

## Original Research Article

# Aeroallergens in allergic rhinitis: a rural Indian survey

Shreyas S. Joshi\*

Department of Otorhinolaryngology, Prakash Medical College, Islampur, Maharashtra, India

**Received:** 25 November 2019

**Revised:** 10 December 2019

**Accepted:** 11 December 2019

### \*Correspondence:

Dr. Shreyas S. Joshi,

E-mail: [joshienthospital@gmail.com](mailto:joshienthospital@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** Allergic rhinitis is a global health problem and its incidence is increasing day by day. However, the identification of causative allergen cannot be confirmed on the basis of symptoms or history alone. Hence, skin prick test (SPT) remains the most useful test for detecting specific allergic triggers associated with allergic rhinitis and guide proper immunotherapy. The objective of the study was to study the prevalence of common aeroallergens in allergic rhinitis patients using SPT in our area.

**Methods:** This prospective study was conducted on 150 patients with allergic rhinitis attending outpatient department of ENT. SPT was performed with 70 common aeroallergens on 150 patients more than 15 years of age with symptoms suggestive of allergic rhinitis.

**Results:** One thirty three patients (88.6%) tested positive for at least one or more aeroallergen. Age distribution ranged from 16 years to 56 years. Out of 150 patients, 15% had episodic symptoms, 34% of patients had seasonal allergic symptoms, while 51% of patients had perennial allergic symptoms. The most common aeroallergen group implicated in SPT positivity was dust mites (42%) followed by dust (22%), grass (13%), trees (9%), insects (6%), fungi (5%) and others (3%).

**Conclusions:** This study indicates a high prevalence of sensitivity to aeroallergens in the rural India. Skin prick test is the gold standard investigation of choice for definitive diagnosis of causative allergen in allergic rhinitis and its further treatment with immunotherapy.

**Keywords:** Allergic rhinitis, Aeroallergens, Skin prick test, Immunotherapy

### INTRODUCTION

The prevalence of allergic diseases including asthma, rhinitis, anaphylaxis, food, drug or insect allergy, is rising worldwide.<sup>1</sup> Allergic rhinitis (AR) is one of the most common chronic diseases worldwide, affecting 10-30% of adults and up to 40% of children.<sup>2</sup> In India, the prevalence of AR is 20-26%.<sup>3</sup> AR is a common inflammatory condition of the nasal mucosa characterized by sneezing, rhinorrhoea, nasal blockage and itching. It is mediated by an IgE associated response to indoor and outdoor environmental allergens. Any inhaled, ingested or contact allergens can trigger off nasal allergy. Exposure to the various aeroallergens plays an important

role in pathogenesis of allergic rhinitis. The distribution and pattern of aeroallergens differ depending upon the geographic regions, temperature and climate. Accurately diagnosing causative allergen is most important but equally challenging. Specific IgE antibodies can be demonstrated by immediate reaction prick and intradermal skin tests, or by in vitro methods like radioallergosorbent test (RAST) and enzyme-linked immunosorbent assay.<sup>4,5</sup> Accurate diagnosis using skin prick testing or serum IgE testing is needed to develop a holistic approach for treatment. Skin prick test (SPT) is the preferred diagnostic test because it is faster, safer, painless and more specific than the intracutaneous test, and cheaper and more sensitive than the RAST.<sup>4</sup> This

study will help in identifying common aeroallergens implicated in causation of AR in the rural Indian setup. The avoidance of identified allergens will lead to improvement of patient's quality of life. It will also be useful in initiation of allergen-specific immunotherapy in patients whose symptoms are not controlled with allergen avoidance and pharmacotherapy.

## METHODS

This prospective study was conducted on 150 patients aged 15 years or above with AR attending to the Department of Otorhinolaryngology and Head and Neck Surgery, Prakash Institute of Medical Sciences between June 2018 to June 2019. The protocol for this study was approved by the hospital ethics committee, and all patients gave their informed consent.

### Inclusion criteria

Patients with classical symptoms of AR such as sneezing, watery rhinorrhoea, nasal itching and nasal congestion was included in this study.

### Exclusion criteria

Patients with active upper respiratory infection, fever, uncontrolled asthmatics, immunodeficiency status, severe eczema or dermatographism, current users of oral antihistamines and steroids (that need to be stopped 5-7 days prior to skin prick testing) and pregnant woman were excluded in this study.

SPT was performed against 70 common aeroallergens which included grasses and trees (*Ischaemum indicum*, *Parthenium*, *Azadirachta indica*, *Cocos nucifera*, *Peltophorum*, *Ailanthus excesia*, *Prosopsis juliflora*, *Samanea saman*, *Putranjiva roxburghii*, *Eucalyptus*, *Mangifera indica*, *Acacia arabica*, *Cassia siamea*, *Cenchrus barbatus*, *Cyperus rondus*, *Typha angustata*, *Zea mays*, *Argemone mexicana*, *Amaranthus spinosus*, *Brassica nigra*, *Chenopodium album*, *Chenopodium murale*, *Casuariana equisetifolia*, *Carcica papaya*, *Holoptelean integrifolia*, *Ipomoea*, *Riinus communis*, *Alternaria alternata*); Fungi (*Aspergillus fumigatus*, *Aspergillus niger*, *Penicillium sp.*, *Candida albicans*, *Cladosporum*, *Curvulara*, *Rhizopus nigricans*, *Aspergillus flavus*, *Aspergillus tamari*); insect/animal (cat, dog, human dander, pigeon feather, pigeon droppings, buffalo dander, chicken feather, sheeps wool, latex, ants, cockroach, mosquito, house fly, honey bee, moth, rice weevil, cricket, grass hopper, dust mites (*Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*, *Blomia*), dust (cotton dust, house dust, paper dust, wheat dust, grain dust, saw dust, rice dust, polish dust, spider dust, silk dust, hay dust); other include histamine, saline.

The patients were advised not to take antihistaminics or steroids 5 days prior to the test. The patients were

however allowed to take nasal sprays. The positive control used was histamine and the negative control was buffered normal saline. The pricks were given on the ventral aspect of the forearm by a fine sharp needle, using separate needle for each prick, making sure that prick did not draw blood (Figure 1).

### Interpretation of test

Two reactions is seen wheal and flare formation. Interpretation is done according to wheal size in mm after 15 minutes of prick. Positive histamine control should be around 4 mm or more and negative saline control 1 mm. Allergen is considered positive if wheal formations is 3 mm or more and graded accordingly 3 mm is mild, 4 mm moderate, 5 or more is severe allergy.



Figure 1: Skin prick test on forearm.

The data was analysed using Microsoft Excel and presented in number and percentages.

## RESULTS

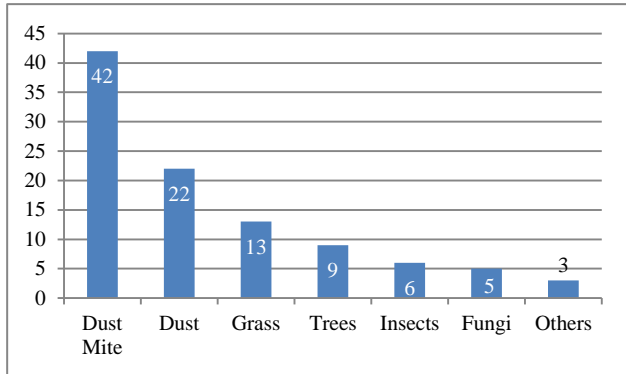
There were 86 males (57%) and 64 females (43%) in our study (Table 1). Age distribution ranged from 16 years to 56 years. Out of 150 patients, 15% had episodic symptoms, 34% of patients had seasonal allergic symptoms, while 51% of patients had perennial allergic symptoms. Family history of allergic conditions was found to be positive in 63 patients (42%). One hundred and thirty three (88.6%) tested positive for one or more aeroallergen.

Table 1: Gender wise distribution patients.

Sex	Number	Percentage (%)
Males	86	57
Females	64	43
Total	150	100

The most common aeroallergen group implicated in SPT positivity was dust mites (42%). The prevalence of other allergens were dust (22%), grass (13%), trees (9%), Insects (6%), fungi (5%) and others (3%) (Figure 2). The prevalence of individual aeroallergens is depicted in Figure 2. Amongst dust mites, *D. farinae* (46%) was the

most common indoor aeroallergen showing positive reaction with SPT followed by *D. pteronyssinus* (34%) and *Blomia* (20%). Among other groups house dust (37%), *Parthenium* (28%), *A. arab* (31%), Mosquito (47%), *A. Fumigatus* (26%) were most common allergen tested positive respectively.



**Figure 2: Percentage of aeroallergen positivity.**

## DISCUSSION

AR is a global health problem due to its impact on quality of life and work productivity. Aeroallergens are the prominent cause of allergic symptoms in patients with allergic rhinitis. Different environmental aeroallergens are known to play a role in triggering or exacerbating allergic rhinitis. Identification of the most prevalent aeroallergen in each area has a very important role in diagnosis and treatment of allergic rhinitis.

The SPT is the recommended initial investigation to find causative aeroallergens as it provides faster results when compared to RAST.

Few other Indian studies reported varying common allergens to ours. The study done in Allahabad, Uttar Pradesh on a relatively smaller cohort (50 patients) showed dust mite (78%), followed by dust (66%), and insects (44%), as the implicated antigens.<sup>6</sup> Prasad et al, showed markedly positive skin reaction to various dusts and the most common dusts identified were house dust (25%), wheat dust (12.5%), cotton dust (6.3%) and paper dust (4.2%).<sup>7</sup> Mishra et al identified insects (48%) as most common offending allergen followed by weeds (29%), dust (26%), trees (23%), grass (13%), fungi (12%) and others (5%). The patterns of aeroallergens in the environment differ widely in different localities and also change from one season to another. That may be due to variation in climate conditions, living conditions, agricultural production across the country.

In our study, most common offending allergen was dust mite (*D. farinae*). In a similar study, Farrokhi et al demonstrated house dust mites (88.5%) were the most common aeroallergens followed by molds (80.7%), animal dander (77.5%), weeds and trees (73.3%) and grass pollen (67.9%).<sup>9</sup> Most of SPT positive patients were

reactive to two or more allergens showing multi-allergen sensitization. It may be due to several factors, such as cross reactivity among allergens belonging to close reservoirs, which reflects the presence of common allergenic epitopes in different but botanically close plant species, long term exposures to close phylogenetic source of allergens and interactions of genetic and environmental factors. The patterns of aeroallergens in the environment differ widely in different localities and also change from one season to another.

The allergen group most commonly implicated here was Dust mites, hence stressing that change in environmental factors such as maintaining clean household has an important role in management of allergic rhinitis. SPT should be performed in all patients with allergic rhinitis, so as to avoid the implicated aeroallergen and to start specific immunotherapy.

## CONCLUSION

Most important factor in long term management of AR is identification causative allergen. Hence, it is recommended that SPT should be performed in all patients with allergic rhinitis, so as to educate the patient about avoidance of the implicated aeroallergen and to start specific immunotherapy for those particular allergens.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Pawankar R, Canonica GW, Holgate ST, Lockett RF. Allergic diseases as global public health issue. WAO white book on allergy 2011-2012: executive summary. Available at: [http://www.worldallergy.org/publications/wao\\_white\\_book.pdf](http://www.worldallergy.org/publications/wao_white_book.pdf). Accessed on 3 June 2019.
2. Wallace DV, Dykewicz MS, Bernstein DI, Blessing Moore J. The diagnosis and management of rhinitis: an updated practice parameter. *J Allerg Clin Immunol.* 2008;122:1-84.
3. Singh AB, Kumar P. Aeroallergens in clinical practice of allergy in India. An overview. *Ann Agric Environ Med.* 2003;10(2):131-6.
4. Badhwar AK, Druse HM. Allergic rhinitis. *Med Clin North Am.* 1992;76(4):789-803.
5. Ferguson AC. RAST and allergic disease. *B C Med J.* 1983;25:568-70.
6. Agarwal RL, Chandra A, Jain S, Agarwal G. Identification of common allergens by skin prick test associated with united airway disease in Allahabad, Uttarpradesh, India. *Ind J Allergy Asthma Immunol.* 2008;22(1):7-13.
7. Prasad R, Verma SK, Dua R, Kant S, Kushwaha RA, Agarwal SP. A study of skin sensitivity to

various allergens by skin prick test in patients of nasobronchial allergy. *Lung India.* 2009;26:70-3.

8. Mishra M, Chakravarti A, Kumar R. Skin Sensitivity to Aeroallergens in Allergic Rhinitis. *Clin Rhinol An Int J.* 2013;6(2):64-6.
9. Farrokhi S, Gheybi MK, Movahed A, Tahmasebi R, Iranpour D, Fatemi A. Common aeroallergens in patients with asthma and allergic rhinitis living in southwestern part of Iran: Based on skin prick test

reactivity. *Iran J Allergy Asthma Immunol.* 2015;14(2):133-8.

**Cite this article as:** Joshi SS. Aeroallergens in allergic rhinitis: a rural Indian survey. *Int J Otorhinolaryngol Head Neck Surg* 2020;6:66-9.