Role of Some Cytokines After Fracture Trauma in young and Old Patients

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Abstract

Background: Immune factors are of the most important systems used by the human body to treat infections and repair the emergency disorders.

Objective: During period from January 2018 to June 2018 collected serum from (50) patients with different fractures patients who attended fractures units in Al-Yarmouk teaching hospital /Iraq. and determine by Elisa the levels of IL-6, IL-10 and granulocyte-monocyte colony-stimulating factor (GM-CSF) in sera of patients with fractures in relation with their age groups, current study also included 50 people as a control group, which represented the distribution of patients and healthy people as groups of young and elderly as well as their division on the basis of gender as well as body mass index (BMI).

Patients and Methods: Four milliliter of venous blood was withdrawn from all patients and healthy so to measure the level of interleukins (IL-6, IL-10 and granulocyte-monocyte colony-stimulating factor (GM-CSF)) in sera, by Elisa .

Results: The study found that IL-6 means were significantly elevated in old and young fracture trauma patients (31.36 ± 5.33 and 23.81 ± 4.33 pg/ml) respectively as compared with healthy young and old control individuals. The study revealed that, GM-CSF level was significantly elevated in young fracture trauma patients (62.61 ± 7.23 pg/ml) as compared with old fracture trauma patients and healthy individuals and GM-CSF level was significantly elevated in old fracture trauma patients (27.18 ± 4.87 pg/ml) as compared with old healthy individuals. IL-10 means were significantly elevated in young and old fracture trauma patients (3.51 ± 0.28 and 2.29 ± 0.31 pg/ml) respectively as compared with healthy young and old control individuals (2.18 ± 0.27 and 1.99 ± 0.18 pg/ml) respectively.

Conclusion: The study showed positive correlation of IL-6, CM-CSF and IL-10 with BMI of young and old with fracture trauma.

Keywords: IL-6; CM-CSF; IL-10; Fracture; old and young.

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Introduction

Fractures in the human body usually occur in four different stages: infections of all kinds, soft callus, callus steel and reformatting [1]. While most types of fractures are examined in their vast restoration stages, many people do not know about the role of immunity in healing of wounds and fractures in the human body and the nature of the immune response in the repair of those fractures by the body itself [2]. Immune factors are of the most important systems used by the human body to treat infections and repair the emergency disorders of the body, including fractures in the bones by specific standardized system[3,4]. To understand the role and effectiveness of various types of anti-inflammatory factors, its important to study the role of cytokines in healing of fractures, cytokines significantly contribute to regeneration of broken bones, especially those associated with trauma[5]. As people get advanced age (elderly), there is a high risk of fractures occurrence[1]. Globally, fractures in the elderly have increased significantly in recent years[6]. More than 1.5 million fractures occur annually, and in the United States, in persons over 65 years of age, and 75% Return to their natural movement even after the healing fractures in their bodies [4,5,7]. Some previous studies suggest a change in the functional markers of many cytokines in older people that may be responsible for the non-return of the body and bones in particular to normal[8]. The term "senescence" is also related to the role of those cytokines such as interleukin-6, 1,

10, and alpha-alveolar [9,10]. In addition, there are several observations of an increase in apoptosis in the immune system of elderly people, especially those with chronic disease and weight gain. While the mechanism of apoptosis of immune cells is one of the most important causes of immune deficiency. Studies also indicate that the programmed death of these lymphocyte cells is affected by increased levels of tumor necrosis factor and interleukin-10 as well as granulocyte-monocyte colony-stimulating factor(GM-CSF) [7,11]. The aim of this study was to determine the levels of IL-6, IL-10 and granulocyte-monocyte colony-stimulating factor (GM-CSF) in sera of patients with fractures in relation with their age groups.

Patients and Methods

The study was conducted for the period from January 2018 to June 2018 for patients with different fractures of 50 patients who attended fractures units in Al-Yarmouk teaching hospital /Iraq .The study also included 50 people as a control group, as shown in Table (1), which represented the distribution of patients and healthy people as groups of young and elderly as well as their division on the basis of sex as well as body mass index (BMI). Four milliliter of venous blood was withdrawn from all patients and healthy so to measure the level of interleukins by Elisa as the following : Add 100 μL standard or sample to each well, then Incubate for 90 min at 37℃. Remove the liquid, after that add 100 μL Biotinylated Detection Ab ,and incubate for 1 hour at 37℃. Aspirate and wash 3 times, after then

add 100 μL HRP Conjugate, and incubate for 30 min at 37℃, aspirate and wash 5 times, after then add 90 μL of Substrate Reagent and incubate for 15 min at 37℃ and add 50 μL Stop Solution, then read at 450 nm immediately and calculation of results.

Statistical analysis

The study and analysis of the results was carried out using the Statistical Package for the Social Sciences (SPSS version 22.1), which included the extraction of the P. value, which indicates the level of the difference between all the subjects in the study. $P<0.01$ considered significant.

Table (1): Differences of sex and age among the study groups

Studied group		No.	Mean age (year)	SD	Male to female ratio	Mean BMI $\pm$ SD (kg/m^2)
Patients	Young	25	29	3	17 to 8	21.19±2.91
	Old	25	72	4	12 to 13	26.99±3.16
Control group	Young	25	27	3	15 to 10	22.56±2.88
	Old	25	67	4	15 to 10	23.51±2.16

Results

As shown in Table (2), IL-6 means were significantly elevated in old and young fracture trauma patients (31.36±5.33 and 23.81±4.33 pg/ml) respectively as compared with healthy young and old control individuals.

Table (2): Difference in IL-6 level among the study groups.

Studied group		No.	IL-6 level (Mean ± SD) (pg/ml)	P.value
Patients	Young (17-40 years)	25	23.81±4.33*	0.0031
	Old (55-79 years)	25	31.36±5.33**	0.007
Control group	Young (16-38 years)	25	14.66±2.15	
	Old (50-73 years)	25	13.88±1.97	

* significant different from old patients and control
** significant different from control

The study revealed that, GM-CSF level was significantly elevated in young fracture trauma patients (62.61±7.23 pg/ml) as compared with old fracture trauma patients and healthy individuals and GM-CSF level was significantly elevated in old fracture trauma patients (27.18±4.87 pg/ml) as compared with old healthy individuals Table (3).

Table (3): difference in GM-CSF level among the study groups

Studied group		No.	GM-CSF level (Mean ± SD) (pg/ml)	P.value
Patients	Young (17-40 years)	25	62.61±7.23*	0.003
	Old (55-79 years)	25	27.18±4.87**	0.001
Control group	Young (16-38 years)	25	25.67±3.98	
	Old (50-73 years)	25	22.07±3.08	

* significant different from old patients and control
** significant different from old control

As shown in Table (4), IL-10 means were significantly elevated in young and old fracture trauma patients (3.51±0.28 and 2.29±0.31 pg/ml) respectively as compared with healthy young and old control individuals (2.18±0.27 and 1.99±0.18 pg/ml) respectively.

Table (4): difference in IL-10 level among the study groups

Studied group		No.	IL-10 level (Mean ± SD) (pg/ml)	P.value
Patients	Young (17-40 years)	25	3.51±0.28*	0.0031
	Old (55-79 years)	25	2.29±0.31**	0.004
Control group	Young (16-38 years)	25	2.18±0.27	
	Old (50-73 years)	25	1.99±0.18	

* significant different from old patients and control
** significant different from old control

The study showed positive correlation of IL-6, GM-CSF and IL-10 with BMI of young and adults with fracture trauma Table (5).

Table (5): Correlation of cytokine with BMI of studied patients

Cytokines levels (pg/ml)	BMI levels (kg/m^2)	
	Young patients	Old patients
IL-6	r =0.35	r =0.31
GM-CSF	r =0.29	r =0.26
IL-10	r =0.41	r =0.33

Discussion

In this study, , IL-6, IL-10 and GM-CSF means were significantly elevated in young and old fracture trauma patients respectively as compared with healthy control individuals. Many previous research, showed that serum IL-6 concentration was higher in older vs young adults [12,13,14]. Older patients tend to be more prone to postoperative complications and respond differently to trauma than younger patients with similar injuries. Because the community is extreme elderly , at a possible double clinical trial if systemic inflammation as well as apoptotic response in circulating neutrophils differed in older patients, young people after stress and subsequent medical work. Our data show that large differences between these two groups.

In our study, older patients showed a significant increase of IL-6 concentrations after trauma and surgery whereas young patients did not respond to these insults. Both young healthy and old healthy controls showed similar baseline levels of IL-6. IL-6 is a prognostic marker for trauma outcome and development of multiple organ failure. Some studies have found that the immune system of older people over the age of 65 differs somewhat from the immune system of people under the age of 40 [15-16]. Quain et al found in his study that the level of many interleukins were high in young people and somewhat lower in older people because of the low expression of TOL receptors such as 1 (TLR1) in PMNs in the elderly[15]. Plonquet et al was pointed out that the difference in immunity in older people than

in the youth group often leads to many diseases like hospiat transmitted infections, especially in the elderly group of individuals who were aged (70 years) [17].

In other studies, there were significant correlation between the level of interleukin-6 and fracture in relation to the young group, including previous studies, which showed that the level of interleukin 6 was high in patients with fractures [18,19] . In addition, they report that IL-6> 800 pg / ml has a positive correlation with the failure of the immune system in the pathogenesis and complete recovery[20]. A similar authors were observed that the levels of IL-10 and IL-6 were also high in patients (with new and old fractures) compared to the control group[21,23]. As noted by Pape and his colleagues [21] they noted that the levels of interleukin 6 and 10 has a significant role in the deterioration of the condition of patients regardless of the opposite framework or principle (inflammatory/anti-inflammatory interleukins) between them. Additionally, several studies have shown that there are significant differences in the rate of GM-CSF in healthy young adults and elderly, and on the other hand, in young patients compared with elderly patients[24,25]. In addition, other studies conducted in the previous study showed that the level of GM-CSF was different between the two groups of patients and healthy and that the most infected young adults had high levels of GM-CSF high, which indicates their immune strength and also indicates the speed of their cure and

reflect Also the vulnerability of the elderly, who showed a high proportion but less than the young[26].   Another study showed that GM-CSF with other interleukins was higher in patients than in healthy person on the one hand and higher in young patients compared to older patients [26].   G-CSF levels, granular stimulation factor (GM-CSF), and monoclonal protein (MCP-1) in older persons. In addition, a partial correlation analysis showing the relationship between cytokine levels in control of sex, systolic blood pressure, total cholesterol, HDL cholesterol, cholesterol, triglycerides and serum creatinine levels showed that G-CSF, GM-CSF, and MCP-1 levels were significantly negative results with age[28]. In different study, young patients responded after shock and surgery with a marked increase in serum GM-CSF concentrations while GM-CSF remained unchanged in the old rib[29].

Conclusions

Concluded from this study that, Level of interleukins   IL-6   and   IL-10   were significantly elevated in young and old fracture trauma patients as compared with healthy person , so the GM-CSF level was significantly elevated in young fracture trauma patients , also current study conclude to positive correlation of IL-6, IL-10 and GM-CSF with BMI of young and adults with fracture trauma. as well as these significant differences between young and elderly fractured patients in the levels of IL-6, Il-10 and GM-CSF were responsible to delay in cure of old patients.

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