The Medical Journal of Tikrit University (2025) 31 (2): 400-404
DOI: http://dx.doi.org/10.25130/mjotu.31.2.41

IRAQI Academic Scientific Journals

ISSN: 1813-1638

The Medical Journal of Tikrit University

Available online at:www.mjotu.com

MJTU

The Medical Journal of Tikrit University

# Interleukin-1 and Tumor Necrosis Factor alpha in Systemic Lupus Erythematosus patients

**Dheyaa saleh mahdi** [1]

1 Department of microbiology, College of Medicine, University of Tikrit ,Iraq.

***Keywords***: *IL-1, TNF-alpha, Cytokine storm, SLE, immune dysregulation*

ARTICLE INFO

***Article history:***

Received 01 Jul 2025
Accepted 01 Sep 2025
Available online 31 Dec 2025



Citation:

Corresponding Email:
Dheyaa.saleh@tu.edu.iq

## *ABSTRACT*

**Background:** Systemic lupus erythematosus (SLE) is a long-lasting autoimmune disorder with an unclear cause that can impact almost every part of the body. In addition to heredity environmental effect, an imbalance between pro-inflammatory and anti-inflammatory cytokines plays a role in immune system dysfunction, initiates an inflammatory response, and leads to damage in tissues and organs. In SLE, inflammatory responses can be enhanced and/or sustained by the presence of cytokines that are produced in excess both systemically and in specific local tissues.

**Methodology:** Numerous significant chemical substances have been regarded as a targets for diminishing acute or chronic infection in systemic lupus erythematosus (SLE). another research has shown that the abnormal synthesis of chemokines , especially the interleukin related to the family Interlukin-1 and Interleukin-10, drives immune response and affects immunomodulation , which are crucial in the development of such auto immune diseases. Among the cytokines in the IL-1 family, IL-1, IL-18, IL-33, IL-36, IL-37, and IL-38 have been extensively studied in relation to SLE. Furthermore, the IL-10 family cytokines, including IL-10, IL-20, are found to be immune reaction in auto immune disorder.

**Results:** Cytotoxic substances released by activating of CD8+ T cells which leads to tissue damage. By activation of CD8 cells which produce many chemokines that effect vital tissues Additionally, B cells play a role in the pathogenic severity in final step represented in autoimmune disorder.

**Conclusions:** Autoantibodies attach outside of cells, triggering the complement system to unleash their cell-killing effects and result in tissue harm. Conversely, autoantibodies targeting proteins inside cells serve as important biomarkers for autoimmune diseases.

## INTRODUCTION

Autoimmune diseases are defined by a failure in self-tolerance, resulting in inappropriate and harmful immune reactions against the body. These conditions will be divided into T cell response, such as rheumatoid arthritis (RA), and antibodies response , such as systemic lupus erythematosus (SLE). A pro-inflammatory cytokine, encourages the development of neutrophils, cytotoxic T-lymphocytes, and natural killer cells [3] When cells are stimulated by IL-1 or tumor necrosis factor (TNF)-a, or when toll-like receptors (TLR)-4 are activated, IL-1 production release are induced [4] .

Tumor Necrosis Factor-alpha regard as pro-inflammatory chemical substances which regulate cell proliferation and cell death. It is located on chromosome 6p21.33 inside the HLA III region.[7] Macrophages are one of the main sources of TNF-a. It is mostly produced by active macrophages and monocytes, numerous cells, including T and B cells, osteoblasts, smooth muscle cells, endothelium, epithelial, and tumor cells, can also release it. [3] This study aimed to evaluate the IL-1 and TNF alpha levels in SLE patients.[3]. Consequently, the genesis and progression of autoimmune disorders depend heavily on the complex interplay between T cells and B cells. Both external and intracellular proteins can be targeted by autoantibodies in autoimmune disorders that are mediated by them. When autoantibodies attach to extracellular proteins, the complement system is activated, causing tissue injury and cytolysis. Conversely, autoantibodies directed against intracellular proteins are important indicators of autoimmune diseases [8].

Apart from cellular interactions, cytokines play a significant role in the onset and progression of autoimmune diseases in a number of ways, including controlling T cell activation and polarization, the B cell switching cell apoptosis and inflammatory response, and the induction of immune system cells. [5]. Because of their many uses, proinflammatory cytokines aid in the development and spread of autoimmune inflammation, whereas anti-inflammatory cytokines aid in the reduction of inflammation and the recovery from the disease's acute phase[4].

**Aim:**

To assess the level of Interleukin-1 and TNF-alpha in SLE patients.

**Objectives:**

1. To assess the level of TNF-alpha in SLE patients.
2. To determine associations between IL-1 and SLE.
3. To identify the relationship between IL-1 and TNF-alpha.

## MATERIALS AND METHODS

This study, are of a case control study, was conducted in mars 2024. Five milliliters of whole blood then we obtained a 1ml of serum were taken from each of the thirty (30) SLE patients and the thirty (30) healthy controls. The study included all patients who were over the age of 18 and had clinically confirmed SLE by clinical correlation with physicians and admitted to different local hospitals , an ELISA test (Mindray, China) to detect concentration of chemokines (interlukin-1 and tumor necrosis factor alpha).

**Included criteria :**

All patients with SLE.

**Excluded criteria :**

- Patients with autoimmune disorder
- Patient with immunotherapy
- Patients on corticosteroid drugs
- Patients with chemotherapy pregnant women

**Data analysis:**

Data were entered and analysed using ANOVA test was employed to examine associations between categorical variables. Statistical significance was set at $p < 0.05$.

## RESULTS

Interleukin-1 and TNF –α Table 1 and fig, 1, 2 displays mean of each category. It can be shown that high mean levels of IL-1 concentration (p 0.01) and TNF- α (p 0.01) between the research groups. Patients with severe levels of IL-1 were 11.9 ± 9.8 pg/ml and 7.3±3.4 pg/ml for healthy controls. Patients of SLE had levels of 45.4 ±55 pg/ml of TNF-α, whereas 17.4±16.4 pg/ml for control group, table (1).

## DISCUSSION

To explain the high levels of cytokine production that are responsible for inducing immunopathological reactions during infectious processes, the term "cytokine storm" was developed .[9]Among the inflammatory mediators released by immune cells, the cytokines IFN-gamma, IFN-α, IL-1, IL-6, TNF-α, and TGF are highlighted, and altered levels are associated with different clinical features either metabolically triggered as a result of an infection [6].

High levels of interleukins may be associated with to production of inflammatory cytokines in SLE individuals. Although cytokines fight microbes, an immune system overreaction can harm vital tissue. Inflammatory cytokines and tissue damage lead to its production in SLE patients [7].

In this study had observably higher levels of IL-1 (P 0.001). The conclusions of Liu's inquiry were approved by his coworkers in 2020 [8]. Other researchers found that 67.9% of patients had higher IL-1 levels upon admission. The percentage of patients in the severe category who had elevated IL-1 levels was significantly higher (P 0.001) [8]. TNF-α was strongly correlated with the presence SLE . This finding might point to a particular cytokine profile that was present at this stage of SLE. According to the study by Costella-Ruiz *et al*. 2020, the patients with elevated level of Interleukin-6 and TNF-α was associated with the severe and harm immune response that contributed at coronavirus infection rate.

## CONCLUSION

In human study of lupus in with SLE, pro-inflammatory cytokine lead to immune dysfunction and tissue damage and maintain disease. The nature of cytokines different according to disease type , the amount of cytokine production depend on the type and severity of disease . in SLE patient strong indication of proinflammatory cytokines will be produced. New cytokines types is recommended to notify possible effectiveness in SLE patients or cytokines blockers to reduce SLE pathogenicity .

**Acknowledgments:**

The author expresses deep gratitude to patients with SLE at Tikrit teaching hospital .

**Conflicts of Interest:**

The author declares that there are no conflicts of interest regarding the publication of this article.

## REFERENCES

1. Burbelo PD, Iadarola MJ, Keller JM, Warner BM. Autoantibodies targeting intracellular and extracellular proteins in autoimmunity. Front Immunol. 2021;12:548469.
2. Moudgil KD, Choubey D. Cytokines in autoimmunity: role in induction, regulation, and treatment. J Interferon Cytokine Res. 2011;31(10):695–703.
3. Liblau RS, Wong FS, Mars LT, Santamaria P. Autoreactive CD8 T cells in organ-specific autoimmunity: emerging targets for therapeutic intervention. Immunity. 2002;17(1):1–6.
4. Shachar I, Karin N. The dual roles of inflammatory cytokines and chemokines in the regulation of autoimmune diseases and their clinical implications. J Leukoc Biol. 2013;93(1):51–61.
5. Shachar I, Karin N. The dual roles of inflammatory cytokines and chemokines in the regulation of autoimmune diseases and their clinical implications. J Leukoc Biol. 2013;93(1):51–61.
6. Pinto RJ, Correia-Santos P, Costa-Leite J, Levendosky AA, Jongenelen I. Cortisol awakening response among women exposed to intimate partner violence. Psychoneuroendocrinology. 2016;74:57–64.
7. Ali N. Elevated level of C-reactive protein may be an early marker to predict risk for severity of COVID-19. J Med Virol. 2020;92(11):2409.
8. Liu DX, Liang JQ, Fung TS. Human coronavirus-229E, -OC43, -NL63, and -HKU1 (Coronaviridae). In: Encyclopedia of Virology. 2021. p. 428.

## TABLES

**Table 1: Descriptive Statistics of IL-1 and TNF-α, in patients with SLE .**

| Parameters | SLE patients | Control | P value |
|---|---|---|---|
| | Mean±SD | Mean±SD | |
| **IL-1 (pg/mL)** | 9.8±11.9 | 7.3±3.4 | *0.001 |
| **TNF-α (pg/mL)** | 55±45.4 | 17.4±16.4 | *0.001 |
| ^Significant difference among more than two independent means using ANOVA-test at 0.05 level. | | | |

## FIGURES

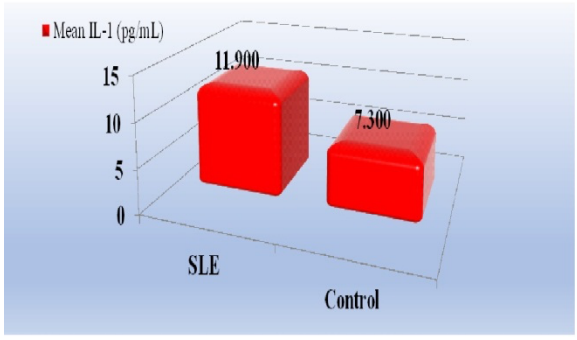


**Figure 1:** IL-1 frequency in two groups

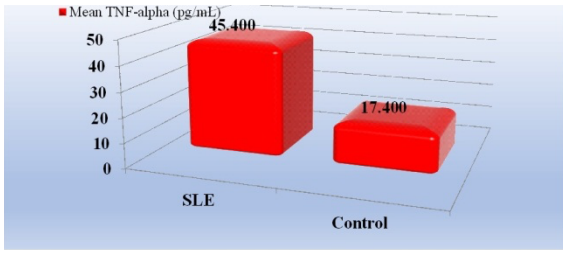


**Figure2:** TNF-alpha frequency in two groups