

Atopy Patch Test to *Dermatophagoides* Mix in a Self-selected Population in Beijing

Jian Zhao, MD and Lin-Feng Li, MD, PhD

Background: *Dermatophagoides* is one of the most common inhalant allergens in the pathogenesis of atopic dermatitis (AD). The prevalence of atopy patch test (APT) to it in the general population, however, is largely unknown.

Objectives: The aim of this study was to detect the frequency of APT to *Dermatophagoides* in a self-selected population in Beijing.

Methods: Healthy university student volunteers were recruited and patch tested with a commercial *Dermatophagoides* (*pteronyssinus*/*pharinae*) mix.

Results: Of 201 students studied, 25.9% exhibited positive results. The positivity rate was not correlated to gender but increased with age. In volunteers without eczema, allergic rhinitis, or asthma, the positivity rate of APT was as high as 13.6% but is much lower than that of volunteers who had allergic rhinitis or asthma (56.1%, $P < 0.05$, χ^2 test). One volunteer had AD and was tested positive, but only 27.3% of those who had other types of eczema but without allergic rhinitis or asthma were tested positive.

Conclusions: This study confirmed that APT to *Dermatophagoides* mix is highly related not only to AD but also to respiratory allergy. The high positivity rate of APT in volunteers without eczema or respiratory allergy implied that a large number of positive APTs in patients with AD may be not relevant.

DERMATOPHAGOIDES has been recognized as one of the most common inhalant allergens in the pathogenesis of atopic dermatitis (AD). The clinical value of atopy patch test (APT) to *Dermatophagoides* has been widely studied, but a great debate still exists, including the high irritation rate in patients with AD and the difficulties to determine the clinical relevance in some patients. Although APT has been developed for more than 30 years,¹ the prevalence of *Dermatophagoides* APT in the general population is largely unknown. It is important because a high prevalence of APT to *Dermatophagoides* in the general population may interfere with the test result interpretation in patients with AD and therefore influence the further management, such as avoidance of mite and mite-specific immunotherapy. Limited data have shown that the prevalence of APT to *Dermatophagoides* in the general population may be high. A study from Denmark had shown that, in 25 health volunteers without personal or family

history of atopic diseases and with a negative skin prick test to standard inhalant allergens, 8% had a positive APT to *Dermatophagoides pteronyssinus*.² A study from Italy showed that, in 277 unselected primary school children, the prevalence of positive APT to *D. pteronyssinus* was 29.8%.³ A study from Turkey showed that 17 (23%) of 42 healthy volunteers reacted to 20% mite patch tests (mixture of *D. pteronyssinus* and *Dermatophagoides pharinae*).⁴ In this study, APT to *Dermatophagoides* mix was performed in university students in Beijing.

METHODS

Study Population

Healthy student volunteers from several universities in Beijing were recruited by an advertisement via the university education department stating that healthy volunteers were needed to test for the frequency of allergic reactions to common environmental allergens. Exclusion criteria included severe skin conditions, immunosuppressant treatment, or the use of corticosteroids within the 4 weeks before the study. A confirmed or suspected *Dermatophagoides* allergy was neither an inclusion nor an exclusion criterion. All participants were Chinese. A local ethics committee approved this study, and oral consent was obtained from the subjects. To decrease the possible influence of dry or humid environmental conditions on patch testing, this study was conducted between November 30, 2011, and December 30, 2011, and completed within a month.

From the Department of Dermatology, Peking University Third Hospital, Beijing, China.

Address reprint requests to Lin-Feng Li, MD, PhD, Department of Dermatology, Peking University Third Hospital, 49 N Garden Rd, Haidian District, Beijing, China, 100191. E-mail: zoonli@sina.com.

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Jian Zhao conducted the statistical analysis and wrote the manuscript; Lin-Feng Li conceived and designed the study, contributed in analysis of the data, and revised the manuscript for intellectual content.

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TABLE 1. Prevalence (%) of Contact Allergy to *Dermatophagoides Mix* in University Students in Beijing

Variations	Prevalence, %
Gender	
Men, n = 61	31.1
Women, n = 140	23.6
Volunteers who never had eczema, allergic rhinitis, or asthma, n = 125	13.6*
Volunteer who had AD and allergic rhinitis due to house dust, n = 1	100
Volunteers who had other types of eczema, but without allergic rhinitis or asthma, n = 22	27.3
Volunteers with allergic rhinitis or asthma, n = 54	53.7
Volunteers without allergic rhinitis or asthma, n = 147	15.6*

* $P < 0.001$, compared with volunteers with allergic rhinitis or asthma, χ^2 test.

Atopy Patch Test

Patch tests were performed with a commercial *Dermatophagoides mix* (*pteryonyssinus/pharinae*) and IQ chamber (Chemotechnique Diagnostics, Vellinge, Sweden). Allergens were applied to the upper back, and the results were recorded at Day 2 and Day 4 according to the International Contact Dermatitis Research Group criteria.⁵ After testing, the relevance of the patch testing was analyzed.

Relevance of APT Analysis

The relevance of APT was evaluated in volunteers after patch testing. In volunteers who had eczema, allergic rhinitis, or asthma, the positive APT was considered relevant if a recurrence or exacerbation of clinical symptoms after exposure to the house dust was observed. In this study, eczema is applied to a set of highly heterogeneous clinical conditions including exogenous and endogenous eczema and was diagnosed and classified according to standard textbooks.^{6,7} Specific types of eczema, such as irritant contact dermatitis, allergic contact dermatitis, AD, asteatotic eczema, and seborrheic dermatitis, were clinically diagnosed accordingly, and the remaining unspecified eczema was diagnosed as unclassified eczema.⁸

Statistical Analysis

Data were analyzed with the software package SPSS 18.0 (SPSS, Chicago, Ill). χ^2 test and Pearson correlation were used for statistical comparison.

RESULTS

A total of 201 volunteers [61 men, 140 women; mean (SD) age, 23.5 (2.0) years; range, 19–30 years] were studied. Only 1 volunteer had AD (0.5%). Twenty-two volunteers had other types of eczema

but not allergic rhinitis or asthma, and 54 volunteers had allergic rhinitis or asthma. Fifty-two volunteers (52/201, 25.9%) exhibited positive APT to *Dermatophagoides mix* including 19 men (36.5%) and 33 women (63.5%). The positivity rate of APT in men (19/61, 31.1%) is similar to that of women (33/140, 23.6%, $P > 0.05$, χ^2 test; see Table 1).

The positivity rate of APT was found increased with the increase of age (Pearson correlation, $r = 0.443$, $P = 0.149$; see Fig. 1).

One hundred twenty-five volunteers never had allergic rhinitis, asthma, or eczema. Of those, the positivity rate of APT to *Dermatophagoides mix* was 13.6% (17/125).

Fifty-four (54/201, 26.9%) volunteers had allergic rhinitis or asthma. Of those, 29 (53.7%) were tested positive to *Dermatophagoides mix*, which was much higher than that of volunteers without allergic rhinitis or asthma (23/147, 15.6%, $P < 0.001$, χ^2 test; see Table 1) and that of volunteers without allergic rhinitis, asthma, or eczema (13.6%, $P < 0.001$, χ^2 test).

Thirty-five (35/201, 17.4%) volunteers had other types of eczema other than AD. Of those, 34.3% (12/35) reacted to APT to *Dermatophagoides mix*, which is higher than that of volunteers without allergic rhinitis, asthma, or eczema (13.6%, $P < 0.05$, χ^2 test). Among these volunteers, 22 (22/201, 10.9%) had other types of eczema but without allergic rhinitis or asthma; only 6 of them (6/22, 27.3%) were tested positive to *Dermatophagoides mix*, which is similar to that of volunteers without allergic rhinitis, asthma, or eczema (13.6%, $P > 0.05$, χ^2 test; Table 1).

The volunteer who had AD was a 23-year-old woman who also had allergic rhinitis, conjunctivitis, or asthma due to house dust. She was tested positive to *Dermatophagoides mix*, which was considered relevant.

DISCUSSION

In this study, the prevalence of AD (0.5%) in university student volunteers in Beijing is lower than those reported worldwide but is similar to that (0.69%) reported in China in 2000,⁹ indicating

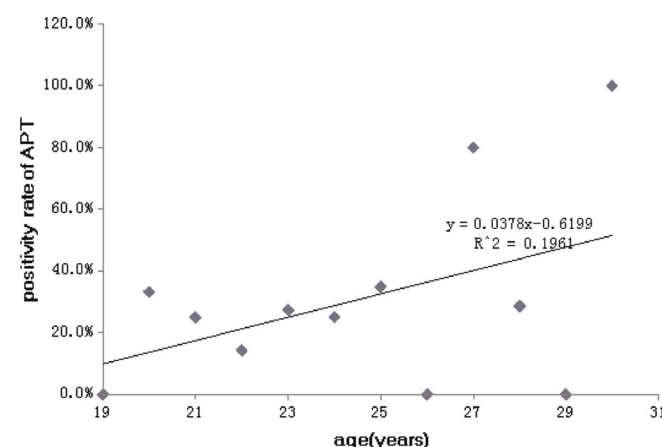


Figure 1. The relationship between positivity rate of APT to *Dermatophagoides mix* and age.

that the prevalence of AD in adults in mainland China is still lower than that in developed countries.

The atopic patch test has been considered an important tool in the detection of mite sensitization in patients with AD. The test result of our volunteer who had AD supported this notion. In this study, however, we also found that, in healthy volunteers, the positivity rate of APT to dust mites was very high (25.9%), which is consistent with the reported results of 8% to 29.8% worldwide,²⁻⁴ suggesting that sensitization to *Dermatophagoides* mix is common in the general population even in volunteers without any skin or respiratory allergy (13.6%, Table 1). Therefore, great caution must be taken before instructing the AD patients for further mite-oriented treatment with a positive APT reaction to mite.

Unlike the positivity rate of patch test to common contact allergens, which is female dominant, we did not find any difference between men and women in the positivity rate of APT (see Table 1).

Similar to the positivity rate of patch test to common contact allergens that tends to increase with age, we also found that the positivity rate of APT increased with the increase of age (see Fig. 1). In the Turkey study,¹⁰ APT was found not related with age; however, the age range of their volunteers was 8 to 16 years, which is different from ours.

Recently, a review published in 2011 stated that APT to dust mites is frequently positive, and it may be the only positive test, not only in subjects with atopic eczema/dermatitis syndrome (AEDS) but also in subjects with only respiratory symptoms (rhinitis, asthma) and a history of AEDS. Instead, positive APT and in vitro immunoglobulin (Ig) E tests prevail in patients with a negative history for AEDS.¹¹ In this study, the fact that the positivity rate of APT to *Dermatophagoides* mix in volunteers who had allergic rhinitis or asthma is much higher than that of volunteers without allergic rhinitis or asthma (see Table 1) provides support that APT to dust mites was also highly associated with allergic rhinitis or asthma. The fact that the frequency of positive APT in volunteers who had other types of eczema (other than AD) but not allergic rhinitis or asthma is similar to that of volunteers without allergic rhinitis, asthma, or eczema (Table 1) also supports this notion.

A limitation of our study is that the volunteers are self-selected. Those who had detectable or a history of eczema or had allergic rhinitis, conjunctivitis, or asthma might be more willing to test, potentially leading to bias; therefore, the sensitization rate in our volunteers may be overrepresented. However, in our volunteers who never had allergic rhinitis, asthma, or eczema, the positivity rate of APT was 13.6%, which is still within the range reported.²⁻⁴

In summary, sensitization to *Dermatophagoides* mix is common in China, even in volunteers without eczema or respiratory allergy. *Dermatophagoides* mix APT is not correlated to gender but increased with age and is highly related to allergic rhinitis or asthma. The high positivity rate of APT to dust mites in volunteers without eczema or respiratory allergy indicated that a large number of positive APTs to dust mites in patients with AD may be not relevant.

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