

Mite-allergen levels in Norwegian homes

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The scarce data published on mite sensitization and mite-allergen levels in Norway indicate that the mites may not be of the same importance in allergic disease in Norway as in countries such as the UK and the rest of Europe. The problem also involves the low allergen levels and small amounts of dust collected for allergen determination, and when the level is to be expressed as mg/g, the lower detection limit will often vary from sample to sample, giving within the same investigation results such as $<0.2 \mu\text{g/g}$, $<0.5 \mu\text{g/g}$, and even $<2.0 \mu\text{g/g}$. The use of allergen levels expressed instead per area ($\mu\text{g/m}^2$) at least results in a uniform lower detection limit, making statistical analysis easier.

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There are remarkably few published reports on mite sensitization and on mite-allergen levels in Norway. The impression of Norwegian pediatricians and allergologists appears to be that sensitization to mites is of considerable importance in asthma in childhood, but that cat and dog allergy is probably of even greater importance.

In one study from northern Norway, 211 atopic schoolchildren were compared with 209 nonatopic controls (1). In the atopics, prick test positivity to cat dander, timothy pollen, dog dander, and birch pollen was more common (19-31%) than positivity to *Dermatophagoides pteronyssinus*, the predominant house-dust-mite species in Norway (7%). In the homes of children sensitive to *D. pteronyssinus*, an increased frequency of dampness problems and increased mite counts in the mattresses were found (2). In addition, significantly more Der p 1 allergens were demonstrated in the mattresses of mite-sensitized children than in the mattresses of controls (3). However, levels were expressed as ng/m^2 , which, although intuitively very sound, makes comparisons with the bulk of data expressed as ng per g sieved dust difficult.

In another study (4-6), mattress and house floor dust was collected in a standardized manner in 107 homes in seven different municipalities in southern Norway. Mites were identified and counted by R. Mehl (Laboratory of Entomology, National Institute of Public Health, Oslo), and the levels of Der p 1, Der f 1, and Der m 1 were determined by ALK (Copenhagen, Denmark). In approximately 70% of the dwellings, mite-allergen levels were below

$1 \mu\text{g/g}$, and in 30%, levels were higher than $1 \mu\text{g/g}$. In 16% of the dwellings, levels above $2 \mu\text{g/g}$ were found. The mite allergen demonstrated was predominantly Der p 1. In 10 samples, Der p 1 and Der f 1 levels were also determined by another laboratory (Dr S. Elsayed, Allergy Research Group, Institute of Biochemistry, Haukeland University Hospital, Bergen, Norway) using a different ELISA system. Prominent differences were found, indicating difficulties encountered when comparing mite-allergen-level data from different laboratories. Der f 1 was detected in a few dust samples, even though *D. farinae* itself was not detected (and never has been detected in samples from Norwegian homes [5]).

In Bergen, western Norway, allergen levels in dust from homes in comparison with schools and from carpeted floors in comparison with smooth floors have been studied (7, 8). In dust from carpeted floors, significantly higher levels of mite allergens were found in homes than in schools. In dust from smooth floors, however, there was no difference between homes and schools. The levels measured were consistently very low, but allergen levels were mostly expressed as ng/m^2 in unsieved dust, and are therefore difficult to compare with most other reports.

A cohort of children born in Oslo in 1992 and 1993 was followed for 2 years for the early detection of bronchial obstruction. House dust was collected in a standardized manner from the beds and bedroom floors of 251 children with episodes of bronchial obstruction and in 251

matched controls (9, 10). Sieved dust was weighed and extracted, and the extracts were tested in an ELISA system using monoclonal antibodies obtained from Drs T. Platts-Mills and M. Chapman. The amounts of dust collected from the children's bedrooms were generally remarkably low. This made the detection limit, expressed as ng allergen per g of sieved dust, quite high, varying from 0.1 to 2 µg/g from sample to sample, depending on the amount of sieved dust obtained. The stratification of such results is difficult. Had this been fully foreseen, we might instead have chosen ng per m² and unsieved dust. This would have given far more definite values and a uniform limit of detection for all samples, enabling a fruitful stratification of results, although decreasing the opportunity to compare the levels with those of other studies. In only 14 (11 cases and three controls) of the total of 502 homes investigated were Der p 1 levels higher than 2 µg/g of sieved dust found. Mattress levels were usually higher than floor levels. Most of the remaining dust samples had Der p 1 levels below the variable detection limits. Although exact mean or median levels for this reason cannot be calculated, the levels are, no doubt, by far lower than those reported from the UK, i.e., mean level of 4.4 µg/g dust from bedroom floors and 10.6 µg/g dust from mattresses (11), and from Berlin, i.e., median mattress dust Der p 1 level of approximately 0.5 µg/g (12), but more like those reported from Sweden (13).

In this connection, it is tempting to bring forth the old question of which is more relevant, allergen levels expressed as ng/g or as ng/m². Nanograms per m² seems intuitively more relevant, at least to the present author, as the important thing should be the available amount of allergen, irrespective of how much of other materials is present in the dust. Moreover, when the amounts of dust are small, as they usually seem to be in Norwegian children's beds, the amount of dust collected may be insufficient to achieve a satisfactory assay sensitivity when expressed as ng/g of sieved dust. In such cases, when both the amounts of dust and the mite-allergen levels are low, ng/m² would at least secure a common detection limit in the samples, leading to results that can be more easily stratified for further analyses.

In conclusion, even though concern has been expressed that the Norwegian habit during the last

decades of building heavily insulated, "air-tight" houses will favor the growth indoors of house-dust mites, the levels of mite allergens detected seem to be generally low. However, even at low levels, they may possibly lead to sensitization of predisposed individuals (13). Further studies are warranted to elucidate this.

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