Study of Some Immunological Aspects in Scabietic Patients

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Abstract

Scabies is an important parasitic skin disease that continues to persist all over the world. The current study was designed to asses some immunological parameters that may be related with scabies disease Blood samples were collected from 60 patients (30 first infestation,30 re-infestation) with ordinary scabies and 30 healthy individuals as a control group to determine the total and differential WBCs count , in addition sera levels of some immunological parameters including, C3,IgE and Indoleamine 2,3 dioxygenase (IDO). The results revealed that a significant increase ($P \leq 0.05$) in total and differential WBCs count of patients groups compared with healthy group , also the levels of immunoglobulin IgE and IDO showed a significant increase ($P \leq 0.05$) in patients groups in comparison with healthy group . Concerning with complement components (C3) its levels observed a significant differences ($P \leq 0.05$) between patients groups(first infestation and re-infestation) , also between patients and healthy group .

Keywords: *Sarcoptes scabiei. IDO. IgE. C3.WBCs.Patients.*

Introduction

Scabies is a pruritic skin disease caused by Sarcoptes scabiei var. hominis which is characterized by severe itching particularly at night, red papules and often secondary infection. Commonly infested areas are the skin between the fingers, elbows, axillae, groin, penis, and nipples(1). Since, both the cell-mediated immune reaction in the skin and the circulating antibody response act parallels in clearing of the mites, eggs and debris(2) . Hypersensitivity reactions in patients infested with scabies caused by secretion of different materials by S. scabiei in the host skin (3-4) and during 4 weeks from infestation of scabies the immunity developed and appears of first symptom (5) The human body is exposed to different pathogens every day, but only few of them causing diseases because of the natural defense that called innate immune system, which represent the first line of host defense (6).

The data concluded that serum levels of C3 and IDO may be play an important role in controlling or persistent of skin parasitic infestation with Sarcoptes scabiei and increased levels of IgE .

Materials and Methods

1. Patients and control:

A total of 60 patients infected with Sarcoptes scabiei var. hominis (25 males and 35 females) and 30 healthy individuals (15 males and 15 females) were included in current study.

2. Blood samples :

The blood samples were drown from each patients and healthy subjects(5ml) . The sample was divided into two parts , the first placed in EDTA tube for calculate the total and differential WBCs count , while the other part was kept to clot at room temperature , then centrifuged at 3000 rpm for 10 minutes , after that sera samples were transferred into eppendrof tubes and stored at deep freeze until used .

3. Laboratory investigations :

A. **The total and differential WBCs count assay :**

The total and differential WBCs count were done according to the [7]

B.**Immunological assays :**

Serum IgE was measured by Enzyme Linked immuno- Fluorescent Assay technique (ELFA) performed by mini VIDAS, according to the manual procedure in kit provided by bio Mérieux company /

France, while the levels of C3 and IDO were estimated by ELISA according to the manual procedure of kits provided by MyBiosource company / USA and Abcam company / UK respectively .

Statistical Analysis

The results were analyzed by using statistical system spss version -24 .The data were expressed by means ±standard deviation (±SD) .Differences among patients and control groups were assessed using least significant differences (L.S.D.)

Results

There was a significant increase($P<0.05$) in means of the total WBCs count for patients groups compared with control group which reached to $12.783\pm1.488 \times 10^9$ and $12.790\pm1.482 \times 10^9$ (cell /L) for first infestation and re-infestation groups respectively ,while it was $8.147\pm2.403\times10^9$ (cell /L) for controls (table 1).

The differential WBCs counts for the first infestation and re-infestation groups of patients were shown a significant increase ($P<0.05$) in neutrophils , eosinophils , and basophils compared with healthy group , but there was a significant decrease ($P<0.05$) in monocytes and lymphocytes in patients groups compared with healthy group as shown in table(1).

Table 1: The total and differential WBCs counts (%) in patients and control groups .

Variables	Groups			LSD	Sig.
	First Infestation n=30 Mean ± S.D. (cell/L)	Re infestation n=30 Mean ± S.D. (cell/L)	Control n=30 Mean ± S.D. (cell/L)		
WBCs	12.783±1.488	12.790±1.482	8.147±2.403	0.946	0.000
Neutrophils	70.967±6.803	72.350±6.597	54.217±5.139	3.194	0.000
Lymphocytes	13.500±5.308	13.953±5.532	32.010±6.428	2.964	0.000
Monocytes	4.470±3.073	4.140±2.955	10.048±2.398	1.449	0.000
Eosinophils	10.783±2.426	9.290±2.263	3.473±1.539	1.084	0.000
Basophils	0.443±0.264	0.393±0.200	0.105±0.100	0.103	0.000

As notified in table (2) the results revealed that a significant increase($P<0.05$) in the levels of IgE in patients groups compared with control group which reached to 524.15±246.59 and 513.13±251.64 (IU/ml) for first infestation and re-infestation , whereas it was 73.64±19.21 (IU/ml) in control group. The data of current study showed statistically significant differences at the level of significance P- value < 0.05 between mean averages in studied groups, as notified in table(2).In which , there was a significant differences in the levels of C3 between the three groups, which is reached to 2.61±1.49 µg/ml , 64.74±26.8 µg/ml and 11.68±3.28 µg/ml in first Infestation , re-infestation and control groups respectively .

The results (table 2) showed that a significant increase ($P < 0.05$) in the level of Indoleamine 2,3 dioxygenase in patients compared to control groups , which reached to 7.61±2.39 , 7.83±2.26 and 0.52±0.28 (ng/ml) in first Infestation , re-Infestation and control groups respectively.

Table (2): The levels of IgE, C3and IDO in first infestation, re- infestation and control groups .

Variables	Groups			LSD	Sig. or P. Value
	First Infestation n=30 Mean ± S.D.	Re -infestation n=30 Mean ± S.D.	Control n=30 Mean ± S.D.		
IgE IU/ml	524.15±246.59	513.13±251.64	73.64±19.21	104.55	0.000
C3 µg/ml	2.61±1.49	64.74±26.8	11.68±3.28	8.01	0.000
ID0 ng/ml	7.61±2.39	7.83±2.26	0.52±0.28	0.979	0.000

Discussion

There were a significant differences($P<0.05$) in the total and differential WBCs counts between patients and healthy subjects groups. [8] and [9] mentioned that the elevated numbers of lymphocytes, monocytes, eosinophils and basophils in scabietic patients compared with healthy group, also [5] reported that occurs of blood eosinophilia and enhanced production of IgE in scabietic patients .

IL-10 and TGF-β cytokines produced by eosinophils may alter the local character of the Th2/Th1 responses by preventing the differentiation of naïve T lymphocytes to either the Th1 or Th2 phenotype , on the other hand producing indoleamine 2, 3, −dioxygenase by eosinophils may also drive Th1/Th2 imbalance [10-11].

The mechanisms for the infiltration of mast cells and basophils into the blood and skin remains to be addressed to elucidate their role and importance in scabies inflammatory and allergic responses. [12] and [13] .referred that the activated mast cells and basophils rapidly produce TNF-α, IL-6 and Th2 cytokines(IL-4, IL-5 and IL-13) which are the main molecules responsible for the allergic Th2-type inflammation .

There were a significant differences in IgE levels among the patients groups and healthy subjects , in which [14] noted that elevate levels of IgE in patients compared with healthy groups which ranged between 17–1219 (IU/mL) when they studied 50 patients (suspected with scabies) and 20 healthy group. Also , [15] showed a high significant differences in total IgE levels (1.92±0.52 pg/ml) in patients with scabies compared with control group, while [16-17] have been documented a wide variation in serum IgE levels among healthy non-allergic adult populations. [18] explains the hypersensitivity reaction type 1 in patients infested with scabies who is responsible for expelling parasites and products from the borrowing of severe itching and scratching, which in turn leads to a sudden reduction in the density of parasites at the time it began to itch [19] . On the other hand , the studies of humoral immune responses in forty scabietic patients and twenty healthy control individuals, showed no significant difference in the levels of IgE between patients and control groups , while other researches have demonstrated a significant increase in IgE levels among patients with scabies [20-21-22-23- 24-25] .

The cysteine and serine proteases of the dust mite and the serine protease of Aspergillus fumigatus have

all been documented to induce Th2-driven inflammatory responses dominated by elevated IgE , eosinophilia, and Th2 cells ,therefore, the author suggests the mites and its products contains on inactivated serine proteases may be leads to elevate level of IgE [26].

There are a significant differences in C3 levels between the three groups of the study . [27-28] found that a significant difference in C3 levels between scabietic patients and control groups , in which there was a high levels of C3 in patients, while [22] pointed out no significant differences in C3 levels between patients(177.71±81.34pg/ml) and controls (160.37±61.22pg/ml) .On the other hand , [29] showed no significant differences in the level of C3 in scabietic patients before or after treatment compared with control group , that's mean a normal levels in the C3 concentration.

The results of current study revealed that a significant increase in IDO level in patients(first infestation , re-infestation) compared to healthy subjects group . [30] illustrated that cutaneous Leishmania major infection stimulated expression of the immune regulatory enzyme indoleamine 2,3 dioxygenase (IDO) in local lymph nodes, therefore, induced IDO attenuated the T cells stimulatory functions of dendritic cells and suppressed local T cells responses to exogenous and nominal parasite antigens.

Recently , IDO-1 enzyme activity were lower in patients with asthma and allergic rhinitis than in control group ($P<0.05$), while in the same study they found that the patients with atopic dermatitis shows higher IDO-1 activity compared with control group ($P<0.05$) [31]. Meantime, [32] mentioned that the IDO activity in serum of patients with atopic dermatitis and controls considered statistically significant differences .

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Department of Biology and all experiments were carried out in accordance with approved guidelines.

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