

**How to Cite:**

Nugroho, W. T., Ervianti, E., Zulkarnain, I., Hidayati, A. N., Damayanti, D., Prakoeswa, C. R. S., & Utomo, B. (2022). Clinical relevance of skin prick test in atopic dermatitis patients at allergy immunology division dermatovenerology outpatient clinic Dr. Soetomo general academic teaching hospital Surabaya. *International Journal of Health Sciences*, 6(S1), 2241–2247.  
<https://doi.org/10.53730/ijhs.v6nS1.5161>

# **Clinical Relevance of Skin Prick Test in Atopic Dermatitis Patients at Allergy Immunology Division Dermatovenerology Outpatient Clinic Dr. Soetomo General Academic Teaching Hospital Surabaya**

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**Abstract**---Positive specific IgE tests, including skin prick test (SPT), for several food allergens are frequently found in atopic dermatitis (AD) patients, most of which have no clinical relevance and are associated only with atopy. This study aimed to determine the allergic history of AD patients who were subjected to SPT and to determine its clinical relevance. This is a descriptive retrospective study on AD patients who were subjected to SPT from 2017 to 2019 using secondary data. Allergy history, SPT results, and its clinical relevance were collected and analyzed. From a total of 284 AD patients, only 60 patients who were subjected to SPT. Most of the patients had dust allergy (50.0%) and house dust mite (HDM) allergen also had the highest positive SPT result (63.3%). Furthermore, the highest clinical relevance was found in HDM allergen (93.3%). This study shows that most AD patients were allergic to dust. The highest positive SPT result was found in HDM allergen, where ultimately this allergen also had the highest clinical relevance.

**Keywords**---atopic dermatitis, allergy history, skin prick test, allergen, clinical relevance.

**Introduction**

Atopic dermatitis (AD) is a chronic, multifactorial, inflammatory skin disease that involves interactions between the host, agent, and environmental aspects (allergen exposure). Allergens might be in the form of plant and animal protein sources (Simpson *et al.*, 2018). History of AD patients often needs to be reconfirmed using allergy testing. When food allergy is suspected, in vivo and/or in vitro tests to explore IgE-mediated sensitization are required. One type of in vivo test is the Skin Prick Test (SPT) (Bergmann *et al.*, 2013).

Skin prick test is a primary examination method for rapid IgE-mediated allergy. Skin prick tests provide information on specific IgE presence for antigen protein and peptide (allergen) (Lachapelle & Maibach, 2019). The selection of food or allergen that will be tested should be based on the history of the most common food allergy in a given population, because positive specific IgE tests for several food allergens are frequently found in AD patients, most of which have no clinical relevance and are associated only with atopy (Bergmann *et al.*, 2013). This study aimed to determine the allergic history of AD patients who were subjected to SPT and to determine the clinical relevance of the SPT results to allergy history of AD patients.

## **Materials and Method**

This study is a descriptive retrospective study at Allergy Immunology Division Dermatovenerology Outpatient Clinic Dr. Soetomo General Academic Teaching Hospital, Surabaya, Indonesia from 2017 to 2019. This study has received ethical approval from the Hospital Ethics Committee Dr. Soetomo General Academic Teaching Hospital Surabaya.

### **Study population and sample**

The study population was atopic dermatitis patients at Allergy Immunology Division Dermatovenerology Outpatient Clinic Dr. Soetomo General Academic Teaching Hospital Surabaya. The study sample was patients who were subjected to SPT procedure and were recorded in the medical record with a diagnosis of atopic dermatitis based on Hanifin and Rajka's criteria from January 2017 to December 2019. The sampling technique was conducted with a total population technique and the data was in the form of secondary data collected from the medical records of atopic dermatitis patients.

### **Study procedure**

This study used patient's medical record data that could be found from medical status records, electronic medical records (EMR), and SPT procedure's records performed on atopic dermatitis patients. If the patient's medical record was not found, the patient data were traced through the patient's EMR and we used the patient's register book recorded in the Allergy Immunology Division. There were five types of allergens used in the SPT procedure: house dust mite (HDM), broiler chicken, shrimp, chicken egg white, and cow's milk.

The data and results obtained were then entered into data collection sheets for analysis. The analysis was carried out using the Statistical Package for Social Science (SPSS) version 17. The analyzed data were allergy history in AD patients, SPT results, and clinical relevance of SPT results to the allergy history of AD patients.

## **Results**

There was a total of 284 AD patients in the Allergy Immunology Division of URJ Skin and Sex RSUD Dr. Soetomo Surabaya from 2017 to 2019. Among all AD patients who visited, there were 60 patients who were subjected to SPT. Prior to SPT, the patient's allergy history was taken. Table 1 outlines the allergy history of AD patients. Based on Table 1, most of the patients had a history of dust allergy with 30 patients (50.0%).

Skin Prick Test with house dust mite, broiler chicken, cow's milk, and shrimp allergens were performed on all patients, while chicken egg white allergen was only performed on 45 patients. Table 2 outlines the SPT results for the five allergens. Among all patients who underwent SPT, HDM allergen had the highest percentage of positive SPT result with 41 patients (63.3%).

After the patient's allergy history and SPT results were obtained, clinical relevance was determined. Table 3 outlines the clinical relevance between allergy history and SPT results in AD patients. The greatest clinical relevance was found in HDM allergen with 24 patients (40.0%).

Table 1  
Allergy history distribution of AD patients

Allergen	Patients (n) <sup>a</sup>	Percentage (%)
Dust	30	50.0
Broiler chicken	9	15.0
Shrimp	15	25.0
Cow's milk	1	1.7
Chicken egg	14	23.3

<sup>a</sup>One patient might have more than one allergy history

Table 2  
Skin prick test results of AD patients

Allergen	Positive SPT Result	Positive SPT Result Percentage (%)	Negative SPT Result	Negative SPT Result Percentage (%)
House dust mite	41/60	63.3	19/60	36.7
Broiler chicken	8/60	13.3	52/60	86.7
Shrimp	5/60	8.3	55/60	91.7
Cow's milk	3/60	5.0	57/60	95.0
Chicken egg white	2/45	4.4	43/45	95.6

Table 3  
Clinical relevance between the patient's history and SPT results

Allergen	Clinical Relevance
House dust mite	24 (40.0%)
Broiler chicken	2 (3.33%)
Shrimp	1 (1.67%)
Cow's milk	0 (0.00%)
Chicken egg white	2 (3.33%)

## Discussion

In this study, the highest prevalence of allergy history was dust allergy (50.0%). This result was similar with a study from Peroni et al., who investigated the prevalence, comorbidities, and risk factors of AD patients in Italy using a questionnaire. They reported that among 205 AD patients, most patients reported house dust mite allergy with 32 patients (15.6%) (Peroni *et al.*, 2008). Analytical descriptive study conducted by Faridian and Indar at Dermatology and Venereology Outpatient Clinic of Dr. Kariadi General Hospital, Semarang, Indonesia who examined the suitability of allergen identification results in AD patients using the patient's history and SPT results reported that of 43 AD

patients who had allergy history, 39 people (90.7%) had a history of dust allergy (Faridian & Indar, 2008). Aeroallergens or inhaled allergens can be divided into two types: indoor and outdoor allergens. Indonesia itself is a tropical country, where household allergens such as house dust mites are more common (Siregar, 2016).

Among 284 AD patients who visited our outpatient clinic, only 60 patients who were subjected to SPT. This might be caused by the patient's condition who had absolute or relative contraindications to SPT at the time of visit. Absolute contraindications for SPT include diffuse dermatological conditions (examination should be performed on healthy and normal skin), severe dermatographism, uncooperative patients, and patients who could not stop their antihistamine or other treatment that might altered the test's result. Relative contraindications to SPT include severe/unstable persistent asthma, pregnancy (because of the mild risk of anaphylaxis with hypotension and uterine contractions), infants less than two years of age, and patients taking beta blockers and ACE inhibitors (Heinzerling *et al.*, 2013).

The allergen with the highest positive SPT result was HDM allergen (63.3%). This result was similar with a study from Zeppa *et al.* (2011) on AD patients aged 18 years and over at the Dermatoveneorology Clinic in a hospital in Italy involving 332 AD patients, where they reported that positive SPT results were found for aeroallergens and food allergens in 227 (68,4 %) AD patients. Another study from Pónyai *et al.* (2008) on adult patients at the Atopic Clinic in a hospital in Hungary aimed to identify contact allergens and aeroallergens that trigger skin disease in AD patients by performing SPT, atopy patch and epicutaneous tests (APT), serum IgE levels, and patch tests reported that among 34 AD patients, the majority (44.11%) showed positive SPT results for *Dermatophagoides pteronyssinus* and/or *Dermatophagoides farinae*, a mite species often referred to as house dust mite. A retrospective descriptive study with data collected from medical records and SPT results by Garna *et al.* (2017) at the Allergy Clinic at Immanuel Hospital, Bandung, Indonesia aimed to determine the characteristics of allergic patients who visited their clinic. From a total of 206 patients with allergy history, most allergy patients who came to the clinic had dermatitis clinical findings with 89 patients (43.20%), where house dust mites gave the most positive SPT results with 108 patients (52.43%).

Clinical relevance is determined if there was an allergy history from certain allergen and is confirmed with the SPT result. In this study, the greatest clinical relevance was found in HDM allergen (40.0%). Wagner & Rudert (2019) investigated 387 patients with previous history of IgE-mediated allergy and a sensitisation against one of the tested allergens. They used standardised allergens for SPT and found that patients who were allergic to dust and tested with HDM allergen in a concentration of 50,000 SU/mL showcased 75.0% sensitivity and 62.4% specificity. Another study from Anggraeni *et al.* (2021) who compared SPT results of new local and imported allergen extracts reported that local HDM allergen had sensitivity, specificity, Positive Predictive Value, and Likelihood Ratio (+) of 84.61%, 83.33%, 97.1% and 5.08, respectively. Sensitivity was defined as the proportion of patients who did have a history of a particular disease and reported having a positive test result, whereas specificity was

defined as the proportion of patients who did not have a history of a particular disease and reported having a negative test result (Asha'ari *et al.*, 2011).

## Conclusion

Most AD patients in this study had dust allergy. Skin prick test with the highest positive result and clinical relevance was house dust mite allergen. Future studies with more allergen types might be conducted to determine the clinical relevance for various types of allergens. Patients' education is also important for AD patients regarding the need for SPT to confirm the allergen that triggers this chronic and often relapsing condition, and therefore might help the patients to avoid those allergens in the future.

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