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Short Communication

Prevalence of skin test reactivity to aeroallergens in the Pakistani population

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ABSTRACT

Objectives: The prevalence of allergies has increased in all parts of the world. The present study was conducted to determine the prevalence of sensitivity to common aeroallergens, pollen, thresher dust and cotton dust, in Pakistan.

Study-Design: Retrospective cohort study.

Method: Record of 65067 who attended the Allergy Centre, National Institute of Health, Islamabad, Pakistan from January 2007 to August 2008 was retrieved. Subjects that were skin prick test (SPT) negative and those that were SPT positive to aeroallergens were extracted and subcategorized on the basis of the 8 provinces of Pakistan, including, Islamabad Capital Territory, Punjab, Baluchistan, Sindh, Northern Areas, Kashmir, North Western Frontier Province (NWFP) and Federally Administered Tribal Areas (FATA). Monthly analysis of prevalence of allergies was also determined.

Results: Of the total, 68.6% were SPT positive. The highest number of affected individuals was from the Punjab region (41%). The highest number of cases of all aeroallergens was reported in the month of August (3532, 13.7%). Significant high correlations were observed between mixed pollen, thresher dust and raw cotton and allergic rhinitis, asthma, urticaria and allergic conjunctivitis. There was no significant correlation between allergen sensitivity and atopic edema.

Conclusion: A high prevalence of sensitivity to aeroallergens is observed in the Punjab Province of Pakistan.

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Environmental factors play a pertinent role in the increasing prevalence of allergies worldwide. Many environmental particles are important aeroallergens that affect sensitive people causing allergic responses. Immunoglobulin E (IgE) reactivity profiles to individual allergenic components (allergens) vary between populations.¹ This may be due to diverse geographical and botanical regions in terms of the season, the type of vegetation growing in surrounding places, plant

phenology and meteorological conditions. Additionally, aeroallergens include organic dust particles, perhaps the most ubiquitous respiratory hazard in the agricultural setting of industrializing countries, which include plants such as tea, coffee, tobacco, cotton, cereal grains, sisal and jute as their major products. During production of these crops, the risk exposure of agricultural workers to substantial quantities of dust is increased.^{2–5}

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Pakistan is an agricultural land, and sensitivity toward various allergens is hypothesized to be high. Data regarding the prevalence of sensitivity to aeroallergens in the Pakistani population are scarce. Therefore, this study was conducted to determine the prevalence of sensitivity to common aeroallergens, derived from a major allergy centre at the National Institute of Health (NIH), Islamabad, Pakistan.

Records of individuals who underwent skin prick tests (SPT) at NIH were reviewed retrospectively. Information included data on location and positive or negative SPT to three common allergen extracts, namely mixed pollen, thresher dust and cotton dust. Affected subjects were divided into subcategories on the basis of the eight provinces in Pakistan.

In total, 65,067 subjects, from all regions of Pakistan, were registered at NIH during the period from January 2007 to August 2008. Of these, 68.6% ($n = 44,669$) were positive to different aeroallergens: 61.2% ($n = 39,814$) showed positive SPT to pollen, 58.9% ($n = 38,360$) to thresher dust and 51.9% ($n = 33,757$) to cotton dust. Fig. 1 shows the percentage prevalence of individuals sensitive to aeroallergens in the different regions of Pakistan. A markedly higher prevalence of individuals sensitive to all three aeroallergens was observed in the province of Punjab ($n = 26,672$) compared with other regions of the country. Punjab is richer in flora and vegetation than the other provinces, and the high prevalence is likely to be due to the overall vegetation, flora and climate of Punjab. Greater prevalence of aeroallergen sensitivity in certain areas of a country compared with others suggests that different environmental conditions and hygienic factors play a role in the emergence of allergic diseases.⁶

The monthly frequency of individuals with positive SPT to pollen, thresher dust and cotton dust was studied for January

2007 to December 2007. All aeroallergens showed similar patterns of prevalence. Seasonal variation in allergen sensitivity has been observed previously, and, as expected, the highest frequencies of positive SPT results for all three aeroallergens were found during the hot, rainy season in August ($n = 3532$, 13.7%). There was a consistent increase in the number of affected individuals from December ($n = 1393$, 5.4%) to May ($n = 2563$, 10%), followed by a decline in June ($n = 2084$, 8.1%) and July ($n = 1342$, 5.2%). In the rainy season, pollen grains rupture due to osmotic shock in the humid atmosphere, and release part of their contents, including allergen-carrying cytoplasmic starch granules (0.5–2.5 μm) or other components that can reach airways, inducing respiratory reactions.⁷

Significant correlations were found between sensitivity to all three allergen extracts and allergic rhinitis ($r = 0.94$), asthma ($r = 0.7$), urticaria ($r = 0.9$) and allergic conjunctivitis ($r = 0.74$). No significant correlation was found between allergen sensitivity and atopic edema ($r = 0.49$). Subjects who were sensitive to cotton dust or thresher dust were also found to be sensitive to pollen. As hypothesized previously, the common pathogenetic denominator may be the systemic effects of inflammatory mediators induced by exogenous dusts.⁸ Several studies have shown that extracts of cotton dust and grain dust have biological properties, and inhalation of these dusts can lead to respiratory disease.⁹ Both cotton dust and grain dust contain tannins, which have been shown to activate phospholipase C and A2. This leads to the release of diacylglycerol, mobilization of intracellular free calcium and stimulation of smooth muscle contraction.¹⁰

Worldwide, Pakistan is the fourth largest producer of cotton. In addition, there is large-scale production of different

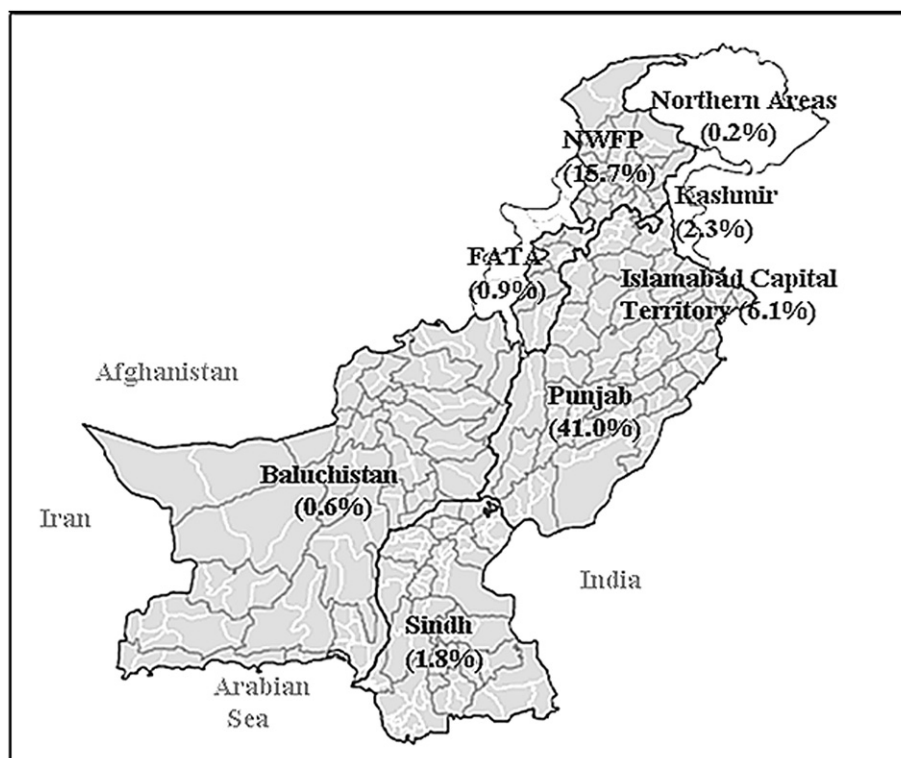


Fig. 1 – Map of Pakistan showing regional distribution of individuals sensitive to aeroallergens (January 2007 to August 2008).

types of grain, so Pakistani farmers are exposed to these plants along with different types of pollen-producing plants and grasses which are considered important in the elicitation of various allergic reactions. To the best of the authors' knowledge, this is the first report on the prevalence of sensitivity to aeroallergens in the Pakistani population.

Ethical approval

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Competing interests

None declared.

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