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Skin Prick Test Profile: A Retrospective Study

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ABSTRACT

Background: A skin prick test is one method to detect allergies. Skin prick testing in dermatology can be performed on atopic dermatitis and urticaria. Skin prick test can be done easily, it's relatively safe, fast, and can use many allergens simultaneously in one test. **Purpose:** To describe the characteristics of the skin prick test results at the clinic of Dermatology and Venereology, Mohammad Hoesin Palembang General Hospital, for the period 2016-2021. **Methods:** Descriptive retrospective study using a cross-sectional approach. Medical record data for the period January 2016-December 2021. **Result:** The number of patients who underwent skin prick testing during the period January 2016 to December 2021 was 116 patients, dominated by women (59.5%) and those aged 26-35 years (40.5%). The majority of diagnoses examined were atopic dermatitis (48.3%) and chronic urticaria (31.9%). The most positive results were for allergens in the form of house dust mites, shrimp, and crabs. The positive proportion of milkfish allergen was higher in women, while the positive proportion of shrimp allergen was higher in men. Chicken feather allergen showed significant differences between the diagnoses of atopic dermatitis, chronic urticaria and acute urticaria. **Conclusion:** House dust mites were the dominant allergen in patients with atopic dermatitis, chronic urticaria, and acute urticaria. skin prick test is recommended to be performed in the management of atopic dermatitis, chronic urticaria, and acute urticaria in order to detect the allergen because it has significant clinical relevance.

Keywords: skin prick test, allergen, allergy.

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BACKGROUND

Allergic disease is one of the most common diseases worldwide, and the burden of this disease is increasing. Accurate diagnosis coupled with optimal therapy requires appropriate testing to confirm allergen sensitization and detailed information about suspected allergen exposure. There are several skin tests, including skin prick tests and intradermal tests, while laboratory tests can test for total immunoglobulin (Ig) E (non-specific) and specific IgE.[1]

The skin prick test is an in vivo diagnostic test against inhaled and food allergens, to detect antigens involved in IgE-mediated type-I hypersensitivity reactions.[2] Epidermal allergen deposition produces local reactions, including urticaria and flares. Urtica occurs due to histamine release due to rapid-type hypersensitivity reactions and plasma extravasation in the vicinity of allergen exposure.[3]

Skin prick testing can be done both in the field of dermatology and non-dermatology.[4] A skin prick test in atopic dermatitis has a sensitivity of 80-97% and a specificity of 70-95%.[5] Research in Surabaya regarding the skin prick test with atopic dermatitis, it was found that 33.3% of patients showed positive results for more than one allergen.[2] The type of allergen used in the skin prick test should be adapted to the geographic and clinical characteristics of the patient.[6]

Identifying the causative allergen is important in the management of atopic dermatitis because it can educate the patient to avoid the causative allergen in order to prevent exacerbations. Identification of inhaled and food allergens can be done by asking for a medical history including things that are suspected of

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causing a recurrence of AD, performing a skin prick test, and testing for specific IgE.[2] There is no previous research that describes the characteristics of the skin prick test results at the Dermatology and Venereology (DV) outpatient clinic of Dr. Mohammad Hoesin General Hospital (RSMH) Palembang. This study will describe the profile of the skin prick test in the 2016-2021 period based on demographic data and patient diagnosis

METHODS

This is a retrospective descriptive study using a cross-sectional approach. The source of outpatient data for the period 2016-2021 was obtained from the medical records of the RSMH Palembang of Dermatology and Venereology. The sampling technique was total sampling, i.e., using all members of the population who fullfil the inclusion criteria. Inclusion criteria in the form of medical record data showing the result of the skin prick tests in 2016-2021. If the patient underwent more than one examination during this period, the examination after the first examination would be excluded.

Demographic characteristics data consisted of gender (male and female), age groups based on the Indonesian Ministry of Health criteria[7] (<17 years, 17-25 years, 26-35 years, 36-45 years, 46-55 years, 56-65 years, and > 65 years), and diagnosis (atopic dermatitis, chronic urticaria, and acute urticaria). The skin prick test examination consisted of a series of allergen extracts from Airlangga University/Dr. Soetomo General Hospital, 27G needle, a 70% alcohol swab, and anaphylactic equipment. The procedure refers to the 2017 Clinical Skills Guidelines for Dermatology and Venereology specialists. The types of allergens tested include house dust mites, dog fur, chicken feathers, chicken egg yolks, chicken meat, chicken eggwhites, peanuts, soybeans, wheat, cow's milk, chocolate, tea, coffee, pineapple, tomato, carrot, snapper, milkfish, clams, crab, squid, and shrimp. The highest sensitivity of the reagents was 84.61% and the highest specificity was 93.75%.[8]

The data from the samples were recorded in the recapitulation table. The data is then cleaned, edited, and coded. Incomplete data is excluded. Data is processed with the principle of anonymity. Data analyze using Statistical Analysis Software Package (SPSS) version 22.0 (SPSS, Inc., Chicago, Illinois). The comparison of the positive levels of allergens from the skin prick test based on demographic data was carried out using the Chi Square test or Fisher's test. The results were declared statistically significant if the p value <0.05. This research has been approved by the Ethics Committee of Dr. RSUP. Mohammad Hoesin Palembang, with number No. 06/KEPKRSMH/2022.

RESULT

Skin prick test data obtained at the RSMH Palembang Outpatient Clinic of Dermatology and Venereology during the period January 2016 to December 2021 revealed that women dominated the 116 patients, accounting for 69 (59.5%), while men accounted for 47 (40.5%). Patients grouped by age according to Indonesian Ministry of Health criteria[7], those under 17 years old were 17 (12%), 17-25 years old were 40 (34.5%), 26-35 years old were 47 (40.5%), 36-45 years old were 8 (6.9%), 46-55 years old were 5 (4.3%), and 56-65 years old were 2 (1.7%). The majority of diagnosis were atopic dermatitis 56 patients (48.3%), chronic urticaria 37 patients (31.9%), and acute urticaria 23 patients (19.8%) (Table 1).

Of all the allergens, the most positive results were house dust mite, shrimp, and crab allergens. Statistically significant differences between sexes were found only in milkfish and shrimp allergens. Milkfish allergens had a higher positive proportion in female subjects with $p<0.05$, while shrimp allergens had a higher positive proportion in male subjects with $p<0.05$ (Table 2).

For the diagnosis of atopic dermatitis, house dust mites, chicken feathers, and chicken egg yolks were the 3 allergens with the highest positive result. House dust mites, shrimp, and crabs are the 3 highest positive allergens for chronic urticaria. For acute urticaria, house dust mites are the most common cause (Table 3).

Based on the diagnosis, it was found that almost all the allergens tested did not differ between diagnoses. Only chicken feathers showed statistically significant differences between diagnoses. Patients with atopic dermatitis and chronic urticaria had a higher positive proportion of chicken feather allergen compared to patients with acute urticaria only (Table 4).

DISCUSSION

Skin prick testing is a reliable diagnostic method for IgE-mediated allergic diseases such as urticaria, atopic dermatitis, asthma, rhino-conjunctivitis, anaphylaxis, and food and drug allergies. A skin prick test is indicated if a type 1 (rapid type) allergy is suspected.[9] The reading of the skin prick test results after 15-20 minutes of allergens and controls was checked. The diameter of each urtica was measured. It was positive if the allergen with an urtica diameter was more than 50% of the total diameter of the positive control and the negative control.[10] Skin prick test

results can be false positive or false negative. False positives occurred when the negative control reaction was positive, dermographia was present, and when all skin prick test areas showed the same positive reaction. False negatives occur when the positive control reaction is too weak or negative, the reading time is inadequate, and the patient is taking antihistamines or oral corticosteroids.[11]

The prevalence of allergic diseases continues to increase throughout the world. If left untreated, it can cause symptoms of dermatitis, urticaria, rhinitis, and others, so that it can interfere with the quality of life.[12] Oncham et al. (2018) stated that the diagnoses of allergic patients undergoing skin prick testing was allergic rhinitis, asthma, chronic urticaria, drug allergy, atopic dermatitis, allergic conjunctivitis, and chronic rhinosinusitis.[13]

Table 1. The characteristics of skin prick test patients at the Outpatient clinic of Dermatology and Venereology RSMH Palembang 2016-2021

Characteristics	Categories	n(%)
Sex	Male	47 (40.5%)
	Female	69 (59.5%)
Age groups (based on the Indonesian Ministry of Health criteria[7])	<17 years	14 (12%)
	17 – 25 years	40 (34.5%)
	26 – 35 years	47 (40.5%)
	36 – 45 years	8 (6.9%)
	46 – 55 years	5 (4.3%)
	56 – 65 years	2 (1.7%)
	>65 years	0 (0 %)
Diagnosis	Atopic dermatitis	56 (48.3%)
	Chronic urticaria	37 (31.9%)
	Acute urticaria	23 (19.8%)

The diagnosis of subjects who underwent skin prick testing in this study was ordered by proportion, namely atopic dermatitis, chronic urticaria, and acute urticaria. All of the skin prick test results have clinical relevance to the patient's signs and symptoms

Lesmana et al, (2019) stated that the majority (60.4%) of subjects who underwent skin prick testing were 30 years old or less.[14] In 2019, Ismayani et al. stated that the majority of research subjects were aged 21-40 years.[15] There were 47 patients (40.5%) aged 26-35 years old, 40 patients (34.5%) aged 17-25 years, and less than 17 years old as many as 17 (12%).

Allergic diseases such as atopic dermatitis, asthma, and food allergies account for nearly one billion cases worldwide and differ in prevalence between women and men. In general, the allergy disease is more common in males, but after puberty the incidence in females increases to the same or more than in males.[16] IgE levels are known to be influenced by the menstrual cycle, so there is a role for sex hormones in the incidence of post-pubertal allergies.[17] Natallya et al. stated that 58% of patients with a positive skin prick test were female and 42% were male.[2] On the other hand, Novitasari et al. stated that the majority of patients were female, with 78 patients (57.4%), while there were 58 male patients (42.6%).[18] The number of female patients in this study was greater than the number of male patients, counted to 69 people (59.5%).

Dust mites are globally recognized as one of the main allergy triggers, and the body parts of mites containing allergens are the cuticle, gastrointestinal tract, and sexual organs. In the tropics, inhaled allergens in the house are more influential on allergies, mostly caused by *Dermatophagoides pteronyssimus*, *Dermatophagoides farinae*, and house dust. In addition to the bodies of house dust mites, it is reported that house dust mite feces are also antigenic.[19] Research by Garna et al. (2017) reported that the most common allergens were house dust mites (70.59%), mosquitoes (46.41%), cockroaches (43.79%), and shrimp (24.84%).[20] Brahmanti et al. (2020) stated that dust was the most common allergen in urticaria patients.[21] In the study of Yudhistira et al. (2019) it was found that the most common cause of allergy based on skin prick tests was the house dust mite B. tropicalis, followed by the *D. pteronyssinus*, and *D. farinae*.[22] In this study, dust mites were the most common cause of three diagnoses, namely atopic dermatitis, chronic urticaria, and acute urticaria.

Table 2. The result of Skin Prick test at the RSMH Palembang Outpatient Clinic of Dermatology and Venereology 2016-2021

Allergen	Categories	Total (n,%)	Male (n,%)	Female (n,%)	P value
House dust mite	Positive	70 (60.3%)	33 (70.2%)	37 (53.6%)	0.084[a]
	Negative	46 (39.7%)	14 (29.8%)	32 (46.4%)	
Dog fur	Positive	9 (7.8%)	4 (8.5%)	5 (7.2%)	1.000[b]
	Negative	107 (92.2%)	43 (91.5%)	64 (92.8%)	
Chicken feathers	Positive	28 (24.1%)	14 (29.8%)	14 (20.3%)	0.241[a]
	Negative	88 (75.9%)	33 (70.2%)	55 (79.7%)	
Chicken egg yolks	Positive	22 (19.0%)	7 (14.9%)	15 (21.7%)	0.356[a]
	Negative	94 (81.0%)	40 (85.1%)	54 (78.3%)	
Chicken meat	Positive	15 (12.9%)	7 (14.9%)	8 (11.6%)	0.603[a]
	Negative	101 (87.1%)	40 (85.1%)	61 (88.4%)	
Chicken egg whites	Positive	9 (7.8%)	5 (10.6%)	4 (5.8%)	0.482[b]
	Negative	107 (92.2%)	42 (89.4%)	65 (94.2%)	
Peanuts	Positive	14 (12.1%)	5 (10.6%)	9 (13.0%)	0.696[a]
	Negative	102 (87.9%)	42 (89.4%)	60 (87.0%)	
Soy	Positive	15 (12.9%)	4 (8.5%)	11 (15.9%)	0.242[a]
	Negative	101 (87.1%)	43 (91.5%)	58 (84.1%)	
Wheat	Positive	7 (6.0%)	5 (10.6%)	2 (2.9%)	0.118[b]
	Negative	109 (94.0%)	42 (89.4%)	67 (97.1%)	
Cow's milk	Positive	18 (15.5%)	7 (14.9%)	11 (15.9%)	0.878[a]
	Negative	98 (84.5%)	40 (85.1%)	58 (84.1%)	
Chocolate	Positive	16 (13.8%)	6 (12.8%)	10 (14.5%)	0.791[a]
	Negative	100 (86.2%)	41 (87.2%)	59 (85.5%)	
Tea	Positive	6 (5.2%)	2 (4.3%)	4 (5.8%)	1.000[b]
	Negative	110 (94.8%)	45 (95.7%)	65 (94.2%)	
Coffee	Positive	11 (9.5%)	3 (6.4%)	8 (6.5%)	0.521[b]
	Negative	105 (90.5%)	44 (93.6%)	61 (88.4%)	
Pineapple	Positive	6 (5.2%)	1 (2.1%)	5 (7.2%)	0.399[b]
	Negative	110 (94.8%)	46 (97.9%)	64 (92.8%)	
Tomato	Positive	3 (2.6%)	1 (2.1%)	2 (2.9%)	1.000[b]
	Negative	113 (97.4%)	46 (97.9%)	67 (97.1%)	
Carrot	Positive	4 (3.4%)	1 (2.1%)	3 (4.3%)	0.646[b]
	Negative	112 (96.6%)	46 (97.9%)	66 (95.7%)	
Snapper	Positive	7 (6.0%)	3 (6.4%)	4 (5.8%)	1.000[b]
	Negative	109 (94.0%)	44 (93.6%)	65 (94.2%)	
Milkfish	Positive	11 (9.5%)	1 (2.1%)	10 (14.5%)	0.027[b]*
	Negative	105 (90.5%)	46 (97.9%)	59 (85.5%)	
Tuna	Positive	11 (9.5%)	5 (10.6%)	6 (8.7%)	0.755[b]
	Negative	105 (90.5%)	42 (89.4%)	63 (91.3%)	
Clam	Positive	24 (20.7%)	10 (21.3%)	14 (20.3%)	0.898[a]
	Negative	92 (79.3%)	37 (78.7%)	55 (79.7%)	
Crab	Positive	27 (23.3%)	11 (23.4%)	16 (23.2%)	0.978[a]
	Negative	89 (76.7%)	36 (76.6%)	53 (76.8%)	
Squid	Positive	16 (13.8%)	7 (14.9%)	9 (13.0%)	0.777[a]
	Negative	100 (86.2%)	40 (85.1%)	60 (87.0%)	
Shrimp	Positive	29 (25.0%)	17 (36.2%)	12 (17.4%)	0.022[a]*
	Negative	87 (75.0%)	30 (63.8%)	57 (82.6%)	

[a] Chi-square test; [b] Fisher exact test; * $p<0.05$

Table 3. Dominant allergen from skin prick test results based on diagnosis at the RSMH Palembang Outpatient Clinic of Dermatology and Venereology 2016-2021

Diagnosis	Allergen	n (%)
Atopic dermatitis (n=56)	House dust mite	36 (64.3%)
	Chicken feathers	19 (33.9%)
	Chicken egg yolks	15 (26.8%)
Chronic urticaria (n=37)	House dust mite	25 (67.6%)
	Shrimp	13 (35.1%)
	Crab	11 (29.7%)
Acute urticaria (n=23)	House dust mite	9 (39.1%)
	Soy, clam, crab, shrimp	4 (17.4%)
	Chicken egg yolks, cow's milk, tuna	3 (13.0%)

Seafood is one of the most common allergens trigger allergies. Crustaceans' seafood, especially shrimp and crabs, are the most common allergens in children and adults. The prevalence rate in the community is reported to range from 1.3% to 5.2%, depending on the country and dietary habits.[23] The main allergen in crustaceans is tropomyosin, which influences the molecular and clinical cross-reactions between groups of crustaceans (shrimp, crab, and lobster) and other invertebrates, for example, house dust mites and cockroaches.[24] Another study found shrimp (24.3%) and crab (27.1%) to be the dominant allergens in patients undergoing skin prick test.[25] House dust mites, shrimp, and crabs were the three most common allergens detected in all subjects in this study.

Connett et al. found that women were more likely to be allergic to fish.[26] In this study, women had a higher proportion of positive milkfish allergens than men. The research by Thalayasingam et al. stated that there was no significant difference in the prevalence of shrimp allergy in men and women.[27] Almost all allergens did not show differences in characteristics by sex, except for milkfish and shrimp allergens. Male subjects had a higher positive proportion of shrimp allergens. There are no studies that specifically compare the differences in the incidence of milkfish allergy between the sexes.

Atopic dermatitis is a chronic recurrent skin disease characterized by flare-ups due to allergen exposure. Treatment is to avoid triggers based on the patient's history and can refer to allergens that are detected a positive by the skin prick test results. The causes that aggravate atopic dermatitis at the age of less than 15 years are dry skin, seasonal changes, dust, food, animal dander, smoke, and skin infections.[28] In this study, three dominant allergens were found in atopic dermatitis, namely house dust mites, chicken feathers, and egg yolks. In statistical tests, chicken feather allergen showed significant differences between the diagnoses of atopic dermatitis, chronic urticaria, and acute urticaria.

Chronic urticaria affects about 1% of the world's population of all ages, mostly young and middle-aged women. This condition may present as spontaneous chronic urticaria, induced chronic urticaria, or both. It usually lasts for several years (>1 year in 25-75% of patients) and often takes more than 1 year before finding effective treatment for these patients.[29] Darlenski et al. stated that the skin prick test showed sensitization to more than 1 allergen in 39.1% of urticaria patients. It is known to be associated with comorbidities such as allergic rhinitis or oral allergy syndrome.[30] The three predominant allergens found in patients with chronic urticaria are house dust mites, shrimp, and crabs.

Urticaria and angioedema are the most common acute symptoms of allergic reactions, including food allergies. This is because patients generally do not seek medical attention immediately or tell their doctor about the history of these symptoms.[31] In patients with acute urticaria, the dominant allergens were found to be house dust mites, soybeans, shellfish, crabs, and shrimp.

The limitation of this study is that it only performed at one health center. Research in several health centers is recommended to reduce the error rate of data on patients undergoing skin prick testing. All (100%) of the clinical relevance to the skin prick test results were established since all of the subjects were symptomatic patients. The location of the study is a referral hospital, so patients may have been or are undergoing treatment, which may affect the results of the skin prick test. It is suggested that improvements to the medical record of skin prick test by adding information on clinical relevance, conducting periodic studies with a larger number of research subjects, and involving primary health services can provide a better picture of allergens in the community. If the future study also involves asymptomatic subjects, it will show the actual clinical relevance of the test.

Table 4. The results of the skin prick test based on the diagnosis at the RSMH Palembang Clinic of Dermatology and Venereology 2016-2021

Allergen	Categories	Total (n%)	Atopic dermatitis (n %)	Chronic urticaria (n %)	Acute urticaria (n %)	P value
House dust mite	Positive	70 (60.3%)	36 (64.3%)	25 (67.6%)	9 (39.1%)	0.064[a]
	Negative	46 (39.7%)	20 (35.7%)	12 (32.4%)	14 (60.9%)	
Dog fur	Positive	9 (7.8%)	3 (5.4%)	4 (10.8%)	2 (8.7%)	0.593[b]
	Negative	107 (92.2%)	53 (94.6%)	33 (89.2%)	21 (91.3%)	
Chicken feathers	Positive	28 (24.1%)	19 (33.9%)	9 (24.3%)	0 (0%)	0.002[b]*
	Negative	88 (75.9%)	37 (66.1%)	28 (75.7%)	23 (100%)	
Chicken egg yolks	Positive	22 (19.0%)	15 (26.8%)	4 (10.8%)	3 (13.0%)	0.113[a]
	Negative	94 (81.0%)	41 (73.2%)	33 (89.2%)	20 (87.0%)	
Chicken meat	Positive	15 (12.9%)	11 (19.6%)	3 (8.1%)	1 (4.3%)	0.142[b]
	Negative	101 (87.1%)	45 (80.4%)	34 (91.9%)	22 (95.7%)	
Chicken egg whites	Positive	9 (7.8%)	7 (12.5%)	1 (2.7%)	1 (4.3%)	0.250[b]
	Negative	107 (92.2%)	49 (87.5%)	36 (97.3%)	22 (95.7%)	
Peanuts	Positive	14 (12.1%)	11 (19.6%)	2 (5.4%)	1 (4.3%)	0.064[b]
	Negative	102 (87.9%)	45 (80.4%)	35 (94.6%)	22 (95.7%)	
Soy	Positive	15 (12.9%)	9 (16.1%)	2 (5.4%)	4 (17.4%)	0.232[b]
	Negative	101 (87.1%)	47 (83.9%)	35 (94.6%)	19 (82.6%)	
Wheat	Positive	7 (6.0%)	5 (8.9%)	1 (2.7%)	1 (4.3%)	0.599[b]
	Negative	109 (94.0%)	51 (91.1%)	36 (97.3%)	22 (95.7%)	
Cow's milk	Positive	18 (15.5%)	13 (23.2%)	2 (5.4%)	3 (13.0%)	0.063[a]
	Negative	98 (84.5%)	43 (76.8%)	35 (94.6%)	20 (87.0%)	
Chocolate	Positive	16 (13.8%)	10 (17.9%)	5 (13.5%)	1 (4.3%)	0.286[a]
	Negative	100 (86.2%)	46 (82.1%)	32 (86.5%)	22 (95.7%)	
Tea	Positive	6 (5.2%)	4 (7.1%)	2 (5.4%)	0 (0%)	0.484[b]
	Negative	110 (94.8%)	52 (92.9%)	35 (94.6%)	23 (100%)	
Coffee	Positive	11 (9.5%)	8 (14.3%)	3 (8.1%)	0 (0%)	0.146[b]
	Negative	105 (90.5%)	48 (85.7%)	34 (91.9%)	23 (100%)	
Pineapple	Positive	6 (5.2%)	3 (5.4%)	2 (5.4%)	1 (4.3%)	1.000[b]
	Negative	110 (94.8%)	53 (94.6%)	35 (94.6%)	22 (95.7%)	
Tomato	Positive	3 (2.6%)	1 (1.8%)	1 (2.7%)	1 (4.3%)	0.775[b]
	Negative	113 (97.4%)	55 (98.2%)	36 (97.3%)	22 (95.7%)	
Carrot	Positive	4 (3.4%)	3 (5.4%)	0 (0%)	1 (4.3%)	0.411[b]
	Negative	112 (96.6%)	53 (94.6%)	37 (100%)	22 (95.7%)	
Snapper	Positive	7 (6.0%)	5 (8.9%)	1 (2.7%)	1 (4.3%)	0.599[b]
	Negative	109 (94.0%)	51 (91.1%)	36 (97.3%)	22 (95.7%)	
Milkfish	Positive	11 (9.5%)	8 (14.3%)	1 (2.7%)	2 (8.7%)	0.163[b]
	Negative	105 (90.5%)	48 (85.7%)	36 (97.3%)	21 (91.3%)	
Tuna	Positive	11 (9.5%)	4 (7.1%)	4 (10.8%)	3 (13.0%)	0.708[b]
	Negative	105 (90.5%)	52 (92.9%)	33 (89.2%)	20 (87.0%)	
Clam	Positive	24 (20.7%)	12 (21.4%)	8 (21.6%)	4 (17.4%)	0.909[a]
	Negative	92 (79.3%)	44 (78.6%)	29 (78.4%)	19 (82.6%)	
Crab	Positive	27 (23.3%)	12 (21.4%)	11 (29.7%)	4 (17.4%)	0.493[a]
	Negative	89 (76.7%)	44 (78.6%)	26 (70.3%)	19 (82.6%)	
Squid	Positive	16 (13.8%)	9 (16.1%)	5 (13.5%)	2 (8.7%)	0.687[a]
	Negative	100 (86.2%)	47 (83.9%)	32 (86.5%)	21 (91.3%)	
Shrimp	Positive	29 (25.0%)	12 (21.4%)	13 (35.1%)	4 (17.4%)	0.210[a]
	Negative	87 (75.0%)	44 (78.6%)	24 (64.9%)	19 (82.6%)	

[a] Chi-square test; [b] Fisher exact test; * $p<0.05$

House dust mites were the dominant allergen in patients with atopic dermatitis, chronic urticaria, and acute urticaria. Most patients who underwent skin prick tests in 2016-2021 had a diagnosis of atopic dermatitis, were aged 26-35 years, and were female. Milkfish more often trigger allergic reactions in women, while shrimp more often trigger allergic reactions in men. Chicken feather allergen showed statistically significant differences between the diagnoses of atopic dermatitis, chronic urticaria, and acute urticaria. Detection of allergens through skin prick test can establish diagnosis and prevent relapse. Specifically, skin prick test is recommended to be performed in the management of atopic dermatitis, chronic urticaria, and acute urticaria in order to detect environmental allergens because it has significant clinical relevance.

REFERENCES

1. Ansotegui IJ, Melioli G, Canonica GW, Caraballo L, Villa E, Ebisawa M, et al. IgE allergy diagnostics and other relevant tests in allergy, a World Allergy Organization position paper. World Allergy Organ J. 2020;13(2):1–50.
2. Natallya FR, Barakbah J. Penelitian Retrospektif Uji Tusuk Kulit pada Pasien Dermatitis Atopik di Unit Rawat Jalan Kesehatan Kulit dan Kelamin RSUD Dr . Soetomo Surabaya Periode 2007-2012. Berk Ilmu Kesehat Kulit dan Kelamin. 2015;27(1):9–16.
3. Shoormasti RS, Mahloujirad M, Sabetkish N, Kazemnejad A, Ghobadi Dana V, Tayebi B, et al. The most common allergens according to skin prick test: The role of wheal diameter in clinical relevancy. Dermatol Ther. 2021;34(1):1–7.
4. Muthupalaniappen L, Jamil A. Prick, patch or blood test? A simple guide to allergy testing. Malaysian Fam Physician. 2021;16(2):19–26.
5. Suwarsa O, Sormin ER, Sutedja E, Dharmaji HP. The Positive Skin Prick Test not Correlate with Disease Severity and Quality of Life in Atopic Dermatitis Patients. Berk Ilmu Kesehat Kulit dan Kelamin. 2017;29(3):229–33.
6. Kutlu Ö, Metin A. Evaluation of skin prick test results in patients with atopic dermatitis. East J Med. 2020;25(4):578–85.
7. Silvia E, Anggunan, Effendi A, Nurfaridza I. Hubungan Antara Jenis Kelamin Dengan Angka Kejadian Dermatitis Seboroik. J Ilm Kesehat Sandi Husada. 2020;9(1):37–46.
8. Anggraeni S, Umborowati MA, Endaryanto A. The Accuracy of Indonesian New Local Skin Prick Test (SPT) Allergen Extracts as Diagnostic Tool of IgE-mediated Atopic Dermatitis. Indian J Forensic Med Toxicol. 2021;15(3):4278–85.
9. Heinzerling L, Mari A, Bergmann KC, Bresciani M, Burbach G, Darsow U, et al. The skin prick test - European standards. Clin Transl Allergy. 2013;3(1):1–10.
10. Siswati A, Rosita C, Triwahyudi D. Uji Tusuk. In: Widaty S, Soebono H, Nilasari H, Listiawan MY, Siswati AS, Triwahyudi D, et al., editors. Panduan Keterampilan Klinis. Jakarta: PERDOSKI; 2021. p. 30–4.
11. Lachapelle J, Maibach H. The Methodology of Open (Non-Prick) Testing, Prick Testing, and its Variants. In: Lachapelle J, Maibach H, editors. Patch Testing and Prick Testing. 2nd ed. Madrid: Springer; 2009. p. 141–52.
12. Kilic SO, Hiz Çiçekliyurt MM, Oymak Yalçın S. The relationship between house dust mites and environmental factors beyond the analysis power of a skin prick test. Alergol Pol - Polish J Allergol. 2021;8(2):64–71.
13. Oncham S, Udomsubpayakul U, Laisuan W. Skin prick test reactivity to aeroallergens in adult allergy clinic in Thailand: a 12-year retrospective study. Asia Pac Allergy. 2018;8(2):8–15.
14. Lesmana IWL, Sutanegara SWD, Sudipta IM. Distribusi berdasarkan umur, jenis kelamin, pekerjaan, hasil tes cukit kulit dan jenis alergen pada penderita rinitis alergi di Poli THT-KL RSUP Sanglah Denpasar Tahun 2015. Medicina (B Aires). 2019;50(1):109–14.
15. Ismayani, Nursiah S, Rambe AYM, Herwanto Y. Hubungan gejala klinis dengan hasil tes cukit kulit pada pasien dengan rhinitis alergi di RSUP H Adam Malik Medan. J Med Sch. 2019;52(4):171–2.
16. Martinis M De, Sirufo MM, Suppa M, Di Silvestre D, Ginaldi L. Sex and gender aspects for patient stratification in allergy prevention and treatment. Int J Mol Sci. 2020;21(4):1–17.
17. Leffler J, Stumbles PA, Strickland DH. Immunological processes driving IgE sensitisation and disease development in males and females. Int J Mol Sci. 2018;19(6):1–21.
18. Novitasari, Sorisi A, Wahongan GJ. Profil Penderita Alergi Dengan Hasil Skin Prick Test Tdr Positif Di Poliklinik Alergi-Imunologi. J eBiomedik. 2013;1(2):1014–8.
19. Manapa R, Wahongan G, Bernadus J. Profil Penderita Alergi Dengan Hasil Skin Prick Test Tdr Positif Di Poliklinik Alergi-Imunologi Smf Ilmu Penyakit Dalam Blu Rsup Prof. Dr. R. D. Kandou Manado Periode Januari 2010 – Oktober 2012. J e-Biomedik. 2013;1(2):1028–32.
20. Garna DR, Lucianus J, Ivone J. Descriptive Study on Skin Prick Test in Allergy Clinic Immanuel

Hospital Bandung Indonesia. J Med Heal. 2017;1(6):558–67.
21. Brahmanti H, Ekasiwi FD, Maharani I. Hubungan Antara Riwayat Klinis Dan Skin Prick Test pada Pasien Urtikaria Di RSUD Dr. Saiful Anwar Malang. J Dermatology, Venereol Aesthetic. 2020;1(1):49–57.
22. Yudhistira, Sukartini N, Immanuel S, Rengganis I. Evaluasi Pemeriksaan Imunoglobulin E Spesifik Menggunakan Immunoblot Assay dengan Baku Emas Skin Prick Test. Cermin Dunia Kedokt. 2019;46(2):91–7.
23. Pascal M, Grishina G, Yang AC, Sánchez-García S, Lin J, Towle D, et al. Molecular diagnosis of shrimp allergy: Efficiency of several allergens to predict clinical reactivity. J Allergy Clin Immunol. 2015;3(4):521–9.
24. Tuano KTS, Anvari S, Hanson IC, Hajjar J, Seeborg F, Noroski LM, et al. Improved diagnostic clarity in shrimp allergic non-dustmite sensitized patients. Allergy Asthma Proc. 2018;39(5):377–83.
25. Candra Y, Setiarini A, Rengganis I. Gambaran Sensitivitas Terhadap Alergen Makanan. Makara Kesehat. 2011;15(1):44–50.
26. Connett GJ, Gerez I, Cabrera-Morales EA, Yuenyongviwat A, Ngamphaiboon J, Chatchatee P, et al. A population-based study of fish allergy in the Philippines, Singapore and Thailand. Int Arch Allergy Immunol. 2012;159(4):384–90.
27. Thalayasingam M, Gerez IFA, Yap GC, Llanora G V., Chia IP, Chua L, et al. Clinical and immunochemical profiles of food challenge proven or anaphylactic shrimp allergy in tropical Singapore. Clin Exp Allergy. 2015;45(3):687–97.
28. Kulthanan K, Tuchinda P, Nitiyarom R, Chunharas A, Chantaphakul H, Aunhachoke K, et al. Clinical practice guidelines for the diagnosis and management of atopic dermatitis. Asian Pacific J allergy Immunol. 2021;39(3):145–55.
29. Goncalo M, Gimenéz-Arnau A, Al-Ahmad M, Ben-Shoshan M, Bernstein JA, Ensina LF, et al. The global burden of chronic urticaria for the patient and society. Br J Dermatol. 2021;184(2):226–36.
30. Darlenski R, Kazandjieva J, Zuberbier T, Tsankov N. Chronic urticaria as a systemic disease. Clin Dermatol. 2014;32(3):420–3.
31. Kam A, Raveinal R. Imunopatogenesis dan Implikasi Klinis Alergi Makanan pada Dewasa. J Kesehat Andalas. 2018;7(2):144–51.