Original Research Article

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

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Received: 15 December 2016
Accepted: 21 December 2016

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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 hysterophorum, 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.¹

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).² 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.³⁻⁵ Common aero-allergens are pollen, fungi, house dust mites, insects and danders.⁶⁻⁷ 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 allergy test and later on immunotherapy.

Skin sensitivity test

All the patients underwent intradermal allergy test for aero-allergens. 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 aeroallergens 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.

<table>
<thead>
<tr>
<th>Allergen extract</th>
<th>Total no. of patients</th>
<th>Marked positive reaction (%)</th>
</tr>
</thead>
</table>
| Zeamays                     | 1020                  | 408                          | 40.78
| Cyperus rotundus            | 1020                  | 372                          | 36.5
| Gynandropis gynandra        | 1020                  | 357                          | 35.0
| Ricinus rotundus            | 1020                  | 326                          | 32.0
| Sorghum bulgare             | 1020                  | 316                          | 31.0
| Cannabis sativa             | 1020                  | 291                          | 28.5
| Carica patrya               | 1020                  | 280                          | 27.5
| Adhatoda vascica            | 1020                  | 253                          | 24.8
| Chenopodium album           | 1020                  | 246                          | 24.2
| Chenopodium murale          | 1020                  | 245                          | 24.0
| Pennisetum typhodes         | 1020                  | 241                          | 23.6
| Dodonea viscosa             | 1020                  | 240                          | 23.2
| Morus alba                  | 1020                  | 233                          | 22.8
| Eucalyptus tetrodonicum     | 1020                  | 230                          | 22.1
| Ehretia laevis              | 1020                  | 224                          | 22.0
| Asphodelus tenuifolius      | 1020                  | 224                          | 22.0
| Albizia labbeck             | 1020                  | 220                          | 21.6
| Cassia pistula              | 1020                  | 216                          | 21.6
| Amaranthus hybridus         | 1020                  | 212                          | 20.8
| Amaranthus spinosus         | 1020                  | 210                          | 20.6
| Alilanthus excelsa          | 1020                  | 208                          | 20.4
| Cassia occidentalis         | 1020                  | 208                          | 20.4
| Cassia siamea               | 1020                  | 206                          | 20.2
| Salvadoria persica          | 1020                  | 204                          | 20.0
| Rumex dentatus              | 1020                  | 202                          | 19.8
| Putranjiva roxburghii       | 1020                  | 199                          | 19.5
| Melia azedarach             | 1020                  | 197                          | 19.3
| Kigelia pinnata             | 1020                  | 195                          | 19.1
| Argemone mexicana           | 1020                  | 193                          | 18.9
| Chenchus ciliaris           | 1020                  | 191                          | 18.6
| Broussonella papyrifera     | 1020                  | 189                          | 18.3
| Artemisia scoparia          | 1020                  | 184                          | 18.0
| Crataeva nurvala            | 1020                  | 179                          | 17.6
| Clerodendrom phlomodies     | 1020                  | 178                          | 17.4
| Cocos nucifera              | 1020                  | 175                          | 17.2
| Ipomoea flistulosa          | 1020                  | 169                          | 16.6
| Maerua arenaria             | 1020                  | 153                          | 15.0
| Suedafruticosa              | 1020                  | 145                          | 14.2
| Ranunculus sceleratus       | 1020                  | 141                          | 13.8
| Typha angustata             | 1020                  | 126                          | 12.4
| Xanthium strumarium         | 1020                  | 104                          | 10.2
| Ageratum conyoides          | 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%).
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 fumigates* and *Candida* were also major allergens among fungi (Table 2).

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

<table>
<thead>
<tr>
<th>Allergen</th>
<th>Total no. of patients</th>
<th>Marked positive reaction (3+ &amp; 4+) no.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust mite (D farinae)</td>
<td>1020</td>
<td>450</td>
<td>44.2</td>
</tr>
</tbody>
</table>

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

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

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 threshing dust wheat (48.4%) were common in dust allergy (Table 5).

Among dander’s buffalow (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.

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

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

<table>
<thead>
<tr>
<th>Allergen extract</th>
<th>Total no. of patients</th>
<th>Marked positive reaction (3+ &amp; 4+) no.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>House dust</td>
<td>1020</td>
<td>575</td>
<td>56.4</td>
</tr>
<tr>
<td>Hey dust</td>
<td>1020</td>
<td>553</td>
<td>54.2</td>
</tr>
<tr>
<td>Thrashing dust wheat</td>
<td>1020</td>
<td>494</td>
<td>48.4</td>
</tr>
<tr>
<td>Straw dust</td>
<td>1020</td>
<td>477</td>
<td>46.8</td>
</tr>
<tr>
<td>Paper dust</td>
<td>1020</td>
<td>451</td>
<td>44.2</td>
</tr>
<tr>
<td>Thrashing dust bajra</td>
<td>1020</td>
<td>449</td>
<td>44.0</td>
</tr>
<tr>
<td>Grain dust rice</td>
<td>1020</td>
<td>431</td>
<td>42.3</td>
</tr>
<tr>
<td>Grain dust jowar</td>
<td>1020</td>
<td>412</td>
<td>40.4</td>
</tr>
<tr>
<td>Grain dust bajra</td>
<td>1020</td>
<td>391</td>
<td>38.3</td>
</tr>
<tr>
<td>Grain dust wheat</td>
<td>1020</td>
<td>372</td>
<td>36.5</td>
</tr>
<tr>
<td>Cotton meal dust</td>
<td>1020</td>
<td>327</td>
<td>32.1</td>
</tr>
<tr>
<td>Flax fibre dust</td>
<td>1020</td>
<td>167</td>
<td>16.4</td>
</tr>
</tbody>
</table>
Table 6: Results of intradermal allergy test with danders allergen extract on allergy patients.

<table>
<thead>
<tr>
<th>Allergen extract</th>
<th>Total no of patients</th>
<th>Marked positive reaction (3+ &amp; 4+) no</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalow dander</td>
<td>1020</td>
<td>530</td>
<td>52.0</td>
</tr>
<tr>
<td>Cow dander</td>
<td>1020</td>
<td>492</td>
<td>48.2</td>
</tr>
<tr>
<td>Dog dander</td>
<td>1020</td>
<td>412</td>
<td>40.3</td>
</tr>
<tr>
<td>Human dander</td>
<td>1020</td>
<td>402</td>
<td>39.4</td>
</tr>
<tr>
<td>Cat dander</td>
<td>1020</td>
<td>329</td>
<td>32.3</td>
</tr>
<tr>
<td>Horse dander</td>
<td>1020</td>
<td>308</td>
<td>30.2</td>
</tr>
</tbody>
</table>

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

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

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

<table>
<thead>
<tr>
<th>Allergen extract</th>
<th>Total no of patients</th>
<th>Marked positive reaction (3+ &amp; 4+) no</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parthenium leaves</td>
<td>1020</td>
<td>597</td>
<td>58.5</td>
</tr>
<tr>
<td>Brewer yeast</td>
<td>1020</td>
<td>411</td>
<td>40.3</td>
</tr>
<tr>
<td>Tobacco</td>
<td>1020</td>
<td>335</td>
<td>32.8</td>
</tr>
<tr>
<td>Shisham wood</td>
<td>1020</td>
<td>269</td>
<td>26.4</td>
</tr>
<tr>
<td>Ply mix wood</td>
<td>1020</td>
<td>208</td>
<td>20.4</td>
</tr>
<tr>
<td>Teak wood</td>
<td>1020</td>
<td>126</td>
<td>12.4</td>
</tr>
<tr>
<td>Deodar wood</td>
<td>1020</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pine wood</td>
<td>1020</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Saal wood</td>
<td>1020</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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 cunningham (1873).

Kasliwal et al studied atmospheric pollen at Jaipur. Puri S et al also did extensive studies in Delhi on pollen allergy in Delhi.5,7 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 Cedus. 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 hysteropharus. In present study the major sensitizers were Haloptelia Intergirifolia, Parthearrum Hysterophorus, Cynodon Dactylon, Azadirachta Indica, Prosopis Juliflora, Lawsonia I nermis, Imperata Cylindrica and Brassica Compestius Zeornays 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.8,11 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).2

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.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee
REFERENCES
