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Measurement of Several Hematological and Serological Parameters in Patients with Scabies

Mariam Y. Al-Fadhly[1*], Wasan A. Al-Marsomy[2], and Hiba H. Maqdasi [3]
[1, 2]Department of Biology, Collage of Sciences for women, University of Baghdad, Baghdad, Iraq.
[3]Department Medicine, Collage of medicine, Ministry of Health, Baghdad, Iraq.
*Corresponding Author.

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Abstract

People often refer to scabies as the "7-year itch," but it is more appropriate to refer to it as a "family disease" (1, 15). Scabies mites penetrate the stratum corneum epidermis of the skin at the onset of infection (2, 16). The current study involved the collection of blood samples from a patient group infected with scabies disease, comprising sixty individuals, and a control group of sixty individuals who were in good health. The tests showed that there were no statistically significant differences between the scabies patients and the control group for Hb (12.86± 0.31, 12.88± 0.20), PCV (34.40±0.94, 40.35±0.59), and platelets (244.80±9.58, 237.23±8.97), Respectively. There were also significant differences at the 0.001 level between the two groups of patients and the control group for white blood cells (WBC), lymphocytes, neutrophils, eosinophils, monocytes, and basophils. These were (11.09±0.20, 7.50 ±0.16), (5.05±0.16, 2.27 ±0.06), (8.23±0.10, 3.75±0.11), (0.828±0.7, 0.415±0.03), (0.498±0.02, 0.459±0.03), and (0.329±0.02, 0.102 ± 0.01), respectively. However, the measurement of immunoglobulins (IgA and IgE) revealed non-significant differences in the value of IgA for scabies patients (130.73 ± 10.38) compared to the control group (115.55 ± 4.60). However, the IgE ratio resulted in high significant differences at level (P≤0.01) between patients (36.59 ±5.06) and control (13.56 ±0.89).

Keywords: *Sarcoptes*, CBC parameters, IgA and IgE and scabies patients.

1. Introduction:

Scabies is an ectoparasite due to the mite *Sarcoptes scabiei var. hominis*, these tiny insects crawl into the skin, creating small red lumps and severe itching, the pathogen spreads quickly from one person to the next, especially when individuals live near to another one (1). The mites live in the skin's cracks and tiny holes, In addition to the classic form, there are different versions (also

known as typical), usually, mostly located in an African distribution and a larger scale as a population level health issue that demands attention in various contexts globally (2). Scabies can be seen as a barrier to the fundamental human right to live a long life in good health, especially for poor patients in less developed nations (3). Crusted Norwegian often happens in patients with weak immune systems. It tends to form crusted areas covering a big area of skin, crusted scabies, may contain millions of mites instead of the 10 to 15 mites common with classic scabies, while the nodular the kind is more frequent in youngsters (4,26). Bullous type is in adults of scabies and can be confused with bullous pemphigoid, it is another causes infected skin blisters, infected and occurs on scalp and may not present symptoms except for scales that may resemble psoriasis (5). Itching is the most noticeable symptom of scabies, especially at night and it can be so severe that it keeps a person awake at night, other symptoms include rash sores and thick skin crusts (6, 27). Despite experiencing a wide range of clinical features that range from mild to severely harmful which occurs in scabies patients, but the immune and inflammatory responses connected with the different clinical manifestations are still insufficiently understood characterized, although, people with scabies suffered from severe itching that was clear and allergic in nature as Chapter One: Introduction 2 result inflammatory reactions for the host toward the mite and its products. World Health Organization has legally designated scabies as a neglected tropical disease and CS (crusted scabies) is an even less-researched manifestation of this sickness that requires further study, microscopic analysis of skin scrapings identified mites, eggs or faecal pellets (7, 4). The research indicates that *Sarcoptes scabiei* may be reducing the early immune responses by down regulating the expression of pro inflammatory mediators and cytokine. For instance, IgE plays a crucial role in the host defense against to a variety of parasites and along with mast cells, basophils and eosinophil's, it forms a crucial component of allergic and parasitic inflammation, in humans, earlier studies have found that scabies causes an increase in production of circulating IgE antibodies (8,4). Secretory IgA which is necessary for immunological activity in the mucous membranes, is often more abundant in mucosal regions than in serum. And about immune cells, Th2 cells release IL-4, IL-5, and IL-13 and mediate humoral immunity by producing more antibodies to fight extracellular parasites and mediating humoral immunity, Th2 cells are also the predominant effector cells in the pathogenesis of IgE mediated hypersensitivity in asthma and other allergic inflammatory diseases (9, 4). As well as, parasite infection stimulate increase production of Th17 cytokines such IL-23, IL-17 which is a powerful pro-inflammatory cytokine that is typically released Th17 cells, however they can also secreted by other cell types such as CD4+ and CD8+ T cells. Thus, Th17 cell production and IL-17 release is promoted through cytokine signaling, indicating a combination of non-protective allergy Th2 Chapter One: Introduction 3 and IL-17 responses contributing in disease pathogenesis (10, 6).

2. Materials and Methods

The current study encompassed 120 participants, comprising 60 patients (30 males and 30 females) with scabies disease, ranging in age from 4 to 63 years, and 60 healthy individuals (40females and 20 males) with the same age range, from 1st October 2022 to the end of January

2023, from the dermatology unit at Baghdad Teaching Hospital/Medical City. Collected all samples with the patients' consent before including them in the study.

Collection of blood samples: Collected the blood samples (5ml) from both the patients and the control group using a disposable syringe. We divided the blood into two parts: we placed 2 ml in a plain tube with Ethylene Damien Tetra acetic Acid (EDTA) for blood tests, and we centrifuged 3 ml of the serum at 3000 rpm for 10 minutes to separate it. We then collected the serum in other sterile tubes and stored it at -20° C until using. The assay procedure pertains to the immunoglobulins (IgA and IgE). Scientists from Bioassay Technology Laboratory in China say that the tests for IgA and IgE, Nos. E0189HU and SL0913HU, use a method called sandwich ELISA, which stands for enzyme-linked immune-sorbent assay.

3. Results

3.1. Measurement complete blood count (CBC) level

The results showed that there were non-significant differences at the < 0.05 level for measuring Hb, PCV, and platelets (12.86± 0.31, 12.88 ± 0.20), (34.40±0.94, 40.35±0.59), and (244.80±9.58, 237, 23±8.97) respectively between the scabies patients and control group, as shown in table 1.

Table 1. Comparison between Hb, PCV and PLT parameters of patients and control group

	Hb (g/dl)	**PCV** (%)	**Platelet** (10^3/µL)
Patients	12.86 ±0.31	34.40 ±0.94	244.80 ±9.58
Control	12.88 ±0.20	40.35 ±0.59	237.23 ±8.97
T-test	0.732 NS	2.20 NS	26.004 NS
P-value	0.978	0.082	0.565

In the table 2 there were significant differences at the 0.001 level between the two groups of patients and the control. These differences were for white blood cells (WBC), lymphocytes, neutrophils, eosinophils, monocytes, and basophils. They were (11.09+0.20, 7.50 ±0.16), (5.05±0.16, 2.27 ±0.06), (8.23±0.10, 3.75±0.11), (0.828±0.7, 0.415±0.03), (0.498±0.02, 0.459±0.03), and (0.329±0.02, 0.102 ± 0.01) respectively.

Table 2. Comparison between different cell of complete blood count for patients and control group

WBC (10^6 g/L)	**Lymphocyte** (10^6 g/L)	**Neutrophil** (10^6 g/L)	**Eosinophil** (10^6 g/L)	**Monocyte** (%)	**Basophile** (10^6 g/L)
11.09 ±0.20	5.05 ±0.16	8.23 ±0.10	0.828 ±0.7	0.498 ±0.02	0.329 ±0.02
7.50 ±0.16	2.27 ±0.06	3.75 ±0.11	0.415 ±0.03	0.459 ±0.03	0.102 ±0.01
0.511 **	0.334 **	0.301 **	0.167 **	0.083 NS	0.044 **
0.0001	0.0001	0.0001	0.0001	0.361	0.0001

3.2. Serum Level of the Immunoglobulins (IgA and IgE)

The result of the present study investigated non-significant differences in the value of IgA for scabies patients (130.73 ± 10.38) compared with the control group (115.55 ± 4.60). But the result of the IgE ratio represented high significant differences at level (P≤0.01) between patients (36.59 ±5.06) and control (13.56 ±0.89) (Table 3).

Table 3. Comparison between scabies patients and control group according to level of IgA and IgE

	IgA (mg/ml)	IgE(mg/ml)
Patients	130.73 ±10.38	36.59 ±5.06
Control	115.55 ±4.60	13.56 ±0.89
T-test	22.489 NS	10.19 **
P-value	0.183	0.0001

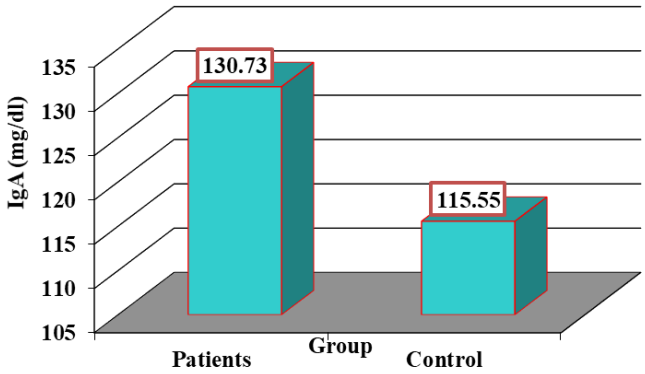

Figure1. Comparison between patients and control groups in IgA.

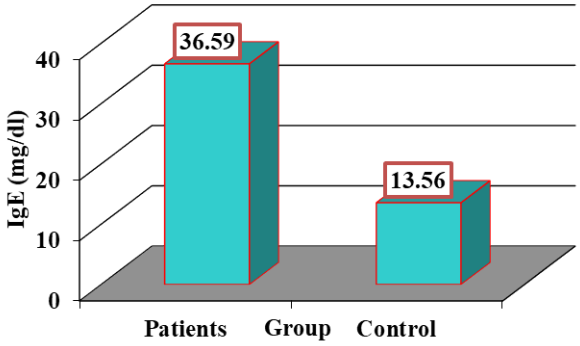

Figure2. Comparison between patients and control groups in IgE.

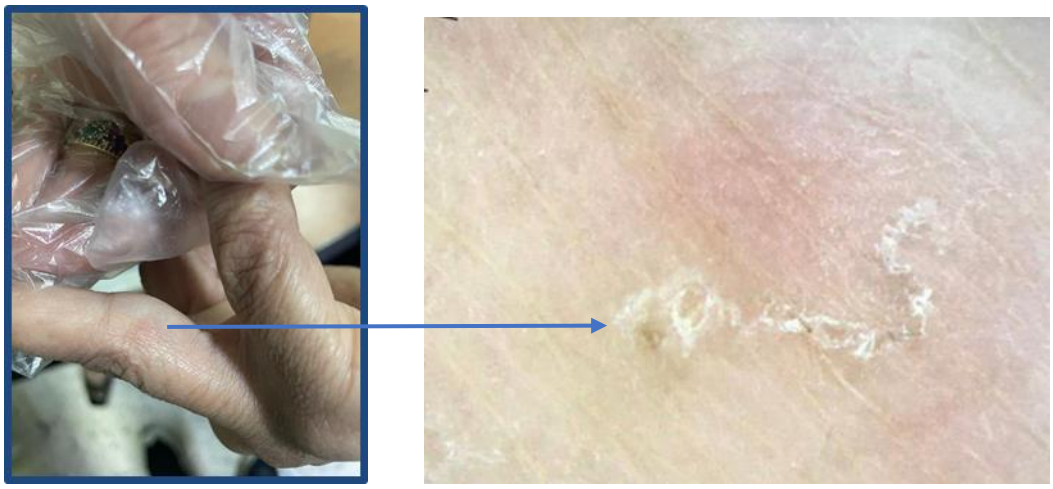

Figure 3. Skin burrow (scabietic nodules)

4. Discussion

The study results showed that there were non-significant differences at < 0.05 level for measuring (Hb, PCV and platelet) was 12.86± 0.31, 12.88 ±0.20 g/dl , 34.40±0,94, 40.35±0.59 % and 244.80±9.58, 237,23±8.97 103/ml respectively between the scabies patients and control group. The results manifestation that no considerable differences of Hb and pcv and platelets tests due to the blood components may be is influenced by several factors such as fibrinogen concentration and other acute phase proteins, the immunoglobulin concentration, number, size and shape of the erythrocytes and patient age and the gender, so, sometimes makes it less suitable for the diagnosis of inflammatory and infectious diseases (11, 28). The present results is approved with past results done by (14, 13, and 12). Where they recorded that not significant variations for measuring these tests between the patients and control groups. While the other results of this table include total number of WBC , lymphocyte, neutrophil, esinophil, monocyte and basophil) revealed significant differences at ≤0.001 level was 11.09+0.20 ,7.50 ±0.16 103/ml, 5.05±0.16, 2.27±0.06, 8.23±0.10, 3.75±0.11, 0.828±0.7, 0.415±0.03 , 0.498±0.02,0.459±0.03 and 0.329±0.02 , 0.102 ± 0.01 % respictively between two groups, patients and control. Whereas, the reason for the increase of these cells such WBC, neutrophil and eosinophil is the scabies infection stimulate the innate immunity in addition to humoral and cellular immunes (15, 29) and this result convention with (16,17,13). As well as, the increment of basophile value, as the cause of allergic reactions in patients with scabies, of which is one important of its symptoms. This result compatible with the results of study (18, 19, 15), that reported the increase in eosinophil of scabies patients could produce some kinds of allergens which reach some a deeper layer of mucosa during the infection. As for the monocytes, when they first leave the circulation to respond to (*Sarcoptes s*.) in one way, this response changes for these cells in transformed into macrophage that can then internalize and present antigen, also possible that the cytokines produced by T and B lymphocytes in the PBMC (Peripheral Blood Mononuclear Cells) in response to parasite, may that influencing on monocyte production (20). The present results is approved with prior results done by (14, 13 and 12). Where they recorded that not significant variations for measuring these tests between the patients and control groups.

Although, the increasing level of IgE in scabies patients serum because the parasitic infections that have allergy reactions which is one of the most important symptoms of scabies, that work to stimulate the secretion of IgE whose participate to the local inflammatory reaction and is associated with the skin inflammation and in addition to the it is role in the activation to producing CD4+ (T-helper) (21, 30). Therefore the infection with ectoparasite (*Sarcoptes scabiei*) causes stimulation humoral and cellular immune system of the host (22, 31). Present results consistent with previous results conducted by (23, 21). That reported great levels of IgE in scabies patients. Immunoglobulin (IgA) an antibody has a major role in the immune system in combat diseases that invade the body and struggle infection, which is renewed all six days as it is excreted in the mucous membranes (such as respiratory and digestive system, saliva, tear and breast milk) and has the might to defend versus sepsis and immunity particular in the mucous membranes, therefore it is called secretory IgA because it is found in the mucous tissues more than the serum (24, 32). Thus, the current result demonstrated non-significant differences between scabies patients and control group, so, this result convention with (25). But this result disagreement with (26 ,33) study, that reported was the higher significant rates of IgA for patients group compare with control by conducted on indirect induction of scabies disease to the emergence of an autoimmune disease (SLE) in the province of Thi Qar.

5. Conclusion:

The hematological parameters in present study represented there were no-significant differences for Hb, PCV, monocyte and platelets, whereas, revealed significant differences with total number of WBC, lymphocyte, neutrophil, eosinophil and basophil percentage between patients and control group. The present study investigated no-significant differences in the values of immunoglobulin IgA for parasitic infection, but IgE ratio represented high significant differences in scabies patients.

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Conflict of Interest:

The Writers say they have nothing to disclose about conflicts of interest.

Ethical Clearance

Statistical analysis Data analysis was done by SPSS program, while qualitative data were expressed as a number, percentage and quantitative data by chi square test and utilized T test and Pearson correlation coefficient were also applied to p value of 0.01 and 0.05 was used to indicate if the results are significant.

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