

## Original Research Article

# A study of common aero-allergen in Mewar region, Udaipur, Rajasthan, India

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### ABSTRACT

**Background:** Aero-allergens are important causative factor in pathogenesis of allergic respiratory diseases (Asthma, Allergic Rhinitis). Present study aimed to identify the common aeroallergens in Mewar region, Udaipur, Rajasthan, India.

**Methods:** Intradermal allergic testing done on 1050 respiratory allergic patients in last 15 yrs (2002 to 2016) by kit containing 125 allergen extracts includes pollen, fungi, insects, dust, dander's, fabrics, feathers and wood. In 1020 patients (after excluding 30 patients), marked positive skin reaction (3+/4+) to one or more aeroallergen noted.

**Results:** Most common aero allergens found were pollens (62%), woods (58.5%), dander (52%), insects (45%), dust mite (44.2%) and fungi (38.4%). Among pollens most common allergens were *Holoptelia integrifolia*, *Parthenium hysterophorn*, *Cynodon*. Among fungi *aspergillus* and *candida* species were most common. Cockroach and fly were predominant insects.

**Conclusions:** Role of allergen testing have important role in management of allergic respiratory diseases as allergen immunotherapy or desensitization is only disease modifying treatment.

**Keywords:** Aero allergens, Intradermal allergic testing, Respiratory allergic diseases

### INTRODUCTION

Allergy is a hypersensitivity reaction of body to substances present in environment called as allergen. Allergic diseases include asthma, rhinitis, anaphylaxis, urticaria, angioedema and allergy to food, drugs and insect's etc. prevalence of respiratory allergy (asthma, allergic rhinitis) documented 12 to 20% worldwide.<sup>1</sup>

A study conducted in India 30 years back (1964) reported prevalence of allergic rhinitis and asthma 10% and 1% respectively. Later studies found 20-30% of population having AR and 15% develops asthma, showing increased prevalence. It is seen that 70-80% asthmatic have AR while 40% of AR patients have asthma, defining concept

of united airway disease (UAD).<sup>2</sup> Aero- allergen plays major role in pathogenesis of respiratory allergic diseases and its role varies with environmental pollutions, family history and atopy, suggesting host-environmental reaction.<sup>3-5</sup> Common aero-allergens are pollen, fungi, house dust mites, insects and danders.<sup>6,7</sup> Present study was undertaken to identify the common aero-allergen in Mewar region, Udaipur, of Rajasthan, India.

### METHODS

Study was carried out on 1050 patients of respiratory allergic disease (allergic rhinitis, asthma or both) aged between 15 to 55 years at RNT medical college Udaipur Rajasthan India in last 15 years. These patients were not

well controlled with conventional treatment, undergo for allergy test and later on immunotherapy.

### Skin sensitivity test

All the patients underwent intradermal allergy test for aero-allergen. Extract includes 51 pollens, 20 fungi, 20 insects, 12 dusts, 6 dander's, 7 fabrics and feathers, 9 woods and house dust mite. Allergen extract were obtained from Alicit India (Pvt.) Ltd., new delhi-110035. Concentrations of allergen used were 1:500 except for house dust mite (1:5000) and insects (1:1000). Precautions were taken to deal with anaphylaxis and other reactions (oxygen, Inj. avil, adrenaline and dexona in hand).

Amount of 0.01 allergen extract (1:50) injected on ventral aspect of forearm by tuberculin syringe. The skin reactions were graded after 20 min according to criteria proposed by Agarwal et al 2003, V P chest institute, Delhi. Control of buffer saline and histamine were made for comparison. Marked positive skin reaction (3+/4+) to one or more aeroallergen noted.

30 patients excluded out of 1050 patients due to severe adverse reactions. Therefore 1020 patients studied.

### Exclusion criteria

- Pregnant females
- Children's
- Persons with other co morbidities
- Patients with immunological disease and coexisting uncontrolled severe asthma

## RESULTS

A Total of 1020 patients selected for allergy test. Out of these 668 (63.62%) were females and 350 (33.33%) were males and 2 transgender.

**Table 1: Results of intradermal allergy test with pollen extract on allergy patients.**

Allergen extract	Total no. of patients	Marked positive reaction (3+ & 4+) no.	%
<i>Holoptelia integrifolia</i>	1020	632	61.96
<i>Parthenium hysterophorn</i>	1020	616	60.29
<i>Cynodon dactylon</i>	1020	590	57.84
<i>Azadirachta indica</i>	1020	546	53.53
<i>Prosopis juliflora</i>	1020	402	47.20
<i>Lawsonia inermis</i>	1020	416	46.86
<i>Imperata cylindrica</i>	1020	570	45.59
<i>Brassica compestris</i>	1020	487	42.74

<i>Zeamays</i>	1020	408	40.78
<i>Cyperus rotundus</i>	1020	372	36.5
<i>Gynandropis gynandra</i>	1020	357	35.0
<i>Ricinus rotundus</i>	1020	326	32.0
<i>Sorghum bulgare</i>	1020	316	31.0
<i>Cannabis sativa</i>	1020	291	28.5
<i>Carica patrya</i>	1020	280	27.5
<i>Adhatoda vasica</i>	1020	253	24.8
<i>Chenopodium album</i>	1020	246	24.2
<i>Chenopodium murale</i>	1020	245	24.0
<i>Pennisetum typhodes</i>	1020	241	23.6
<i>Dodonea viscoso</i>	1020	240	23.2
<i>Morus alba</i>	1020	233	22.8
<i>Eucalyptus teteticornis</i>	1020	230	22.1
<i>Ehretia laevis</i>	1020	224	22.0
<i>Asphodelus tenuifolius</i>	1020	224	22.0
<i>Albizia labbeck</i>	1020	220	21.6
<i>Cassia pistula</i>	1020	216	21.6
<i>Amaranthus hybridus</i>	1020	212	20.8
<i>Amaranthus spinosus</i>	1020	210	20.6
<i>Alilanthus excelsa</i>	1020	208	20.4
<i>Cassia occidentalis</i>	1020	208	20.4
<i>Cassia siamea</i>	1020	206	20.2
<i>Salvadora persica</i>	1020	204	20.0
<i>Rumex dentatus</i>	1020	202	19.8
<i>Putranjiva roxburghii</i>	1020	199	19.5
<i>Melia azedarach</i>	1020	197	19.3
<i>Kigelia pinnata</i>	1020	195	19.1
<i>Argemone mexicana</i>	1020	193	18.9
<i>Cenchrus ciliaris</i>	1020	191	18.6
<i>Broussonetla papyrifer</i>	1020	189	18.3
<i>Artemisia scoparia</i>	1020	184	18.0
<i>Crataeva nurvala</i>	1020	179	17.6
<i>Clerodendrom phlomodies</i>	1020	178	17.4
<i>Cocos nucifera</i>	1020	175	17.2
<i>Ipomoea flstulosa</i>	1020	169	16.6
<i>Maerua arenaria</i>	1020	153	15.0
<i>Sauedafruticosa</i>	1020	145	14.2
<i>Rannunculus sceleratus</i>	1020	141	13.8
<i>Typha angustata</i>	1020	126	12.4
<i>Xanthium strumarium</i>	1020	104	10.2
<i>Ageratum conyzoides</i>	1020	81	8.0

Among 1020 patients, 772 (75.68%) had family history of allergy. The entire 1020 patient had marked allergic skin reaction (3+/4+) from one or more allergen extracts. Most common aero allergens found were pollens (62%), house dust (56.4%), dander (52%), insects (45%), dust mite (44.2%) and fungi (38.4%).

**Table 2: Results of intradermal allergy test with dust mite on allergy patients.**

Allergen	Total no. of patients	Marked positive reaction (3+ & 4+) no.	%
Dust mite (D farinae)	1020	450	44.2

Among pollens *Holoptelia* (61.96% of total patients) topped the list followed by *Parthenium* (60.29%), *Cyanodon* (57.84%), *Azadirachta* (53.53%), *Prosopis* (47.25%) and others (Table 1). 38.4% of patients showed reaction to *Aspergillus fumigatus* and *Candida* were also major allergens among fungi (Table 2).

**Table 3: Results of intradermal allergy test with fungus allergen extract on allergy patients.**

Allergen extract	Total no. of patients	Marked positive reaction (3+ & 4+) no.	%
<i>Aspergillus fumigatus</i>	1020	396	38.4
<i>Aspergillus niger</i>	1020	369	36.2
<i>Aspergillus varicolor</i>	1020	349	34.2
<i>Candida albicans</i>	1020	327	32.1
<i>Penicillium sp.</i>	1020	298	29.2
<i>Aspergillus flavus</i>	1020	279	27.4
<i>Phoma batae</i>	1020	277	27.2
<i>Alternativa tenuis</i>	1020	251	24.6
<i>Botrytis cinerea</i>	1020	226	22.2
<i>Fusarium solanii</i>	1020	185	18.2
<i>Curvularia lunata</i>	1020	176	17.3
<i>Helminthosporium</i>	1020	173	17.0
<i>Neurospora sitophilla</i>	1020	164	16.2
<i>Triphoderma sp.</i>	1020	159	15.2
<i>Nigrospora sp.</i>	1020	154	15.1
<i>Mucormucedo</i>	1020	124	12.2
<i>Acrothecium</i>	1020	106	10.3
<i>Aspergillus termarii</i>	1020	94	9.2
<i>Cladosporium herbarium</i>	1020	20	2.0
<i>Rhizopus nigricans</i>	1020	-	-

The prevalence of marked skin reactions were maximum with cockroach (45%), house fly (38.2%), locust (37.6%) and mosquitos (36.2%) (Table 4).

House dust (56.4%), hay dust (54.2%) and thrashing dust wheat (48.4%) were common in dust allergy (Table 5).

Among dander's buffalo (52%) and cow dander (48.2%) were common allergen (Table 6). kapok cotton

(26.4%) and chicken feather (24.2%) formed majority for fabrics and feathers (Table 7). Among woods allergen, *Parthenium* leaves (58.5%) and Brewer yeast (40.3%) showed positive reactions in most patients (Table 8).

**Table 4: Results of intradermal allergy test with insect's allergen extract on allergy patients.**

Allergen extract	Total no. of patients	Marked positive reaction (3+ & 4+) no.	%
Cockroach (female)	1020	459	45.0
Cockroach (male)	1020	451	44.2
House fly	1020	390	38.2
Locust (female)	1020	384	37.6
Locust (male)	1020	384	37.6
Mosquitoes	1020	369	36.2
Honey bee	1020	357	35.0
Aulado phora	1020	343	33.6
Jassids	1020	330	32.4
Butterfly	1020	318	31.2
Bumble bee	1020	306	30.0
Ant	1020	290	28.4
Cantheroid beetle	1020	287	28.2
Grass hoipper	1020	269	26.4
Rice weevil	1020	267	26.2
Cricket	1020	237	23.2
Moth	1020	206	20.2
Dragon fly	1020	185	18.2
Hornet	1020	167	16.4
Yellow wasp	1020	145	14.2

**Table 5: Results of intradermal allergy test with dusts allergen extract on allergy patients.**

Allergen extract	Total no of patients	Marked positive reaction (3+ & 4+) no	%
House dust	1020	575	56.4
Hey dust	1020	553	54.2
Thrashing dust wheat	1020	494	48.4
Straw dust	1020	477	46.8
Paper dust	1020	451	44.2
Thrashing dust bajra	1020	449	44.0
Grain dust rice	1020	431	42.3
Grain dust jowar	1020	412	40.4
Grain dust bajra	1020	391	38.3
Grain dust wheat	1020	372	36.5
Cotton meal dust	1020	327	32.1
Flax fibre dust	1020	167	16.4

**Table 6: Results of intradermal allergy test with danders allergen extract on allergy patients.**

Allergen extract	Total no of patients	Marked positive reaction (3+ & 4+) no	%
Buffalow dander	1020	530	52.0
Cow dander	1020	492	48.2
Dog dander	1020	412	40.3
Human dander	1020	402	39.4
Cat dander	1020	329	32.3
Horse dander	1020	308	30.2

**Table 7: Results of intradermal allergy test with fabrics and feathers allergen extract on allergy patients.**

Allergen extract	Total no of patients	Marked positive reaction (3+ & 4+) no	%
Kapok Cotton	1020	269	26.4
Chicken feather	1020	246	24.2
Sheep wool	1020	228	22.4
Silk raw	1020	209	20.5
Wool mixed	1020	149	14.6
Pigeon feathers	1020	122	12.0
Jute	1020	102	10.0

**Table 8: Results of intradermal allergy test with Woods allergen extract on allergy patients.**

Allergen extract	Total no of patients	Marked positive reaction (3+ & 4+) no	%
Parthenium leaves	1020	597	58.5
Brewer yeast	1020	411	40.3
Tobacco	1020	335	32.8
Shisham wood	1020	269	26.4
Ply mix wood	1020	208	20.4
Teak wood	1020	126	12.4
Deodar wood	1020	-	-
Pine wood	1020	-	-
Saal wood	1020	-	-

## DISCUSSION

Prevalence of aero-allergens is variable in different ecozones and it is important to identify them for diagnosis of allergy and immuno therapy. In India first survey to identify aero- allergens was done in Kolkatta by cunninghan (1873).

Kasliwal et al studied atmospheric pollen at Jaipur. Puri S et al also did extensive studies in Delhi on pollen allergy in Delhi.<sup>6,7</sup> 43 types of pollens were recorded from

Northern India by All India Co-ordinated project on aero-allergens and human health, conducted by the ministry of environment and forest, Govt. of India (2000). The dominant types were *holoptelea*, *Poaceae*, *Eucalyptus*, *casuarinas*, *putranjiva*, *cassia*, *guercus*, *Pinus* and *Cedtus*. *Holoptelea* contributed 22.2% pollen to the air from March to May. *Poaceae* pollens were recorded 1.8% with maximum concentration in April to June, followed by *Asteraceae*, *Prosopis Juliflora*, *Ricinus Communis*, *Morus*, *Mallotus*, *Alnus*, *Argemone*, *Amaranthus*, *Chenopodium* and Grasses. In the present study, most of the above mentioned pollens were skin tested to evaluate sensitization.

Singh D et al reported that common pollen types were *Cheno-Amaranthus*, *Poaceae*, *Asterace*, *Holoptelea*, *Cassia Spp.*, *Azadirachta*, *Brassica*, *Parthenium hysterotharum*.<sup>9</sup> In present study the major sensitizers were *Haloptelia Intergrifolia*, *Parthearium Hysterothorus*, *Cynodon Dactylon*, *Azadirachta Indica*, *Prosopis Juliflora*, *Lawsonia I nermis*, *Imperata Cylindrica* and *Brassica Compestius Zearnays* from grass & herbs pollen.

Fungi are considered to be one of most common allergen worldwide in present study. *Aspergillus Fumigatus*, *Niger*, *Versicolour*, *candida albicans* & *Penicillium sp.* were dominant allergen among fungus.

The findings are consistent with the study of Prasad et al and Agarwal et al but in present study *Penicillium sp* were also markedly positive in 29.2% cases.<sup>8,11</sup> Prevalence of insect allergy comparable to Prasad et al and Agarwal et al. The result of skin test for dust were comparable to Agrawal et al for House dust, Hay dust, Threshing dust wheat, straw dust and paper dust are comparable.

The findings are also in accordance with the study by Podder et al at Kolkata and other studies across the country in relation to the skin positivity of fungi (*A. fumigates*), danders (dog dander and cat dander), fabrics and feathers (kapok cotton), dust mite, house dust, Parthenium leaves, insects (cockroach).<sup>2</sup>

In present study in this reason we have seen buffalo dander, human dander, chicken feather, Brewer Yeast and Tobacco are addition to previous studies.

## CONCLUSION

In conclusion we suggested that such studies should be conducted from time to time and at different area's to know the changing trends and prevalence of allergens that can help clinicians in management of patients.

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