IBN AL- HAITHAM J. FOR PURE & APPL. SCI. VOL.23 (3) 2010

Levels of interleukins 6 and 8 in Psoriatic patients serum

M. N. Iqbal

College of Medical & Health Technology, Baghdad.

Abstract

Recent progress in the understanding of psoriasis has shown that the regulation of local and systemic cytokines plays an important role in its pathogenesis. Different studies evaluated the association of serum levels of some proinflammatory cytokines invivo and their correlation with severity of psoriasis. Eighty cases of psoriatic patients had been studied. Patients were divided into mild psoriasis group (30) and severe psoriasis group (50) according to severity, and (30) apparently healthy individuals ware used as acontrol group. Sera samples of all groups were collected from all individuals for the estimation levels of interleukins (IL-6 and IL-8). All mean values sera levels (IL-6 32.004 pg/ml and 17.579 pg/ml for IL-8) of patients were significantly higher than those of controls (12.640 and 8.860 pg/ml for IL-6and IL-8 respectively). There was a high significant in sera levels of IL-6 and IL-8, in comparion with disease severity. The levels of IL-6 and IL-8 were significantly higher in severe psoriatic patients than thos in mild type. Furthermore, there was a positive correlation between the levels of IL-6, and IL-8 among the samples of psoriatic patients. The measurements of serum levels of these cytokines may be objective parameters for the disease severity.

Key words: IL-6, IL-8, Psoriasis

Introduction

At present, the researches of psoriasis are dominated by the hypothesis that it is an immunological disorder described by abnormal keratinocytes proliferation mediated through T lymphocytes [1]. Autoimmune disorders and inflammatory reaction are currently segregated into cell – mediated Th1 or Th2 categories. Psoriasis is associated with an overexpression of proinflammatory cytokines produced by Th1 cells and relative under expression of Th2 cytokines [2].Cytokines are small, biologically highly active proteins that regulate the growth, function, and differentiation of cells and help steer the immune response and inflammation [3]. Interleukin 6 (IL-6) is a pleiotropic cytokine. Among its characteristic actions are regulation of expression of other cytokines, induction of proliferation, differentiation of normal and malignant cells, and inhibition of tumor growth.

IL- 6 is also regarded as a major inducer of the acute-phase response [4]. Intrleukin 6 is a component of normal human skin and it was immunologically detected in basal keratinocytes, endothelial cells, many of mononuclear cells, fibroblasts, and sudoriparous ducts. Interleukin 6 has been suggested to function as an autocrine mitogen in psoriatic epidermis. In psoriasis, intense labeling of the cytoplasm in the vicinity of keratinocytes membranes was detected in the epidermal layers and other skin appendages [5]. Interleukin-8 (IL-8) is probably the best-known member of the family of chemokines [6]. Experimental data documented its role within a cascade of inflammatory events. These are focused and amplified by the action of IL-8 by local attraction and activation of different

leukocyte subsets - prominently neutrophilic granulocytes and lymphocytes [7].Increased IL-8 level in blood have been demonstrated in a number of systemic inflammatory disorders [6]. The role of circulating IL-8 in psoriasis, however, has not been adequately addressed in the past. The aim of the present study is to evaluate, IL-6 and IL-8 levels in the serum of psoriatic patients according to disease activity.

Materials and Methods

This study has been approved at the consulting center of allergy and asthma – Baghdad. It was conducted in the period between October 2008-May 2009.

Patients and controls

Consecutive patients with psoriasis who had not received any prior local or systemic treatment within two months were included in this study. The diagnosis was made clinically, based on characteristic plaque-type psoriatic lesions. Patients with erythrodermic, pustular, and only palmoplantar forms of psoriasis, and patients with psoriatic arthritis were excluded. The study comprised (80) patients (48 females and 32 males) with psoriasis who attended to center of allergy and asthma. Patients were divided into two groups according to the severity of their psoriasis; the severity of psoriasis was assessed by the Psoriasis Area and Severity Index (PASI) for each patient. 30 cases were diagnosed as mild psoriasis (prevalence = 40%) and 50 case were diagnosed as severe psoriasis (prevalence = 60%). The mean age of psoriasis cases in general was (35) years old. In addition a control group consisted of (30) healthy, their mean age was (35) years old, un psoriatic volunteers with no family history of psoriasis. Blood and urine were collected from both patients and controls for routine laboratory investigations including blood sedimentation rate, and blood cell counts.

Serum

Venous blood samples (5–10 mL) were taken in vacutainer tubes under sterile conditions from patients and controls between 09–11 am. Serum was obtained from freshly drawn, rapidly centrifugated. Serum was quickly frozen and stored for processing.

Cytokines detections

Sera IL-6 and IL-8, levels were measured by (enzyme-amplified sensitivity immunoassay (EASIA) kits technique, revised by Biosource Europe. These assays detected only human cytokines and the minimum detectable concentrations were 1.1pg/mL for IL-6 and 1.9pg/mL for IL-8.

Statistical Analysis:

The data were analyzed using the statistical package for social science (SPSS) 10.0 for Windows program on the computer. The suitable statistical methods were used in order to analyze and assess the results, they include the followings: Descriptive statistics: Summary statistic of the readings distribution (mean, SD, SEM, minimum & maximum) and Graphical presentation by (Scatter –chart). Inferential statistics were used to accept or reject the statistical hypotheses; they include Student test (t-test), least significant differences (LSD) and Pearson Correlation (r).The statistical significance was accepted as (P value < 0.05 &<0.01) [8].

Results

The results presented in this research were based on total of blood samples collected from (80) psoriasis patients and (30) healthy control individuals. The differential count for leukocytes revealed a characteristic blood eosinophilia among all groups of patients, that significantly differs from control group ($P<0.05$).The present data showed, a significantly differences in the mean percentage of neutrophils of mild group compared

with the control group, while total psoriatic group did not showed any differences (table-1).

Serum levels of IL- 6 & IL- 8

The mean, minimum and maximum values of the serum levels of interleukins IL-6 and IL-8 of the studied groups and statistical results are presented in (table -2). The mean value levels of IL-6 of the patients were significantly higher than those of the control (32.0 pg/ml and12.64pg/ml) respectively at ($p < 0.01$).The serum IL-8 levels of patients were significantly higher than those of controls (17.75 pg/ml) and (8.86 pg/ml) respectively at ($p <0.01$).Table (3) shows , the mean concentrations of IL-6 & IL-8 were higher in severe psoriatic group (39.24 & 20.48 pg/ml respectively) than in mild psoriatic patients (20.98 and 13.152 pg/ml) with higher significantly at $p < 0.01$, while the levels of IL-6 &IL-8 in mild psoriatic group showed no significant differences as compared with healthy control group ($p > 0.05$).

Correlation between sera levels IL - 6 and IL- 8 among psoriatic patients.

Pearson Correlation has been applied to study the correlation between levels of (IL-6) and (IL-8). The results are listed in Table (4) and figure (1). A positive correlation between IL-6 and IL-8 among the samples of psoriatic patients was shown; the sera IL-6 levels were increased with the increase of sera IL-8 levels in the psoriatic individuals.

Discussion

The present work revealed that both sexes were affected by psoriasis disease, the higher percentage of females than males were infected with disease with no significant differences. Recent studies have revealed that sex hormones manifest a variety of biological and immunological effects in the skin, pregnancy, menstruation and the menopause modulate the natural course
of psoriasis, indicating a female hormone induced regulation of skin inflammation. Estrogen invitro down regulates the production of the neutrophil, type1 T-cell and macrophage attracting chemokines by keratinocytes, and suppresses IL-12 production and antigen presenting capacity while enhancing anti-inflammatory IL-10 production by dendritic cells. These data indicate that estrogen may attenuate inflammation in psoriatic lesions [9]. The variations between the present results comparing with recent studies may be related to the differences in sample size, to the specific morphological structure of their skin, or the specific Iraqi nature which increased the stress in the subjective nature and that related to adverse life events. The diagnostic features may not all be present at the same time in every case and are some times obscured or evanescent [10, 11].

Eosinophil is a characteristic of severe and mild cases psoriasis and correlated with skin inflammation [12] .The Eosinophil percentage of current study revealed a characteristic blood eosinophilia, among all groups of psoriatic patients. They significantly differ from control group in accord with [13] who stated that peripheral eosinophilia seems to be associated with severe forms of psoriasis. This finding may suggest that the eosinophils have significant roles in the pathogenesis of psoriasis. In recent studies, it has been documented that the eosinophile cells play active role in many kinds of inflammatory disorder, increasing in number of circulating eosinophils is due to increasing release of eosinophils from bone marrow, the mediators which are involved in this process are Granulocyte Macrophage-Colony Stimulating Factor (GM-CSF), IL-3 and more selective for eosinophils IL-5 [14]. In addition, these growth factors are potent activators for eosinophils, acting at sub nanomolar concentration [15]. However, some of psoriatic patients had normal eosinophil cell numbers in their peripheral blood and it is not correlated with score severity skin of psoriatic patients. The change in eosinophil number might be a result rather than a cause of the disease. It can be concluded from these results that the increase in eosinophil cell counts is

correlated with severity of the disease. Finally this result refered that the psoriasis is one of allergic diseases appeared by its capacity to stimulate delayed mediated cells hypersensitivity which expressed by an increase in the production of the eosinophils. The results of present study are similar to [16] who noted a significantly increased number of leukocytes in inflammatory skin and psoriasis patients while the results were in a disagreement with the study of [17] who reported that mild psoriatic patients had significantly decreased in mean of leukocytes compared with severely group. Finally this result reinforces that the psoriasis is a common and recurrent skin disorder, characterized with inflammation. Histologicaly psoriasis is characterized by marked keratinocytes hyperproliferation,adense inflammatory infiltrate consisting of T cells and neutrophils, and vascular dilatation and proliferation. The primary defect in psoriasis patients was believed to be abnormal epidermal cells proliferation [18]. The very early lesion of psoriasis is characterized by an inflammatory infiltrate of mononuclear cells in the upper dermis with only minimal changes in the epidermis. The systemic effects of circulating cytokines may play an important role in the induction of epidermal cell proliferation. It was proposed that in normal skin there could be an interaction between the epidermis and circulating T cells. Cytokines are small, biologically highly active proteins that regulate the growth, function, and differentiation of cells and help steer the immune response and inflammation [11], Keratinocytes secrete a number of cytokines and chemokines that either activate or suppress immune responses [19]. However, precise mechanism of their involvement in psoriasis remains unclear. Any local or systemic stimulus may stimulate keratinocytes cytokines production [20]. The pattern of cytokine expression suggests that Thl cells may mediate or maintain disease, [21]. The present data confirmed the IL – 6 one of the proinflammatory cytokines is influenced in serum of psoriatic patients [5, 11&22] and contrary to other tested Th2 type cytokine IL – 6, had sera levels comparable with normal controls [23].Moreover, the present results showed significant differences in IL – 6 sera levels among studied patients groups
according to the severity of disease. Present results are in line with previous reports which found that IL-6 was shown to be elevated in serum of patient with active disease [24, 25]. It had been reported that IL-6 elevation positively correlated with psoriatic Assessment and Severity Index Scores. [25, 26] Interleukin 6 mediates T-cell activation, stimulates proliferation of keratinocytes, and at the beginning of acute inflammation, mediates the acute phase responses [11]. Interleukin 8 (IL-8) is the best- known chemokines. Its action is greatly enhanced by IL-1 and TNF-α. Interleukin 8 exerts a very strong chemotactic activity towards neutrophils [20]. Gearing et.al, [27] studied different cytokine levels, which were, IL-2, IL-4, IL-6, IL-8 and GM-CSF in aqueous extracts of stratum corneum from psoriatic lesions and normal heel. They found that IL-8 was the only biologically active cytokine to be elevated in psoriatic lesional extracts. In the present study, serum IL-8 was significantly increased in patients groups when compared with healthy control. Moreover it was increased significantly in severe psoriatic compared with mild psoriatic and healthy control groups. While the differences between mild group and healthy control was insignificant. The previous results did not found correlation between serum IL-8 levels and psoriasis severities and state of disease PASI [28]. Different data pointed out increase serum IL-8 and IL-6 in psoriasis [29]. Some of the reports also demonstrated that either lesional or serum levels of these cytokines reflect to some extent disease activity and treatment [30]. Shimizu et.al, [31] reported psoriatic skin disease patients had increased serum levels IL-8, and it's increasing was positively correlated with disease activity. Also [23] they found increase of IL-8 levels in psoriatic patients (24.4pg/ml) versus normal controls (3.6pg/ml) and positively correlated with degree of erythema. Many studies indicated that IL-8 may be involved in the pathomechanism of psoriasis. In fact, data currently available suggested that this cytokine exerts a critical role as a potent chemoattractant for neutrophils and T lymphocytes, as well as a factor prompting

keratinocyte proliferation [19].Interleukin 8 is known as chemotactic factor for neutrophils and, by an indirect mechanism induces neutrophil degranulation [24]. As neutrophils are present in the epidermis of the psoriatic lesions, it is possible that IL-8 aids in their recruitment and thus contributes to the erythema- while the kinetics of IL-8 in the serum of patients with psoriasis are not known, one could presume that IL-8 could be a good index for the inflammatory process and a crucial element in the cellular activation of psoriasis [23]. Several cytokines are increased in psoriasis, either at local or systemic level or both including Tumor Necrosis Factor alpha (TNF-α) IL-2, IL-6 –IL-8, Interferon gamma (IFN- γ), and Transforming Growth Factor alpha (TGF- α) which are regarded as hallmark, cytokines in psoriatic cytokine network [32]. Cytokines play an important role in the pathogenesis of psoriasis [23]. When measuring cytokines levels in serum, it is not possible to determine the origin of these cytokines, the serum cytokine concentrations are altered by several processes like the production, tissue or cellular deposition, degradation, and elimination of these molecules; furthermore other tissue sources of cytokine production might exist beside the circulating T-cells and the origin of circulating cytokines in blood serum in psoriatic patients is not clear, to achieve the cytokine concentration that can induce biological responses at distant skin lesions, huge amounts of free cytokines that induce generalized inflammation are required, thus, the receptors on psoriatic keratinocytes may be more sensitive to these cytokines [11]. In present study a positive correlation between sera levels of IL-6 and IL-8 were demonstrated that IL-8 could be regarded as an additional a part from IL-6, indicator of psoriasis activity. It is difficult to draw conclusions and very difficult to compare data obtained in different laboratory conditions. It could be argued that plasma levels of examined cytokines were already performed and published a few times but one has to bear in mind also the fact that cytokine evaluation results may vary due to different assays, individual variation in the stage of disease, demographic differences, and coexisting pathologies [33]. Until other inflammatory skin diseases are studied, we cannot speculate on the specificity of these results, and further investigations will be required to define the role of serum proinflammatory cytokines in the pathogenesis and their correlation with clinical severity of psoriasis.

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Table-1: Baseline clinical and demographic findings of study groups

Characteristics \ Subjects	Mild group N=30	Sever group N=50	Total group N=80	Control group N=30
Age Range (mean) years	12-40 (25)	12-70 (43)	12-70 (34)	12-65 (35)
Sex (female/male)	22/8	26/24	48/32	20/10
Percentage of frequency	40%	60%	100%	--------
Neutrophils percentage Range Mean. ± SD	* (57-61.3)% 58.8 ± 3.5	* (48.7-56)% 53 ± 3	(48.7-61.3)% 55.9 ± 3.3	(48-59.3)% 54 ± 3.56
Eosinophils percentage Range Mean. ± SD	(4 -7)% 5.75 ± 0.63	(2 -12)% 6.5 ± 0.735	* (2 -12)% 6.12 ± 0.623	* (2 – 4)% 2.7 ± 0.94

*significant differences at ($p < 0.05$)

Table (2) Sera levels of IL6&IL-8(pg/ml) in a study groups

Parameters	Study groups	N.	Mean± Std.error	Range	t-test(P-value)
IL-6	Healthy control	30	12.640 ± 2.176	1.5 -40.5	.000 ($p<0.01$)
	Psoriatic patients	80	32.004 ± 2.521	3.0 -70.9	
IL-8	Healthy control	30	8.860 ± 1.212	1.0-20.5	.000 ($p<0.01$)
	Psoriatic patients	80	17.579 ± 1.213	.0 - 42.3	

Table (3) Sera levels of IL-6 & IL-8amongpsoriatic patients.

Parameters	Statically parameters	Psoriatic groups		Healthy control (c)	LSD	
		Mild (a)	Severe (b)		P-value	Sig
IL-6	Range	3.0 -60.7	6.5 -70.9	1.5 - 40.5	(a)-(b)=.000	HS
	Mean	20.987	39.243	12.640	(a)-(c)=.084	NS
	S.error	3.747	2.793	2.176	(b)-(c)=.000	HS
IL-8	Range	0. – 30.5	4.5 – 42.3	2.0- 20.5	(a)-(b)=.001	HS
	Mean	13.152	20.489	8.860	(a)-(c)=.079	NS
	S.error	1.648	1.517	1.212	(b)-(c)=.000	HS

*NS = Non significant ($p>0.05$) , HS= High significant ($p>0.001$)

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Table (4): Correlation between sera levels of (IL-6 & IL-8).

Correlations

		Serum IL-8 (Pg/ml)
Serum IL-6 (Pg/ml)	Pearson Correlation (r)	.852
	P-value	.000
	Sig.	HS

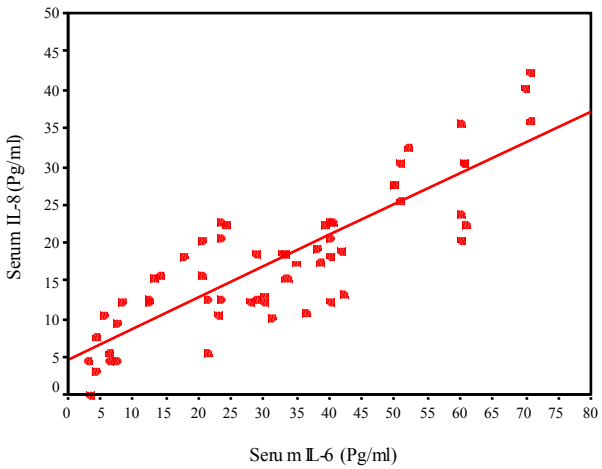

Fig (1): Scatter plot of correlations between sera levels of (IL –6 & IL-8) among patients

مجلة ابن الهيثم للعلوم الصرفة والتطبيقية المجلد23 (3) 2010

المستويات المصلية لكل من الانترلوكين السادس والثامن لدى مرضى الصدفية

ميادة نوري اقبل

كلية التقنيات الصحية والطبية،بغداد

الخلاصة

التطورات الاخيرة في فهم داء الصدفيةاظهرت الدور المهم الذي تؤديه السايتوكينات المنظمة الموقعبة والجهازية في نشوء المرض.العديد من الدراسات قيمت المستويات المصلية لبعض السايتوكينات الالتهابية الاولية داخل الجسم الحي وعلاقتها مع شدة المرض المواد وطرائق العمل: ضمت الدراسة 80 مريضا بداء الصدفية قسموا على مجموعتين الأولى : مجموعة داء الصدفية الخفيفة (30) والثانية : مجموعة داء الصدفية الشديدة (50) قورنت نتائج البحث بـــ (30) فردا من الأصحاء مجموعة سيطرة .قيست تراكيز كلا من انترلوكين السادس والثامن في مصول المرضى والاصحاء .الاستنتاجات : اظهرت نتائج الدراسة اختلافات معنوية في المستويات المصلية لكلا من انترلوكين-6 (32.004 بيكوغرام/مل) وانترلوكين-8 (17.579 بيكوغرام/مل) لدى جميع المرضى الصدفية مقارنة بالأصحاء(12.640 و 8.860بيكوغرام /مل) على التوالي;كما اظهرت الدراسة وجود فروقات معنوية في مستويات الانترلوكينات عند مقارنتها بشدة المرض ،إذ بينت مجموعة داء الصدفية الشديدة فروقاً معنوية في التراكيز المصلية لكلا السايتوكينين عند مقارنتها مع مجموعة داء الصدفية الخفيفة فضلاً عن ذلك، كان هناك إرتباطُ إيجابيُ بين مستويات انترلوكين -6، وانترلوكين -8 بين عيناتِ مرضى الصدفية وتلك المقاييسِ مِن مستويات السايتوكينات المصليةِ وهذه قَدْ تكُون مؤشرات موضوعيةَ لشدَّةِ المرضَ.