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The Role of Interleukin-17 in the Development and Severity of Psoriasis

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ABSTRACT: IL-17 is a member of the innate immune system, it is preferentially expressed by Th2 cells, and is highly recognized in psoriasis skin lesions. The current study aims investigate the role of Interleukin-17 (IL-17) in development and severity of psoriasis (PsO). Eighty persons from both genders are included in the study, 40 of them were patients and the same number were as control. Blood samples were taken from both groups and ELISA ready kit was used to estimate the sera levels of IL-17. The current findings pointed to a significant increase ($p<0.05$) in the of serum IL-17 in the patients' group in comparison with the control group (20.97 ± 12.93 vs 20.97 ± 12.93 respectively). The results also showed that there is a highly significant increase in mean levels of IL-17 (20.3 pg/ml) in patients with moderate PsO and (20.8 pg/ml) for patients with severe PsO, compared to those with mild PSO. Conclusion: It was concluded that the high levels of IL-17 in psoriasis, and it seem that this interleukin may contribute to the severity of the disease. No gender differences were seen regarding the level of IL-17.

KEYWORDS: Interleukin-17, psoriasis, severity, skin disorders

INTRODUCTION

There are few previous studies that investigated skin diseases in patients in Thi-Qar province Southern to Iraq; a previous study has shown that interleukin-6 and 10 serum levels are elevated in patients with cutaneous Leishmaniasis in Thi-Qar province (1).

Psoriasis (PsO), a chronic inflammatory skin ailment, affects approximately 1–3% of the population. The condition presents various clinical forms, such as plaque, guttate, erythrodermic, and pustular subtypes. It is marked by distinct red, scaly patches on the arms, legs, torso, and scalp (2). Additionally, psoriasis patients may experience systemic effects, including a heightened susceptibility to metabolic syndrome, Crohn's disease, psoriatic arthritis, and cardiovascular ailments. Beyond the physical symptoms, psoriasis exacts a substantial emotional and social toll, with stigmatization elevating the risk of depression. (3).

Keratinocytes are pivotal in the epidermis, serving as a protective barrier on the skin surface. A distinctive feature of psoriasis involves alterations in the epidermis due to excessive cell growth and irregular keratinocyte development, leading to the formation of psoriatic plaques typical of the condition. Psoriasis is believed to arise in individuals with genetic predispositions when T cell tolerance to specific self-antigens is compromised. This breakdown in tolerance may be instigated by environmental factors activating innate immune cells (4).

Growing evidence reveals elevated levels of Th17 cytokines IL-17A and IL-22 in patients' blood samples, along with heightened IL-17 mRNA levels in psoriatic lesions. This observation has spurred speculation regarding the central role of IL-17 in driving the pathophysiology of psoriasis. Lowes et al. contributed additional evidence through a study, demonstrating an increased occurrence of IL-17-producing T cells and IL-17 mRNA in the dermis of psoriatic lesions(5).

Psoriasis is currently recognized as being fueled by numerous pathogenic cells that produce IL-17. IL-17C levels, heightened in psoriatic lesions, collaborate with TNF, prompting the production of proinflammatory cytokines, chemokines, and antimicrobial peptides. Furthermore, IL-17E levels increase in psoriatic lesions, stimulating dermal macrophages to generate TNF and IL-8(6).

The current study aims investigate the role of Interleukin-17 (IL-17) in development and severity of psoriasis (PsO).

MATERIAL AND METHODS

The study included 40 patients with psoriasis from both genders who attending to Al-Sadr medical city, in Al-Najaf City in Iraq, during the period between February 2022 to August 2023. The age range was (22-51 years). Exclusion criteria, Patients who have taken systemic or topical treatments for psoriasis in the past month, patients suffering from chronic systemic illness, and

females who are pregnant or breastfeeding. In addition, 40 non-psoriasis participants were included in the study as a control healthy group.

Three milliliters of venous blood were drawn from all participants (patients and healthy controls) had and placed in a clot-activator tube to separate serum. The serum was separated and centrifuged at 3000 rpm for 10 minutes before getting frozen at -20°C. IL-17 levels in the blood were determined using an ELISA kit and following the manufacturer's instructions (The RayBiotech BDNF-USA).

The clinical diagnosis of psoriasis patients was confirmed by a dermatologist physician. Patients were divided into three categories according to severity. The Psoriasis Area and Severity Index (PASI) is a widely used instrument in psoriasis trials that assesses and grades the severity of psoriatic lesions and the patient's response to treatment. It produces a numeric score ranging from 0 to 72. In general, a PASI score of 5 to 10 is considered moderate disease, and a score over 10 is considered severe (7).

Ethical permission was obtained from the hospital and all participants in this work patients and healthy. The patient's selection was accomplished with the assistance of dermatologists in the hospital.

STATISTICAL ANALYSIS

Statistical analysis was done by using SPSS 26 program. It was determined at $P<0.05$ and the results were shown as mean ± SD. Chi-square were used to test dependence association between groups. ANOVA test was used to determine significant difference in IL-17 levels between patients' groups according to severity (8).

RESULTS

Table 1. Sex and age distribution of Iraqi investigated groups of this study

Indicators		`Patients (No. = 40)		Control (No. = 40)		Chi Square	P value (Sig.)
		Freq.	%	Freq.	%		
Age/Years	22-31	11	27.5	14	35.0	0.71	0.7 (NS)
	32-41	19	47.5	12	30.0		
	42-51	10	25.0	14	35.0		
Gender	Male	16	40.0	20	50.0	0.54	0.64 (NS)
	Female	24	60.0	20	50.0		

The description of investigated groups was shown in table (1). This study included 80 Iraqi subjects, 40 of them were psoriasis patients 16 (40%) males, and 24 (60%) females, and there were 40 healthy individuals 20 (50%) males, and 20 (50%) females. Regarding age distribution in this study, their ages ranges between (22-51) years, as listed in (Table 1). The majority of PSO patients was found within the age groups 32-41 in which there was 19 patients (47.5%), these results indicated that young individuals appear to be more susceptible to Psoriasis.

According to the severity of the disease, patients were divided into three categories by using the PASI scoring, 24 patients (60%) were mild PSO patients, 10 (25%) were moderate PSO patients, and 6 (15%) were patients with severe PSO. Figure (1).

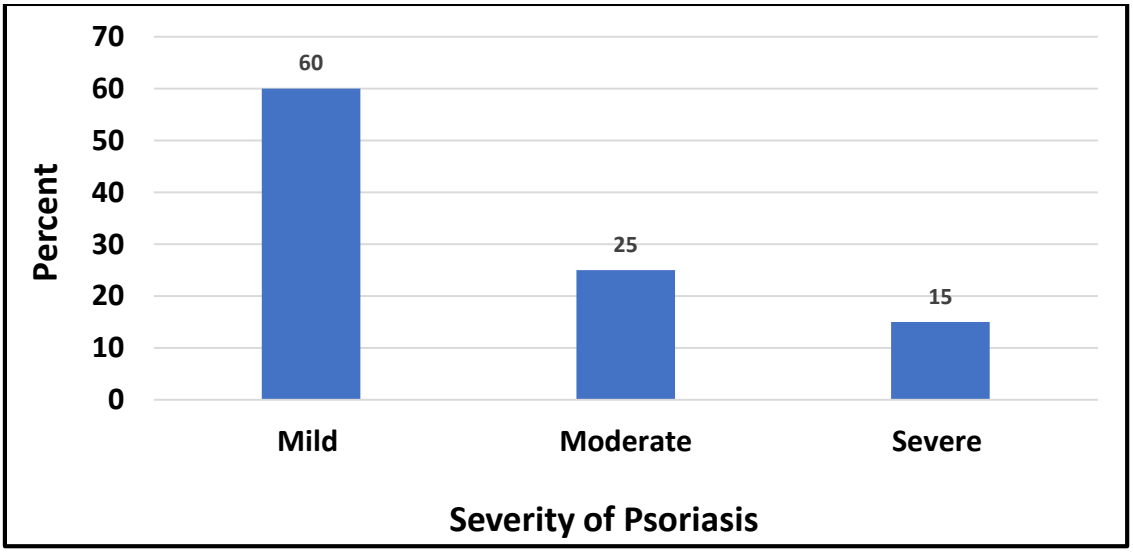

Figure (1): Distribution of Psoriasis Patients Groups According to severity.

The current findings pointed to a significant increase ($p<0.05$) in the of serum IL-17 in the patients' group in comparison with the control group (20.97 ± 12.93 vs 20.97 ± 12.93 respectively) as shown in table (2). According to table 3, there is no significant difference ($P>0.05$) in IL-17 levels between male and female patients.

Table 2. Differences in IL-17 levels between patients and healthy subjects

Groups	No.	IL-17 (pg/ml) Mean ± SD	T Test (P Value)
Patient	40	20.97 ± 12.93	2.21 (0.03)
Control	40	15.65 ± 8.07	

Table 3. Differences in IL-17 levels in patients' groups according to gender

Groups	No.	IL-17 (pg/ml) Mean ± SD	T Test (P Value)
Male	16	21.62 ± 5.07	0.97 (0.33)
Female	24	19.92 ± 5.93	

The means levels findings of IL-17 among patient groups referred to elevated levels of IL-17 in severe and moderate PsO patients compared mild groups as explained in Table (4). According to this table, there is a highly significant increase in mean levels of IL-17 (20.3 pg/ml) in patients with moderate PsO and (20.8 pg/ml) for patients severe PsO, compared to those with mild PSO (17.7 pg/ml).

Table 4. Differences in IL-17 levels in patients' groups according to severity

Groups	Number	IL-17 (pg/ml) Mean ± S.D	F test	P-value
Mild	24	A 16.7 ± 3.09	**9.88**	**0.004 (HS)**
Moderate	10	B 20.3 ± 2.11		
Severe	6	B 20.8 ± 1.17		

DISCUSSION

In the current study, the distribution of PSO patients according to gender found that the female to male ratio was (1.5 : 1), this agrees with a previously published paper by Mina *et al*. (9). Also, it comes in an agreement relatively with a research conducted by Bahnan *et al.* (10). Whereas this finding disagrees with Kim, *et al*. who found that the percentage of a male predominance is larger than females (11). These results were somehow consistent with those of a study conducted in Iran which also revealed a higher proportion of females (53.4%) compared to males (46.6%) (12), but they were inconsistent with the Korean study which showed a higher proportion of males (51.8%) compared to females (48.2%) (13). A recent study in Iraq exhibited that the female to male ratio was approximately 1:1 (14). Studies experimenting with skin irritation haven't established gender disparities. Therefore, the increased occurrence of irritant contact dermatitis in females is probably linked to exposure, whether at work or outside of work. Hand eczema significantly affects quality of life, with females generally reporting greater discomfort than males. (15). Regarding age, the current study has an agreement with a previous study that found interleukins 17 and 35 concentration does not affect with the patient's age (16)

The current findings pointed to a significant increase ($p<0.05$) in the of serum IL-17 in the patients' group in comparison with the control group (20.97 ± 12.93 vs 20.97 ± 12.93 respectively), the results agree with data reported many previous studies. Razzaq et al. (2015) have found a significant increase in the IL-17 serum mean concentration in PsO patients compared to controls in Karbala City (17), other important results by Al-Janabi (2018) indicated that IL-17A levels were found to be higher in psoriasis patients than healthy subjects (18). In addition, Abd Al Khaliq observed that levels of iL-17A levels were high before treatment. These levels were found to be reduced significantly after treatment with medication, IL-17 produced by (Th17) cell trigger the differentiation of naïve CD4+ T cells into helper T cells (Th17) (19).

The means levels findings of IL-17 among patient groups referred to elevated levels of IL-17 in severe and moderate PsO patients compared mild groups and these results were confirmed by previous studies (20).

Kareem and Al-Thwani (2021) have revealed that in some patients with severe psoriasis, (Almost all of their bodies) there is a significant increase in the level of IL-17 compared with patients with mild-to-moderate ones (14). Another study conducted by Golden et al. (2013) who indicated the increasing level of IL-17 in psoriatic patients. According to the severity of psoriasis, and supports the search that referred for the severity of the disease was associated with high levels of interleukin-17 compared to patients with moderate or mild severity with statistically significant high difference (21).

These findings are compatible with the fact that while T cells which produce IL-17 may be more common in certain skin conditions, they were discovered in greater numbers in PSO patients. IL-17 is identified in prurigo nodularis, chronic spontaneous urticaria, familial primary localized cutaneous amyloidosis, allergic contact dermatitis, and non-atopic eczema, among other pruritic skin conditions. (22).

CONCLUSION

It was concluded that the high levels of IL-17 in psoriasis, and it seem that this interleukin may contribute to the severity of the disease. No gender differences were seen regarding the level of IL-17.

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