

An immunological study of acne patients using IgG3, TLR2 and IL-17A

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Abstract

It was found after diagnosing 75 samples infected with acne that were collected from some health institutions in Salah-Din Governorate in the period between (8/2022 to 3/2023) and compared to the control group (15 healthy samples). Immunological tests were conducted using the ELIZA technology using three types of Antibodies: IgG3, TLR2, and IL-17A (serine-related cytotoxic T lymphocytes). The percentage of IgG3 formation in the immune system of infected samples reached (435.19971) g/ml. while the control group recorded (123.29864) g/ml. The highest recorded in the infected samples was (759.17642) g/ml, while the lowest in the infected samples was recorded (104.07295) g/ml, as for the immune receptor TLR2, it increased significantly, with a rate recorded at (792.07308) g/ml, and the highest infection recorded was (1237.73994) g/ml, while the lowest sample recorded was (154.92708) g/ml, compared to the control group, which recorded (133.46532) g/ml, while Interleukin IL-17A also recorded: a significant increase in the immune system of samples infected with acne. The rate of IL-17A in the affected samples was (43.29432) g/ml compared to the control group, so the rate of presence of IL-17A in blood serum was (26.51416) g/ml. The highest infection recorded was (55.47752) g/ml, while the least infected sample was recorded (12.6228) g/ml. It has also become clear from this study that the immune indicators IgG3, TLR2 and IL-17A are the best diagnostic indicators for people with acne than the immune indicators resulting from other infections. The study also proved that TLR2 is the most prominent immune indicator in people with acne.

Introduction

Acne is the most common inflammatory skin condition affecting millions of people. The main cause of this disease involves the hormonally-induced production as well as keratinization of hair follicles, and immune inflammation resulting from the response to Propionibacterium acnes bacteria, which are Gram-positive bacteria and are specifically located within the lipid-rich follicle close to or attached to the hair [1], but in fact, It has become clear that the exact cause of acne development is not yet known. As is known, acne responds to anti-inflammatory drugs, they are often ineffective and acne may be considered a contagious disease[2]. The immune response may be high against the bacteria Propionibacterium acnes that originally coexist with humans, so this may be considered The

bacteria are opportunistic, and although *P. acnes* colonizes all humans, it does not infect all young people with disease, and this bacterium may not react to the strength of inflammation[3]. The immune responses of acne patients to *P. acnes* may play a role in Cytokines play a role in the immune system and activate regulatory T cells (Treg) [4] and may be responsible for the formation of a group of interleukins such as IL 17a and IL 8 , *P. acnes* colonization is believed to occur sometime during adolescence and in children. Between the ages of 11 and 15 years, almost no acne is found in unaffected postpubertal individuals. [7] However, adolescents with acne have a much higher number of immune markers compared with adolescents of the same age) [5]. It is interesting to note that, in older individuals, the number of microorganisms is the same as in those with and without acne [10]. Acne produces an extracellular lipase that breaks down fatty triglycerides into glycerol and free fatty acids, which may contribute to the formation of Comedonal acne. The enzymes produced by *P. acnes* lead to the rupture of the comedonal wall, and this is what gives an impetus for more dangerous types of germs to easily infect the skin.[6]. The aim of this study : is to identify the immune indicators associated with acne.

Materials and Method

The 75 samples from acne patients were diagnosed after consultation with a specialist doctor, and blood samples (serum) were taken from each patient using a needle. (5 cc) from each sample in highly sterile conditions and the blood samples were placed in special test tubes, then the blood was taken with the same the method was taken from (15) other samples who did not suffer from acne or any other inflammation, and they were considered a control group. After that, a centrifugation process was performed on all the infected and healthy samples to obtain (Serum), then the tubes were kept in a refrigerated container. Especially highly sterilized.

After that, immunological tests were performed using ELISA technology on two groups: the first group, 75 acne-infected samples, and the second group (control group), 15 healthy samples, and the kits were done according to the instructions of the manufacturer of the kits used in this study.

The antibodies used in the study were: IgG3, TLR2, and IL-17A, and after conducting immunological tests, the results were recorded.

Results:

IgG3: After conducting immunological tests using the ELISA technique for samples infected with acne, it became clear that the rate of IgG3 formation in the immune system in 75 infected samples recorded (435.19971) g/ml, and the highest for the infected samples was recorded (759.17642) g/ml, while the lowest infected samples were recorded (104.07295) g/ml.

As for the group of samples that did not suffer from acne (15) samples (control group), the rate of IgG3 formation in the blood serum was (123.29864) g/ml, and the highest percentage present in the blood serum of the control samples was (315.39665) g/ml and the lowest percentage present was (10.32785) g/ml.

TLR2: It has become clear that immunological tests using (ELIZA) for a total of 75 samples infected with acne showed a clear increase in the percentage of formation of the membrane protein or the immune receptor TLR2. The rate was recorded at (792.07308) g/ml, and the highest infection recorded was (1237.73994) g/ml. As for the lowest sample recorded (154.92708) g/ml, as for the control group (15) samples, the average presence of TLR2 in blood serum was (133.46532) g/ml, so it was found that the highest control samples recorded (332.32194) g/ml and the lowest control samples recorded (11.06622).)g/ml.

IL-17A: It has been shown that there is an increase in the percentage of Interleukin (IL-17A) in the immune system of samples infected with acne (75) samples under study. The rate of IL-17A in the infected samples was (43.29432) g/ml, and the highest infection recorded was (55.47752) g/ml. As for the lowest infected sample recorded (12.6228) g/ml, while in the control group (15) samples, the average presence of IL-17A in the blood serum was (26.51416) g/ml, so it was found that the highest for the control samples was (35.45688) g/ml and the lowest control samples recorded (2.41152) g/ml.

Table 1. Average of some immune indicators under study for people with acne:

The group affected by acne				
Type of immunological index	Immune index rate g/ml	Highest infection g/ml	Less infection g/ml	
IgG3	435	759	104	
TLR2	792	1237	154	
IL-17A	43	55	12	
Healthy group (control group)				
Type of immunological index	Immune index rate g/ml	Top sample	Minimum sample	
IgG3	123	315	10	
TLR2	133	332	11	
IL-17A	26	35	2.4	

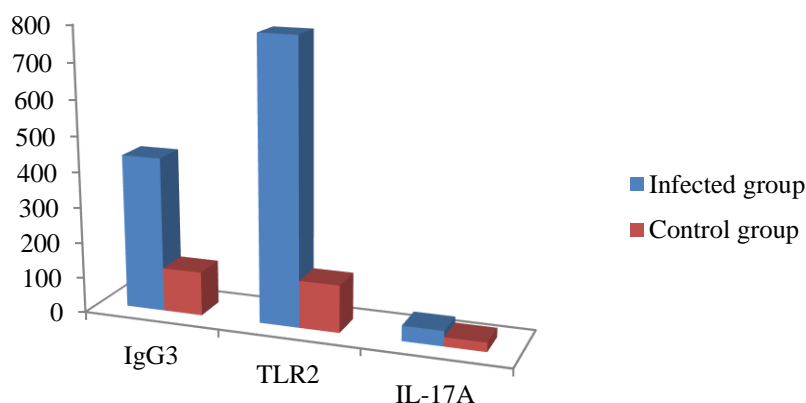


Fig. 1 Average of immune indicators for people with acne compared to the control group.

Discussion:

Immune indicators are considered one of the most reliable factors in determining infections that affect humans [8]. An increase in any immune indicator in the blood serum is a clear indication of infection with a specific infection resulting from a pathogen such as bacteria or others, [9] and it is clear in this study and according to Table (1) High immune

indicators are being studied in people suffering from acne caused by a type of bacteria, which may be *Propionibacterium acnes*. We notice a significant increase in the rate of immune globulin (IgG3) in people with acne, as it reached 435 g/ml compared to the control group of unaffected people, where the rate of presence of this immune globulin in the blood serum was 123 g/ml, and this is certainly the result of high percentage of *Propionibacterium acnes* bacteria in the blood or immune system. This study may be similar to what was reported, [12] as it evaluated a group of monoclonal antibodies, namely IgG1, IgG2, and IgG3, against some pathogens that infect humans.

As for the TLR2 antigen, it is very clear that there is a significant increase in the rate of presence of this antigen in the blood serum of people with acne, where it was recorded at 792 g/ml, and for unaffected people or the control group, it was 133 g/ml, and at the same time there was a noticeable increase. About the rates of other immune indicators (Figure 1). Therefore, TLR2 may be the indicator most affected by acne, and the reason may be due to the physiological changes resulting from some hormones that are formed in young people during adolescence, which differ from one person to another according to the samples tested [9]. They ranged Between (154-1237 g/ml) and this applies to the rest of the other immune indicators. In addition, the reason may be due to the sensitivity of TLR2 towards the bacteria that cause acne. This study may be similar to [7], which demonstrated that TLR2 increases chemotactic factors (NCF), especially in acne.

It is also noted that there is a significant difference in the rate of formation of Interleukin (IL-17A) in the immune system of samples of people with acne compared to those without it. It was 43 and 26 g/ml, respectively. The reason may be the spread of *Propionibacterium acnes* bacteria in the blood, which led to increase the formation of this antibiotic, which stimulates an increase in the activity of all types of white blood cells [11]. In addition, we note that the ratio of (IL-17A) to other immune indicators is the lowest, and this may be due to the decreased sensitivity of this Interleukin to the bacteria that cause acne. This study may be consistent with the study [13], which confirmed that there is a clear significant difference between the rates of formation of types of cytokines according to the sensitivity of each Interleukin against the types of bacteria that infect humans.

Conclusion:

The immune indicators IgG3, TLR2, and IL-17A are among the best indicators of acne compared to other inflammatory indicators.

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دراسة مناعية لمرضى حب الشباب باستخدام IgG3 و TLR2 و IL-17A

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الخلاصة:

تبين بعد تشخيص 75 عينة مصابة بمرض حب الشباب بالمقارنة مع مجموعة السيطرة (15 عينة سليمة) واجراء الاختبارات المناعية بواسطة تقنية (ELIZA) باستخدام ثلاث انواع من الكتات هي IgG3 ، TLR2 و IL-17A (انترلوكين مرتبط بالخلايا اللمفاوية الثانية السامة للخلايا); ان معدل تكوين الكلوبين المناعي IgG3 في الجهاز المناعي للعينات المصابة (435.19971) g/ml بينما مجموعة السيطرة سجلت (123.29864) g/ml وقد سجلت اعلى العينات المصابة سجلت (759.17642) g/ml، بينما سجلت اقل العينات المصابة (104.07295) g/ml، اما المستقبل المناعي TLR2 فقد ارتفع معنويا بشكل واضح فقد سجل معدل (792.07308) g/m وكانت اعلى اصابة سجلت (1237.73994) g/ml اما اقل عينة سجلت (154.92708) g/ml، بالمقارنة مع مجموعة السيطرة التي سجلت (133.46532) g/ml، بينما سجل IL-17A: ارتفاعا معنويا في الجهاز المناعي للعينات المصابة بحب الشباب فقد كان معدل IL-17A في العينات المصابة (43.29432) g/ml بالمقارنة مع مجموعة السيطرة فكان معدل وجود IL-17A في مصل الدم (26.51416) g/ml. اعلى اصابة سجلت (55.47752) g/ml اما اقل عينة مصابة سجلت (12.6228) g/ml. لقد اتضح ايضا من هذه الدراسة ان المؤشرات المناعية IgG3، TLR2 و IL-17A هي أفضل المؤشرات تشخيصا للأشخاص المصابين بمرض حب الشباب من المؤشرات المناعية الناتجة من الالتهابات الاخرى، واثبتت الدراسة ايضا ان TLR2 انه اعلى المؤشرات المناعية ظهورا عند الاشخاص المصابين بمرض حب الشباب.

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