Immunological study of patients with first and second degree of skin burns

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Abstract

The aim of the study was to estimate the level of IL-6, IL-0, IFN gamma and CRP in patients with 1st and 2nd degree skin burns. On patients who had previously been diagnosed with Skin burn infection, the study was conducted in Kirkuk from July 1 to August 2020 over a period of three years. Participants in the study ranged in age from 20 to 80 years, with the average age being 20. The study also included taking 40 healthy people from the same age groups and using an ELISA technique (Koma biotech, ELISA, USA) to detect interleukin 6 and 10 gamma interferon, as well as measuring the level of C-reactive protein. The study included the collection of five milliliters of venous blood from patients and taking all of the necessary information from them, including their gender, age, current living situation, number of family members, and history of infection. According to the findings of the study, patients with skin burns had the highest mean level of interleukin-6 (IL-6) when compared to healthy controls (P: 0.01). The researchers also discovered that the level of IL-10 in patients with skin burns was significantly higher than in healthy controls (P: 0.01), which they compared to a healthy control. According to the findings of the study, the level of IFN-Gamma in patients with skin burns was significantly higher when compared to healthy controls (P: 0.01). According to the findings of the study, the level of CRP in patients with skin burns was significantly higher when compared to healthy controls (33.18 3.19 mg/dl vs. 3.1.81 mg/dl) (P: 0.01).

Conclusions: Levels of IL-6, IL-0, IFN gamma, and CRP were elevated significantly in patients with COVID-19 disease in the first and second degree of burn infection

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Introduction

Significant skin injuries appear to have different responses depending on the etiology, and this appears to be the case. This is demonstrated by the observed sexual dimorphism in which female patients have a lower incidence of sepsis and mortality after surgical or blunt force trauma, whereas male patients fare better after burn injury, with a 2-fold increase in mortality observed in females with equivalent total body surface area burn injury (1-3). Following a burn injury, all patients have a poorer outcome than predicted by the injury severity scoring system, whereas recent evidence indicates that burn injury patients, particularly females, are at an increased risk of developing cancer in the future. These findings could be indicative of a distinct impact of burn injury

on the immune system, which could have significant acute and long-term consequences (4,5). The skin serves as a protective barrier against toxins, microorganisms, radiation, and mechanical impacts, as well as a regulator of several physiological functions, such as temperature regulation, dehydration prevention, sensory detection, and immune surveillance, among other things (6). A common occurrence in human skin is damage/injury, which results in the loss of its integrity and physiological balance, which can result in significant disability and infection. When the skin is damaged or injured, its natural restorative capacity is usually sufficient to repair and heal the damage or injury (7). Skin grafts, on the other hand, are required in the case of severe skin injuries in order to protect the exposed layers of skin and allow the damaged portion to heal. Although autologous skin graft transplantation is the treatment of choice for skin wounds that have become infected or chronic skin wounds, there may be an insufficient number of autografts available, particularly in severe burn cases and skin morbidities, due to extensive injuries and chronic skin wounds (8,9). It has been demonstrated in both pediatric and adult burn patients that the trauma of a severe burn injury causes distinct systemic inflammatory and immunological responses that are primarily mediated by cytokines. Cell communication is facilitated by cytokines, which are a group of proteins with autocrine and endocrine activities that mediate the functions of various cell types, including those that mediate immune function, angiogenesis, cell proliferation, and apoptosis, among others. Their effects on cell growth and differentiation, as well as their ability to regulate homeostasis and cellular repair, are all mediated by receptor activation. There have been numerous studies that have used cytokines such as interleukin (IL)-1, interleukin (IL)-6, and tumor necrosis factor (TNF) to determine the severity of burn injury (10-14). As a result, the study's primary goal was to determine the levels of IL-6, IL-0, IFN gamma, and CRP in patients who had 1st and 2nd degree skin burns, respectively.

Material and method

The research was carried out in Kirkuk from July 1 to August 2020 on patients who had previously been diagnosed with Skin burn infection. It was carried out on patients who had previously been diagnosed with Skin burn infection. Participants in the study ranged in age from 20 to 80 years, with the average age being 20. The study also included taking 40 healthy people from the same age groups and using an ELISA technique (Koma biotech, ELISA, USA) to detect interleukin 6 and 10 gamma interferon, as well as measuring the level of C-reactive protein. The study included the collection of five milliliters of venous blood from patients and taking all of the necessary information from them, including their gender, age, current living situation, number of family members, and history of infection.

Results

When compared to a healthy control group, patients with skin burns had the highest mean levels of IL-6, according to the research. (P: <0.01) Table 1.

Table 1: IL-6 concentrations in newly diagnosed COVID-19 patients and in healthy individuals acted as a control.

Group	Mean (pg/ml)	SD	P value
Patients with skin burns	26.76	3.17	
Healthy group	12.03	3.21	<0.05

According to the findings of the study, patients who had skin burns had a significantly higher level of IL-10 than healthy control subjects. ((P: <0.01), Table 2.

Table 2: The levels of interleukin-10 (IL-10) in newly diagnosed COVID-19 patients and the control group were measured.

Group	IL-10 Mean (pg/ml)	SD	P value
Patients with skin burns	25.35	4.26	

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Healthy group	14.15	4,19	<0.05

When comparing patients with skin burns to healthy controls, the researchers discovered that the level of IFN-Gamma was significantly higher in the burn patients. (P: <0.01), Table 3.

Table 3: new COVID-19 patients and the control group had their IFN-Gamma levels

Group	IFN-Gamma Mean (pg/ml)	SD	P value
COVID-19 patients	**44.36**	**8.23**	
Healthy group	**31.17**	**5.37**	**<0.05**

Patients with skin burns had a significantly higher level of CRP compared to healthy controls, according to the study. (P: <0.01), Table 5.

Table 4: Levels of CRP in newly diagnosed COVID-19 patients and the control group

Group	CRP Mean (mg/dl)	SD	P value
COVID-19 patients	**16.37**	**2.54**	
Healthy group	**5.37**	**0.18**	**<0.05**

Table 5: Correlation of CRP with each parameter in the study

Parameter	R value
IL-6	**0.67**
IL-10	**0.54**
IFN-Gamma	**0.51**

Discussion

The levels of IL-6, IFN gamma, and CRP increased in patients who had been burned, and the observed increase in these variables was found to correspond with the severity of the burn. IFN and IL-6 F have been connected to an increased risk of infection following second-degree burns in several recent global responses (9). Following skin burns, bacterial infection can lead to an increase in cytokines and other inflammation mediators, which may lead to the body manufacturing a cytokine (10, 11). Even so, it's not known exactly what causes these disorders, whether they are caused by a long-term wound infection or a malfunctioning immune system (12). Several studies have indicated that people with diabetes and inadequate immunity had higher amounts of interleukin-6 and C-reactive protein (CRP) in their bloodstreams when they are infected with skin burns (13-16). CD8 T-cell proliferation was found to be more affected by burn injury than CD4 T-cell proliferation. There was an increase in CD8 T cells in skin-draining lymph nodes following burn and excision in this study. However, the proliferation of CD8 T cells decreased significantly following burn injury. Hematology and lymph node cell populations were significantly altered by the burn procedure in comparison to the excision. For this reason, further investigation on wound infiltrate is required. Activation and maturation of dendritic cell populations decreased significantly after burn injury, although this was not observed in excision samples. Furthermore, these modifications persisted throughout the research. According to an examination of T-cell activation utilizing spleen cells isolated after a burn injury, levels of T-cell activation were lowered initially but restored to normal by day 14 post-injury.

As previously reported, cutaneous burn patients had higher levels of interleukin-6 and CRP than those with mild disease, and the results of this study show that this link holds true for all cytokines evaluated in the study (19). Autoimmunity fluctuation and subsequent loss of initial immunity in individuals with skin burns may both be caused by these pathogens and other factors that have not been considered (20).

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Conclusions:both the first and second degree of burn infection, individuals with COVID-19 illness had higher levels of IL-6, IL-0, IFN-gamma, and CRP.

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