Correlation between skin tests to *Dermatophagoides pteronyssinus*, *Dermatophagoides siboney* and *Blomia tropicalis* in Cuban asthmatics


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**ABSTRACT**

**Background:** Dermatophagoides pteronyssinus, Dermatophagoides siboney and Blomia tropicalis are the most important allergenic mites in Cuba. The aim of this study was to determine the degree of polysensitization and correlation of the skin prick test (SPT) reaction size to these mites in asthmatic patients.

**Methods:** A total of 232 adult patients with asthmatic symptoms caused by house dust and positive SPT to at least one mite were included. Standardized allergenic extracts were used in SPT.

**Results:** A total of 88.4% of patients were positive to *D. siboney*, 87.1% to *D. pteronyssinus*, and 68.1% to *B. tropicalis*. Sensitization to *Dermatophagoides* species was predominant, demonstrated by the fact that 31.9% of patients showed positive SPT to either *D. siboney* or *D. pteronyssinus* only, whereas only 5.6% was sensitized solely to *B. tropicalis*. Nevertheless, most patients (58.6%) were polysensitized to the 3 species. The mean wheal size produced by the different allergens in positive patients was similar (n.s. p > 0.05). Reaction size was strongly correlated (r = 0.71, p = 5.3 × 10⁻⁹) between *D. siboney* and *D. pteronyssinus*, whereas no significant correlation was found between *D. pteronyssinus* or *D. siboney* and *B. tropicalis*.

**Conclusions:** The results of this study support the need to include the 3 allergens in diagnostic panels and for combined allergen-specific immunotherapy.

**Key words:** Skin prick test. Correlation. Polysensitization. Domestic mites.

**INTRODUCTION**

The prevalence of Allergy is achieving epidemical proportions all over the world. In Cuba, it is estimated that about 20% of the population is allergic. According to different sources from 5.7% to 10% of the total population suffer from asthma, with a highest prevalence among teenagers, reaching 17.8%1. The increase of prevalence of allergic diseases is commonly associated with changes in lifestyle and environment. Particularly, allergic asthma is strongly associated with IgE sensitization to House Dust Mites2. Previous studies have described 3 domestic mite species as the most relevant in Cuba regarding allergic sensitization: Dermatophagoides pteronyssinus (Dp), Dermatophagoides siboney (Ds) and Blomia tropicalis (Bt).
**Dermatophagoides** species are well known all over the world as important inhalant allergen sources. *D. siboney* is a local endemic species reported first in 1984 and is closely related to *D. farinae*, which is not found in Cuba. On the other hand, *Bloomia tropicalis* is very common in tropical humid and hot climates. In general, tropical conditions with high temperatures and humidity all over the year favor the growth of the mites. The lancet (ALK, Denmark) was used to administer the skin test. A multicenter, transversal, descriptive and analytical study was performed on 232 adult patients, who attended Allergy Services at two Havana University Hospitals: “Calixto Garcia” and “Joaquín Albarrán”, from October, 2004 to March, 2005. Patient’s mean age was 30.3 years (SD = 8.7); 92 were men and 140, women. The inclusion criteria were the presence of a clinical history of respiratory allergy to house dust (asthma with or without rhinitis) and a positive Skin-Prick-Test to at least one mite species. Written informed consent was given by every patient included in this study in agreement with Good Clinical Practice.

**Materials and Methods**

A multicenter, transversal, descriptive and analytical study was performed on 232 adult patients, who attended Allergy Services at two Havana University Hospitals: “Calixto Garcia” and “Joaquín Albarrán”, from October, 2004 to March, 2005. Patient’s mean age was 30.3 years (SD = 8.7); 92 were men and 140, women. The inclusion criteria were the presence of a clinical history of respiratory allergy to house dust (asthma with or without rhinitis) and a positive Skin-Prick-Test to at least one mite species. Witten informed consent was given by every patient included in this study in agreement with Good Clinical Practice.

**Skin Prick Test**

Skin Prick Test (SPT) was performed on all patients following the method described by Dreborg. Briefly, a drop of the allergen solution was applied on to the forearm of the patient. The lancet (ALK, Denmark) was pressed slightly at 90° angle into the skin, during 1 second. After 15 min. the wheal contour was outlined using a pen and transferred to an adhesive tape. The wheal maximum (d₁) and orthogonal (d₀) diameters were measured and mean diameter was calculated as \( d = [d₁ + d₀] / 2 \). The test was considered valid when the skin reaction to the negative control (Buffer Solution) was smaller than 3 mm, and for the positive control (Histamine HCl, 10 mg/mL), greater than 3 mm. The test result was regarded positive if the wheal diameter was greater or equal to 3 mm. The wheal area was calculated according to the expression: \( A = d^2 / 4 \). The following standardized allergen extracts, manufactured by BIOCEN, Cuba, were used for prick testing: VALERGEN-DS: Dermatophagoides pteronyssinus, VALERGEN-BT: Blomia tropicalis.

The extracts are standardized in Biological Units (BU) according to the definition of Nordic Guidelines for Registration of Allergen Products. The used concentration was 20 000 BU/mL, following manufacturer's instructions.

**Statistical Methods**

Wheal area data was log-transformed and tested for normality using the Kolmogorov-Smirnov test (α = 0.05). Geometric means and 95% confidence intervals were employed for comparing the reaction size between different allergens. The correlation of SPT size was calculated using the non-parametric Spearman rank correlation coefficient. Statistical processing was performed using STATISTICA v.8.1 software package (StatSoft, USA).

**Results**

The highest prevalence of positive test was observed to *D. siboney* (88.4 %) and *D. pteronyssinus* (87.1 %), followed by 68.1 % to *B. tropicalis* (table I).

<table>
<thead>
<tr>
<th>Table I</th>
<th>Positive SPT results to different allergens and allergen combinations (n = 232)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>D. siboney</td>
<td>205</td>
</tr>
<tr>
<td>D. pteronyssinus</td>
<td>202</td>
</tr>
<tr>
<td>B. tropicalis</td>
<td>158</td>
</tr>
<tr>
<td>D. pteronyssinus or D. siboney</td>
<td>219</td>
</tr>
<tr>
<td>Only to D. pteronyssinus or D. siboney</td>
<td>74</td>
</tr>
<tr>
<td>Only to B. tropicalis</td>
<td>138</td>
</tr>
<tr>
<td>D. pteronyssinus and D. siboney</td>
<td>188</td>
</tr>
<tr>
<td>Positive to all three allergens</td>
<td>136</td>
</tr>
</tbody>
</table>

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Most Dermatophagoides positive patients showed positive results to both species simultaneously (81.6% of the total number of tested patients), whereas, up to 94.4% were positive either to Dp or Ds or both; i.e. only 12.8% (the difference) showed a species specific response within Dermatophagoides genus.

The predominant role of sensitization to Dermatophagoides as compared to Blomia tropicalis is evidenced by the fact that 31.9% of patients were exclusively positive to Dp or (and) Ds whereas only 5.6% were positive solely to Bt. Nevertheless, most patients (58.6%) were sensitized against the three mite allergens, simultaneously.

The largest reactions were observed to D. siboney and D. pteronyssinus, followed by B. tropicalis, in full agreement with the prevalence data (table II). Nevertheless, the difference was not significant (p < 0.05). On the other hand, a highly significant Spearman correlation coefficient (r = 0.71, p = 5.3 x 10-16) was found between SPT reaction size to Dp and Ds, whereas no significant correlation was reported between Bt and neither Dp nor Ds.

Dermatophagoides pteronyssinus and Blomia tropicalis are commonly found in house settings in the Caribbean region, leading to the lack of correlation concerning reaction size. Also, the genetic background of the population could also influence the intensity of the response to different allergens, that possibly share a common environment; which is supported also by the lack of correlation concerning reaction size.

### Table II

<table>
<thead>
<tr>
<th>Wheel area (mm²)</th>
<th>D. siboney</th>
<th>D. pteronyssinus</th>
<th>B. tropicalis</th>
<th>Histamine (HC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometric Mean</td>
<td>22.2</td>
<td>21.6</td>
<td>19.8</td>
<td>24.8</td>
</tr>
<tr>
<td>95% Confidence Interval</td>
<td>19.8-24.6</td>
<td>19.4-23.9</td>
<td>16.7-22.1</td>
<td>23.3-26.3</td>
</tr>
</tbody>
</table>

REFERENCES

1. Pawankar R. Allergic rhinitis and asthma: the link, the new ARIA classification and global approaches to treatment. Current Opinion in Allergy and Clinical Immunology 2004;4:1-4.