

COMPARISON OF SKIN REACTIONS IN ASTHMATIC CHILDREN TO VARIOUS HOUSE DUST AND MITE EXTRACTS*

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House dust is probably the most important cause of perennial allergic rhinitis and asthma. Since house dust is a mixture of various allergenic materials, such as human and animal danders, molds, bacilli and various kinds of fibers, it is important to determine which substance is the most important as the causative antigen. Numerous attempts to identify the nature and source of the house dust allergens have been made to date. A Dutch study found a close correlation between house dust and house mite allergy in asthmatic patients¹⁻³. These findings were later confirmed by other authors^{4,5} and mites have now been identified in house dust from many parts of the world^{6,7}. Several species of mites have been isolated. The predominant species in European countries¹⁻⁴ and Iran⁸ is *Dermatophagoides* (D.) *pteronysinus*, while *D. farinae* is more important in the USA⁶, Egypt⁹, India¹⁰ and Japan^{5,11}. It has not yet been shown which kind of mite is predominant in Turkey.

This study was undertaken to shed light on the role of house dust mites as a causative antigen in Turkish asthmatic children. To this end, skin test reactivity to *D. pteronyssinus*, *D. farinae* and Turkish and Spanish house dust extracts in asthmatic children was investigated.

Material and Methods

Subjects: One-hundred eighty-nine children were selected for this study from among the asthmatic patients who came to the Allergy Clinic of the Hacettepe University Institute of Child Health. Ninety-six were females and 93 males, with ages ranging from 4 to 22 years (mean age 13.78).

The diagnosis of bronchial asthma was established according to the patient's history and physical and laboratory examinations. All cases were evaluated using

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Rappaport's allergic index¹². One-hundred five of the asthmatics also had perennial rhinitis.

In addition to the 189 allergic cases, 33 controls were selected from among normal children who had no history of asthma or allergic disease. 20 were male and 13 were female, with ages ranging from 6 to 22 years (mean 14.41).

Allergens Tested: Turkish house dust extract was prepared in our laboratory according to the method described by Phillips¹³. Commercial extracts of Spanish house dust, *D. pteronyssinus* and *D. farinea* were obtained from Abello SA, Departamento de Alergia, Madrid, Spain. The strength of these extracts was 1:5000 weight/volume.

Skin Testing: All cases were tested first with scratch test by the multiple tester in order to avoid systemic reactions. Those who showed negative or weak reactions were retested intradermally. Intradermal tests were performed on the lateral surface of the upper arm with a tuberculin syringe. The smallest amount of antigen required to raise a bleb was injected into the epidermis. In addition, buffered saline was administered to determine non-specific skin reactivity. The skin reactions were compared to the reaction caused within 10 to 20 minutes by a 0.1 mg/ml histamine dihydrochloride solution.

The results of intradermal tests were evaluated as follows:

- No reaction, or same as control with buffered saline.
- 1+ Wheal slightly larger than that of the control, no erythema.
- 2+ Erythema with raised wheal in the center.
- 3+ Wheal smaller than 1 cm with pseudopods and moderate erythema.
- 4+ Wheal larger than 1 cm with pseudopods and marked erythema.

Reactions of 2+ or more were recorded as positive. Antihistamines were withheld for at least 72 hours and bronchodilator drugs for 12 hours prior to skin testing.

Statistical Analysis: Spearman's correlation coefficient (*r*) was used for calculating the correlations between skin test reactions to *D. pteronyssinus*, *D. farinae*, Turkish and Spanish house dust extracts in asthmatic children.

Results

The results of the skin tests performed on the 189 asthmatic children and the 33 non-allergic controls are summarized in Table I.

Of the 33 non-allergic controls, 9 (27.27%) showed positive intradermal test reactions to the Spanish house dust extract and 1 (3.03%) to the *D. farinae* extract. The Turkish house dust and *D. pteronyssinus* extracts produced no reaction in the

TABLE I
INCIDENCE OF POSITIVE REACTIONS TO SKIN TESTS
FOR HOUSE DUST AND MITE EXTRACTS
IN ASTHMATIC CHILDREN AND NON-ALLERGIC CONTROLS

Group	No. of children	Extract used	No. of positive reactions	
Asthmatic children	189	Turkish house dust	133	(70.37%)
		Spanish house dust	173	(91.53%)
		D. farinae	146	(77.25%)
		D. pteronyssinus	125	(66.14%)
Non-allergic controls	33	Turkish house dust	0	
		Spanish house dust	9	(27.27%)
		D. farinae	1	(3.03%)
		D. pteronyssinus	0	

TABLE II
CORRELATION COEFFICIENTS OF SKIN REACTIONS TO EXTRACTS
OF TURKISH AND SPANISH HOUSE DUST, D. PTERONYSSINUS AND
D. FARINAE IN 189 ASTHMATIC CHILDREN

Paired extract	Correlation coefficient (r)	Level of significance (p)
D. farinae-Spanish house dust	+ 0.752	< 0.001
D. pteronyssinus-D. farinae	+ 0.737	< 0.001
D. pteronyssinus-Spanish house dust	+ 0.714	< 0.001
Turkish house dust-Spanish house dust	+ 0.572	< 0.001
Turkish house dust-D. farinae	+ 0.526	< 0.001
Turkish house dust-D. pteronyssinus	+ 0.475	< 0.001

non-allergic controls. As seen in Table I, 173 of the 189 asthmatic children (91.53%) exhibited a positive skin reaction to the Spanish house dust extract, 133 (70.37%) to the Turkish house dust extract, 146 (77.25%) to D. farinae extract and 125 (66.14%) to D. pteronyssinus extract. Positive reactions to D. farinae extract were obtained

more frequently than to *D. pteronyssinus* extract. This difference was found to be statistically significant ($p < 0.02$) when evaluated by the chi-square method.

The distribution of the degree of reaction produced in the asthmatic children by Turkish and Spanish house dust, *D. pteronyssinus* and *D. farinae* extracts is presented in Figure 1, which shows that major skin reactions (3+ and 4+) to Spanish house dust extract were much more common than to the other extracts used. As can be seen in Table II, the distribution of skin test reactions to the Turkish and Spanish house dust, *D. pteronyssinus* and *farinae* antigens showed significant correlation ($p < 0.001$ for all). The highest r value (0.752) was obtained between the Spanish house dust and *D. farinae* extracts. The lowest r value (0.475) was found between the Turkish house dust and *D. pteronyssinus* extracts.

Discussion

House dust sensitivity is common in asthmatic children. The incidence of positive skin reactions among Turkish asthmatic children to house dust extract is higher than to any other allergens. Özkaragöz and Çakın¹⁴ found a 66.1% incidence of positive reactions to house dust in 130 asthmatic children. In addition, Tekül et al¹⁵ reported that 93.4% of the 54 asthmatic patients they studied were skin-test positive to house dust extract. Similarly, our data showed a high incidence of

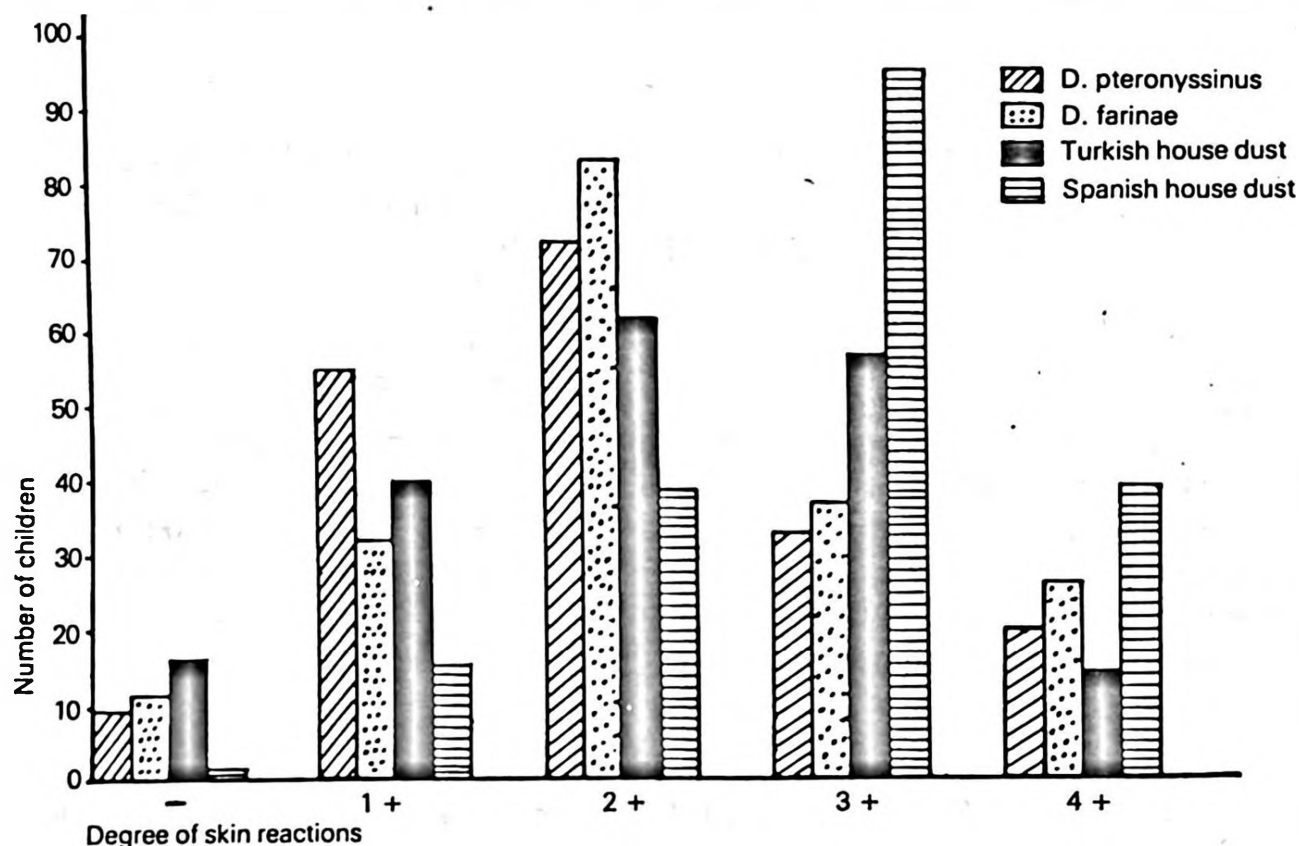


Figure 1

The distribution of skin reactions produced by Turkish and Spanish house dust, *Dermatophagoides pteronyssinus* and *farinae* extracts in 189 asthmatic children.

positive skin reactions to the house dust extracts: of the 189 asthmatic children 91.53% exhibited a positive reaction to the Spanish house dust extract and 70.37% to the Turkish house dust extract. Positive reactions to the Spanish house dust extract were stronger and more frequent. Moreover, 33.33% of non-allergic controls also showed positive intradermal test reactions to Spanish house dust extract, which may be due to non-specific irritants causing false positive reactions in skin tests¹⁶.

Extracts of house dust samples produce skin reactions in many people regardless of the dust sample's provenance. A previous study carried out in our clinic indicated that from the standpoint of skin reactions, American and Turkish house dusts contain similar antigenic materials¹⁴. Similarly, our present study shows a close relationship ($r = 0.572$, $p < 0.001$) in skin testing between the allergenicity of Turkish and Spanish house dust extracts.

The results of our investigations showed a very high incidence of positive skin reactions — 77.25% and 66.14% respectively — to extracts of *D. farinae* and *D. pteronyssinus*. More or less similar results have been reported in other investigations. Smith et al¹⁷ found an 85% incidence of positive reactions to *D. farinae* among 302 asthmatic children. Sarsfield¹⁸ studied 133 children and found 80% of them skin-test positive to *D. pteronyssinus* and 84% to house dust extract. In Warner's¹⁹ series, 74% of 163 asthmatic children had positive prick-skin tests to *D. pteronyssinus*. In our study, positive reactions to *D. farinae* extract were stronger and more frequent than to *D. pteronyssinus* extract. On the other hand, Smith et al¹⁷ in Great Britain found wheal sizes to be slightly smaller and less frequent with the extract of *D. farinae* than with *D. pteronyssinus*.

Many investigators have shown the close correlation between allergens in house dust and house dust mites^{2,5,17}. Miyamoto et al⁵ from Japan reported on the basis of skin test, inhalation-provocation test and the Prausnitz-Kustner reaction that the mite *D. farinae* is the most important component in house dust. In our study, the skin test results showed good correlation between allergenicity of Turkish house dust and *D. farinae* ($r = 0.526$, $p < 0.001$). A weaker although still highly significant correlation was found between reactions to extracts of Turkish house dust and *D. pteronyssinus* ($r = 0.475$, $p < 0.001$). The distribution of the skin reactions to extracts of *D. farinae* and *D. pteronyssinus* indicated that there is a close relationship between the allergens of these mites ($r = 0.737$). These findings are in keeping with those obtained by Spiekma and Voorhorst³.

Although not the only allergen in house dust, skin test results would seem to indicate that the mite, and particularly *D. farinae*, is probably a very important antigenic material in Turkish house dust.

Summary

Skin tests were performed with extracts of *D. pteronyssinus*, *D. farinae* and Turkish and Spanish house dust on 189 asthmatic children and 33 non-allergic controls. Of the asthmatic children, 91.53% exhibited a positive reaction to the Spanish house dust extracts, 70.37% to Turkish house dust, 77.25% to *D. farinae* and 66.14% to *D. pteronyssinus*. Positive reactions to *D. farinae* extract were obtained more frequently than to *D. pteronyssinus* ($p < 0.02$). A very close antigenic relationship between *D. farinae* and *D. pteronyssinus* extract was observed ($r = 0.737$). Skin testing showed a good correlation between the allergenicity of Turkish house dust and *D. farinae* ($r = 0.526$, $p < 0.001$). A weaker although still highly significant correlation was found between the reactions to Turkish house dust extracts and *D. pteronyssinus* ($r = 0.475$, $p < 0.001$). These results suggest that these mites are the important allergens in house dust for asthmatic children in Turkey.

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