

# Prevalence of Allergic Sensitization to Regional Inhalants among Allergic Patients in Jakarta, Indonesia

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Atopic sensitization is the root cause of allergy. Direct skin testing is the oldest and still most clinically useful test for measuring the skin sensitizing antibody, which in humans is identical to the IgE antibody. The presence of sensitization toward environmental allergens can be detected via a skin prick test which is very valuable because it is simple, quick, painless and highly specific in detecting the responsible allergen.<sup>1</sup> The degree of sensitization of individuals toward environmental allergens should be investigated through better and more specific profiling of allergic individuals.

As only commercial allergens are used for skin-prick tests in Indonesia, the selection of allergens is restricted to those produced in Europe or America. While the selection of commercial allergens is large and varied enough to detect most generally encountered allergies, specific regional allergens that may cause allergic disease may not

**SUMMARY** Sensitization towards a panel of eight regional inhalant allergens was evaluated among 107 patients with allergic rhinitis and/or asthma. A total of 32 children (age 5-13 years, mean 9 years; 18 male, 14 female), 75 adolescents and adults (aged 14-66 years, mean 32 years; 21 male, 54 female) and 20 normal control volunteers (aged 16-46, mean 30 years; 4 male, 16 female) were evaluated via skin prick test. A weal response of 3 x 3 mm or greater was taken to be positive. The sensitization rates among individuals to these allergens were: house dust mites, *Dermatophagoides pteronyssinus* (77.57%), *Blomia tropicalis* (71.96%), *Austroglycyphagus malaysiensis* (33.64%), pollen, palm oil *Elaeis guineensis* (22.43%), *Acacia auriculiformis* (12.15%), fern spore, resam *Dicranopteris* spp (11.21%), fungal spores: *Curvularia fallax* (8.41%) and *Exserohillum rostratum* (13.08%). There were significantly higher frequencies of sensitization to these allergens among allergic individuals compared to normal controls, and among atopic individuals with two allergy manifestations (rhinitis and asthma) compared to those with only one. No difference was noted between children and adults in the allergic group. In conclusion, the allergic patients were highly sensitized to dust mites and sensitization to regional pollen and spores was also documented. They should be considered as relevant and be included in skin test batteries in Indonesia.

be available in the panel of commercial allergens and thus may remain undetected.

In Indonesia, there have been few studies of inhalant allergens, whether indoor or outdoor, or of the effect of sensitization of these allergens on individuals with allergy. To investigate the sensitization

rate of regional allergens in the Jakarta area, a study was conducted using eight of the most prevalent re-

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gional allergens based on the results of five-year aerobiological and indoor surveys in Singapore.<sup>2,4</sup> The extracts consisted of three species of dust mites (*D. pteromyssinus*, *Blo-mia tropicalis*, and *Austroglyci-phagus malaysiensis*), two tree pol-lens (palm oil, *Acacia auriculo-formis*), fern spore (*Dicranopteris* spp.), and two fungal spores (*Ex-serohilum* spp. and *Curvularia* spp.). These eight allergens were chosen as they were found to be in abundance in the Singapore envi-ronment,<sup>2,5</sup> and had relatively high rates of sensitization amongst atop-ics in Singapore.<sup>6,7</sup> The use of these allergens may also be relevant to Jakarta, as the 2 cities are only 881 kilometers apart and have similar climates and endemic flora and fau-na.

## SUBJECTS AND METHOD

Sensitization towards a panel of eight regional inhalant al-lergens was evaluated among 107 patients with allergic rhinitis and/or asthma attending a private allergy clinic. A total of 32 children (age 5-13 years, mean 9 years; 18 male, 14

female), 75 adults (age 14-66 years, mean 32 years; 21 male, 54 female) and 20 normal control volunteers (age 16-46, mean 30 years; 4 male, 16 female) were evaluated via skin prick tests.

The skin prick test was performed using Stallerpoints on the volar aspect of the forearm. The skin test response was interpreted by the widest dimension of erythema and/or weal at 10-20 minutes and recorded as 1+-4+ scale, based on the size of the weal. A weal res-ponse of 3 x 3 mm or greater was taken to be positive.

### Allergen extracts

Glycerinated extracts of *B. tropicalis*, *A. malaysiensis*, pollen of oil palm *E. guineensis*, *A. auri-culiformis*, fern spore (mixture of *D. linearis* and *D. curranii*) and fungal spores (*C. fallax* and *E. rostratum*) used in this study were prepared at the Allergy Laboratory of the National University of Singa-pore.<sup>6,7</sup> Standardized commercial extracts (Stallergenes) of *D. ptero-nyssinus*, negative control solution

(saline containing 50% glycerol and 0,4% phenol), positive control solu-tion (histamine 10mg/ml) were also used.

## RESULT AND DISCUSSION

The rate of sensitization of 127 allergic patients (32 children and 75 adults) and 20 adult control volunteers is shown in Table 1. We found very low sensitization rates to *D. pteromyssinus* (10%), *B. tropi-calis* (5%), *A. malaysiensis* (5%) and *C. fallax* (5%) amongst the con-trols. There were no positive res-ponses observed toward the other regional allergens in the controls. A higher frequency of sensitization towards the regional inhalant al-lergens was observed amongst the allergic individuals. The overall sen-sitization rates among the allergic individuals were: dust mites-*D. pteromyssinus* (77.57%), *B. tropi-calis* (71.96%), *A. malaysiensis* (33.64%); pollen-palm oil, *E. gui-neensis*, (22.3%), *A. auriculiformis* (12.15%); fern spore- *Dicranop-teris* spp. (11.21%); fungal spore- *Curvularia fallax* (8.41%) and *E. rostratum* (13.08%).

**Table 1** Sensitization rate among 127 subjects towards regional allergens

Allergens	Controls (%) (N = 20)	Allergic children (%) (N = 32)	Allergic adults (%) (N = 75)	Total allergic patients (%) (N = 107)
<i>D. pteromyssinus</i>	2 (10.00)	22 (68.75)	61 (81.33)	83 (77.57)
<i>B. tropicalis</i>	1 (5.00)	24 (75.00)	53 (70.67)	77 (71.96)
<i>A. malaysiensis</i>	1 (5.00)	5 (15.63)	31 (41.33)	36 (33.64)
<i>E. guineensis</i>	0 (0.00)	5 (15.63)	19 (25.33)	24 (22.43)
<i>A. auriculiformis</i>	0 (0.00)	2 (6.25)	11 (14.67)	13 (12.15)
<i>Dicranopteris</i> spp.*	0 (0.00)	3 (9.38)	9 (12.00)	12 (11.21)
<i>C. fallax</i>	1 (5.00)	2 (6.25)	7 (9.33)	9 (8.41)
<i>E. rostratum</i>	0 (0.00)	5 (15.63)	9 (12.00)	14 (13.08)

\**D. linearis* and *D. curranii* mixture

**Table 2** Sensitization rates in subjects with one allergic (asthma or rhinitis) and more than one allergic manifestations

Allergens	Allergic children		Allergic adults		Total	
	1 allergy (%) (N = 16)	> 1 allergy (%) (N = 16)	1 allergy (%) (N = 43)	> 1 allergy (%) (N = 32)	1 allergy (%) (N = 59)	> 1 allergy (%) (N = 48)
<i>D. pteronyssinus</i>	9 (56.25)	13 (81.25)	21 (48.84)	30 (93.75)	30 (50.85)	43 (89.58)
<i>B. tropicalis</i>	9 (56.25)	16 (100.00)	27 (62.79)	26 (81.25)	36 (61.02)	42 (87.50)
<i>A. malaysiensis</i>	3 (18.75)	2 (12.50)	13 (30.23)	18 (56.25)	16 (27.12)	20 (41.67)
<i>E. guineensis</i>	3 (18.75)	2 (12.50)	9 (20.93)	10 (31.25)	12 (20.34)	12 (25.00)
<i>A. auriculiformis</i>	0 (0.00)	2 (12.50)	7 (16.28)	4 (12.50)	7 (11.86)	6 (12.50)
<i>Dicranopterus spp.*</i>	1 (6.25)	2 (12.50)	6 (13.95)	3 (9.38)	7 (11.86)	5 (10.42)
<i>C. fallax</i>	1 (6.25)	1 (6.25)	3 (6.98)	4 (12.50)	4 (6.78)	5 (10.42)
<i>E. rostratum</i>	3 (18.75)	2 (12.50)	7 (16.28)	2 (6.25)	10 (16.95)	4 (8.33)

\**D. linearis* and *D. curanii* mixture

The difference in sensitization rates to the regional inhalant allergens amongst the allergic individuals (children and adults) was significantly higher compared with normal control ( $p < 0.005$ ). We further compared the atopic subjects with asthma and rhinitis to those with only one manifestation, asthma or rhinitis (Table 2). Individuals with asthma and rhinitis showed higher rates of sensitization to *D. pteronyssinus* and *B. tropicalis* compared to those with only either rhinitis or asthma ( $p < 0.005$ ). Within the atopic group, no difference in sensitization rate was found between children and adults.

Our findings agree with other studies from hot and humid areas where high sensitization rates toward *Dermatophagoides* spp. and *B. tropicalis* have been reported. Previous studies have reported the importance of *D. pteronyssinus* as an allergen worldwide,<sup>8</sup> including

Indonesia.<sup>9</sup> However, the presence of high sensitization rates to *B. tropicalis* found in this study is the first report from Indonesia. These findings substantiate our earlier report carried out in Jakarta,<sup>10</sup> which showed that mites of the *Dermatophagoides* spp. were predominant with *D. farinae* (39.4% of total mites isolated) and *D. pteronyssinus* (25.4%) making up the majority of the counts, followed by *Blomia tropicalis* (14.1%). These findings agree with those from other tropical regions, including neighboring countries. This similarity is likely to be due to the prevalence of *B. tropicalis* in hot and humid areas, and the high likelihood that this house mite prefers houses and other structures where rice is stored or used. In fact, allergic individuals in Latin American countries showed high sensitization rates toward *B. tropicalis*. In Brazil, even higher sensitization rates toward *B. tropicalis* was found compared with *D.*

*pteronyssinus*.<sup>11-13</sup> *B. tropicalis* has also been found in Hong Kong.<sup>31</sup> In Singapore, *Dermatophagoides* spp, *B. tropicalis* and *A. malaysiensis* were the three most common mites<sup>5</sup> and the atopic population was highly sensitized to them.<sup>6</sup>

The predominance of palm oil *E. guineensis* pollen is unique, as other reports from the region indicated that pollen of *Graminae* were usually relatively abundant.<sup>14-16</sup> Ho *et al.*<sup>16</sup> nevertheless reported high concentrations of palm oil pollen in Malaysia. This palm oil pollen was found to be a predominant pollen in Singapore,<sup>3</sup> likely blown from the numerous oil palm plantations of the Malaysian mainland or Sumatra. Palm oil trees are also grown as ornamental plants in Jakarta.

A further study in Singapore has shown that the acacia (*A.*

*auriculoformis*) tree, a common ornamental plant in both Singapore and Indonesia, sheds sufficient airborne pollen to produce positive skin test in patients with pollinosis.<sup>7</sup> Acacia pollen was trapped in our previous study, but its clinical significance was never followed up or studied further. Interestingly, the low abundance of grass and weed pollen (2% of total pollen counts) was notable in the Singapore report,<sup>3</sup> and these findings contrast with the relative importance of grass and weed pollen in the temperate regions.

Fern spores of *Dicranopteris* spp. represent approximately 5-10% of Singapore's total outdoor air spora, present in the environment year-round.<sup>3</sup> It is also the third most common airborne air spora in the atmosphere in Bangkok, with more than 70% of atopic patients tested responding to extracts of fern spores.<sup>17</sup> The widespread presence of ferns and their spores in Singapore and Bangkok calls for a more detailed look at their importance as allergens in other countries like Indonesia, where abundant growth of fern is also found.

In conclusion, a high prevalence of positive skin prick responses to dust mites such as *Dermatophagoides* spp. and *B. tropicalis* were observed among allergic individuals in Jakarta. This was

similar to reports from other Southeast Asian populations and many other tropical countries. Sensitization to other regional mites, pollen and spores was also documented. To study the sensitization of local populations to local or regional inhalant allergens, particularly to environmental mites, pollen and spores, a panel of regional inhalant allergens should be considered as relevant to be included in the skin test batteries in this region.

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