men) with AMI who were admitted to Tikrit Teaching Hospital/ Tikrit/ Iraq were enrolled to this study, and 30 (10 women and 20 men) healthy individuals were considered as control group, their ages were varied between 40-60 years. Five milliter of the venous blood was withdrawn from both patient and control groups, and transferred in to non-heparinized sterile tubes. The levels of IL-6, IL-1α, IL-18, IL-10 and IL-18 were measured by enzyme-linked immunosorbent assay (ELISA) kits from United States Biological-Company.

Statistical analysis: Statistical analysis was performed using SPSS-21 Unpaired t test was done to evaluate significant variance between means. P < 0.05 was considered statistically significant.

Results: The study group included 30 (13 women and 17 men) patients of acute myocardial infarction with a mean age of 57.46 ± 10.95 year, and control group comprised of 30 (10 women and 20 men) healthy individuals with a mean age of 51± 10.47 year.

The results of Table (1) indicate the mean of serum interleukine-6, IL-1α, IL-8, and IL-18, CRP and TNF-α levels was significantly higher in acute myocardial infarction (32.3±1.42 pg/ml), (35.5±5.65 pg/ml), (101.25±14.16 ng/ml), (314.36±23.4 pg/ml), (1.102±0.22 mg/dl) and (33.19±4.95 pg/ml) respectively than in control group (5.89±0.20 pg/ml), (12.09±2.26pg/ml), (11.1740±1.99ng/ml), (102.22±6.83 pg/ml), (0.75±0.15 mg/dl) and
(9.1±1.03 pg/ml) respectively. Also the results showed a significant decrease in serum IL-10 level in AMI patients (26.± 6.01 pg/ml) in comparison with control group (34.23±5.99 pg/ml).

Table (1): Immunological parameters of study groups.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Patients (Group1)</th>
<th>Control (Group2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>Interleukine-6 (pg/ml)</td>
<td>32.3±1.42*</td>
<td>5.89±0.20</td>
</tr>
<tr>
<td>Interleukine-1α (pg/ml)</td>
<td>35.5±5.65**</td>
<td>12.09±2.26</td>
</tr>
<tr>
<td>Interleukine-8 (ng/ml)</td>
<td>101.25±14.16**</td>
<td>11.17±1.99</td>
</tr>
<tr>
<td>Interleukine-10 (pg/ml)</td>
<td>26± 6.01**</td>
<td>34.23±5.9</td>
</tr>
<tr>
<td>Interleukine-18 (pg/ml)</td>
<td>314.36±23.4**</td>
<td>102.22±6.83</td>
</tr>
<tr>
<td>CRP (mg/dL)</td>
<td>1.102±.2215**</td>
<td>0.75±0.15</td>
</tr>
<tr>
<td>TNF-α (pg/ml)</td>
<td>33.19±4.95**</td>
<td>9.1±1.03</td>
</tr>
</tbody>
</table>

*P< 0.01, **P< 0.0001

Correlation within Parameters

The results revealed that there was positive correlation between IL-1 with IL-8 (0.316), IL-6 (0.497), IL-10 (0.757), and CRP (.085) in AMI group. Also there was positive correlation between IL-8 with IL-6 (.488), IL10 (.848) and CRP (885). IL-6 with IL-10, and CRP (0.834), (0.228) respectively, also IL-10 with CRP (0.775). TNF with IL-1 (0.449), IL-8 (0.647), IL-6 (0.656), IL-10 (0.045), and CRP (0.666).
Table (2): Correlation within Parameters

<table>
<thead>
<tr>
<th>parameters</th>
<th>Patients (r )</th>
<th>Control (r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL-1 with IL-8</td>
<td>0.316</td>
<td>0.198</td>
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<tr>
<td>IL-1 with IL-6</td>
<td>0.497</td>
<td>-0.129</td>
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<tr>
<td>IL-1 with IL-10</td>
<td>0.757</td>
<td>0.059</td>
</tr>
<tr>
<td>IL-1 with CRP</td>
<td>0.085</td>
<td>-0.319</td>
</tr>
<tr>
<td>IL-8 with IL-6</td>
<td>0.488</td>
<td>0.132</td>
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<tr>
<td>IL-8 with IL-10</td>
<td>0.848</td>
<td>0.037</td>
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<tr>
<td>IL-8 with CRP</td>
<td>0.885</td>
<td>-0.028</td>
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<tr>
<td>IL-6 with IL-10</td>
<td>0.834</td>
<td>-0.040</td>
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<tr>
<td>IL-6 with CRP</td>
<td>0.228</td>
<td>0.227</td>
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<tr>
<td>IL-10 with CRP</td>
<td>0.775</td>
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<tr>
<td>TNF with IL-1</td>
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<td>TNF with IL-6</td>
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<td>TNF with IL-10</td>
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<tr>
<td>TNF with CRP</td>
<td>0.666</td>
<td>0.077</td>
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</tbody>
</table>

Fig. (1): Correlation between TNF and IL-10 in patients with AMI

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3. Discussion

Acute myocardial infarction (AMI) is defined as a part of acute coronary syndrome characterized by a typical clinical syndrome consisting of chest pain, dyspnea with rise and fall in troponin or creatine kinase–MB [3]. In current data, IL-6 level of AMI patient groups showed a significant increase while IL-10 decrease as compared with the control group. Few other authors verified the same in their studies [4-5]. There are few studies which found a low level of IL-10 in AMI [4, 6-7].

IL-10 is persuaded in the reperfused myocardium and may moderate the reaction to injury by down-regulating levels of TNF-α and IL-6. Stimulation of IL-10 impedes mRNA for IL-6 in reperfused myocardium, however the expression of IL-6 is prolonged in myocardial ischemia [8]. Malarstig et al. [9] who established that raised IL-10 was an indicator of poor outcome and promote systemic inflammation in patients with acute coronary syndrome. In recent years, a new notion of imbalance between pro-inflammatory and anti-inflammatory factors has emerged, favoring pro-inflammatory factors, leading to atherosclerotic plaque rupture [6-7].

In the current work, serum level of IL-8 was found to be significantly elevated in patients with AMI. The findings come in a deal with study conducted by the Kanda et al. [10] Who elucidated that the serum levels of assessment of IL-8 has a clinical relationship of CAD and the sign was useful pointer for the recognition of unstable angina.

Serum level of Interleukin-18 was significantly elevated in patients grouping comparison with control group. Interleukin-18, primarily Locate as interferon gamma encouraging factor in macrophages [11]. It plays crucial role in the inflammatory sequence and in the immunities processes due to its capability to stimulate the production of IFN-gamma in T lymphocytes, which are thought to plays a critical role in the disruption atherosclerotic plaque [12], so the positive impact of the discourag IL-18 on plaque development and composition, and continued benefit to the heart in terms of cardiac remodeling and preserved function was described by Whitman et al. and Hartford et al [13-14].

Interleukin-1 (IL-1) produced within tissues and has multifunctional cytokine contributes to local inflammatory reactions, primarily complicated in the regulation of inflammatory processes, it mediates stimulation of fibroblast growth, and differentiation of B and T cells [15-16]. Serum level of IL-1 was found to be significantly elevated in patients with
AMI. These results were agreement with a study done by Miyao et al. [17], Guillen et al. [18] Interleukin-1 might be donated to the wound healing in cardiac repair mechanism after the stroke [19].

Results of this study showed significantly increase in TNF-α level in myocardial infarction patients. These results harmony with results obtained by Mizia-Stec et al. [20]. Tumor necrosis factor-α has a role in the pathogenesis of atherosclerotic plaques. It increases the chemokine and scavenger receptor expression. We observed significant increase in CRP level in AMI patients, AMI motivate a systemic inflammatory response with enhanced synthesis of CRP, which prompts release of growth factor and cytokine, those mediators affect necrosis expansion and stimulate CRP expression [21-22].

4. Conclusion:

This study demonstrates a pointedly increase in IL-1, IL-18, IL-6, and IL-18 and decrease in IL-10 in the circulation of AMI patients these biomarkers may be valuable in diagnosis AMI.

References


**AUTHOR**

**Entedhar Rifaat Sarhat:** received B. Sc. degrees in veterinary medicine from Baghdad University, and M. S. and Ph. D degrees in College of Medicine Tikrit University-Tikrit, Iraq. During 2006- till now, she worked as a Assistant prof. in College of medicine and dentistry. NO. of Published Researches 35 Conferences and Workshops:16.