

A. Kh. Kanchurin, R. L. Vaicekauskaite,
and V. M. Berzhets

UDC 616.248-022.912.3:613.771]-078

KEY WORDS: mites; house dust.

The presence of mites of the genus *Dermatophagoides* in house dust and their leading role in human allergic diseases are generally accepted [1-3, 5-9, 11, 12, 15]. However, the discovery of mites in samples of domestic dust by microscopic methods does not always give a complete picture of the acarofauna of the dust.

The aim of the present investigation was a comparative study of the content of mites of the species *Dermatophagoides pteronyssinus* in house dust by immunochemical and acarologic methods in association with patients with atopic dust-induced bronchial asthma (ADBA) and in healthy individuals in a coastal region of the country.

EXPERIMENTAL METHOD

Antigens from house dust of patients with ADBA and healthy subjects were prepared by the method in [10] and subjected to immunochemical study. The indirect albino rat mast cell degranulation test (MCDT) in the modification [4] and the double radial immunodiffusion test [14] in a micromodification (on slides) were used. Sera from rabbits and male fowls immunized with a 5% saline extract of the pure mite *Dermatophagoides pteronyssinus*, were used as antibodies. Six fowl antisera and two rabbit antisera were used in the tests. Control antigens for the immunochemical tests consisted of commercial house dust allergen (batch 31) and a semiproduction standard allergen from the pure mite *D. pteronyssinus*, prepared by the writers in accordance with the technical instructions. Tests for the presence of microscopic mites in dust from the apartments of patients with ADBA and healthy subjects and identification of their different species were carried out by the method in [2].

EXPERIMENTAL RESULTS

Of the 99 samples of house dust, collected from 88 apartments of patients with ADBA and healthy subjects, tested mites were discovered in 38 (i.e., in $38.4 \pm 6.0\%$). Mites were found four times more often in the patients' apartments (66 apartments) than in those of healthy subjects (22 apartments): in 39.4 ± 6.0 and $9.1 \pm 2.5\%$ of cases, respectively (Table 1). The principal species of mite was *D. pteronyssinus*, which was found in 41.7% of cases by direct microscopy. Mites of the genus *Dermatophagoides* accounted for $82.9 \pm 6.4\%$ of all mites in house dust found in the samples tested. *Dermatophagoides pteronyssinus* was found in the highest percentage of cases (80.2) and the index of abundance of this species of mite was on average 50 times higher than that for all other species of mites in dust. By freezing and thawing samples of house dust 20% extracts of the dust were obtained. Altogether 60 antigens were prepared: 30 from dust from apartments of patients with ADBA, 30 from dust from apartments of healthy subjects. The MCDT was carried out on all antigens thus prepared, using hyperimmune fowl serum against *D. pteronyssinus* (Table 2). Positive reactions with dust antigens from patients with ADBA were obtained in $93.3 \pm 4.5\%$ of cases, indicating a high level of the *D. pteronyssinus* component in house dust of patients with ADBA. This agrees fully with the percentage of sensitization of patients to mite allergen under clinical conditions [1]. The mite component also was discovered in the group of healthy subjects but in fewer cases (9 of 30 tests were positive). The difference in the frequency of discovery of mite antigen in house dust of patients and healthy subjects was significant, evidence of the much higher content of mite antigen and, consequently, of the mite *D. pteronyssinus* in house dust of ADBA

I. I. Mechnikov Moscow Research Institute of Vaccines and Sera. V. Kapsukas Vilnius University. (Presented by Academician of the Academy of Medical Sciences of the USSR, A. D. Ado.) Translated from *Byulleten' Eksperimental'noi Biologii i Meditsiny*, Vol. 97, No. 3, pp. 329-330, March, 1984. Original article submitted May 24, 1983.

TABLE 1. Investigation of Mites in House Dust by Direct Microscopy ($M \pm m$)

Test object	Number of apartments studied			Number of samples studied		
	total	number in which mites were isolated		total	number in which mites were found	
		absolute	%		absolute	%
House dust from apartments of patients with ADBA	66	26	$39,4 \pm 6,0^*$	76	35	$45,7 \pm 5,7^*$
House dust from apartments of healthy subjects	22	2	$9,1 \pm 2,5$	25	3	$14,0 \pm 7,0$

Legend. $*P < 0.001$ (significance of differences between groups).

TABLE 2. Indirect Albino Rat Mast Cell Degranulation Test with House Dust Antigens and Corresponding Antiserum ($M \pm m$)

Preparation	Total number	Positive results	
		absolute number	by frequency, percent
From ADBA patients	30	28	$93,3 \pm 4,5^*$
From healthy subjects (control)	30	9	$30,0 \pm 8,4$

patients. This agrees completely with the results of our own acarologic study and also with data in the literature [8, 15]. Proof of this factor also is given by the fact that the intensity of MCDT with antigens from ADBA patients averaged $20.6 \pm 1.3\%$, whereas with dust antigen from healthy volunteers, on average it was negative ($P < 0.001$). The double radial immunodiffusion test was carried out with rabbit antiserum. Extracts prepared from dust from rooms in which healthy subjects lived gave no precipitation lines. Mite antigens were discovered in extracts of dust from rooms in which ADBA patients lived in 28 of 30 cases ($93.3 \pm 4.5\%$). Two precipitation lines were found in six cases and three in one case. In 21 cases there was one precipitation line each, and in three of them the lines were very wide. Mite allergen gave a distinct precipitation line in all cases. In this experiment traces of *D. pteronyssinus* mite antigen were detected in commercial house dust allergen in the form of a thin precipitation line.

The presence of allergenic components of the mite *D. pteronyssinus* in house dust was thus demonstrated by two immunochemical methods and in that way their presence both in patients with ADBA and in healthy subjects was indirectly detected. Mite antigens were found in 93.3% of cases, and this undoubtedly indicates predominance of the mite component in house dust in Lithuania. The tests showed that mite antigens contained in house dust can cause the formation of both precipitating and reagin-like antibodies under experimental conditions, in agreement with investigations in recent years [13]. The writers propose immunochemical methods of detection of mites as being more sensitive and giving a fuller picture of the antigenic composition of house dust, for the principal allergen of *D. pteronyssinus* and its source are metabolic products of mites which cannot always be detected microscopically [13]. As well as the classical acarologic (microscopic) method, by which mites of the species *D. pteronyssinus* can be found in dust from apartments of 41.7% of patients, the indirect method of mite detection can be recommended for their comprehensive study by virtue of its superiority.

LITERATURE CITED

1. R. L. Vaicekauskaite, A. Kh. Kanchurin, É. Razgauskas, et al., in: Clinical and Experimental Allergology and Immunology [in Russian], Kaunas (1981), pp. 165-166.
2. E. V. Dubinina and B. D. Pletnev, Methods of Detection and Identification of Allergenic Mites of House Dust [in Russian], Leningrad (1977).
3. E. V. Dubinina, in: Bronchial Asthma (Pathogenesis, Clinical Features, Treatment) [in Russian], Moscow (1974), pp. 18-20.
4. L. M. Ishimova, in: Problems in Immunologic Reactivity and Allergy [in Russian], Moscow (1971), pp. 146-149.

5. A. Kh. Kanchurin, V. M. Berzhets, I. L. Muzyleva, et al., in: Abstracts of Proceedings of the 3rd Symposium on Allergologic and Immunologic Societies of Socialist Countries [in Russian], Sukhumi (1979), p. 27.
6. B. D. Pletnev and N. P. Dmitrieva, in: Proceedings of the 6th All-Union Congress of Dermato-Venereologists [in Russian], Moscow (1976), pp. 66-68.
7. S. M. Titova, Yu. A. Samushiya, B. D. Pletnev, et al., in: Bronchial Asthma (Pathogenesis, Clinical Features, Treatment) [in Russian], Moscow (1974), pp. 244-245.
8. F. F. Yagofarov, "Etiology and Allergenic Activity of Mites of the genus *Dermatophagoides*," Candidate's Dissertation, Semipalatinsk (1979).
9. H. M. Brown and J. L. Filer, Br. Med. J., 3, 646 (1968).
10. J. Casals and R. Palacios, J. Exp. Med., 74, 409 (1941).
11. K. Maunsell, D. Wraith, and A. Cunningham, Lancet, 1, 1267 (1968).
12. J. Pepys, M. Chan, and F. Hargreave, Lancet, 1, 1270 (1968).
13. F. Platts-Mills, M. Chapman, and E. Fovey, Int. Arch. Allergy, 66, Suppl. No. 1, 264 (1981).
14. C. Ouchterlony, Diffusion in Gel Methods for Immunological Analysis, Basel (1958).
15. R. Voorhorts, F. Spieksma, H. Varekamp, et al., J. Allergy, 39, 325 (1967).