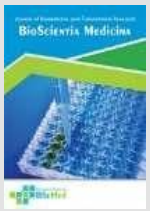
eISSN (Online): 2598-0580



Bioscientia Medicina: Journal of Biomedicine & Translational Research

Journal Homepage: www.bioscmed.com

Profile of Skin Prick Test in Urticaria Patients: 5 Years Retrospective Study at Dermatology and Venereology Polyclinic, Dr. Moewardi General Hospital, Surakarta, Indonesia

Winda Wijayanti[1*], Annisa Fildza Hashfi[1], Muhammad Eko Irawanto[1], Triasari Oktavriana[1]

[1]Department of Dermatology and Venereology, Faculty of Medicine, Universitas Sebelas Maret/Dr. Moewardi General Hospital, Surakarta, Indonesia

ARTICLE INFO

Keywords:
Allergens
Skin prick test
Urticaria

***Corresponding author:**
Winda Wijayanti

E-mail address:
winda_wijayanti@yahoo.com

All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.37275/bsm.v7i1.749

A B S T R A C T

Background: Urticaria is a skin disorder due to the release of mast cell mediators, which is characterized by raised skin (urtica) accompanied by itching. Skin prick test (SPT) is a rapid, sensitive test for detecting IgE-mediated allergic disease. This study aimed to determine the profile of SPT in urticaria patients. **Methods:** A descriptive observational study involving 67 research subjects retrospectively using medical record data for the period January 2017-June 2022. Univariate data analysis was carried out in this study with the help of SPSS version 25 software. **Results:** A total of 67 urticarial patients with positive results on the SPT investigation found that there were more women (71.64%) than men (28.36%), with the most age group being 16-25 years old with 16 patients, followed by 13 patients aged 56-65 years, 12 patients aged 46-55 years, 10 patients aged 36-45 years, 9 years of 26-35 years, 5 patients aged ≥ 65 years and the last age group, namely ≤ 15 years of age in 2 patients. Distribution of urticaria with the most locations in the generalized region, with as many as 20 patients (29.85%), followed by the extremity region with as many as 18 patients (26.87%), the facial region with as many as 17 patients (25.37%) and the least location in the trunk region as many as 12 patients (17.91%). Allergen tests that caused the most were house dust in 21 patients (11.86%), crabs in 18 patients (10.17%), and egg yolk in 11 patients (6.21%). **Conclusion:** Skin prick test profile at the dermatology and venereology polyclinic, Dr. Moewardi General Hospital, Surakarta, Indonesia, for the period January 2017-June 2022, where the results obtained were that there were more women than men, the largest age group was 16-25 years, the most common distribution of urticaria locations was found in the generalized region and the most common allergens caused by house dust.

1. Introduction

Urticaria is a skin disorder due to the release of mast cell mediators, which is characterized by elevation of the skin due to dermal edema (urtica) accompanied by itching and angioedema. Urtica diameter size is between 1 millimeter to 6-8 inches. The causes of urticaria are multifactorial and sometimes difficult to identify.[1] Urticaria is divided into two, namely acute urticaria and chronic urticaria. Acute urticaria occurs when the appearance of urticaria spontaneously with or without angioedema lasts less than 6 weeks, whereas chronic urticaria lasts more than 6 weeks.[2] The prevalence of urticaria in Europe is 8% to 10%. A study by Hellgren reported that the incidence of urticaria was 0.1% of the entire population in Sweden, whereas Gaig et al. reported that the incidence of urticaria was 0.6% in the population in Spain.[3] Data on the prevalence of urticaria in Indonesia is based on an epidemiological study by Rafikasari et al. at Dr. Soetomo General

Hospital, Surabaya in 2015-2017 reported that there were 720 cases of urticaria in the skin and genital health polyclinic for 3 years.[4]

The diagnosis of urticaria is made by anamnesis, physical examination, and supporting examinations, one of which is in the form of a skin prick test (SPT), which functions to identify the causal factors and trigger factors for urticaria. The advantages of SPT are that it is relatively safe, easy, convenient, and inexpensive.[1] SPT examination method is recommended as the primary method for diagnosing IgE-mediated allergies, such as urticaria, rhinoconjunctivitis, asthma, anaphylaxis, atopic eczema, and food and drug-induced allergies. This examination method can help to confirm the diagnosis of suspected type 1 allergic hypersensitivity.[5] The SPT examination is a way to detect the presence of specific IgE against allergens bound to the surface of mast cells in the skin in a way that when the skin is pricked with a lancet, the allergen will come in contact with the specific IgE found on the surface of the mast cells in the skin which causes cell activation and rapid release. Various mediators, including histamine. The release of these various mediators produces manifestations in the form of urticaria and flare.[6] This study aimed to determine the profile of SPT in urticaria patients at Dr. Moewardi General Hospital, Surakarta, Indonesia, for the last 5 years, namely the period January 2017 to June 2022.

2. Methods

This study was a descriptive observational study and used secondary data sourced from medical records at the medical record installation of Dr. Moewardi General Hospital, Surakarta, Indonesia. A total of 67 research subjects participated in this study. The research subjects met the inclusion criteria in the form of patients with a diagnosis of urticaria who underwent SPT examination at the dermatology and venereology polyclinic, Dr. Moewardi General Hospital, Surakarta, Indonesia, for the period January 2017-June 2022, recorded in medical records using the International Statistical Classification of Diseases the 10th revision (ICD 10) namely L.50 for urticaria and has complete medical record data.

This study was approved by the medical and health research ethics committee of the Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia. This study made observations on the sociodemographic data of the research subjects. In addition, this study observed the clinical features of the skin prick test in urticaria patients. Data analysis was carried out with the help of SPSS version 25 software. Univariate data analysis was carried out in this study, where the data frequency distribution for each variable was presented descriptively.

3. Results

Table 1 presents the distribution of urticaria frequency based on the age and gender of the research subjects. The majority of research subjects are female. The results of this study also show that the majority of research subjects are between 16-25 years old.

Table 1. Distribution of urticaria by age and gender.

Gender	Age							Total	Percentage (%)
	≤ 15	16-25	26-35	36-45	46-55	56-65	≥ 65		
Male	0	3	3	1	3	5	4	19	28,36
Female	2	13	6	9	9	8	1	48	71,64
Total	2	16	9	10	12	13	5	67	100

Table 2 presents the distribution of urticaria by location. The majority of research subjects have urticaria locations in the generalized region. Table 3 presents the distribution of allergen skin prick tests in urticaria. The majority of research subjects had an urticarial response to house dust allergens.

Table 2. Distribution of urticaria by location.

Location	Number of patients	Percentage (%)
Facial region	17	25,37
Generalized region	20	29,85
Extremity region	18	26,87
Trunk region	12	17,91

Table 3. Distribution of allergens skin prick test on urticaria.

Types of allergens	Number of patients	Percentage (%)
House dust	21	11,86
Crab	18	10,17
Egg yolk	11	6,21
Squid	10	5,65
Chocolate	9	5,08
Tea	9	5,08
Dog fur	8	4,52
Cashew nuts	7	3,95
Mackerel tuna	7	3,95
Cow's milk	6	3,39
Snapper fish	6	3,39
Peanut	5	2,82
Chicken feather	5	2,82
Soya bean	5	2,82
Shrimp	5	2,82
Fungi	5	2,82
Milkfish	5	2,82
Shell	5	2,82
Wheat	5	2,82
Cat's fur	4	2,26
Tomato	4	2,26
Coffee	4	2,26
Carrot	4	2,26
Chicken	2	1,13
Pineapple	1	0,56
Cockroach	1	0,56
Egg white	1	0,56

4. Discussion

Urticaria is a skin vascular reaction characterized by urticaria on the skin. Urtica is localized edema surrounded by a red halo accompanied by intense itching, stinging, or prickling sensations.[7] The results of this study showed that there were more cases in women (72.64%) than in men (28.36%). This is in accordance with research by Cassano et al. in 2016 in Italy, which reported that the prevalence of urticaria in women was higher than in men. This is caused by sex hormones modulating immune cells and inflammatory cells, namely secretions from mast cells which can affect gender and the menstrual cycle. Hormonal fluctuations during the menstrual cycle can affect the exacerbation of the appearance of urticaria.[8]

The pathogenesis of urticaria is the release of histamine and proinflammatory cytokines from mast cells which result in vasodilation and increased capillary permeability resulting in local fluid transudation, which causes local edema accompanied by erythema. Vasodilation and increased capillary permeability result in the upregulation of endothelial adhesion molecule (ELAM), and vascular adhesion molecule (VCAM) is accompanied by transendothelial

cell migration and chemotaxis. Mast cell degranulation induced by histamine release is key to the appearance of urticaria.[10]

Research by Bains and Dogra in 2015 reported that 44.44% of patients with urticaria had positive SPT results for house dust allergens.[11] This is in accordance with the results of the study, which found that the most common type of allergen found from the SPT data was house dust in 21 patients (11.86%). House dust contains Der p1 Namely, cysteine proteinase inhaled into the respiratory tract is the main component that causes allergies in atopic individuals.[12] Research by Shankar et al. in 2010 reported that 25% showed positive SPT results for food allergens.[13] Research by Moneret-Vautrin reported that as many as 30 patients with food-induced urticaria.[14] Research by Boyano-Martinez et al. reported that food allergy is mediated by IgE, which is caused by the high protein content of these foods. Some individuals signal the body to respond in the form of allergies.[15] The main allergen contained in crab is tropomyosin and arginine kinase, while the allergen in chicken eggs is ovomucoid protein which is a protein that is resistant to degeneration of digestive enzymes, so it is the protein that causes the most allergies.[16] This is in accordance with this study that food is the most common cause, namely crabs in 18 patients (10.71%) and egg yolks in 11 patients (6.21%).

Research by Nath et al. in 2007 reported that positive SPT results were found in animals, namely dog fur by 2% and cat fur by 12%.[17] Animal allergens act as complete antigens and induce IgE and IgG production. Research by Gawlik et al. in 2009 reported that sensitivity to cat fur allergens and dog fur occurs in 22-67% of patients with a history of atopy.[18] This is in accordance with the results of this study that obtained data on urticaria patients who were sensitive to dog fur in 8 patients (4.52%) and cat fur in 4 patients (2.26%).

Allergens are mixtures of various allergenic proteins which can be separated by electrophoresis. The allergen must be free from contamination with other allergenic substances. Allergens contain hundreds of different proteins. Recommended allergen ingredients according to the Global Allergy and Asthma European Network pollen, food consisting of egg whites, milk, fish, wheat, nuts, soya beans, then mites, animals, fungi, and insects.[19]

Skin prick test is a relatively safe test because of the minimal side effects it causes. The SPT procedure is carried out by inserting a lancet tip into the epidermal layer of skin at an angle of 45 degrees, and the tip is lifted so that it forms a small amount of damage to the epidermal layer and then drops the allergen. One needle should be used once for one puncture so as to avoid the possibility of cross-contamination and needle stick errors. The SPT reaction in the form of urticaria varies for each allergen, and the reaction occurs after 15-20 minutes or can be followed by a slow reaction after 4-8 hours. The recommended SPT location is on the volar area of the forearm at a distance of approximately 3 cm from the elbow crease and 5 cm from the wrist.[20]

The interpretation of the SPT was assessed based on the diameter of the positive control, namely using a histamine solution which functions to cause degranulation of mast cells in the skin tissue, causing urticaria.[20] The urtica diameter in the positive control was ≥ 4 mm from the negative control. If the diameter was <4 mm, then the SPT results could not be interpreted. The negative control was a 50% glycerol solution in saline containing no allergens. SPT results can give false positive or false negative results due to incorrect technique or poor allergen ingredients. Positive controls that do not show urtica interpretation must be questioned. This can occur due to taking antihistamines or steroids, or antidepressants (Table 4).[21] False-negative results can be caused by incorrect pinching techniques that can affect SPT reactivity, poor quality and potential of allergens, and the influence of drugs that can affect allergic reactions.

Table 4. Urtica interpretation on skin prick test.[22]

Scale	Results
0	Allergic reaction = negative control reaction
+	Urtica diameter > negative control reaction, and < half the histamine diameter
++	Urtica diameter ≥ half the diameter of histamine
+++	Urtica diameter ≥ mean histamine diameter
++++	Diameter urtica > 2x diameter histamine reactions or any reaction with pseudopodia

Contraindications and indications for SPT can be influenced by several things. One of the contraindications is the inability to stop antihistamines and the presence of generalized skin disease. Relative contraindications such as pregnancy, drug therapy β-adrenergic-receptor blocking, dermatographism, unstable angina, and a history of previous anaphylactic skin tests.[23] Indications for SPT are sensitivity to inhaled allergens, for example, in people with asthma and rhinitis, then sensitivity to food and drug reactions, for example, sensitivity to penicillin and anaphylaxis to insect stings.[24] The drawback of this study is that it is not differentiated based on the type of urticaria, so further research is needed in order to complement the existing data and can be used as serial data.

5. Conclusion

Skin prick test profile at the dermatology and venereology polyclinic, Dr. Moewardi General Hospital, Surakarta, Indonesia, for the period January 2017-June 2022, where the results obtained were that there were more women than men, the largest age group was 16-25 years, the most common distribution of urticaria locations was found in the generalized region and the most common allergens caused by house dust.

6. References

1. Zuberbier T, Aberer W, Asero R, Abdul-Latiff AH, Baker D, et al. The EAACI/GA2LEN/EDF/WAO guideline for the definition, classification, diagnosis and management of urticaria. Allergy. 2018; 73(7): 1393-414.
2. Webster L, Rider NL, Archambault ME. Evaluating and managing chronic idiopathic urticaria in adults. J Am Acad Phys. 2018; 31(7): 22-6.
3. Hide M, Takahagi S, Hiragun T. Urticaria and angioedema. In: Kang S, Amagai M, Bruckner AL, Enk AH, Margolis DJ, et al. Editor. Fitzpatrick's dermatology. 9th ed. New York: McGraw-Hill. 2019: 684-709
4. Rafikasari A, Fetarayani D, Setyaningrum T. Urticaria patient profile. Berkala Ilmu Kesehatan Kulit dan Kelamin. 2019; 31(3): 222-7.
5. O'Brien RM. Skin prick testing and in vitro assays for allergic sensitivity. Aust Prescr. 2002; 25(4): 1-3
6. Ng IE, Turner PJ, Kemp AS, Campbell DE. Parental perceptions and dietary adherence in children with seafood allergy. Pediatr Allergy Immunol. 2011; 22(7): 720-28.
7. James WD, Berger TG, Elston DM. Urticaria. In: Andrews' Diseases of the skin. 12th ed. 2016. James WD, Berger TG, Elston DM, Editor. Philadelphia: Elsevier; 146- 51.
8. Bernstein JA, Bouillet L, Caballero T, Staevska M. Hormonal effects on urticaria and angioedema conditions. The Journal of Allergy and Clinical Immunology: In Practice. 2021; 9(6): 2209-19.
9. Sreejith AP, George AE, Mathew R. Skin prick test in chronic urticaria in a tertiary care centre in South India. J Med Sci Clin Res. 2020; 8(02): 927-32

10. Mandel VD, Alicandro T, Pepe P, Bozano L. Chronic spontaneous urticaria: A review of pathological mechanism, diagnosis, clinical management and treatment. EMJ. 2020; 5(1): 29-39
11. Bains P, Dogra A. Skin prick test in patients with chronic allergic skin disorders. Indian J Dermatol. 2015; 60:159–64.
12. Reddy VB, Lerner EA. Activation of mas-related G-protein–coupled receptors by the house dust mite cysteine protease Der p1 provides a new mechanism linking allergy and inflammation. JBC. 2017; 292(42): 17399-406.
13. Shankar DK, Ramnane M, Rajouria EA. Etiological approach to chronic urticaria. Indian J Dermatol. 2010; 55(1): 33.
14. Moneret-Vautrin DA. Allergic and pseudo-allergic reactions to foods in chronic urticaria. Ann Dermatol Venereol. 2003; 130: 135–42.
15. Boyano-Martinez T, Garcia-Ara C, Diaz-Pena JM, Martin-Esteban M. Prediction of tolerance on the basis of quantification of egg white-specific IgE antibodies in children with egg allergy. J Allergy Clin Immunol. 2002; 110: 304–09.
16. Tan JW, Joshi P. Egg allergy: an update. Journal of Paediatrics and Child Health. 2014; 50(1): 11-5.
17. Nath A, Balaji A, Thappa DM. Prick testing in chronic idiopathic urticaria: A report from a tertiary care centre in South India. Internat J Dermatol. 2007; 6(1): 1-5.
18. Gawlik R, Pitsch T, DuBuske L. Anaphylaxis as a manifestation of horse allergy. World Allergy Organization Journal. 2009; 2(8): 185-9.
19. James WD, Berger TG, Elston DM. Erythema and urticaria. In: Andrew's diseases of the skin clinical dermatology. 11th ed. China. Saunders Elsevier. 2011; 138-54.
20. Sudewi NP, Kurniati N, Suyoko ED, Munasir Z, Akib AA. Various examination techniques to establish the diagnosis of allergic diseases. Sari Pediatri. 2009; 11(3): 174-8.
21. Brockow K, Garvey LH, Aberer W, Atanaskovic-Markovic M, Barbaud A, et al. Skin test concentrations for systemically administered drugs-an ENDA/EACCI drug allergy interest group position paper. Allergy. 2013; 68: 702-12
22. Fatteh S, Rekkerth DJ, Hadley JA. Skin prick/puncture testing in North America: A call for standards and consistency. Allergy Asthma Clin Immunol. 2014; 10(44): 1-9.
23. Lodge CJ, Dharmage SC, Khalafzai RU, Abramson MJ, Hill DJ, et al. Anaphylaxis to skin prick testing in a 29 Year old woman. Int J Clin Med. 2012; 3: 559-61.
24. Bousquet J, Heinzerling L, Bachert C, Papadopoulos NG, Bousquet PJ, et al. Practical guide to skin prick tests in allergy to aeroallergens. Allergy. 2012; 67: 18-24.