Sensitization to Non-Pyroglyphid Mites in Urban Population of Croatia

Božica Kanceljak-Macan, Jelena Macan, Lucija Buneta 1, Sanja Milkoviæ-Kraus

Institute for Medical Research and Occupational Health, Zagreb; and 1Jordanovac University Hospital for Lung Diseases, Zagreb University School of Medicine, Zagreb, Croatia

Aim. Determination of prevalence of sensitization to *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae* (pyroglyphid mites), *Lepidoglyphus destructor*, and *Tyrophagus putrescentiae* (non-pyroglyphid mites) in urban continental Croatia.

Methods. Specific IgE (sIgE) and skin prick test (SPT) for *D. pteronyssinus*, *D. farinae*, *L. destructor*, and *T. putrescentiae* were performed in 67 men. SPT was performed with Epipharm-ALK allergens. A urtica (D+d)/2 of 3 mm or greater was considered a positive skin reaction. sIgE was measured by immunoCAP technology (UNI CAP). Values <0.35 kU/L were considered nonspecific and >0.35 kU/L increased.

Results. The prevalence of subjects with positive SPT was 35.8% for *T. putrescentiae*, 26.8% for *L. destructor* (26.8%), and 22.4% for *D. pteronyssinus* and *D. farinae* (23.9%). The prevalence of increased sIgE for *D. pteronyssinus* and *D. farinae* was 23.9%, followed by *T. putrescentiae* (22.4%) and *L. destructor* (14.9%). Among subjects with increased IgE to *D. pteronyssinus* there were also increased IgE for *D. farinae* in 94%, for *T. putrescentiae* in 75%, and for *L. destructor* in 50%. Mean urtica diameter differed only for *L. destructor* between nonspecific and increased sIgE values in subjects with positive SPT (3.7±0.7 mm vs. 6.2±2.8 mm; p=0.004). Sensitization to storage mites was accompanied by respiratory symptoms in similar proportions as that to house dust mites (51.8% and 54.5%, respectively; p=0.8527).

Conclusion. Sensitization to non-pyroglyphid mites is present in the general urban population of Croatia in similar proportions as to pyroglyphid mites, with the same range of respiratory symptoms. Testing with storage mites should be considered routine allergological diagnostic procedure.

Key words: allergens, dust; atopic hypersensitivity; Croatia; housedust; hypersensitivity, immediate; IgE; skin test

Numerous studies have shown that sensitization to dust mites is significantly increasing all over the world (1). Sensitization is caused by a number of anatomically different mites, particularly from the Pyroglyphidae, Glycyphagidae and Acaridae families (2). For the last 20 years, pyroglyphid mites, such as *Dermatophagoides* genus have been shown to be ubiquitous and major allergen components of house dust (the so-called house dust mites) (3). Non-pyroglyphid mites were firstly studied only as rural occupational allergens in dust samples from stored food products like hay, grain, and flour (so-called storage mites) (4). However, recent studies have shown that non-pyroglyphid mites can also be found in house dust samples from urban as well as rural regions and can constitute about 15-20% of mite fauna in house dust (5,6). Sensitization to dust mites manifests clinically as rhinitis, conjunctivitis, dermatitis, and bronchial asthma. Different studies have shown that sensitization to dust mites is an independent risk factor for asthma (1,3).

The aim of this study was to investigate the prevalence of sensitization to house-dust mites (*Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*) and storage mites (*Lepidoglyphus destructor* and *Tyrophagus putrescentiae*) in a random sample from the continental, urban region of Croatia on the basis of skin prick test and specific IgE levels.

Subjects and Methods

The geographic position of Croatia has two main regions: continental and mediterranean. The continental region, with an annual mean temperature ranging from 6.6 °C to 26.6 °C and mean relative humidity ranging from 35% to 98% is considered a moderate climate region (7).

Subjects

The study included a random sample of 67 men (mean age 40.6±7.7 years; smokers 43/67=64.2%) from the continental, urban region of Croatia. A standard questionnaire was completed for all subjects, with particular attention to respiratory symptoms of upper
(sneezing, rhinorrhea, nasal itching, and congestion) and lower (productive and nonproductive cough, wheezing, and dyspnea) Airways.

Skin Testing
Skin prick test was performed by standard method with Epiphran-ALK (Copenhagen, Denmark) allergens: D. pteronyssinus, D. farinae, L. destructor, and T. putrescentiae (100 BU/mL; BU=Biological Unit) (8). Histamine hydrochloride (1 mg/mL) and buffer solution were tested as controls of positive and negative skin reaction, respectively. An urtica with (D+d)/2 of 3 mm or more (D – largest diameter, d – diameter perpendicular to the largest diameter) was considered a positive test.

Specific IgE
Specific IgE for D. pteronyssinus, D. farinae, L. destructor, and T. putrescentiae was measured by immuno CAP technology – UNI CAP 100 (Pharmacia AB Diagnostics, Uppsala, Sweden). Values below 0.35 kU/L were considered nonspecific and values higher than 0.35 kU/L increased (9).

Statistical Analysis
Chi-square test was used for testing differences in the prevalence of positive skin prick tests and increased specific IgE, and t-test for testing differences between mean skin reactivity in the examined groups. A value of p<0.05 was considered statistically significant.

Results
The results of the specific IgE levels and skin test reactions were analyzed separately and in relation to respiratory symptoms.

The highest prevalence of increased specific IgE was found for D. pteronyssinus and D. farinae (16/67, 23.9%), followed by L. destructor (10/67, 14.9%) and T. putrescentiae (15/67, 22.4%). Among subjects with increased specific IgE for D. pteronyssinus and D. farinae skin prick tests were positive in 10 out of 16 subjects (62.5%), for L. destructor in 9 out of 10 subjects (90%), and for T. putrescentiae in 14 out of 15 subjects (93.3%) (Fig. 1).

The highest prevalence of positive skin prick test was found for T. putrescentiae (24/67, 35.8%) followed by L. destructor (18/67, 26.8%), and D. pteronyssinus and D. farinae (15/67, 22.4%). Among subjects with positive skin prick test for D. pteronyssinus and D. farinae specific IgE was increased in 10 out of 15 subjects (66.7%), for L. destructor in 10 out of 18 subjects (55.5%), and for T. putrescentiae in 14 out of 24 subjects (58.3%) (Fig. 2).

Respiratory symptoms were present in 46.3% of subjects. The prevalence of respiratory symptoms in subjects with positive skin prick test for house dust mites and those with positive skin prick test for storage mites was similar (54.5% and 51.8%, respectively; p=0.8527) and also in subjects with increased sIgE (41.2% and 53.7%, respectively; p=0.4851) (Fig. 3).

The significant difference of mean skin reactivity in skin prick test positive reactions between nonspecific and increased specific IgE values was found only for L. destructor (3.6±0.7 mm vs. 6.2±2.8 mm; p=0.004) and not for other tested mites (Fig. 4).

Among 16 subjects with increased specific IgE for D. pteronyssinus 15 had increased specific IgE to D. farinae, 8 to L. destructor and 12 to T. putrescentiae. Among 15 subjects with positive skin prick test for D. pteronyssinus 8 had positive skin prick test to D. farinae, and 11 to L. destructor and T. putrescentiae. In 16 subjects with increased specific IgE for D. pteronyssinus 8 had increased specific IgE for all tested mites, as well as

Discussion
The prevalence of sensitization to different species of dust mites in urban house environments has not been sufficiently investigated (10). A few recent studies have focused on sensitization to some species of storage mites, particularly L. destructor and T. putrescentiae in different urban populations (6,11,12).
Clinical relevance of positive skin test reactions and/or increased specific IgE values for more than one species of dust mites is difficult to assess.

The prevalence of positive skin prick test reactions and/or increased specific IgE values for *Dermatophagoides* species has been investigated in numerous studies for moderate climate regions, where it ranged between 5% and 30% (1,3). Data for storage mites in urban populations ranged between 12% and 61.5%, depending on the used sample and criteria. However, the majority are around 15% (5,12-14). The results of this study are within the above ranges. In our previous study (15), the prevalence of positive skin prick test reactions to *D. pteronyssinus* in the general, adult population of Croatia was 13%. In this study the prevalence is higher (22.4%), indicating an increase of sensitization to *D. pteronyssinus* in the general population of Croatia over the last 4 years.

In this study, significant difference of mean skin reactivity in prick test positive reactions between non-specific and increased specific IgE values was found only for *L. destructor* and not for *T. putrescentia* (Fig. 4). These results indicate that skin prick test with *T. putrescentia* shows more non-specific positive reactions and that specific IgE measuring is a more reliable method for establishing sensitization to this mite.

Sensitization to storage mites in this study was accompanied by respiratory symptoms in similar proportions as in those sensitized to house dust mites (about 50%). This means that about half of the sensitized subjects to all tested dust mites are asymptomatic, suggesting the need for additional diagnostic procedures, such as specific nasal or bronchial challenges and measurement of mites allergen levels in the dust. Such procedures could help in determination of present or future clinical relevance of sensitization to dust mites. Some studies have shown that relevant clinical manifestations in sensitized patients to a specific dust mite are connected only with sufficient environmental exposure to that dust mite (11,16). Positive skin prick test and increased specific IgE levels in the majority of studies showed lack of correlation with clinical manifestation of sensitization (10).

Figure 4. Mean skin reactivity in subjects with positive skin prick test. Open circles, subjects with specific IgE<0.35 kU/L. Closed circles, subjects with specific IgE>0.35 kU/L.

Figure 5. Cosensitization between house dust and storage mites in sensitized subjects. DP, *Dermatophagoides pteronyssinus*; DF, *Dermatophagoides farinae*; LD, *Lepidoglyphus destructor*; TP, *Tyrophagus putrescentiae*.

References

sons in two climatic areas of the Basque region (Spain). Allergy 1995;50:478-82.


19 van der Heide S, Nimejier NR, Hovenga H, de Monchy JGR, Dubois AEJ, Kauffman HF. Prevalence of sensitization to the storage mites Acarus siro, Tyrophagus putrescentiae and Lepidoglyphus destructor in allergic patients with different degrees of sensitization to the house dust mite Dermatophagoides pteronyssinus. Allergy 1998;53:426-30.

Received: August 12, 1999
Accepted: November 20, 1999

Correspondence to:
Božica Kanceljak-Macan
Institute for Medical Research and Occupational Health
Ksaverska cesta 2
10000 Zagreb, Croatia
bkancelj@imi.hr