Content available at: https://www.ipinnovative.com/open-access-journals

IP Indian Journal of Immunology and Respiratory Medicine

Journal homepage: https://www.ijirm.org/

Original Research Article

Food allergen sensitivity in atopy

R Anuja[1], **M Midhun**[1,*]

[1] *Dept. of Respiratory Medicine, Pushpagiri Institute of Medical Sciences, Thiruvalla, Kerala, India*

ARTICLE INFO

Article history:
Received 20-11-2022
Accepted 24-04-2023
Available online 03-05-2023

Keywords:
Food Allergy
Atopy
Skin Prick Test
SPT

ABSTRACT

Atopic symptoms are a commonly encountered presentation the pulmonology, dermatology and medical outpatient visits. Identification and avoidance of the precipitating factors is important in the management of these patients.

Clinical history usually doesn't give a complete picture of the spectrum of allergen sensitivity. Skin prick Test is described as a safe technique in identifying some obscure precipitating factors that might be worsening the clinical scenario.

This is a 6 month cross sectional study conducted in a research institute in central Kerala among 31 chronic urticaria patients during May to October 2022. Skin prick testing with 30 common food allergens was done. Among the 31 subjects studied 26 (83.87 %) had allergy to foods (90 % among males and 80 % among females). Dal Urud (35.35 %) was the found as the most frequent food allergen, followed by pea (25.8 %), fish, rice and wheat (22.7%).

Dal Arhar, Milk and fennel seeds were found to be the least common food allergens.

Apart from minor itching and redness, none of the subjects developed significant reactions following the test.

This study underlines the importance and safety of skin prick testing in patients with chronic uricaria. In this study it was found that more commonly used foods in Kerala like rice, dal urud were more sensitive.

1. Introduction

Atopy can present to the op in various forms like Urticaria, Allergic rhinitis asthma etc. Atopy is the genetic tendency to develop allergic conditions like asthma, atopic dermatitis and allergic rhinitis.[1] Other common presentations of atopic individuals are allergic conjunctivitis, drug allergy, uricaria, angioedema and anaphylaxis.[2] Urticaria one of its common presentations is an immunologically mediated common disorder causing distress to the affected patients all over the world. Food allergens are can precipitate this reaction. Urticaria may eventually lead to a more serious medical conditions like angioedema and anaphylaxis and hence needs timely attention and management.

Atopic symptoms in the form of allergic rhinitis, asthma can also be linked to food allergens. Avoidance of the precipitating factor is important in the management of atopy. The pattern of food allergen sensitivity may vary from place to place and from time to time. This study is expected to highlight the pattern of food allergen sensitivity in central Kerala.

Urticaria referred to as hives presents as blanchable erythematous, oedematous papules or weals and are usually intensely itchy. The lifetime incidence of urticaria is usually about 15 %.[3] Chronic urticaria is defined as uricaria on most days of a week for six weeks or longer. It is more common in the age group 30 to 50. Studies have also shown a female preponderance, the prevalence being two times as

* *Corresponding author*.
E-mail address: dr.m.midhun@gmail.com (M Midhun).

https://doi.org/10.18231/j.ijirm.2023.006

in men.[4] Food allergy influences the health related quality of life significantly. It has impact on dietary, social and psychological factors.[5]

Food allergy is an adverse health event originating from a specific immune response that may occur reproducibly or repeatedly on exposure to a specific food. Food allergens are specific components of food or its ingredients (usually proteins) which when recognised by allergen specific immune cells, elicit specific immunologic reactions resulting in characteristic symptoms.[5] Genetic predisposition and environmental factors interfere with oral tolerance leading to development of food allergy.[6]

1.1. Types of food allergy[7]

IgE Mediated - Contact Urticaria, Pollen Food Allergen syndrome, Anaphylaxis.

Non IgE Mediated - Food protein induced enterocolitis syndrome & proctocolitis.

Mixed (IgE + Non igE) - Eosinophillic esophagitis.

Allergic reactions can be classified into immediate and delayed. Immediate reactions occurs within minutes to few hours and are IgE Mediated. Delayed reactions occur within several hours to few days and are mediated by cellular mechanisms.[5] According to a study done in 2010 Vitamin D also has an important role in immunological mechanisms contributing to food allergy.[8] Food allergy should be differentiated from other conditions like Coeliac disease, food protein induced enterocolitis syndrome, IBS (Irritable Bowel Syndrome) etc.[9]

Guidelines recommend performing SPT for identification of foods causing food induced reactions which are IgE mediated. However it cannot be relied upon for diagnosis.[5] A positive. The sensitivity of Skin prick test (SPT) is approximately 90%. However the specificity is lower, around 50%. So for diagnosis a supportive history is essential.[10] The preferred instrument for SPT is a single headed metal lancet. The test is conducted by placing a drop of allergen extract on the skin and pressing metal lancet through it for at least 1 second penetrating the epithelial layer of skin without inducing bleeding.[11]

The gold standard for diagnosing food allergy is the Skin Prick test. Serum allergen specific IgE tests can be used when the patient has severe dermatographism or when the patient is unable to stop taking anti-allergic medications.[12] Patch test is the gold standard test for diagnosis of delayed type IV hypersensitivity reactions. Other tests used for diagnosis are prick to prick test, double blinded placebo controlled food challenge test (DBPCFC) etc.[13] Novel diagnostic tests like basophil activation tests, DNA methylation signatures, determination of epitope binding, and bioinformatics may upgrade the scope of diagnosis in future.[14]

The best, safest and simplest strategy to prevent the occurrence of allergic reactions is to avoid the offending agent. Specific emergency medications like adrenaline may be useful in the event of an anaphylaxis. De-sensitisation with Oral Immunotherapy or Sublingual Immunotherapy may increase the tolerance to the offending agent.[15] According to a multicentric study published in 2021 early introduction of some foods causing allergy like peanut and egg has been found to decrease the development of food allergy.[16] Tolerance to can develop naturally over time to allergic foods but are uncommon to some foods like peanut, treenut, fish or shellfish.[17] Vitamin D, Essential fatty acids and zinc may promote immunologic tolerance by enhancing the anti-oxidative and anti-inflammatory barrier.. Nutritional components such as pre and pro-biotics may also be useful.[18]

According to a study done by Huge A Sampson in 2004 in USA, milk and egg were the most frequent food allergen among children and shellfish was the most frequent food allergen among adults.[19] In a study conducted in 2012 among Asian population the most frequent food allergens were shellfish followed by egg peanut beef cow's milk and tree nuts.[20] According to a study published in 2017 in Kerala wheat, garlic and nuts were the most common food allergen.[4] A ten year population based study report published in 2018 reveals the temporal trends in food allergy with a marked increase in incidence of food allergy between 2002 and 2009.[21]

2. Objective

To study the pattern of food allergy in patients with atopy with h/o allergy to foods using skin prick test.

3. Materials and Methods

3.1. Inclusion criteria

All consecutive patients presenting to OPD with atopic symptoms with h/o food allergy, subjected to skin prick testing for diagnosis and are consenting to be included in this study

3.2. Exclusion criteria

1. Immunosuppression - Diabetes, HIV.
2. Patients with diffuse skin disease which may interfere with interpretation.
3. Patients on treatment with biologics.
4. Patients on long term treatment with topical or systemic steroids.

A detailed history of the past events of atopy, food allergy, and urticaria were taken. Patients were advised not to consume antihistamines, steroids, tricyclic antidepressants, 1 week hours prior to the test.

Allergy Skin prick testing was done with 31 food allergens according to guidelines and skin reactions were read at 15 to 20 minutes. The positive control given

was histamine and the negative control buffered saline. A positive reaction was taken as a wheel size of 3 mm or more than negative control.

4. Results

Table 1 details the demographics of the study population. The study population predominantly consisted of females which may reflect the increased incidence of urticaria among females in the general population. Majority of the study population were of the age group 20 to 34.

The prevalence of food allergen sensitivity by Skin prick testing in the study population was 83.87 %. The food allergen sensitivity pattern as observed in the skin prick test is given in the chart below (Figure 1). Dal Urud (35.35 %) was found to be the most frequent allergen in the study population. The other agents the study population was most sensitive to were Pea (25.8 %), Fish, Rice and wheat (22.5 %) were. Dal Arhar, Milk and Fennel Seed were the least common allergens. None of the study participants developed serious allergic reactions.

Table 1: Age- gender distribution

	Male	Female	
< 20	2	5	7
20-34	6	6	12
35-49	3	6	9
> 50	0	3	3
	11	20	31

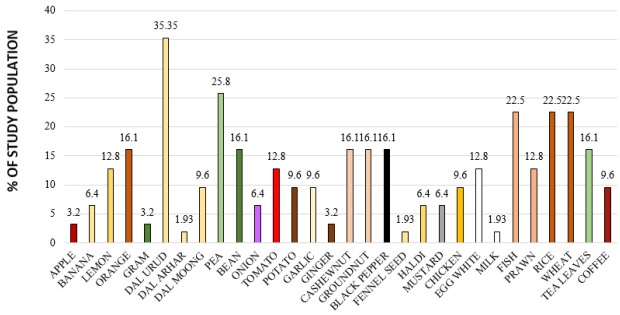

Fig. 1: Food sensitivity pattern by SPT

5. Discussion

Food allergy affects 2 to 10% of the population. The most prevalent age group varies with studies. Some studies have shown a higher prevalence among children.[7] The prevalence was higher among adults in few other studies.[4]Our study population were predominantly of the age group 20 to 34. Limited sample size and selection bias due to reluctance to skin prick testing in children might have affected this study result.

64% of our study population were females. The gender prevalence of urticaria revealed a female predominance in a study done in 2017 in Kerala.[4]In a 10 year population based cohort study published in 2018, studying the trends in food allergy over time, the annual average incidence rate of food allergy was significantly higher among males.[22]

The prevalence of allergy to foods in patients presenting with atopy with h/o allergy to foods was 83.87 % in our study. In this aspect studies from Kerala had revealed widely variable reports ranging from 62.9% to 98%.[4,23] Regional differences in allergen sensitivity pattern might account for these differences. Even though food allergen sensitivity is predominant in our population, the possibility of aeroallergen sensitivity and other causes might be contributing to urticaria in the remaining 16.13% study participants.

In our study population the most frequent food allergen was found to be Dal urud which is one of the most common foods used in Kerala. Idly and Dosa prepared with a combination of Dal Urud and Rice are popular foods in South India especially Kerala. Other common food allergens found were pea, fish and rice. In study done in 2012 in Kerala black pepper followed by coffee, banana, prawns and dal urud were the most frequent food allergen while in another study done in 2017, wheat followed by garlic and nuts were the most frequent food allergens. According to a study done by Huge A Sampson in 2004 in USA, milk and egg were found to be the most frequent food allergen among children and shellfish was the most frequent food allergen among adults.[19] Regional and temporal differences might account for the change in pattern of food allergens.

Emerging evidences regarding the role of Vitamin D and early exposure to some foods have been found to have association with the pattern of food allergen sensitivity.[8,16] Inclusion of these concepts might improve the scope of this study.

6. Conclusions

The prevalence of food allergy was found to be 83.87% in patients presenting with atopy with h/o allergy to foods.

In this study the study population were most sensitive to Dal urud which is one of the most commonly used food in Kerala.

None of the study participants developed serious allergic reactions and therefore skin prick testing may be considered as a safe test to identify food allergen sensitivity among patients with urticaria.

Studies including larger sample size and inclusion of assessment of relation of vitamin d levels with food allergen sensitivity can be done in the future.

7. Source of Funding

None.

8. Conflict of Interest

None.

9. Acknowledgement

None.

References

1. Available from: https://www.aaaai.org/tools-for-the-public/allergy,-asthma-immunology-glossary/atopy-defined.
2. Vaillant AJ, Modi P, Jan A. Atopy. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023.
3. Deacock SJ. An approach to the patient with urticaria. *Clin Exp Immunol*. 2008;153(2):151–61.
4. Panicker V, Sulaiman S. A Cross Sectional Study on The Profile of Food Allergy Among Patients With Chronic Urticaria In Kerala. *J Evidence Based Med Healthcare*. 2017;4(26):1501–4. doi:10.18410/jebmh/2017/293.
5. Boyce JA, Assa'ad A, Burks AW, Jones SM, Sampson HA, Wood RA, et al. NIAID-Sponsored Expert Panel. Guidelines for the diagnosis and management of food allergy in the United States: report of the NIAID-sponsored expert panel. *J Allergy Clin Immunol*. 2010;126(Suppl 6):S1–58. doi:10.1016/j.jaci.2010.10.007.
6. Sicherer SH, Sampson HA. Food allergy. *J Allergy Clin Immunol*. 2009;125(2):116–25. doi:10.1016/j.jaci.2009.08.028.
7. Abrams EM, Sicherer SH. Diagnosis and management of food allergy. *CMAJ*. 2016;188(15):1087–93. doi:10.1503/cmaj.160124.
8. Vassallo MF. Potential mechanisms for the hypothesized link between sunshine, vitamin D, and food allergy in children. *J Allergy Clin Immunol*. 2010;126(2):217–22. doi:10.1016/j.jaci.2010.06.011.
9. Wright BL, Walkner M, Vickery BP, Gupta RS. Clinical Management of Food Allergy. *Pediatr Clin North Am*. 2015;62(6):1409–24. doi:10.1016/j.pcl.2015.07.012.
10. Waserman S, Bégin P, Watson W. IgE-mediated food allergy. *Allergy Asthma Clin Immunol*. 2018;14(2):55. doi:10.1186/s13223-018-0284-3.
11. Heinzerling L, Mari A, Bergmann KC, Bresciani M, Burbach G, Darsow U. The skin prick test - European standards. *Clin Transl Allergy*. 2013;3(1):3. doi:10.1186/2045-7022-3-3.
12. Brown CE, Jones CJ, Stuttaford L, Robertson A, Rashid RS, Smith HE, et al. A qualitative study of the allergy testing experiences, views and preferences of adult patients. *Clin Transl Allergy*. 2016;6(1):34. doi:10.1186/s13601-016-0125-8.
13. Muthupalaniappen L, Jamil A. Prick, patch or blood test? A simple guide to allergy testing. *Malays Fam Physician*. 2021;16(2):19–26. doi:10.51866/rv1141.
14. Sicherer SH, Sampson HA. Food allergy: A review and update on epidemiology, pathogenesis, diagnosis, prevention, and management. *J Allergy Clin Immunol*. 2017;141(1):29157945–29157945.
15. Jaidev MD, Reddy UN, Patra V. Standard treatment guidelines, Indian Academy of Pediatrics (IAP) ; 2022.
16. Yakaboski E, Robinson LB, Arroyo A, Espinola JA, Geller RJ, Sullivan AF, et al. Early Introduction of Food Allergens and Risk of Developing Food Allergy. *Nutrients*. 2021;13(7):8308770–8308770.
17. Berin MC, Mayer L. Can we produce true tolerance in patients with food allergy? *J Allergy Clin Immunol*. 2013;131(1):14–22.
18. Mazzocchi A, Venter C, Maslin K, Agostoni C. The Role of Nutritional Aspects in Food Allergy: Prevention and Management. *Nutrients*. 2009;9(8):5579643–5579643.
19. Sampson HA. Update on food allergy. *J Allergy Clin Immunol*. 2004;113(5):15131561–15131561.
20. Boye JI. Food allergies in developing and emerging economies: need for comprehensive data on prevalence rates. *Clin Transl Allergy*. 2012;2:25–25.
21. Willits EK, Park MA, Hartz MF, Schleck CD, Weaver AL, Joshi AY. Food Allergy: A Comprehensive Population-Based Cohort Study. *Mayo Clin Proc*. 2018;93(10):6366995–6366995.
22. Willits EK, Park MA, Hartz MF, Schleck CD, Weaver AL, Joshi AY. Food Allergy: A Comprehensive Population-Based Cohort Study. *Mayo Clin Proc*. 2018;93(10):6366995–6366995.
23. Dunngalvin A, Dubois AE, Blok BMFD, Hourihane JO. The effects of food allergy on quality of life. *Chem Immunol Allergy*. 2015;101:26022884–26022884.

Author biography

R Anuja, Senior Resident https://orcid.org/0000-0002-6569-3237

M Midhun, Assistant Professor https://orcid.org/0000-0002-6569-3237

Cite this article: R Anuja, M Midhun. Food allergen sensitivity in atopy. *IP Indian J Immunol Respir Med* 2023;8(1):24-27.