Serum level of interleukin-22 in patients with psoriasis and its correlation with disease severity

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Introduction
Psoriasis is a T-cell-mediated inflammatory disease where T-helper (Th) lymphocytes (Th1, Th17, and Th22) play an important role in its pathogenesis. The aim of the present study was to assess the serum levels of interleukin (IL)-22 and its correlation with disease severity.

Materials and methods
The present study included 25 psoriatic patients and 25 healthy controls. Using serum samples collected from psoriatic patients and healthy controls, the concentrations of IL-22 were examined using ELISA kits. The severity of psoriatic skin lesions was assessed using psoriasis area and severity index scores.

Results
IL-22 concentrations were significantly higher in psoriatic patients in comparison with the control group. A significant, positive correlation between the concentrations of IL-22 and the severity of psoriasis was found.

Conclusion
The results of our study suggest that Th22 along with its cytokine responses may contribute to the skin and systemic inflammatory conditions characteristic of psoriasis. It seems that early identification of soluble biomarkers and initiation of well-matched treatment may prevent exacerbation and progression of psoriasis.

Keywords:
interleukin 22, psoriasis, serum

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Introduction

Knowledge about the role of cytokines in psoriasis has developed in the last several years. Initially, only T-helper-1 (Th1) cells and cytokines secreted by these cells, such as tumor necrosis factor-α, interferons-γ, and interleukin (IL)-2, were associated with the development and maintenance of chronic inflammatory diseases such as psoriasis [1]. In the 1990s, Th17 cells were described as another T-cell population that produces IL-17, IL-6, IL-21, IL-22, and tumor necrosis factor [2]. Cytokines produced by Th17 cells were found to initiate acanthosis, hyperkeratosis, and parakeratosis. Th17 cells demonstrated involvement in neutrophil and monocyte chemotaxis, T-cell migration and activation, and neovascularization [3]. Th22 cells have been lately described as inflammatory $CD4^+$ T cells that produce cytokines such as IL-22, IL-26, and IL-13 of which IL-22 is the most important functional cytokine. Th22 cells do not express IL-17A or interferons-γ ([3–7]). The aim of the present study was to assess the serum levels of IL-22 in psoriatic patients and its correlation with disease severity.

Materials and methods

Clinical assessment and patient materials

Serum samples were collected from 25 psoriasis patients and 25 healthy individuals. Patients and controls were pair matched for age and sex. The disease severity of each patient was assessed using the psoriasis area and severity index (PASI) score. All patients enrolled in our study had no other autoimmune or systemic diseases and underwent no systemic treatment including glucocorticoids, immunosuppressive drugs, or phototherapy at least 1 month before the PASI score evaluation and sample collection period. Informed consent was obtained from all the patients and healthy controls. Research protocol has been accepted and monitored throughout the conduction of research by the local Ethical Commitee, Assiut Faculty of Medicine, Assiut University.

Assessment of serum interleukin-22 concentrations in psoriatic patients

Patients and controls

Blood samples were collected from psoriatic patients and controls, and were centrifuged for 15 min at 1000*g*.

Next, the serum samples were subdivided into small aliquots to be stored at −80°C until analysis for cytokine levels. ELISA kits were used to determine serum IL-22 (PRC; Elabscience (Bethesda, MD, USA)) levels, according to the manufacturer's instructions.

Statistical analyses

Mann–Whitney's U-test was used to compare continuous data between the psoriasis group and the control group. Pearson's correlation coefficient was used for correlation analyses. A *P* greater than 0.05 was considered to be statistically significant.

Results

Characteristics of study individuals

This study included 25 patients with psoriasis and 25 age-matched and sex-matched controls as listed in Table 1. Disease duration, BSA, and the PASI score are listed in Table 2.

Serum interleukin-22 levels in patients with psoriasis and healthy controls

We found significantly higher levels of IL-22 in patients with psoriasis vulgaris with a mean ± SD of 11.62 ± 10.21 pg/ml compared with controls who had a mean ± SD of 1.77 ± 1.61 pg/ml (*P* = 0.000) (Fig. 1).

Correlation between serum interleukin-22 levels and psoriasis area and severity index scores in patients with psoriasis

Table 1 Personal data of the studied groups

	Patients (*n*=25)	Controls (*n*=25)	*P*
Age (years)			
Range	12.0–70.0	15.0–60.0	0.564
Mean±SD	42.72±15.34	36.96±12.06	
Sex (*n* (%))			
Male	16 (64.0)	17 (68.0)	0.765
Female	9 (36.0)	8 (32.0)	

Table 2 Clinical characteristics of psoriatic patients

	n=25 (*n* (%))
Duration of disease (years)	
<3	7 (28.0)
3-6	10 (40.0)
>6	8 (32.0)
Body surface area	
Mild	13 (52.0)
Moderate-to-severe	12 (48.0)
PASI score	
Mild	11 (44.0)
Moderate	8 (32.0)
Severe	6 (24.0)

PASI, psoriasis area and severity index.

There was a significant, positive correlation between IL-22 levels and disease severity (r = 0.688; P = 0.000) (Fig. 2).

Discussion

IL-22 has a pathogenetic role in psoriasis, where it is responsible for the altered proliferation and differentiation of keratinocytes and induces inflammatory molecules [8].

With regard to IL-22, our study showed that there were significantly higher levels of IL-22 in patients with psoriasis vulgaris (11.62 ± 10.21 pg/ml) compared with controls (1.77 ± 1.61 pg/ml) (*P* = 0.000).

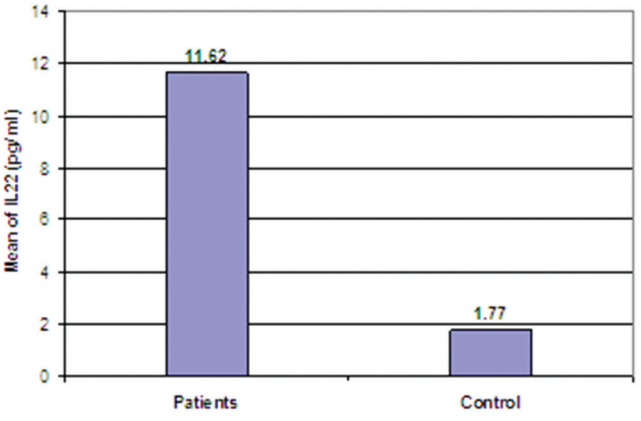
Our study agrees with the study by Michalak-Stoma *et al.* [9]who showed that significantly higher levels of IL-22 were observed in psoriatic patients compared with healthy controls (*P* < 0.001). In the study by Boniface [10], IL-22 was detected in the serum of 22 of 33 psoriatic patients (59 ± 21 pg/ml), compared with only a single serum sample (27 pg/ml) among 20 normal individuals (*P* < 0.001). The results of all these studies confirm the involvement of IL-22 in psoriasis pathogenesis.

In our study, a significant, positive correlation was found between IL-22 levels and disease severity (r = 0.688; P = 0.000).

Michalak-Stoma *et al.* [9] also found a significant, positive correlation between IL-22 concentrations and psoriasis severity as measured by the PASI score (r = 0.557; P < 0.001).

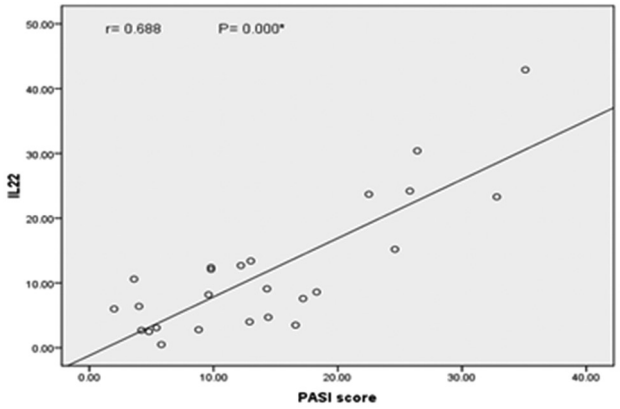
In the study by Boniface [10], the circulating levels of IL-22 in patients were dispersed, but not to the index of disease severity.

Figure 1



Interleukin-22 levels in patients and controls.

Figure 2



Correlation between interleukin-22 levels and disease severity. PASI, psoriasis area and severity index.

Conclusion

Serum levels of IL-22, which correlated with the clinical severity of psoriasis, may be an objective parameter for successful treatment and may be used for the follow-up of patients.

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Conflicts of interest

There are no conflicts of interest.

References

1 Michalak-Stoma A, Pietrzak A, Szepietowski JC, Zalewska-Janowska A, Paszkowski T, Chodorowska G. Cytokine network in psoriasis revisited. Eur Cytokine Netw 2011; 22:160–168.

2 Miossec P. IL-17 and Th17 cells in human inflammatory diseases. Microb Infect 2009; 11:625–630.

3 Asarch A, Barak O, Loo DS, Gottlieb AB. Th17 cells: a new paradigm for cutaneous inflammation. J Dermatolog Treat 2008; 19:259–266.

4 Nograles KE, Davidovici B, Krueger JG. New insights in the immunologic basis of psoriasis. Semin Cutan Med Surg 2010; 29:3–9.

5 Duhen T, Geiger R, Jarrossay D, Lanzavecchia A, Sallusto F. Production of interleukin 22 but not interleukin 17 by a subset of human skin-homing memory T cells. Nat Immunol 2009; 10:857–863.

6 Liu Y, Yang B, Zhou M, *et al.* Memory IL-22-producing $CD4^+$ T cells specific for Candida albicans are present in humans. Eur J Immunol 2009; 39:1472–1479.

7 Sabat R, Wolk K. Research in practice: IL-22 and IL-20: significance for epithelial homeostasis and psoriasis pathogenesis. J Dtsch Dermatol Ges 2011; 9:518–523.

8 Sestito R, Madonna S, Scarponi C, Cianfarani F, Failla CM, Cavani A, *et al.* STAT3-dependent effects of IL-22 in human keratinocytes are counterregulated by sirtuin 1 through a direct inhibition of STAT3 acetylation. FASEB J 2011; 25:916–927.

9 Michalak-Stoma A, *et al.* Serum levels of selected Th17 and Th22 cytokines in psoriatic patients. Dis Markers 2013; 35:625–631.

10 Boniface K, *et al.* A role for T cell-derived interleukin 22 in psoriatic skin inflammation. Clin Exp Immunol 2007; 150:407–415.