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# Evaluation Serum IL-22, and TNF-α as a Potential Diagnostic Biomarker in Iraqi Psoriasis Patients

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## ABSTRACT

***Background:*** *Psoriasis (PS) is a chronic, multifactorial autoimmune skin disease with systemic involvement. Psoriasis affects approximately 2-3% of the global population. The disease is prone to recurrence, characterised by intervals of increased severity and remission. Despite the lack of a specific cause, psoriasis is considered to be complex; it involves a combination of genetic, immunological, and environmental components.* ***Goal of study:*** *Our study aimed to evaluate the serum levels of IL-22, TNF-α in Iraqi PS patients and to assess its potential diagnostic significance.* ***Material and Methods:*** *A case-control study involved 40 clinically diagnosed PS patients and 40 healthy controls matched for age and sex. Serum samples were collected, separated by centrifugation, and stored at –40°C. IL-22, TNF-α levels were measured using a sandwich ELISA kit.* ***Results:*** *Clinical data were recorded for correlation analysis, including disease duration, disease severity, and psoriasis PASI score. Serum IL-22 and TNF-α levels were significantly elevated in PS patients compared to healthy controls ($p < 0.001$). Higher IL-22 and TNF-α concentrations were associated between serum IL-22 and severity, duration, or PASI score. ROC curve analysis indicated good diagnostic potential, with TNF-α as a promising non-invasive biomarker. Furthermore, elevated IL-22 and TNF-α levels were linked to the important inflammatory factors in the pathophysiology of psoriasis.* ***Conclusion:*** *Serum IL-22 and TNF-α levels may serve as valuable diagnostic biomarkers in Iraqi PS patients. Further large-scale studies are needed to validate its clinical utility in PS management.*

**Keyword: PS , IL-22 , Biomarker diagnosis.**

**Article Information**

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## INTRODUCTION

Psoriasis is a chronic medical condition that predominantly impacts the skin and joints. It manifests as painful, erythematous plaques that induce considerable physical discomfort and psychological distress. The disease is prone to recurrence, characterised by intervals of increased severity and remission. Despite the lack of a specific cause, psoriasis is considered to be complex, it involves a combination of genetic, immunological, and environmental components (Olejnik, et al., 2022). Immune studies have shown that T cells, which have a positive feedback mechanism and interact with inflammatory cells like dendritic cells, neutrophils, and macrophages, are responsible for the development of psoriasis ( Guo, J et al., 2023). These cells have an inflammatory basis. interact through a variety of inflammatory-related proteins, such as IFN-γ ,TNF-α, IL-22& IL-17 (Sieminska, I et al., 2024). This study assesses the diagnostic and prognostic significance of serum TNF-α, IL-22 levels in Iraqi PS patients.


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# MATERIALS AND METHODS

## Patients and Healthy Control Subjects

This study included 40 PS and 40 PAS patients, diagnosed by a consultant dermatologists and rheumatologist , and 40 healthy controls. The study was conducted between December, 2023, and jun, 2024. At the Al- Sadr Medical City and Al- Najaf Teaching Hospital in the province of Najaf, dermatologists and rheumatologist determination for patients suspected of having PS and PSA. Using an anonymous questionnaire covering age, sex, site of disease , illness severity, duration of diseases, and other autoimmune diseases, patients with PS and PSA were directly interviewed.

## Collection of Blood Samples

The total number of participants in this study was 80 individuals, divided into two groups: the first group included 40 patients diagnosed with PS. In contrast, the second group comprised 40 healthy volunteers serving as controls. Blood samples were collected through venipuncture under aseptic conditions using a sterile syringe. Blood samples were obtained from PS patients and healthy controls, followed by centrifugation to separate the serum. The collected serum was stored at –40°C until further analysis. Serum TNF-α, IL-22 levels were quantified using a sandwich enzyme-linked immunosorbent assay (ELISA) kit. Human TNF-α, IL-22 are an enzyme used in an immunoassay for in vitro specific and quantitative determination of these cytokines in human serum. This test has been achieved according to the manufacturing company (BT Lab, China).

## Calculation of results

Construct a standard curve by plotting the average OD for each standard on the vertical (Y) axis against the concentration on the horizontal (X) axis, and draw a best-fit curve through the points on the graph. These calculations can be best performed with computer-based curve-fitting software, and the best fit line can be determined by regression analysis, as demonstrated in **(Figure 1)**.

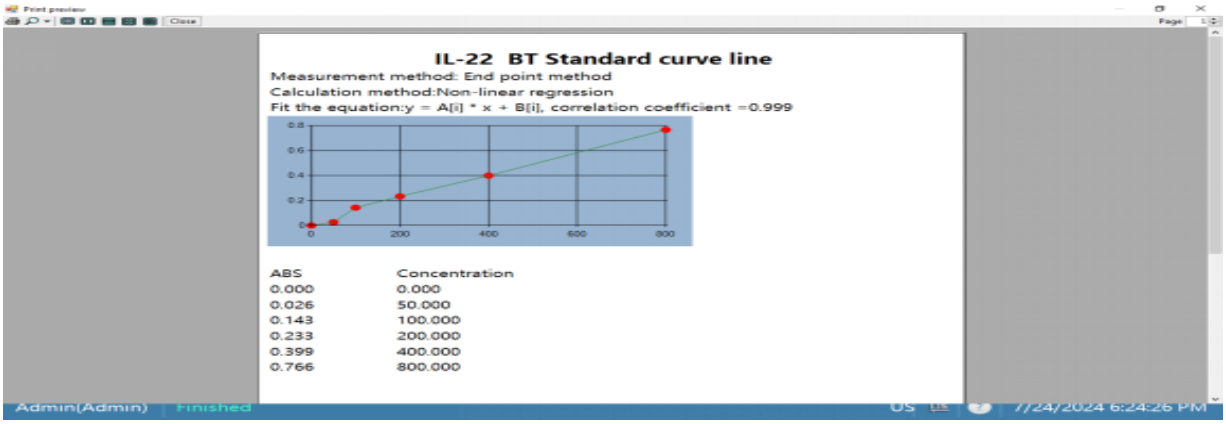


**Figure 1: Standard curve of IL-22 concentration.**

# RESULT

## Demographic Analysis

The avarage age of patients with psoriasis was 32.31±6.53 years, and the mean age of the control group was 32.56±5.06 years Among psoriasis patients, 17 (42.5%) were under 30, 7 (17.5%) were aged 30 to 39, and 16 (40.0%) were over 40. In the control group, 17 patients (42.5%) were under 30, 4 patients (10.0%) were aged 30 to 39, and 19 patients (47.5%) were over 40. Significant disparities were observed in the distribution of patients and controls across all age categories (P = 0.001). In terms of gender,among the patients with psoriasis, 19 were males (47.5%) and 21 were women (52.5%). The control group contained 16 male patients (40.0%) and 24 female patients (60.0%). The gender distribution of the sick group and the control group did not differ significantly. (P = 0.497). . as demonstrated in (**Table 1**).

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**Table 1: Demographic Analysis of PS Patients and Controls.**

| Study groups | | Gender | | Total | p-value |
|---|---|---|---|---|---|
| | | Male | Female | | |
| Groups | Psoriasis | 19 (47.5%) | 21 (52.5%) | 40 | 0.497 ¥ NS |
| | Control | 16 (40.0%) | 24 (60.0%) | 40 | |
| Total | | 35 (43.5%) | 45 (56.5%) | 80 | |

**¥: Chi-square test; NS: not significant at *P* > 0.05**

**Expression of TNF-α, IL-22 serum level in PS**

The result of **(Table 2, Table 3** ) illustrate that serum IL-22, TNF-α levels for patients with PS (n =40) were compared to healthy control samples using ELISA. Represents an increase in TNF-α, IL-22 serum level.

The receiver operating characteristic (ROC) analysis was performed to investigate the diagnostic usefulness of interleukin-22 concentrations in patients with psoriasis and controls. When the ideal threshold value of IL-22 was larger than 80.53(pg/ml), the AUC was 0.843 (95% CI: 0.732-0.955, p = 0.001), the sensitivity was 83.3%, the specificity was 86.7%, the positive predictive value (PPV) was 86.2%, and the negative predictive value (NPV) was83.9%. These data imply that IL-22 is a potential strong marker that separates patients with psoriasis from controls, as shown in (**Table 4):** The diagnostic accuracy of TNF-α levels in psoriasis patients relative to controls was assessed using the ROC analysis. The optimum threshold forTNF-α was larger than 13.69(pg/ml), with an AUC of 1.000 (95% CI, 1.000-1.000, p = 0.001), a sensitivity of 100.0%, a specificity of 100.0%, aPPV of 100.0%, and an NPV of 100.0%. These data imply that TNF-α might be a key differentiator between patients with psoriasis and controls, as shows in (**Table 5**).

**Table (2): IL-22 level in patients and healthy control.**

| Groups | | (IL-22) level |
|---|---|---|
| Psoriasis | Mean ± SD | **115.79 ± 34.37** |
| | Range | 25.17-300.56 |
| Control | Mean ± SD | **73.89** ± 9.84 |
| | Range | 45.71-93.17 |
| p-value | | **0.001**** |


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**Table (3): TNF-α level in patients and healthy control.**

| Groups | | TNF-α level |
|---|---|---|
| Psoriasis | Mean ± SD | 21.56 ± 2.41 |
| | Range | 15.09-24.33 |
| Control | Mean ± SD | 9.40 ± 1.2 |
| | Range | 7.75-12.30 |
| p-value | | 0.001** |

**Table (4): Roc curve of (IL-22and TNF-α) level (pg/ml).**

| Characteristic | *IL22 Psoriasis/control* | *TNF-αPsoriasis/control* |
|---|---|---|
| **Cutoff value** | > 80.53 | > 13.69 |
| **P value** | 0.001 | 0.001 |
| **Sensitivity %** | 83.3 % | 100.0 % |
| **Specificity %** | 86.7 % | 100.0 % |
| **PPV %** | 86.2 % | 100.0 % |
| **NPV %** | 83.9 % | 100.0 % |
| **AUC (95% CI)** | 0.843 (0.732- 0.955) | 1.000 (1.000- 1.000) |

## DISCUSSION

Although psoriasis can afflict people of any age, the current study reveals that a significant proportion of afflicted patients were less than 30 years old (42.5%). Similar to a number of earlier research, Khazem and Ibraheem (2020) ,found that the majority of psoriatic patients and control individuals (30% vs. 50%) were between the ages of 15 and 25 years. The geography, sample randomization, and average age of the populace in various nations are the causes of these difference. Regarding the present results, there was no significant difference in the frequency distribution of patients and control subjects according to gender (*P*= 0.497). Results recognized that psoriasis affects both men and females. Furthermore, between 2% and 3% of the overall population has psoriasis, with men and women equally affected(Armstrong et al .,2021).

Interleukin-22 (IL-22) is another member of the IL-10 family which is involved in regulating the growth and movement of keratinocytes, which inhibit their differentiation and retains pro-inflammatory cytokines and chemokines in the skin (Miyazaki et al., 2018). The mean concentration of IL-22 in patients with psoriasis was significantly higher than that in

 

the controls, which was 115.79 ± 34.37 and 73.89 ± 9.84, respectively (P < 0.01). Similarly, Wawrzycki et al. (2018) stated that blood levels of IL-22 were significantly higher in psoriasis patients than in healthy controls. According to this study, since IL-22 had different discriminatory value between patients with psoriatic condition and controls (maximal value being 80.53) and a sensitivity of 83.3% and a specificity of 86.7%.

TNF-α, a pro-inflammatory cytokine that encourages the inflammatory process, is released by many cell types, including monocytes/macrophages. It plays an essential role in pro-inflammatory immune responses (Saddala and Huang, 2019). The role of TNF in various aspects of the pathophysiology of psoriasis is highly diverse. The key immunological event facilitating interaction between DC and T cells is this pro-inflammatory cytokine, which simultaneously up-regulates the DC production of IL 23 that accelerates Th17 development (Furue, 2019). Regarding the findings of the present study, it was realized that the amount of TNF measured appeared to be substantially higher in psoriasis patients compared with the control population (P < 0.001). Samara and Shaima in 2024 recorded similar findings that TNF-α levels were significantly higher in psoriasis in comparison to controls (182.38 vs. 151.98); p-Value was (0.033*), in line with our results. In agreement with the findings by Mehta et al. (2017) TNF-α was higher in patients than in healthy persons.

Evidence has been provided through several investigations that levels of TNF-α are significantly higher in the blood and lesional skin among individuals with psoriasis, when compared with controls. Furthermore, this particular drug class decreased the T-cell populations in psoriasis patients, lowered the epidermal thickness of skin in psoriasis patients, and led to improvements in the health of psoriasis patients, while levels of TNF-α also decreased in their blood (Lee and Moon, 2023). According to the study's findings, those with severe psoriasis typically had greater levels of TNF-α than other participants, which was not statistically significant (p = 0.065). The results correspond to that of Samara and Shaima (2024), who found some positive association of TNF with the severity of the disease.

## CONCLUSION

The mean age of the PS patients were 32.31±6.53 years. Receiver operating characteristic (ROC) curve analysis indicated that TNF-α, IL-22 can be helpful as a diagnostic marker for the early prediction of PS in Iraqi patients.

## REFERENCES


- **Olejnik, M**., Adamska, K., Adamski, Z., &Dorocka-Bobkowska, B(2022). Oral Health Status of Psoriatic Patients Managed with Modern Biological Therapy. *Adv. Dermatol. Allergol.* , 39(6), 1151–1156. doi: 10.5114/ada.2021.112317.

- **Guo, J**., Zhang, H., Lin, W., Lu, L., Su, J., & Chen, X.(2023). Signaling pathways and targeted therapies for psoriasis. *Signal Transduct. Target. Ther* , 27;8(1):437.

  doi: 10.1038/s41392-023-01655-6.

- **Sieminska,** I., Pieniawska, M.,& Grzywa, T.M(2024). The Immunology of Psoriasis—Current Concepts in Pathogenesis. *Clin. Rev. Allergy Immunol*., 66, 164–191. doi: 10.1007/s12016-024-08991-7

- **Khazem,** R., & Ibraheem, S., (2020). Detection of Some Immunological Parameters in Psoriatic Iraqi Female


 

Patients. *Iraqi Journal of Science*, 61( 10): 2515-2524. doi: https://doi.org/10.24996/ijs.2020.61.10.8

- **Armstrong,** A.W., Mehta, M.D.& Schupp, C.W., et al., (2021). Psoriasis Prevalence in Adults in the United States. *JAMA Dermatol*,157(8):940-946. doi: 10.1001/jamadermatol.2021.2007

- **Miyazaki** Y., Nakayamada S., Kubo S. &Nakano K., et al., (2018). Th22 cells promote osteoclast differentiation via production of IL-22 in rheumatoid arthritis. *Front Immunol*.10(9):2901. https://doi.org/10.3389/fimmu.2018.02901

- **Wawrzycki** B., Pietrzak A.& Grywalska E., et al. (2019). Interleukin-22 and its correlation with disease activity in plaque psoriasis. Arch Immunol Ther Exp., 67(2):103-108. doi: 10.1007/s00005-018-0527-5

- **Saddala,** M.S. and Huang, H., (2019). Identification of novel inhibitors TNFα, TNFR and TNFα-TNFR1 complex using pharmacophorebased approaches. *J. Transl. Med*. 17, 215. https://doi.org/10.1186/s12967-019-1965-5

- **Furue,** K., (2019). Psoriasis and the TNF/IL23/IL17 axis. *G Ital Dermatol Venereol.* 154(4):418-424. DOI: 10.23736/S0392-0488.18.06202-8

- **Mehta,** N.N., Teague, H.L.& Swindell, W.R., et al., (2017). Baumer Y, IFN-gamma and TNF-alpha synergism may provide a link between psoriasis and inflammatory atherogenesis. *Sci Rep* ; 7(1):13831. doi: 10.1038/s41598-017-14365-1.

- **Lee**, B.W,. and Moon, S.J., (2023). Inflammatory Cytokines in Psoriatic Arthritis: Understanding Pathogenesis and Implications for Treatment. *Int J Mol Sci.* 24(14):11662. doi: 10.3390/ijms241411662

- **Samara,** A.S. and Shaima, R.I, (2024). A Study Correlation between Levels IL-15, IL-23 and TNF-α in a Sample of Iraqi Psoriasis Patients. IHJPAS. 37, (1): 75–85. doi:https://doi.org/10.30526/37.1.3148

 