

Variations of Total-Aeroallergen Specific IgE and Eosinophil Levels in Psoriasis

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Abstract

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The aim of the present study was to investigate the predisposition to atopy in psoriasis vulgaris. Total serum immunoglobulin E (Ig E) and radioallergosorbent test (RAST) (Allergen-specific IgE Antibody test) were used in psoriasis patients in order to investigate this correlation. Forty-eight psoriasis patients and thirty-nine healthy control group were included in the study. Allergen-specific IgE antibody test for peripheral eosinophilia, serum total Ig E and Dermatophagoides (D.) pteronyssinus and D. farinae was applied to all the study group. The treatment, severity of the disease, age, gender, and the duration of the disease were taken into account in the patient group, no statistically significant difference was detected in terms of allergen-specific IgE antibody test for D. pteronyssinus and D. farinae ($p > 0.05$). Serum IgE and eosinophil were seen at a higher rate in psoriasis patients ($p < 0.05$). Patients with psoriasis have elevated levels of serum eosinophil and serum total Ig E. Although there is no aeroallergen specific immune shift associated in relation to house dust mites, serum IgE and eosinophils may be important in the course and follow-up of the disease.

INTRODUCTION

Psoriasis vulgaris is an immune-mediated proinflammatory skin disease with a prevalence of 2-3% in general population. It is characterized by abnormal epidermal proliferation¹. Although the pathogenesis of psoriasis is still unknown, abnormal T-lymphocyte activity is in question. Also, it is known that environmental and genetic factors take place in its etiology. Th1 and Th17 are the primary cells responsible for inflammation. Th2 has an antagonistic effect on inflammation caused by these cells².

IgE and eosinophils are the basic components of allergic inflammation. IgE is an antibody having an important role in congenital and acquired immunity and there are publications reporting that IgE may play a role in the pathogenesis of psoriasis^{3,4}. Eosinophil is a strong inflammatory cell playing an active role in almost all kinds of inflammatory process. It is important in the pathogenesis of tissue fibrosis, thrombosis, vasculitis, and allergic inflammation⁵.

There is an increasing prevalence of allergies

including atopic eczema, allergic asthma, allergic rhinitis, food allergies, and anaphylaxis in the world⁶.

There are limited number of studies in the literature investigating the predisposition to atopy in psoriasis and showing contradictory results^{7,8}. In the present study, total serum Ig E and radioallergosorbent test (RAST) (Allergen-specific IgE Antibody test) were used in psoriasis patients in order to investigate this correlation.

MATERIAL and METHOD

Patient and control groups

Forty-eight psoriasis patients applying to the psoriasis outpatient clinic were included in the study. Informed consent was obtained from participants in this study. Demographic characteristics of the patients including the psoriasis area and severity index (PASI) score, duration of disease, and the drugs used were recorded. Patients under 18 years of age and pregnant patients were excluded from the study. Thirty-nine healthy subjects were included in the control group. Personal and familial allergy histories including allergic rhinitis, asthma, atopic eczema, food allergy, drug allergy, urticaria, and venom

(bee, etc.) allergy were examined for all the individuals included in the study. Voluntary control group with history of atopy was excluded from the study. Allergen-specific IgE antibody test for peripheral eosinophilia, serum total Ig E and Dermatophagoides (D.) pteronyssinus and D. farinae was applied to all the study group.

Serum total IgE and Allergen-specific IgE antibody test

Serum total IgE values were measured using the ELISA method (Immagine[®] 800 Protein Chemistry Analyzer, Beckman Coulter, USA) at the Microbiology laboratory of Cumhuriyet University, Faculty of Medicine. Values ranging between 0 and 100 IU/mL were accepted as normal. Values over 100 were accepted as positive total IgE.

RAST test was applied to the patients because its sensitivity and specificity (60-95%; 30-95%) are higher than the skin prick test⁹.

D. pteronyssinus and D. farinae were tested as aeroallergens as they are the most likely encountered allergens regardless of regional discrepancies.

Serum-specific IgE levels were detected in the peripheral blood samples of the patients via the IFMA procedure (ImmunoCAP; Phadia, Uppsala, Sweden). Serum was separated from all the blood samples after a 4-hr centrifugation and serums were kept at -20° unless IgE that is specific to D pteronyssinus and D. farinae allergens was assessed. Specific IgE levels higher than 0.35 kUA / L were accepted as positive.

Statistics

Chi-square (Fischer's exact test) was used for the statistical assessment of specific IgE levels between the groups. Mann-Whitney U test was used for the statistical assessment of serum total IgE and eosinophil levels between the groups. Treatments applied in the patient group were grouped as local, conventional, and biological agents. The patients were grouped as those aged 44 and below and those aged 45 and over based on average age; as mild psoriasis for PASI scores of < 10 and severe psoriasis for PASI scores of ≥ 10 based on severity of the disease; and as those having the disease for less than 10 years and those having the disease for more than 10 years based on duration of the disease.

RESULTS

Of the participants, 48 were included in the psoriasis group and

39 were included in the control group. Average age was 43.9±13.3 in the psoriasis group and 44.3±9.2 in the control group. While psoriasis group included 24 (50%) male patients and 24 (50%) female patients, control group had 22 (56.4%) male individuals and 17 (43.6%) female individuals. According to the PASI score, there were 5 patients (10.1%) having a PASI score higher than 10 and 43 patients (89.9%) having a PASI score lower than 10. When the patients were assessed according to the duration of the disease, 17 patients had psoriasis for less than 10 years; whereas, 31 patients had psoriasis for more than 10 years. Eighteen patients used biological agents, 4 patients used local treatment, and 26 patients used conventional treatment.

When the treatment, severity of the disease, age, gender, and the duration of the disease were taken into account in the patient group, no statistically significant difference was detected in terms of allergen-specific IgE antibody test for D. pteronyssinus and D. farinae (p>0.05).

There was a statistically significant difference between psoriasis and control groups when assessed in terms of serum total IgE and eosinophil (p < 0.05) (Figure 1). Serum IgE and eosinophil were seen at a higher rate in psoriasis patients.

When psoriasis patients were assessed according to

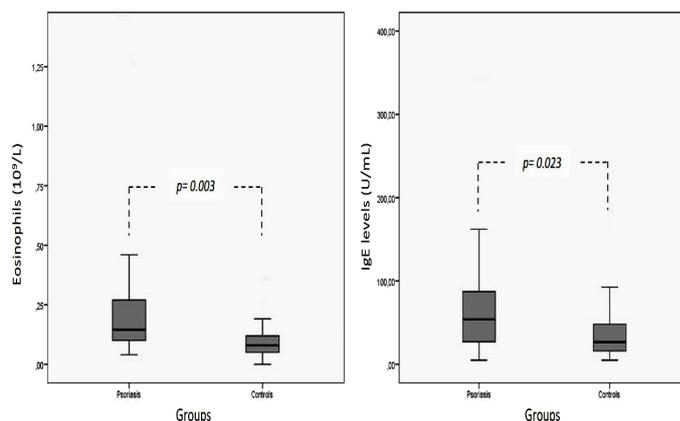


Figure 1. Serum IgE and eosinophil were seen at a higher rate in psoriasis patients.

the PASI values, there was no significant difference between the groups (p> 0.05). In other words, the values of Ig E and eosinophil values were not different between the patients having a PASI score higher than 10 and those having a PASI score lower than 10.

When the durations of the disease were compared, no statistically significant difference was found between the patient groups with a duration of disease more than 10 years

and less than 10 years in terms of IgE and eosinophil values ($p > 0.05$).

When the psoriasis patients were evaluated among themselves according to the treatments used, there was a statistically significant difference in terms of serum total IgE between the patient group using biological agent and the patient group receiving conventional treatment ($p < 0.05$); however, no significant difference was found in terms of eosinophils ($p > 0.05$). Serum total Ig E value was higher in the patient group using biological agents.

According to the treatments used, there was no significant difference between the patients receiving biological agent treatment and local treatment in terms of Ig E and eosinophil counts ($p > 0.05$).

No significant difference was found in terms of Ig E when conventional drug use and topical drug use were compared ($p > 0.05$). On the other hand, the eosinophil count was found to be higher in the patient group receiving conventional treatment when evaluated in terms of eosinophils ($p < 0.05$).

DISCUSSION

Among the most important reasons of atopic sensitization and allergic diseases around the world, *D. pteronyssinus* and *D. farinae*, which are house dust mites, take place¹⁰. *D. pteronyssinus* and *D. farinae*-specific IgE (specific IgE) measurement is an important diagnostic test for detecting the susceptibility against both mites¹¹. There are studies in the literature investigating the relationship between atopy and psoriasis. In the present study, serum total IgE levels and IgE values specific to *D. pteronyssinus* and *D. farinae* allergens besides the correlation between atopy and psoriasis were examined in psoriasis patients.

It is suggested that psoriasis is an immune-mediated proinflammatory skin disease. IgE plays an important role in congenital and acquired immunity³. Even though some studies have stated that serum IgE levels of psoriasis patients are not different from those of normal controls, some studies have reported that serum Ig E and eosinophilia values were higher in the psoriasis patient group as similar with the results in the present study^{7, 12-17}.

Also, similar to the study by Ovcina et al., it was determined in the present study that while serum Ig E and eosinophilia levels were high in psoriasis patients, there was no

correlation between age, gender, severity and duration of the disease, and Ig E and eosinophil levels⁷. There are publications reporting that as the side effects of anti-TNF drugs, they cause high eosinophil and drug-specific IgE elevation in psoriasis patients¹⁸⁻²¹. In the present study, eosinophil was not detected in the patients using biological agent, but their serum Ig E values were high. The reason for high IgE may be the drug-specific IgE elevation but also by the shift from Th1 to Th2 alleged in psoriasis patients.

Activated T cells have an important role in the pathogenesis of various skin diseases such as psoriasis and atopic dermatitis (AD). Th1 cells play a role in cellular inflammatory reactions and stimulate the delayed-type hypersensitivity reactions. Th2 cytokines support antibody production and especially the IgE response, and allergic responses depending on eosinophil differentiation and its functions. Th1 and Th17 cells are responsible for inflammation in psoriasis. Also, Th2 cells have an antagonistic effect on inflammation caused by these cells²². Upon the discovery of new cytokines and the subsets of T cells, classical Th-1/Th-2 paradigm has become more sophisticated in allergic skin diseases. IL-17, TNF-alpha, and type I interferon play an important role in the pathogenesis of psoriasis and the monoclonal antibodies targeting IL-17a can significantly decrease psoriasis²³. IL 17 is a pro-inflammatory cytokine and psoriasis plays an important role in the pathogenesis of skin diseases such as contact hypersensitivity and AD. High IgE serum level is a characteristic of acute phase in atopic dermatitis. As in the current and other studies, high IgE level is detected in psoriasis patients as similar to atopic dermatitis. In the study by Milavanovic et al., it was found that IL-17a in the human body increased IgE production by the B cells²⁴. Thus, it can be considered that IL-17a has a direct positive effect on the number of IgE-producing B cells.

Keratinocytes are responsible for the mechanical barrier on the skin and IL17 has a negative effect by reducing the level of the genes encoding the adhesion molecules playing a role in the mechanical barrier. In the study by Gutowska-Owsiak et al., a downregulation was detected in the filaggrin expression in psoriatic skin lesions similar to atopic dermatitis as a result of the increased circulating IL-17 levels²⁵.

There are various studies investigating the contribution of skin microbiome to the pathogenesis of

psoriasis. *Staphylococcus (S) aureus* colonization has been found in the psoriasis skin as similar to atopic dermatitis. There are studies showing that *S. aureus* proteins promote the Th17 differentiation in vitro and this suggests that *S. aureus* colonization may lead the Th17 activation and IL17 secretion to increase ²⁶. As a result of high IL-17 level caused by *S. aureus*, there can be an increase in the number of IgE-producing B cells. Again, in the study conducted by Hoff et al., on mice with impaired skin barrier, they revealed that microbiota-derived signals caused skin lesions by causing IL 17 expression and eosinophil and neutrophil infiltration on the skin ²⁷.

CONCLUSION

A susceptibility increase may develop toward Th2 in psoriasis and this increase can be associated with the pathogenesis of the disease or may be developed by the drugs used in the treatment. Although there is no aeroallergen specific immune shift associated in relation to house dust mites, serum IgE and eosinophils may be important in the course and follow-up of the disease and further studies explaining IgE and eosinophil elevation in psoriasis are required.”

Conflict of interest

The author declare that they have no conflict of interest.

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