Relationship between serum IgE levels and psoriasis area and severity index (PASI) score in psoriasis vulgaris

Fitra Aina Hidayat*, Kristo Alberto Nababan, Irma Damayanti Roesyanto

ABSTRACT

Introduction: Psoriasis is an immune system-mediated inflammatory disorder characterized by skin inflammation, epidermal hyperplasia, and other comorbidities. Based on medical data from H. Adam Malik hospital in 2011, the proportion of psoriasis vulgaris incidence was 0.81%. It is important to assess the severity of the disease. The most frequently used measuring instrument is the Psoriasis Area and Severity Index (PASI) score. Elevated serum IgE levels have been reported in some cases of psoriasis. The relationship between serum IgE levels and psoriasis severity is controversial. The study aimed to determine the relationship between serum IgE levels and PASI scores in psoriasis vulgaris.

Method: An observational analytic study with a cross-sectional approach to 37 subjects of psoriasis vulgaris at Haji Adam Malik General Hospital Medan. Patients who meet the criteria are recorded with basic data in personal identity, history taking, physical examination, and dermatological examination. Furthermore, the calculation of the Psoriasis Area and Severity Index (PASI) score and serum IgE levels using ARCHITECT CIB200 with Quanta IgE reagent. The data will be analyzed using SPSS.

Results: Psoriasis vulgaris mostly occurs in women (54.1%) with the most age group 31-45 years (40.5%). The median age was 35 years with a range of 21-67 years. The proportion of study subjects with high serum IgE levels (≥100) was 26 people (70.3%) with a median of 130 IU/ml and a range of 25-475.5 IU/ml. Based on the PASI score, the highest proportion were subjects with moderate and mild PASI scores as many as 21 people (56.8%) and 13 people (35.1%). The median PASI score was 6, with a range of 0.5 – 10.40. The results of the Pearson correlation test (p) serum IgE levels and PASI scores obtained p-value = 0.0001, which indicated that the relationship between serum IgE levels and PASI scores was significant. The value of the correlation coefficient (r) of 0.909 indicates that the direction of the positive correlation with the strength of the correlation is very strong.

Conclusion: There is a relationship between serum IgE levels and Psoriasis Area and Severity Index (PASI) scores in psoriasis vulgaris.

Keywords: psoriasis vulgaris, serum IgE, PASI score.


INTRODUCTION

Psoriasis is a multifactorial disease, can be influenced by genetics and immunity. Psoriasis belongs to a combination of Th17 and Th1 immune responses. Although it is believed that psoriasis is a prototype of Th1-associated autoimmune disorders with overexpression of proinflammatory cytokines produced by Th1 cells, the elevation of serum IgE and prototype markers of Th2 immunity have also been reported in some cases of psoriasis.4,6 Previously, IgE was recognized as a response to allergic reactions and a major defense mechanism against certain helminth parasitic infections but recently elevated serum IgE levels have also been reported in some cases of psoriasis.4,6 It is supported with studies by Yan et al. showing that in addition to elevated serum IgE, skin lesions of psoriasis patients contain more cells containing IgE and FcεRI than skin without lesions.7 The mechanism of elevated serum IgE in psoriasis patients is unclear. However, as an alternative to IL-4 and IL-13, IgE production by B cells can also be promoted by IL-17A.6 Most likely, the IgE response is not the main mediator of pathogenesis but is produced after the initial auto-reactive IgG. Chronic autoreactive IgG memory B cells can lead to secondary Ig class switching to IgE. The resulting soluble IgE will then be incorporated into immune complexes and increase the response of plasmacytoid dendritic cells by involving FcεRI.9 In psoriasis patients, it is important to assess the severity of the disease to monitor changes due to the effects of the treatment given in both clinical trial studies and daily practice. The most frequently used severity and extension of psoriasis is the Psoriasis Area and Severity Index (PASI) score. The PASI score is usually calculated before, during, and after treatment to determine the patient’s level of responsiveness to the given therapy. PASI 50 signifies a reduction of 50% from the initial PASI score at the start of the intervention.10 Although this measuring scale has been used in general, several weaknesses can be found, namely the calculation of the PASI score is quite
complicated, the calculation of the lesion area depends on the subjectivity of each examining physician, and improvement in clinical scores is not always accompanied by clinical relevance. In addition, PASI is not sensitive in evaluating mild psoriasis and cannot simultaneously determine the decreased quality of life and patient comorbidities.\textsuperscript{11,12}

Research on the correlation between serum IgE levels and PASI scores is still very limited. Therefore, this study aims to determine the relationship between serum IgE levels and Psoriasis Area and Severity Index (PASI) scores in psoriasis vulgaris.

METHOD

This study is an observational analytic study with a cross-sectional approach, carried out from November 2020 until the number of samples is met. This research was conducted at the Polyclinic of the Immunodermatology Division of the SMF Dermatology and Venereology, Haji Adam Malik Hospital, Medan. The examination of serum IgE levels was carried out at the Clinical Pathology Laboratory of Haji Adam Malik Hospital, Medan.

The study sample consisted of 37 patients diagnosed with psoriasis vulgaris. The inclusion criteria used in this study were patients aged 15 years or more, and the exclusion criteria were having a history of atopy, suffering from helminth infections, using topical or systemic corticosteroids one day before the measurement of serum IgE levels, and patients who had diagnosed with immunodeficiency disease of hyper IgE syndrome.

Psoriasis vulgaris patients who met the inclusion and exclusion criteria recorded basic data in personal identity, history taking, physical examination, and dermatological examination. Furthermore, the calculation of the Psoriasis Area and Severity Index (PASI) score and serum IgE levels using ARCHITECT CI8200 with Quanta IgE reagent.

The data collected were tabulated using a computer. The data is tested for normality using the Shapiro Wilk test because the sample set is less than 50. The mean (mean) and standard deviation (SD) will be displayed if the data is normally distributed. The median (median) and range (min-max) will be displayed if the data is not normally distributed. A correlation test was performed to analyze the relationship between variables with numerical data. Pearson correlation test is used because the data were normally distributed. This study was based on a 95% confidence interval (p<0.05).

This research has obtained ethical clearance by letter number 72/KEP/USU/2021 dated February 26, 2021, from the Research Ethics Commission of the Faculty of Medicine, Universitas Sumatera Utara.

RESULTS

This study was conducted from March 2021 to June 2021, involving 37 psoriasis vulgaris patients who met the inclusion and exclusion criteria. The research data collection was carried out at the Dermatology and Venerology Polyclinic, Haji Adam Malik Hospital, Medan. IgE levels were examined at the Clinical Pathology Laboratory, Haji Adam Malik Hospital, Medan. Subjects consist of 20 (54.1%) females and 17 (45.9%) males. Most of the subjects are aged 31-45 years old (40.5%), and a smaller portion of the subjects are aged 15-30 (35.1%), 46-60 (18.9%) and >60 years old (5.4%). We found IgE concentration in the serum of the 26 subjects tends to be high (70.3%), and the other 11 subjects are in normal concentration (29.7%). Most of the study subjects have moderate PASI score (56.8%), and the rest of the subjects have mild (35.1%) or severe score (8.1%). The baseline characteristics of the subjects can be seen in Table 1.

The correlation analysis found that serum IgE levels and PASI score in the psoriasis vulgaris subject are significantly correlated (p=0.0001). Subjects with normal IgE concentration will likely have a mild PASI score. In contrast, the rest of the subjects with high IgE levels tend to have moderate to severe PASI score. The correlation coefficient between serum IgE levels and PASI score is very strong (r=0.909). Correlation analysis results can be seen in Table 2, and the scatter plot can be seen in Figure 1.

DISCUSSION

This study was followed by 37 patients with psoriasis vulgaris who came for treatment

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Psoriasis vulgaris (n=37)</th>
</tr>
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<tbody>
<tr>
<td>Gender</td>
<td></td>
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<tr>
<td>Male</td>
<td>17</td>
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<tr>
<td>Female</td>
<td>20</td>
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<tr>
<td>Age</td>
<td></td>
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<tr>
<td>15 – 30</td>
<td>13</td>
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<td>31 – 45</td>
<td>15</td>
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<td>46 – 60</td>
<td>7</td>
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<tr>
<td>&gt; 60</td>
<td>2</td>
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<tr>
<td>IgE Serum</td>
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<tr>
<td>Normal (&lt;100)</td>
<td>11</td>
</tr>
<tr>
<td>High (≥100)</td>
<td>26</td>
</tr>
<tr>
<td>PASI Score</td>
<td></td>
</tr>
<tr>
<td>Mild (&lt;5)</td>
<td>13</td>
</tr>
<tr>
<td>Moderate (5-10)</td>
<td>21</td>
</tr>
<tr>
<td>Severe (&gt;10)</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 1. Baseline characteristics of research subjects.

<table>
<thead>
<tr>
<th>PASI Score</th>
<th>Serum IgE Level</th>
<th>p</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal (n/%)</td>
<td>High (n/%)</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>11 (100)</td>
<td>2 (7.7)</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Moderate</td>
<td>0</td>
<td>21 (80.8)</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>0</td>
<td>3 (11.5)</td>
<td></td>
</tr>
</tbody>
</table>

*significant at p<0.05

Table 2. The relationship between serum IgE levels and PASI scores in the psoriasis vulgaris.
Psoriasis can affect all age groups but most commonly occurs at the age of 15-30 years, and the least occurs at the age of under ten years. This study shows the majority at the age 31-35 years, 15 people (40.5%) and following by age group 15-30 years totaling 13 people (35.1%). The results of this study are followed by Valenzuela et al. (2010) in Santiago who reported that most psoriasis vulgaris patients were in the age range of 30-49 years (50.3%). The same thing was also found in Trettel et al. (2016) in Germany. This study stated that from 3,615 psoriasis vulgaris patients, the age group with the highest number was 35-64 years, namely 2,376 subjects (65.7%) and followed by the 18-34 year age group as many as 776 subjects (21.4%).

Several studies in Indonesia have research results that are under this study. In a study conducted by Cantika (2012) in Semarang, it was found that the majority of psoriasis vulgaris patients were women (67.5%). The results of this study are also in line with research conducted by Lufiana et al. (2019) in Medan. This study reported that female psoriasis patients (56.8%) were more common than males (43.2%).

Hormonal factors can cause this finding. Female hormones significantly influence biological and immunological changes in the skin. The severity of psoriasis in female patients can vary according to hormonal changes during puberty and menopause. Psoriasis and hormones have such a strong relationship that estrogen and progesterone are potentially useful in managing psoriasis. Another factor that plays a role is that women pay more attention to their skin so that if problems arise, they will immediately seek treatment.

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vulgaris, 15 people (46.88%) had moderate PASI scores, followed by 10 (31.25%) with mild PASI scores and 7 (21.88%) with severe PASI scores. Several other studies assessing PASI scores in psoriasis vulgaris patients have had mixed results. Research conducted by Kim et al. (2016) in the USA, of 57 psoriasis vulgaris patients, obtained 34 people (59.6%) with mild PASI scores and 23 people (40.4%) with severe PASI scores.

There are also several studies conducted in Indonesia. Based on research conducted by Budiastruti (2011) in Semarang, from 16 subjects, nine people (56.2%) with a heavy PASI score and four people (25%) with a mild PASI score. The median PASI score is 17.2 with a range of 0.3 – 55.8. Another study conducted by Budini et al. (2014) in Malang, from 25 psoriasis vulgaris subjects, 11 people (44%) with severe PASI scores and followed by ten people (40%) with a moderate PASI score. Research conducted by Puruhito (2017) in Semarang, from 30 psoriasis vulgaris subjects, obtained 22 people (73.3%) with severe PASI scores, 5 (16.7%) with moderate PASI scores, and 3 (10%) with moderate PASI scores. The median PASI score was 15.7 with a range of 6.7-51. Another study conducted by Putri (2018) in Medan, from 33 subjects of psoriasis vulgaris, found 17 people (51.5%) with a mild PASI score, followed by severe PASI scores were ten people (30.3%), and moderate PASI scores were six people (18.2%).

Psoriasis is a chronic disease with fluctuating severity, so it is recommended to reassess its severity periodically. In addition to evaluating the effectiveness of therapy, it also aims to identify factors that can influence clinical improvement or worsen psoriasis patients. Smoking, alcohol, metabolic syndrome, and stress have been closely related to psoriasis severity.

The correlation coefficient found in this study is 0.909, indicating a positive and very strong correlation between IgE levels and PASI score (p=0.0001). The results of this study agree with a study conducted by Abdelmoaty and Elkheshen (2014) in Cairo, which compared 40 psoriasis patients and 40 healthy subjects. This study showed an increase in serum IgE levels in 16 patients (40%) of 40 patients with chronic plaque psoriasis. A statistically significant positive correlation was also found between PASI scores and serum total IgE levels in chronic psoriasis patients (p<0.05). Another study conducted by Przybilla et al. (1986) in Germany, from 2,951 samples of total IgE levels examination serum in dermatological patients showed a significant increase in geometric mean values in 18 of the 25 groups, one of which was psoriasis.

In contrast, the results of this study are different from the study conducted by Lajevardi et al. (2014) in Iran, wherein this study an increase in serum IgE levels was found in 22.4% of psoriasis patients, but there was no significant correlation between serum IgE levels and the severity of the disease. As measured by the PASI score (r=0.11, p<0.21). Another study conducted by Lotfi et al. (2015) in Egypt, in which this study found a statistically significant increase in serum IgE levels was carried out in 90 psoriasis patients (p≤0.01). However, no positive correlation was found between serum IgE levels and PASI scores in patients with chronic plaque psoriasis.

Psoriasis is described as a Th1 dominant disease. However, there are several reports of increased IgE concentrations in patients with psoriasis vulgaris. It is argued that the Th1 to Th2 shift in antigen-exposed T lymphocytes may also lead to an increase in serum IgE concentrations in some patients.

Research on the relationship between serum IgE levels and PASI scores in patients with psoriasis vulgaris is still very limited. Many factors play a role in the variation of results in this study and previous studies, such as age, gene interaction with the environment, genetic factors, gender, and stress factors that can also affect the regulation of the immune system in psoriasis patients.

Other study stated that increased serum IgE levels were more dominant in patients with erythroderma diseases such as erythroderma psoriasis than other types of psoriasis. However, this is also still a debate that needs further research.

One of the limitations of this study came from the cross-sectional study design itself. This study cannot explain the temporal link between the PASI score and the serum IgE levels because both are examined at one time. Further research is needed to explain the pathophysiology and the temporal link between PASI score and serum IgE levels. Large-scale research involving multiple healthcare centers is also needed to overcome the limitation in subject diversity.

**CONCLUSION**

There is a significant relationship between serum IgE levels and Psoriasis Area and Severity Index (PASI) scores in psoriasis vulgaris. This study showed that the number of subjects with psoriasis vulgaris with high serum IgE levels was higher than those with normal serum IgE levels. In this study, the number of psoriasis vulgaris subjects with moderate and mild PASI scores was higher than those with severe PASI scores.

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**AUTHOR CONTRIBUTION**

All authors have contributed to all processes in this research, including preparation, data gathering and analysis, drafting and approval for publication of this manuscript.

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**CONFLICT OF INTEREST**

The authors declare no conflict of interest regarding the publication of this article.

**REFERENCE**


