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House Dust Mite Antigen Exposure of Patients with Atopic Dermatitis or Psoriasis

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We studied the amount of house dust antigen in the beds of 55 patients with atopic dermatitis, eleven patients with psoriasis and ten healthy volunteers using a commercial ELISA which can determine the amount of antigen from *Dermatophagoides pteronyssinus, D. farinae and D. microseras* expressed as nanogram (ng) antigen per gram of house dust. The World Health Organization has indicated that 10,000 ng house dust mite antigen per gram house dust can elicit an asthma attack in IgE-sensitized patients with asthma bronchiale. There are no recommendations for patients with atopic eczema. We observed no statistical significant differences between each group concerning the amount of house dust found in the beds or the amount of house dust mite antigen. However, there were very wide variations. Twenty-seven percent (15/55) of patients with atopic dermatitis and 27% (3/11) of psoriasis patients had levels of house dust mite antigen above 10,000 ng per gram of house dust compared with healthy volunteers (1/10). Half of the patients had a type I allergy to house dust mite antigen using prick tests. This group had a total serum IgE of 2,034 kU/l (median value) compared to 301 kU/l in the group without type I allergy to house dust mite antigen ($p<0.01$). The exposure to house dust mite antigen was similar in the two groups. We conclude that only 1/4 of patients with atopic dermatitis are exposed to high levels of house dust mite antigen in their bed environment equal to what is found for patients with another scaling disorder (psoriasis). Patients who have an increased serum IgE have significantly increased type I allergy to house dust mite antigen even though their exposure is not different from patients with low IgE.

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Several investigations have shown that patients with atopic dermatitis can exhibit type I and type IV immune reactivity towards house dust mite antigen (1–5). A double-blind study has demonstrated that house dust mite avoidance can diminish the clinical activity of eczema (6). Previous studies have shown that patients with atopic dermatitis and asthma are exposed to house dust mites with the highest frequency of mites among those having eczema (7, 8). A new commercial test makes it possible to measure three classes of mites in house dust based on an ELISA technique (9). We have used this analysis in 55 patients with atopic dermatitis, in eleven patients with psoriasis, and in ten healthy controls.

MATERIALS AND METHODS

Patients and methods

A total of 76 persons participated (Table I). Ten of these were healthy controls – 3 men and 7 women with a mean age of 25.5 years and an age range of 22–43 years. These were recruited from the staff of the dermatology department. Sixty-six patients with atopic dermatitis (55 patients) and psoriasis (11 patients) were referred to Marselisborg Hospital to the Dermatology clinic. The group consisted of both in-patients and out-patients. In the atopic dermatitis group there were 23 men and 32 women with a mean age of 22 years and an age range of 3–49 years. In the psoriasis group there were 4 men and 7 women with a mean age of 43 years and an age range of 22–61 years.

Dust samples from the participants' beds were collected from September 1993 to June 1994 (69 persons) and from May 1996 to February 1997 (7 patients). All participants received filters for dust collection and a careful instruction of its use (Fig. 1). The filter was mounted in a plastic holder and connected to the participants own vacuum cleaner. Each participant was instructed to remove the sheets from the mattress of their bed and then perform approx. 10 min. vacuum cleaning of an area approx. 1 m^2 in size at the pillow area of the matress. Immediately following the vacuum cleaning, the filter was carefully removed, closed with its lid, put into an airtight plastic bag with a zip-lock and sent to ALK-ABELLÓ, Denmark, where the following parameters were measured: Weight of total amount of house dust and the amount in nanogram of the three house dust mites: *Dermatophagoides pteronyssinus, D. farinae* and *D. microseras*.

Allergological investigations

We performed investigations for type I allergy towards house dust mite antigen, Der p1, using standard prick tests. Blood was secured and total serum IgE levels measured.

Statistics

We used Mann-Whitney's rank sum test for statistical analysis.

RESULTS

The total amount of house dust collected did not differ between the three groups (Table I). The amount of house dust mite antigen showed a wide range in all groups. There was a tendency to an increased exposure to house dust mite antigen among atopic dermatitis patients, but it was not statistically significant (Table I and Fig. 2).

We then looked at the number of patients and controls with a house dust mite antigen level above 10,000 ng/g house dust and observed that 15/55 (27%) with atopic dermatitis, 3/11 (27%) with psoriasis, and 1/10 (10%) of healthy controls were above this limit. The difference was not statistically significant (Table I). The most prevailing type of house dust mite was *D. pteronyssinus* (Table II). Patients with psoriasis had a significantly increased amount of *D. farinae* compared to patients with atopic dermatitis ($p=0.016$) (Table II).

When looking at type I allergy to house dust mite (Der p1) we observed that 26 of 51 tested patients had a positive prick test (51%). Their median value of total serum IgE was 2,034 kU/l. Twenty-five did not have type I allergy to house dust mite and their median total serum IgE was 301 kU/l ($p<0.001$). Three patients were not tested and one had urticarial dermographism. Thus, patients with type I allergy to house dust mite have a significantly increased total serum

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Table I. *House dust and mite antigen in patients and controls*

	Number of patients	House dust (g)		Total house dust mite antigen per gram of dust		
		Median	Range	Median	Range	% >10,000
Atopic dermatitis	55	0.8	0.2–3.7	3,693	0–432,913	27% (15/55)
Psoriasis	11	0.9	0.2–1.0	1,202	124–58,304	27% (3/11)
Controls	10	0.8	0.2–1.1	702	61–53,222	10% (1/10)

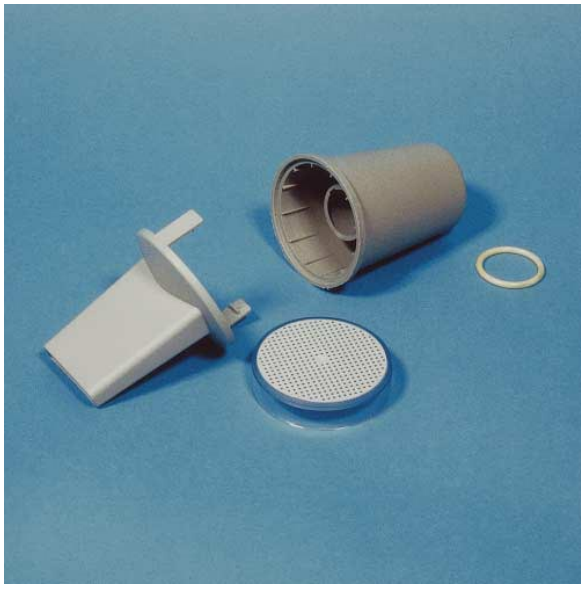

Fig. 1. The equipment for house dust collection used in connection with a vacuum cleaner.

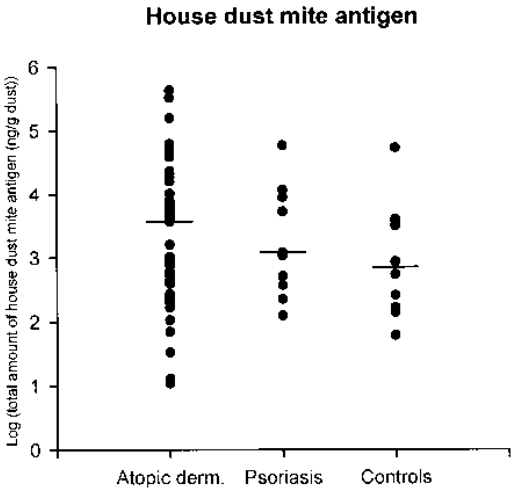

Fig. 2. Total amount of house dust mite antigen for patients with atopic dermatitis and psoriasis and healthy controls and the median value in each group.

Table II. *The median values of house dust mite antigen expressed as nanogram per gram of house dust*

	Atopic dermatitis	Psoriasis	Controls
D. pteronyssinus	1,552	865	367
D. farinae	25	216*	22
D. microseras	0	47	32

*$p = 0.016$.

IgE, but there was no correlation with their antigen exposure (Table III).

DISCUSSION

This study shows that the amount of house dust in the beds of patients with atopic dermatitis, psoriasis and healthy controls was equal. Although the samples were collected by different people and with different vacuum cleaners, the samples did not vary more than could be expected.

There tended to be a higher amount of house dust mite antigen in the atopic dermatitis group, but maybe because of the wide variation among the results, the difference did not reach statistical significance. However, 27% of both atopic and psoriatic patients were exposed to levels of house dust mite antigen above 10,000 ng/g house dust, which is above a level where mite sensitive asthma patients may have an asthma attack (11). Again, this increase did not reach statistical significance.

Psoriatic patients were exposed to significantly higher amounts of *D. farinae*, which is a new observation. The explanation probably relates to the fact that *D. farinae* nutures better on psoriatic scales.

A total of 51% of our atopic dermatitis patients had type I allergy towards house dust mite antigens. In the group with type I allergy to house dust mites we found a significantly higher serum IgE value compared to the group without type I allergy to house dust mites. The patients did not show a correlation between mite antigen exposure and the presence of type I allergy.

Studies on house dust mite exposure is receiving new attention because it is now possible to diminish exposure to the antigens via the use of Gore-tex® bed covers (12). A double-blind clinical trial confirmed that a reduction in mite exposure leads to reduced eczema activity (6). Other investigations performed in an open design have not come to the same conclusion (13).

Our findings could be interpreted as follows: Patients with a scaling disorder seem to have an increased exposure to house dust mite antigen. Patients with atopic dermatitis and increased total serum IgE have a significantly increased risk of developing

Table III. *Patients with or without type I allergy to house dust mites and their level of IgE in serum in median values with ranges in parenthesis (n=51)*

There is a significant difference in IgE between house dust mite antigen positive patients and negative patients.

	n	Non-specific IgE (kU/l)	Total amount of house dust antigen (ng/g dust)
Atopic dermatitis +type I allergy	26	2,034 (238–16,463)	4,230 (0–325,076)
Atopic dermatitis −type I allergy	25	301 (8–14,090)	4,039 (0–432,913)

type I allergy to house dust mite antigen. This is best explained as a consequence of a skewed immune system. Type I allergy was prevalent in half of the patients. Future studies must determine if patients with high allergen exposure (more than 10,000 nanogram house dust mite antigen per gram house dust) will benefit from allergen avoidance using Gore-tex® bed covers (6, 12). The new ELISA technique will allow accurate determination of antigen (9).

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