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Research Article

IL-17A and IL-6 as Key Mediators of Immune Dysregulation and Systemic Inflammation in Psoriasis

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About Article

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ABSTRACT

The psoriasis, which is a chronic inflammatory skin disease, in addition is immune-mediated, is also characterized by hyperproliferation of keratinocytes and infiltration of activated immune cells. Besides, psoriatic inflammation pathogenesis and persistence are primarily connected with the imbalance of cytokines, IL-6, and IL-17A. Thus, early detection of elevated cytokine levels may be used in the therapeutic monitoring and disease evaluation. The current study was aimed to compare the IL-6 and IL-17A diagnostic performance of psoriasis patients that of healthy people. Eighty participants were included in this study, 30 controls (matched in age and sex), whereas 50 cases of psoriasis patients. The lab results of erythrocyte sedimentation rate (ESR), high-sensitivity C-reactive protein (hs-CRP), also IL-6, and IL-17A by means of ELISA. It was found that the mean serum levels of IL-6 and IL-17A were significantly increased in patients with psoriasis compared to controls ($p < 0.001$). In addition, the analysis results of ROC showed that both cytokines possess high sensitivity and specificity values, which implies good diagnostic capacity. Therefore, findings suggest that IL-6 and IL-17A can be effective immunological markers of assessing the inflammatory activity and also might be utilized in the early diagnosis and treatment of psoriasis.

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1. INTRODUCTION

Psoriasis was a chronic inflammatory skin disease and was experienced by millions of people across the globe. It presents itself in the form of the red, scaly regions that occur due to the chronic inflammation and also rapid replacement of skin cells. Even though its exact cause was not yet clear, psoriasis was widely recognized to be an immune-mediated disease, which has both genetic as well as environmental factors. Moreover, the initial cause of the immunological response in psoriasis was activated T cells which can produce some pro-inflammatory cytokines (Brembilla & Boehncke, 2023; Holdrowicz & Żebrowska, 2025). So, Interleukin-6 (IL-6) and interleukin-17A (IL-17A), were important mediators due to maintain the inflammatory process. IL-6 differentiates Th17 cells, those that produce IL-17A, a cytokine that attracts other immune cells to the skin and also activates the proliferation of keratinocytes (Holdrowicz & Żebrowska, 2025; Kar *et al.*, 2024; Solak & Kara, 2024).

2. LITERATURE REVIEW

Systemic inflammatory markers were also high in many patients of psoriasis and this markers denote the levels of persistent inflammation. These were the ESR and hs-CRP. As well as, cytokines in combination with these markers may provide a more insight into the disease activity and treatment response. Besides, current study was conducted to determine the diagnostic significance of IL-6 and IL-17A in the patients with psoriasis compared to the healthy individuals and to the relationship that they have with the inflammatory indices like hs-CRP and ESR (Xiong & Yu, 2025). Compared to the healthy controls, the aim of this study was to highlight the diagnostic and also clinical significance of interleukin-6 (IL-6) and interleukin-17A (IL-17A) in psoriasis patients. Even though, it analyzed the concentration of the two cytokines in the blood and their association with the inflammatory biomarkers such as ESR and hs-CRP. Consequently, the present study examined the potential of IL-6 and IL-17A as reliable immunological disease activity indicators in the psoriasis patients in order to assessing their diagnostic abilities based on ROC curve analysis.

3. METHODOLOGY

3.1. Subject and Study Design

In this case control study, eighty participants were used with 30 apparently healthy individuals acting as a control group, besides 50 patients with psoriasis. The gender and age of all

the participants were also equalized. The study was performed at the Department of Pathological Analysis of the Wasit University in the College of Science between January 2024 and May 2024 in cooperation with the local dermatology clinics. A dermatologist based his diagnosis on clinical and test outcomes and revealed that the patient had psoriasis. In addition, the individuals who had viral, metabolic or autoimmune illnesses were excluded, except psoriasis.

3.2. Sample Collection

Five milliliters of venous blood were collected in an aseptic environment. Samples were coagulated and left to coagulate after that centrifuged 10 minutes at 3000 rpm in order to extract serum. So, the serum was aliquoted and stored at -20degC before it was analyzed.

3.3. Laboratory investigations

- The following parameters have been measured:
- The Erythrocyte Sedimentation rate of the Westergren method.
 - Immunoturbidimetric assay of hs-CRP.
 - Interleukin-6 (IL-6) and Interleukin-17A (IL-17A) by enzyme-linked immunosorbent assay (ELISA) with commercially available kits as per the guidelines of the manufacturer.

3.4. Statistical Analysis

Data analysis was done in SPSS version 26. The results were represented as mean ± SD. Categorical data were compared with the chi-square test and shapiro-wilk test and independent samples t-test was applied to compare the patients and controls. Person correlation test used for assessed the correlation of parameters. In addition, diagnostic specificity and sensitivity were evaluated with the help of Receiver Operating Characteristic (ROC) curve. Besides, the P- value that is less than 0.05 was considered to be statistically significant.

4. RESULTS AND DISCUSSION

The total number of controls in this study was 30 healthy people besides 50 psoriasis patients. Table (1) shows that most psoriasis patients were female 31(62.0%), and male 19 (38.0%). The control group consisted of 20 females (66.7 %) and 10 males (33.3%). Furthermore, there was no significant difference between the distribution of the gender of patients and controls (P = 0.674). Also, this implies that the genders among the two groups were similar.

Table 1. distribution of Psoriasis patients according to the gender

Study groups		Gender		Total	p-value
		Male	Female		
Groups	Psoriasis Patients	19 (38.0%)	31 (62.0%)	50	0.674 ¥
	Control	10 (33.3%)	20 (66.7%)	30	
Total		29 (36.2%)	51 (63.8%)	80	NS

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

Table 2 shows the comparative inflammatory indicators of psoriasis patients than healthy controls. The results indicate that the erythrocyte sedimentation rate (ESR) and high-sensitivity C-reactive protein (hs-CRP) are definitely increased

among psoriasis patients. In addition, the hs-CRP level of the members of psoriasis had a mean of 4.58 ± 1.01 mg/L on the other hand, it was just 1.10 ± 0.31 mg/L in the control groups, and $P = 0.001$ showed that this difference was statistically significant. In addition, the mean ESR of the patients and controls was 43.64 ± 9.21 mm/hr and 24.13 ± 2.26 mm/hr, respectively. Also, this difference was statistically significant ($P = 0.001$). Based on these findings, psoriasis patients have a greater systemic inflammation compared to healthy groups. Thus, the long-term inflammatory process and disease activity of psoriasis could be indicated by the high hs-CRP and ESR levels.

Table 2. Inflammatory marker comparison between healthy controls and the Psoriasis patients

Groups	Hs-CRP (mg/L) Mean $\pm$ SD	ESR (mm/hr) Mean $\pm$ SD	P- value
Psoriasis patients N = 50	4.58 ± 1.01	43.64 ± 9.21	0.001 † S
Control N = 30	1.10 ± 0.31	24.13 ± 2.26	0.001 † S

n: number of cases; †: Chi-square test; S: significant at $P > 0.05$.

According to Table (3) of the current investigation, psoriasis patients serum IL-6 concentrations were significantly ($P < 0.001$) higher than those of healthy control groups. In all psoriasis patients, the mean IL-6 values was 42.43 ± 9.34 , but in control subjects, it was 23.58 ± 4.68 . Also, The ROC curve showed that the sensitivity was 90.0% and the specificity was 90.0% for IL-6 with a cut-off value of 28.00 pg/ml. Thus, Table 4 and Figure 1 show that these results were statistically significant ($p = 0.05$).

Table 3. Serum level of (IL-6 pg/ml) among in Psoriasis patients and healthy controls

Groups	(IL-6) pg/ml
Psoriasis patients Mean $\pm$ SD	42.43 ± 9.34
Control Mean $\pm$ SD	23.58 ± 4.68
p-value	< 0.001 † HS

n: number of cases; SD: standard deviation; †: independent samples t-test; HS: highly significant at $P \leq 0.001$.

Table 4. Specificity & sensitivity of interleukin (IL-6) (> 28.00-fold) in the Psoriasis patients

Interleukin-6	Patients (n = 50)	Healthy control (n = 30)
> 28.00	45	3
> 28.00	5	27
Sensitivity %	90.0 %	
Specificity %	90.0%	
PPV %	93.8 %	
NPV %	84.4%	

AUC (95% CI) 0.901 (0.837- 0.964)

CI: Confidence interval, AUC: Area under curve.

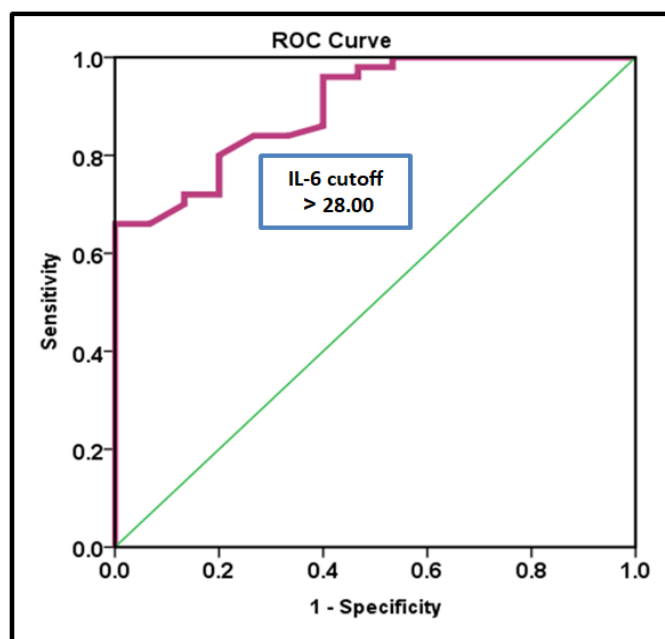


Figure 1. Interleukin (IL-6) receiver operator characteristic curve to determine the potential diagnostic cutoff value

According to the findings (Table 5), all Psoriasis patients groups had considerably ($p < 0.001$) increased serum levels of IL-17A (80.22 ± 8.03) than of the healthy control groups (60.10 ± 6.19). Whereas, the ROC curve showed that the sensitivity was 92.0% and the specificity was 90.0% for IL-17A with a cut-off value of 66.17 pg/ml. Also, Table 6 and Figure 2 show that these results were statistically significant ($p = 0.05$). Consequently, significant differences were observed in the positive association of interleukin-6 and interleukin-17A with other parameters (table 7). There was positive correlation between IL-6 and IL-17A ($r = 0.897$ and $p = 0.001$), IL-6 and Hs-CRP ($r = 0.391$ and $p = 0.005$), IL-6 and ESR ($r = 0.632$ and $p = 0.005$). Indeed, Also, there was positive correlation between IL-17A and Hs-CRP ($r = 0.336$ and $p = 0.017$), IL-17A and ESR ($r = 0.554$ and $p = 0.005$) in the Psoriasis patients.

Table 5. Serum levels of interleukin (IL-17A) in the Psoriasis patients and healthy controls

Groups	(IL-17A) pg/ml
Psoriasis patients Mean $\pm$ SD	80.22 ± 8.03
Control Mean $\pm$ SD	60.10 ± 6.19
p-value	< 0.001 † HS

n: number of cases; SD: standard deviation; †: independent samples t-test; HS: high significant at $P \leq 0.001$.



Table 6. Specificity & sensitivity of (IL-17A) in the Psoriasis patients (> 66.18-fold)

Interleukin-17A	Patients (n = 50)	Healthy control (n = 30)
> 66.17	46	3
> 66.17	4	27
Sensitivity %	92.0 %	
Specificity %	90.0%	
PPV %	93.9 %	
NPV %	87.1%	
AUC (95% CI)	0.909 (0.848- 0.971)	

CI: Confidence interval, AUC: Area under curve.

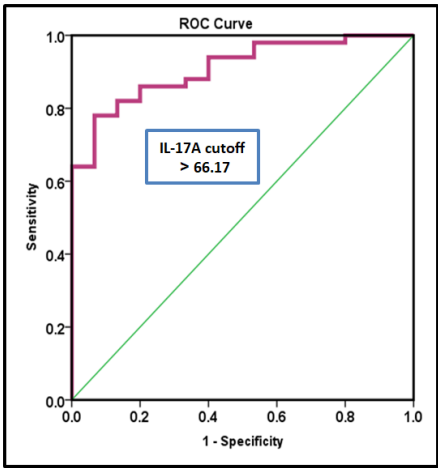


Figure 2. Interleukin IL-17A receiver operator characteristic curve to determine the diagnostic cutoff value

Table 7. Shows the relationship between the Psoriasis patients immunological parameters (IL-6 and IL-17A) and other parameters

Characteristic	IL-6		IL-17A	
	r	P	r	P
IL-6	1			
IL-17A	0.897	0.001*	1	
Hs-CRP	0.391	0.005*	0.336	0.017*
ESR	0.632	0.001*	0.554	0.001*

r: correlation coefficient.

4.1. Discussion

The overproduction of the cytokines and the abnormal communication between cytokines and the immune system typify psoriasis, which was a chronic inflammatory disease that was immunologically caused. However, based on the present research, patients with psoriasis (as opposed to healthy individuals) had significantly elevated IL-6 and IL-17A serum concentrations, which also indicates that these factors are essential in the pathophysiology of this disease. Furthermore, these findings can be explained by the previous studies that showed the importance of the proinflammatory cytokines, namely, IL-6 and IL-17A, in initiating and maintaining the process of inflammation related to the psoriasis (Merzel *et al.*, 2025; Melikoğlu & Pala, 2023).

Although, IL-6 being a pleiotropic cytokine influences both the adaptive and innate immune system. It was stimulates naive T cells to differentiate into Th17 cells via the STAT3 signaling pathway, which is a cytokine that activates the inflammatory cascade due to recruitment of neutrophils and also promoting the proliferation of keratinocytes (Ishchenko *et al.*, 2025). Furthermore, the IL-6/Th17/IL-17A axis of psoriatic inflammation was justified by the fact that there was a positive correlation between IL-6 and IL-17A in the study ($r = 0.897$, $P = 0.001$). Besides, the finding was consistent with recent research works that reported an increase in the serum level of these cytokines in the serum of psoriatic patients and their lesional tissue (Paroli *et al.*, 2025; De *et al.*, 2024).

Collectively, this synergy has an effect on the tissue remodeling,

epidermal hyperplasia and also chronic inflammation. As well as, the high concentrations of acute-phase reactants present in the current study ESR & hs-CRP could also be attributed to the increase in IL-6 in psoriasis patients. The direct stimulation of hepatocytes by IL-6 to produce CRP and fibrinogen causes the presence of the systemic inflammation and increases in ESR (Huangfu *et al.*, 2023). Also, similar results have been published and others demonstrating that more CRP levels correlate with more disease activity and severity of the psoriasis patients(Lopez & Kongsbak, 2022; Krueger *et al.*, 2024). The existing evidence shows that the psoriasis was a systemic inflammatory disorder whose effects may include extracutaneous effects, such as metabolic and also, cardiovascular comorbidities, along with being a skin condition.

Furthermore, the hallmark cytokine of the Th17 subset was IL-17A, which was imperative in the sustenance of psoriatic inflammation. Besides, it maintains leukocyte infiltration and epidermal thickening since it enhances the creation of proinflammatory mediators by keratinocytes and also endothelial cells (Wang *et al.*, 2022). As well as, IL-17A has the ability to complement tumor necrosis factor-alpha (TNF-a) to the increase the expression of the chemokines CXCL1 and CXCL8 [15]. Consequently, the high level of IL-17A that was observed in this study reflects persistent immune activation and also consistent with the reported efficacy of IL-17-inhibitory biologic therapies including ixekizumab and secukinumab (Zhao *et al.*, 2024; Mills, 2023; Matei *et al.*, 2025).

The interaction between systemic inflammation and local

immunological dysregulation was demonstrated by the presence of strong relationships between IL-6, IL-17A, hs-CRP, and ESR. So, a combination of these biomarkers provides a picture of disease activity. The present research assessed their diagnostic abilities with the receiver operating characteristic (ROC) analysis method and also identified that the diagnostic abilities of both IL-6 (AUC = 0.901) and IL-17A (AUC = 0.909) were good in terms of sensitivity and specificity. This accuracy implies that the cytokines have the potential to be regarded as reliable biomarkers to distinguish normal individuals and psoriasis patients. This is also a better diagnostic outcome than the rest of the research carried out in the past that had sensitivity values of less than eighty (Lebwohl *et al.*, 2025; Li *et al.*, 2025; Hüning, 2022).

In addition, these results have practical clinical implications. Routine measures of IL-6 and IL-17A may use to aid in the monitoring of the disease and also early detection of systemic inflammatory involvement. Also, such a therapeutic target as the IL-6/IL-17A axis also has a perspective. In addition, the drugs that prevent IL-6 or IL-17 signalling have greatly enhanced psoriatic lesions and systemic inflammation confirming the pathogenic importance of cytokines (Li *et al.*, 2025; Hüning, 2022; Brembilla & Boehncke, 2023).

Consequently, the data presented here substantiates the premise that psoriasis was a systemic immune-mediated disease that was characterized by the inflammation that was caused by the cytokines. In addition indicating disease activity, high concentrations of IL-6 and IL-17A can also be used as the biomarkers of disease assessment and to monitoring of treatment.

5. CONCLUSION

Thus, serum interleukin (IL-6 and IL-17A) were significantly elevated in the psoriatic patients and both of them were strongly positive correlation with the inflammatory indices (hs-CRP and ESR). Also, the high diagnostic accuracy of ROC analysis supports the fact that they can be used as sensitive and specific biomarkers in the diagnosis of active psoriasis disease. In addition, these findings underscore the role of interleukins (IL-6/IL-17A axis) in the immunopathogenesis of the psoriasis, and also suggest that a cytokine profile can be useful in the development of superior diagnostic besides therapeutic strategies to limit systemic inflammation and to prevent disease outcomes.

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