A Brief Survey of Fungi as Allergen in Respiratory Allergic Patients by Intradermal Skin Sensitivity Test in Terai Area

Rachna Chaturvedi¹ and Sushil Chaturvedi²*

¹Amity Institute of Biotechnology, Amity University Lucknow, India. ²District Tuberculosis Officer Lucknow PHMS U.P., India.

ARTICLE INFO

Article history:
Received on: 25/09/2013
Revised on: 6/10/2013
Accepted on: 14/10/2013
Available online: 30/10/2013

Key words:
Fungal Allergens, Fungal Extract, IgE, Intradermal Test, Respiratory allergy

ABSTRACT

The present survey was conducted to observe allergic effect of various fungi in patients of respiratory allergy of terai area. Terai area has humid, subtropical climate, warm in winter and hot in summer total of 96 patients were studied after full clinical examination. Age group of patients was 12 to 48 yrs and male female ratio was 3:2. About 12% patients had acute problem of breathlessness and rhinitis while rest were having chronic respiratory allergy. Intradermal test was performed to observe skin sensitivity. Rhizopus nigricans was found most offending fungal allergen (50%). Next to it was Aspergillus fumigates (30%). Among other fungal allergens eg: Alternaria tenuis (28%), Aspergillus flavus (26%), Curvularia sp. (24%), Neurospora sp. (22%), Phoma sp. (18%), Fusarium solani (13%), Helminthosporium sp. (12%) and Penicillium sp. (11%) were found as common fungal allergens. Acrothecium sp., Aspergillus niger, Aspergillus tamari, Candida albicans, Cladosporium sp., Mucor sp., Nigrospora sp. and Trichoderma sp. etc. were having allergenic effect in less than 10% patients. About 12% patients had not shown positive skin sensitivity test against any fungal allergen.

1. INTRODUCTION

The present study is the survey of fungal allergens in terai area. Terai is also known as madhes in Nepali is the flat southern region of Nepal which stretches from east to west. In south of Terai there is eastern Uttar Pradesh and Bihar. The terai has a subtropical climate and it can often be humid. One of the most important physical parameters affecting fungal growth is moisture. Although it is widely stated that relative humidity over 70% is needed for active fungal growth, the water activity of the substrate is actually the critical parameter. Many species of fungi require high water activities, but the xerophilic (osmophilic) fungi are able to grow under lower water activity conditions than any other organism [1, 2]. Day temp. ranges from 20 to 25°C in winter and nights are cool some time cold. Optimum growth temperature among species of fungi vary but commonly between 18°C to 32°C. Fungi grow over a wide temperature range (-5 to 50°C and greater) [2, 3, 4]. Fungi grow almost everywhere, even as lichens inside Antarctic rocks [5].

Monsoon goes from mid June to mid September. Most area of Terai get 1500 mm of rains in a year. Fungal allergy is a worldwide problem [6] Fungi have long known association with human diseases. Sensitivity to a variety of fungi is known to be a factor in allergic rhinitis and asthma. The amount of exposure that causes illness is related with individual sensitivity.

Mould spores can be found in outdoor or indoor environments [7, 8, 9], but exposure can also occur by having contact with saprophytic species [10] or by ingestion of edible mushrooms [8, 11] The fungi involved in Type 1 respiratory allergies are mostly saprophytes that grow on naturally occurring dead and decaying organic matter. Exposure to allergenic moulds may lead to rhinitis and asthma [12, 13], atopic dermatitis [10, 13, 14]. Inhalation of fungal spores carrying allergens has been claimed as a risk factor for severe asthma [15].

Epidemiological surveys support that asthma affects 5-30% of children and 2-30% of adults [16, 17]. This wide range of inter-survey fluctuation is mainly due to the different geographic distribution. Rhinitis affects 40% of the population. Among all patients suffering from respiratory allergy symptoms, 20-30% of them are sensitized to fungal spores [18]. Different species of fungal spores disperse in the atmosphere, which are characteristic of each region. Fungal spores involved in allergic diseases belong to 80 genera, the most significant of which belong primarily to Zygomycetes and Ascomycetes and Deuteromycetes and, secondly, to Basidiomycetes [18, 19, 20].

2. MATERIAL AND METHODS

This survey was conducted in patients who are suffering from bronchial asthma, allergic rhinitis related with other allergic symptoms like sneezing and cough of who attended the district hospital of Balrampur of Uttar Pradesh. It was important to know when & how the symptoms develop and what is the relationship with seasons, damp weather, physical activity and certain foods.
Pregnant and lactating females were not included in this survey. Clinical examinations, blood eosinophiles, sputum examination and X ray chest were performed to all patients before allergy testing to exclude other diagnosis. For present survey antigens were obtained from Allergen division Curewel (India) Limited an Indo- vulgarian joint venture. 19 type of fungal extracts were selected for survey. Before performing intradermal test, oral drugs were stopped but inhaled drugs were continued. Oral antihistaminics were stopped 3 days before and oral sympathomimetic were stopped 12 hrs before performing the test. Patients on corticosteroids for more than two weeks were called for allergy testing at least after three weeks. About 0.01 ml of each extract in conc. Of 1:500 was injected intradermally. The common sites used for the skin test were the volar aspect of the for arms starting about 5cm proximal to the crease of the wrist and the lateral aspect of the upper arms. Phosphate Buffe saline was used as negative control and histamine as positive control. The skin is cleaned with 70% alcohol swab and allowed to dry. The individual test sites are 5 cm apart to avoid overlapping of reactions. The tests were read after 15 to 20 minutes graded according to criteria. Assessment of skin reactivity was done according to criteria proposed by Shrivpuri including modifications. Positive reaction with association of history was incorporated in this study.

3. RESULTS

In this present brief survey the sum of patients were 96. Out of these 96 patients 58 (60.4 %) were male and 38(39.6 %) were female. Average age of patients was 27.5 yrs as shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1: Age Distribution of Patients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age distribution</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>10 – 20</td>
</tr>
<tr>
<td>20 – 30</td>
</tr>
<tr>
<td>30 – 40</td>
</tr>
<tr>
<td>40 – 50</td>
</tr>
</tbody>
</table>

3. RESULTS

Out of 96 symptomatic patients, in whom the allergy testing was performed, 12% patient had not shown any positive reaction. Rest 88 % patients who had shown positive reactions are shown in Table 2. Rhizopus nigricans had proved the most offending allergen (50 %), next to it was Aspergillus fumigatus (30 %) and Alternaria (28 %). Terai population were sensitive with Aspergillus flavus (26 %), Curvularia sp. (24 %) and Neurospora sp. (22 %). Sensitivity was ranging in 11 to 18 % patients for Phoma sp., Fusarium sp., Helminthosporium sp. And Penicillium sp. Other fungi were having sensitivity in less than 10 % patients.

4. DISCUSSION

There are 80 genera of most important fungal groups have been connected with respiratory diseases. The most common fungal groups are as Zygomycetes, Ascomycetes, Basidiomycetes. Ascomycetes tend to release spores during periods of high humidity or high rainfall or microenvironment with high water content. Basidiomycetes comprise mushrooms, rusts and smuts, dominate the outdoor air flora. The Deutromycetes, species are allergenic such as Cladosporium, Fusarium and Alternaria, fairly common in excessive moisture in indoor air flora. Several species and genera have been reported to cause fungal allergy. Epidemiological, environmental, and medical research was focused on relevant species like Alternaria [21, 22], Aspergillus [23], Cladosporium [21, 24], and Penicillium [25]. These results are in support of present survey. The fungal species of Rhizopus spp. belongs to Zygomycetes and comprises the most common indoor allergenic fungal spore family, along with mucor species, altogether known as moulds [19, 26, 20].

IgE – mediated sensitivity to fungi is demonstrated by means of skin testing with extracts prepared from fungi, although sensitivity does not necessarily reflect disease but it helps to determine the frequency of severity of respiratory allergic symptoms. National and international studies indicate that fungal sensitivity is common among asthmatics. The outdoor environment of the source of the fungal spores includes cereal crops, decaying vegetable and organic waste on which fungi thrive while indoor environment, the sources are damp walls, dustbins, window pans, matterresses, leaking pipes and humidifiers. Max studies on fungi as aeroallergen have been limited to the fungi imperfecti (class Deutromycetes) with little information on allergenicity of members of other fungal groups.

From Delhi to Dehradun Alternaria is reported to be very high in conc. Followed by Cladosporium [27, 29]. At Solan and Lucknow, Aspergillus, penicillium followed by Cladosporium and Helminthosporium are the dominant type [28].

Study carried out at Gorakhpur, Calcutta and Gauhati [30] revealed that Aspergilli, penicilli, Cladosporium, Nigrospora and the Rhizopus as the major of east India.

Beside the outdoor environment, indoor and work environment are also greatly influenced by fungi especially occupational sites employing organic raw materials grainary, poultry, flourmills, bakery and sugar factory etc.
5. ACKNOWLEDGEMENTS

Authors are very much thankful to superintendent of district hospital Balrampur for providing the patients suffering from allergic reactions and for his support to make this brief survey more convenient.

6. REFERENCES


How to cite this article: