

Short communication

Sensitization to *Dermatophagoides siboney*, *Blomia tropicalis*, and other domestic mites in asthmatic patients

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Mite species adapted to warm, humid climates are commonly found in house dust in the tropics. In Cuba, *Dermatophagoides pteronyssinus*, *D. siboney*, and *Blomia tropicalis* are the most common and abundant mite species in house dust. To investigate the pattern of sensitization of Cuban asthmatic patients to common mite species, we skin-prick-tested (SPT) 148 patients with a clinical history of asthma and possible mite allergy, and determined specific IgE antibodies against mite allergens (*D. pteronyssinus*, *D. farinae*, *D. siboney*, *B. tropicalis*, *Acarus siro*, *Lepidoglyphus destructor*, *Tyrophagus putrescentiae*, and *Glycyphagus domesticus*). The prevalence of positive SPT was high to *D. siboney* (88%), *D. pteronyssinus* (87%), *A. siro* (85%), *B. tropicalis* (85%), and *D. farinae* (83%). The largest skin reactions were obtained with *D. siboney* and *B. tropicalis* extracts. The skin test response to the *D. siboney* extract correlated to those of *D. farinae*, *D. pteronyssinus*, *B. tropicalis*, and *A. siro*. The highest IgE levels were found to *Dermatophagoides* species and *B. tropicalis*. IgE to *D. siboney* and *B. tropicalis* were found in 97% and 96% of the patients, respectively. The prevalence of specific IgE to the other mites studied varied from 46 to 65%. *D. siboney* and *B. tropicalis* are important sensitizers among asthmatic patients in Cuba.

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Dermatophagoides pteronyssinus and *D. farinae* are the best studied and characterized sources of mite allergens. Other mites associated with clinical symptoms of asthma are *Euroglyphus maynei* (1, 2), *Lepidoglyphus destructor* (3–5), *Acarus siro* (6), *Glycyphagus domesticus* (7), *Aleuroglyphus ovatus*, and *Chortoglyphus arcuatus* (8). These mites, which are common in farming environments, are also found in house dust from tropical and subtropical regions. A mite fauna adapted to high temperature and humidity is found in the tropics. *Blomia tropicalis* (9–11), *B. kulagini* (12), and *Tyrophagus putrescentiae* (13, 14) are important sensitizers. In Latin America, sensitivity to different mite species has been found to be common (15–18).

Dermatophagoides siboney was described in Cuba in 1982 (19). This species was found in dust samples from 85% of the investigated homes. Together with *D. pteronyssinus* (100%) and *B. tropicalis* (72%), *D. siboney* was the most abundant mite in dust collected from homes of asthmatic patients in Cuba (20). Characterization of allergens from *D. siboney* has shown several allergenic components. Major allergens of groups 1 and 2 have been identified and isolated from *D. siboney* extracts (21), and cross-reactivity with *D. pteronyssinus*, *D. farinae*, and other mites has been reported (22).

The aim of this study was to investigate the pattern of sensitization to different mites, focusing on *D. siboney* and *B. tropicalis*, in a group of Cuban

asthmatic patients with a clinical history of possible mite allergy.

Material and methods

Patients and sera

A total of 148 patients (104 female, 44 male; aged 6–52 years, mean 29 years) presenting with a clinical history of asthma and with perennial symptoms indicating possible mite allergy were included in this study. All patients gave their informed consent.

Allergenic extracts

Extracts of *D. siboney* and *B. tropicalis* were prepared from whole-mite cultures (21). Extracts of *D. pteronyssinus*, *D. farinae*, *A. siro*, and *L. destructor* were obtained from ALK Laboratories (Soluprick® SQ, Denmark).

Skin tests

Skin prick tests (SPT) were performed in duplicate on the forearm of each patient (23) with all allergenic extracts. Histamine dihydrochloride (10 mg/ml) and glycerol solution (Soluprick® SQ) were used as positive and negative controls, respectively. After 15 min, the sizes of the wheals were outlined with a felt-tip pen and then transferred by adhesive tape to a record sheet. Areas were calculated from transverse diameters and expressed in square millimeters. Reactions with an area larger than 7 mm² were considered positive.

Specific IgE determination

Specific IgE levels were tested by the Magic Lite™ System (ALK Laboratories, Denmark). Solid-phase paramagnetic particles with *D. siboney* and *B. tropicalis* were prepared by coupling freeze-dried whole extracts of each mite species according to the manufacturer's instructions, except that phosphate saline buffer, pH 7.4, was used to reconstitute the allergens and during the incubation with the activated solid phase. Solid phases of *D. pteronyssinus*, *D. farinae*, *A. siro*, *L. destructor*, *T. putrescentiae*, and *G. domesticus* allergens were used as supplied by the manufacturer. Levels of specific IgE higher than 1.43 SU/ml (class 1) were considered positive.

Statistical analysis

Analyses of the data were computed by nonparametric tests (Wilcoxon signed rank and Spearman

rank correlation) with StatView software (Abacus, USA).

Results

The highest percentage of positive skin reactions occurred with *D. siboney*, followed by *D. pteronyssinus* (Fig. 1). Positive reactions were observed in more than 80% of the asthmatic patients to all mite allergens except *L. destructor*, to which fewer than half of the subjects had a positive test result.

Only four patients (3%) were SPT negative to all the six mite extracts. Cases with sensitization to a single mite species were also rare. Three patients reacted only to *B. tropicalis*, and one patient each was sensitized only to *D. siboney*, *D. farinae*, or *D. pteronyssinus*, respectively. Thirteen patients reacted to two of the six allergens tested. Positive reactions to *B. tropicalis* and *D. siboney* were observed in five of these patients.

In general, wheals were larger to those allergens which showed the highest frequency of sensitization (Fig. 1). The largest wheals were obtained with *D. siboney*, *B. tropicalis*, and *D. pteronyssinus* extracts. Reactions to these three species were significantly larger ($P < 0.01$) than those to *D. farinae*, *L. destructor*, and *A. siro*. There were no significant differences in size between the reactions to *D. pteronyssinus*, *D. siboney*, and *B. tropicalis*.

A high correlation was observed among the skin reactions to the *Dermatophagoides* extracts (Table 1). The wheal areas induced by *D. siboney* correlated also to those of *B. tropicalis* and *A. siro*, but there was no correlation to those induced by *L. destructor*. There was no relation between skin reactions to the nonpyroglyphid mite allergens studied (*B. tropicalis*, *L. destructor*, and *A. siro*) (data not shown).

The highest levels of mite-specific IgE antibodies were recorded against *D. pteronyssinus* and *D. farinae* (Fig. 2). However, although the median levels of IgE to *D. siboney* and *B. tropicalis* were lower than those to *D. pteronyssinus* and *D. farinae*, a positive specific IgE response to these mites occurred much more frequently. The levels of specific IgE to *L. destructor*, *T. putrescentiae*, and *G. domesticus* were lower.

Discussion

The high prevalence of positive skin reactions to mites, especially *B. tropicalis* and *D. siboney*, agrees with the pattern of frequency and abundance of these mite species in Cuba (20). *Blomia* and *Dermatophagoides* species are often predominant

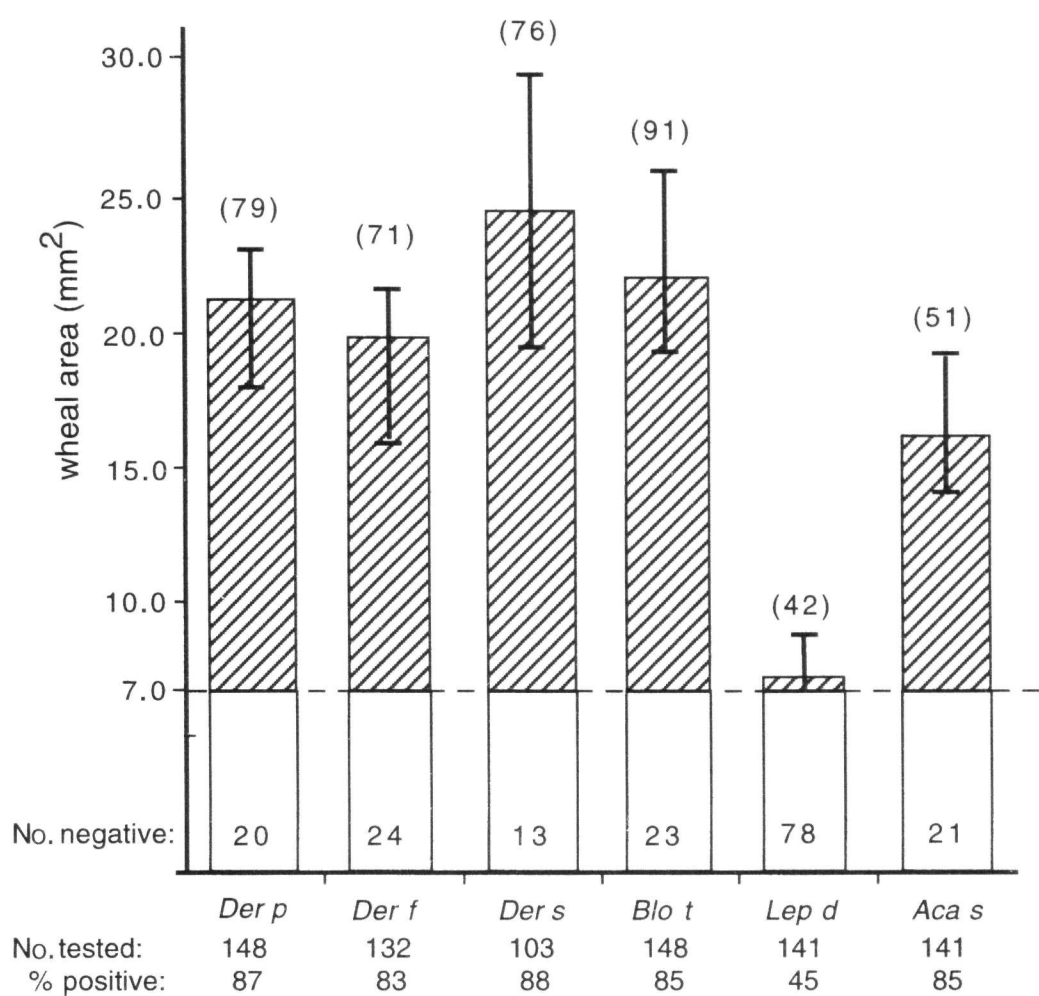


Fig. 1. Median values of skin prick test reactions to different mite allergens. Vertical bars show 95% confidence intervals; numbers in parentheses indicate highest values for each mite species; numbers of negative test results are shown on white area of each bar.

Table 1. Correlations among skin prick test reactions to mite allergens

Mites	No. tested	r*
<i>D. pteronyssinus</i> – <i>D. farinae</i>	132	0.73**
<i>D. siboney</i> – <i>D. pteronyssinus</i>	100	0.75**
<i>D. siboney</i> – <i>D. farinae</i>	91	0.74**
<i>D. siboney</i> – <i>B. tropicalis</i>	100	0.55**
<i>D. siboney</i> – <i>L. destructor</i>	100	0.22
<i>D. siboney</i> – <i>A. siro</i>	100	0.61**

* Spearman rank correlation; ** *P* < 0.01.

in countries with a similar climate, and the prevalence of sensitization to these mites is often high. Positive SPT to *Blomia* was reported in Guatemala in 68% of the patients (17) and in Brazil in 90% of the patients (24). A high prevalence of sensitization to *Dermatophagoides* species, as measured by positive skin tests, has been found in Argentina (25) and Florida, USA, too (26). In a multinational study on mite sensitization from five Latin American countries, Fernández-Caldas et al. (15) found the prevalence of positive skin tests in asthmatic patients to *D. pteronyssinus* and *D. farinae* always to be higher than 50%, and in one location more than 97% of the patients were sensitized to these mites.

In temperate climates, farmers may become sensitized to storage mite species (5, 7, 27). These species are also common in house dust in tropical countries (28, 29). *B. tropicalis*, *Suidasia pontificia*, and *Cheyletus eruditus* are also common in Cuban house dust (20), as is *T. putrescentiae*, which multiplies rapidly at high temperature and humidity. The prevalence of sensitization to the mites studied by us agrees with these data.

The prevalence of positive specific IgE tests to several mite species found in our study also agreed with the prevalence of positive skin tests and with the frequency of *B. tropicalis* and *Dermatophagoides* species in Cuban house dust (20). Most of the patients, i.e., 97%, showed IgE to pyroglyphid mites and *B. tropicalis*. Among the children in São Paulo, Brazil, 65% had specific IgE to *B. tropicalis*, 95% to *D. pteronyssinus*, and 80% to *D. farinae* (30, 31). A similar prevalence of specific IgE was found to *B. tropicalis* (81%) and *Dermatophagoides* species (more than 75%) in Cartagena, Colombia, where there was also a high prevalence of sensitization to *C. arcuatus* (71%), *A. ovatus* (69%), and *L. destructor* (60%) (16). In our study, high levels of specific IgE to “storage mites” were uncommon.

The lower, frequency of *A. siro*, *L. destructor*, *G. domesticus*, and *T. putrescentiae* in house dust from homes of asthmatic patients than of *D. pteronyssinus*,

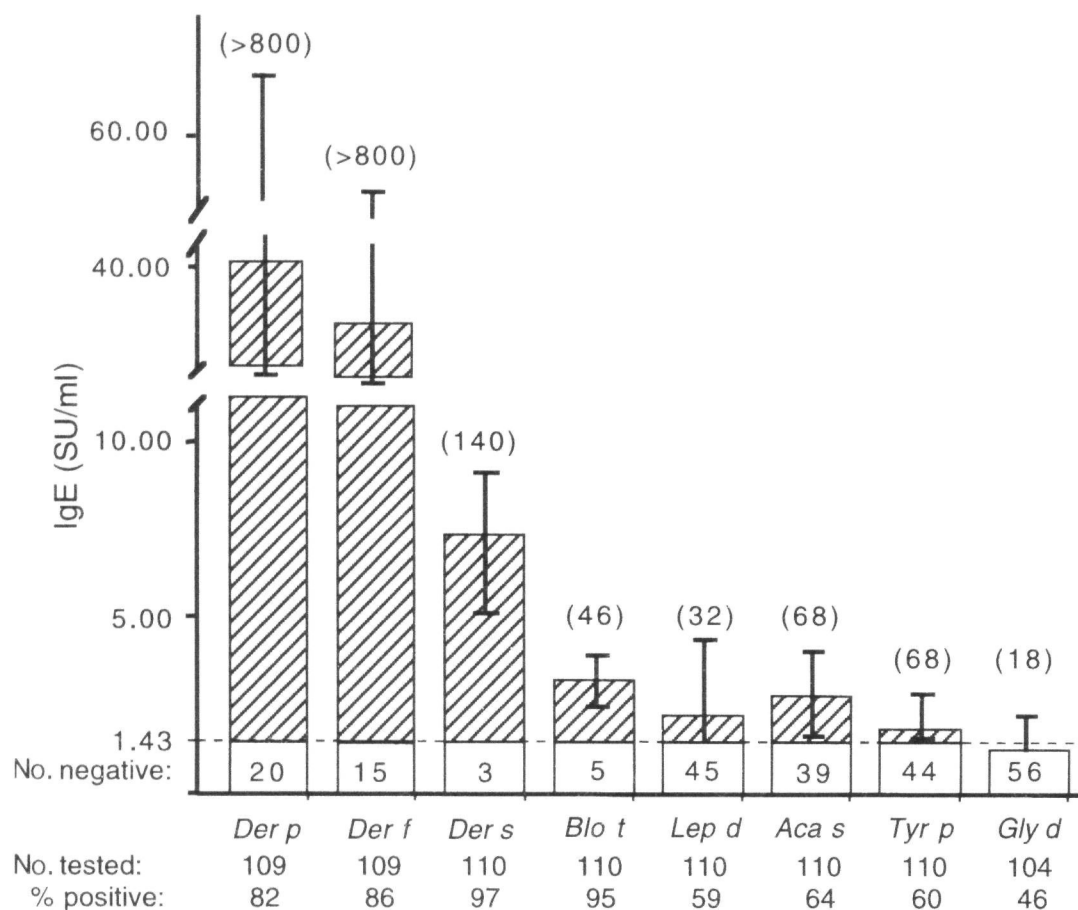


Fig. 2. Median values for concentration of IgE antibodies against different mite allergens. Vertical bars show 95% confidence intervals; numbers in parentheses indicate highest values for each mite species; numbers of negatives are shown on white area of each bar.

D. siboney, and *B. tropicalis* could explain the lower degree of sensitization to these species. The fact that the patients studied were from an urban area could also contribute to this pattern of sensitization.

Previous studies using specific IgE inhibition assays have shown high cross-reactivity among *D. siboney*, *D. farinae*, and *D. pteronyssinus* (22). The high prevalence of positive SPT and high IgE binding to *D. farinae*, a species which is not found in house dust in Cuba, can be explained by this cross-reactivity. Similarly high values of specific IgE to *D. farinae* due to cross-reactivity were found in Mauritius, where this species has not been found (32), and in Colombia, where *D. farinae* is uncommon (11). Our SPT results confirmed the good correlation between IgE to *D. siboney* and that to other pyroglyphid mites, and also to non-pyroglyphid mites (22). Further studies are needed on the cross-reactivity among individual mite allergens in order to define the composition of mite allergen preparations suitable for diagnosis and therapy. This is particularly true of tropical regions where many mite species are prevalent.

D. pteronyssinus and *B. tropicalis* are the most common mite species in the tropics, and several studies have demonstrated their role in sensitization. Our study has confirmed their importance in Cuba, and we can conclude that *D. siboney*, which

had not yet been studied, is also an important sensitizing mite. The weak cross-reactivity between *B. tropicalis* and *Dermatophagoides* species found when testing Cuban patients (22) and the high frequency of sensitization to *B. tropicalis* indicate that *B. tropicalis* should be considered an important sensitizer. *D. siboney* and *B. tropicalis* should be used when studying sensitization to mites in the tropics. *D. siboney* will probably be found in other Caribbean countries, and its role in house-dust mite allergy should be further studied.

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