

Protozoal forms in house-dust mites and respiratory allergy

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ABSTRACT

The presence of mites in sputum smears has been described with possible implications through direct action of dust mites inside the lungs and of the possibility of them being a causal factor in asthma. Because of the impact and frequency of allergic respiratory diseases associated with exposure to dust mites, we examine extracts of the intestinal content of dust mites to find a special factor to link the allergic respiratory diseases and the dust mites. We examined 600 slides of household dust with an average of 5 (3–8 mites) mites being observed on each, ~3000 mites in all. Among the remains of intestinal contents of the mites, the presence was observed of various protozoal forms with filiform projections. These forms were very similar in morphology to those previously observed by us, under the same conditions of phase contrast, in the sputa of asthmatic patients and the nasal extrusions of patients with allergic rhinosinusitis. The discovery of these protozoal forms may be the nexus necessary to connect these diseases with the arthropods mentioned.

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It was first suggested and subsequently shown that the house-dust mite is one of the principal causes of respiratory allergies.¹ The relationship between certain allergens and the fecal particles of such microorganisms is known also,² revealing the presence of specific allergens inside the digestive tract of house-dust mites.³ Because of the impact and frequency of allergic respiratory diseases associated with exposure to dust mites, there is much research being performed at present.⁴

Among other kinds of arthropods (cockroaches), which also are associated with the development of respiratory allergies,^{5,6} the existence of protozoa inside the intestinal tract has been established.⁷

Although the presence of mites in sputum smears has been described previously,⁸ a study recently published⁹ speaks of the possible implications through direct action of dust mites inside the lungs and of the possibility of them being a causal factor in asthma. This is the reason why we have performed the following research, designed to examine extracts of the intestinal content of house-dust mites.

METHODS

Household dust has been used, obtained from vacuum sweepings taken in five houses (three urban houses and two country houses) located in a temperate, humid coastal region (Asturias, in the north of Spain). The dust samples were collected between June 2003 and December 2004.

The vacuum cleaner dust was deposited on a slide to detect the presence of mites (*Dermatophagoides* spp.). By observation under the lens (lower power) of a microscope and using histological needles, the mites were separated and then placed on clean slides with a drop of saline serum (Fig. 1A). Through the manipulation with the help of histological needles we were able to extract the internal contents of the mites, being examined directly under the microscope using phase contrast. A total of 600 slides of household dust were examined, an average of 5 (3–8 mites) mites being observed on each, ~3000 mites in all.

RESULTS

Among the remains of intestinal contents of the mites, the presence was observed of various round-oval protozoal forms ~10–15 μ m in size, with filiform projections (Fig. 1, B and C), in ~1 of 10 mites. These forms were very similar in morphology to those previously observed by us, under the same conditions of phase contrast, in the sputa of asthmatic patients (Fig. 1D) and also the nasal extrusions of patients with allergic rhinosinusitis (Fig. 1E). These protozoal forms also have been observed by us in the intestinal content of the cockroach *Blattella germanica* (Fig. 1F).

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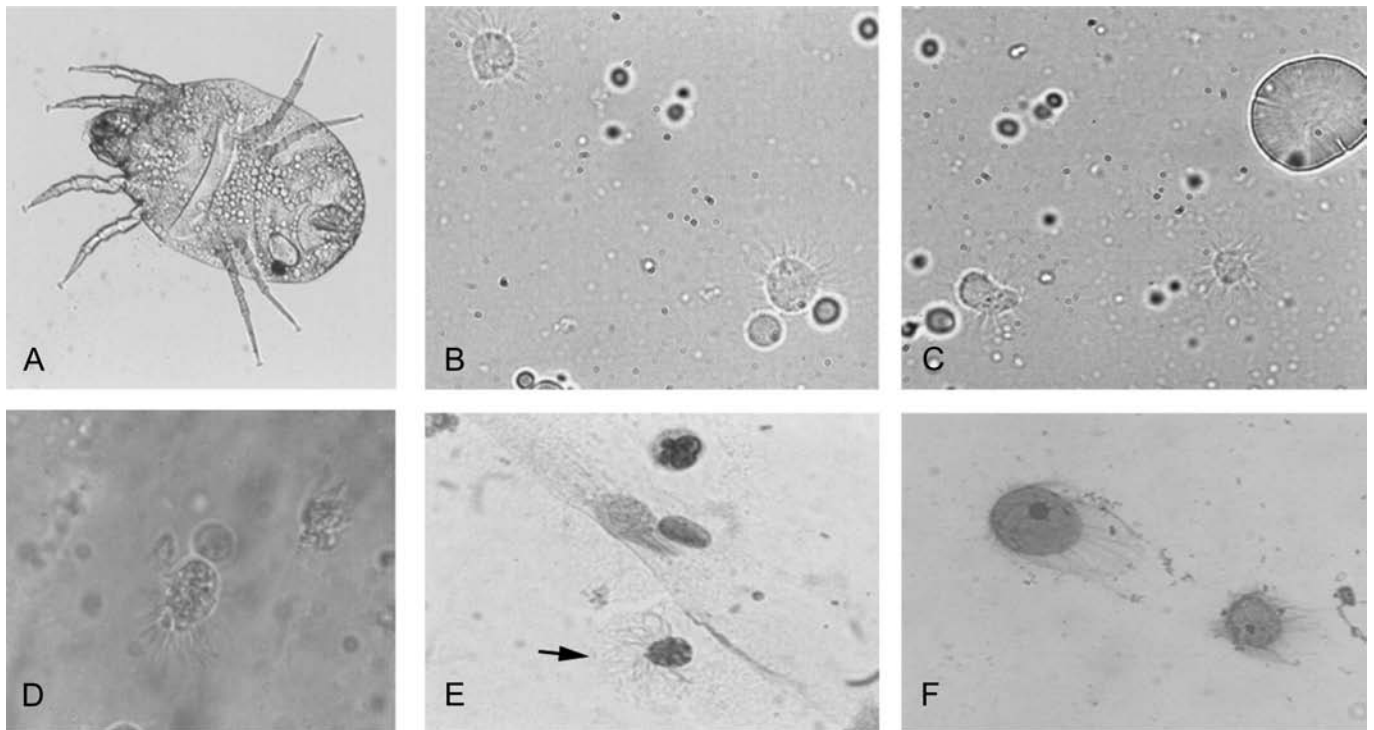


Figure 1. (A) Isolated house-dust mite in saline serum (×200). (B and C) Four protozoal forms with filiform projections, observed in the internal contents of the mites (phase contrast, ×1000). (D) Protozoal form with thin elongated projections, similar to the ones seen in the mites, in a fresh sputum sample of an asthmatic patient (phase contrast, ×1000). (E) Round protozoal form with abundant tortuous projections (arrow), observed in a nasal secretion of an allergic rhinitis patient. Note the presence of a ciliocytophthoria phenomenon above the protozoal form (Wheatley's trichomic stain, ×1000). (F) Two round protozoal forms obtained from the intestinal contents of a cockroach, similar to the prior forms (hematoxylin and eosin, ×1000).

DISCUSSION

Although the presence of protozoa has been described in the cockroach, to our knowledge, it is the first time that this finding of protozoal forms in the visceral contents of house-dust mites is described. The finding of these protozoal forms in the internal content of house-dust mites as well as in the nasal discharge of patients with allergic rhinosinusitis,¹⁰ in the sputa of asthmatic patients¹¹ and in that of immunocompromised patients,¹² among whom a greater incidence of asthma has been observed,^{13,14} leads us to propose that bronchial asthma and allergic rhinosinusitis may have a common etiopathogenic factor. This factor could be protozoa that are widespread in nature and are present in the internal secretions of some mites and cockroaches.

A strong association between large numbers of dust mites in houses and the development of asthma has been described,^{15,16} with the implication also of cockroaches^{17,18} and predatory mites.¹⁹ There is also a high incidence of allergic rhinitis (75%) in asthmatic patients, which also has been published.^{20,21}

Our findings seem bring once more to the forefront the concept of rhinosinusitis asthma as a single disease affecting different segments of the respiratory apparatus.^{22,23} The asseveration of "one way, one disease"

seems very plausible now.^{24,25} There evidently exists a state of great confusion among the scientific community, faced as it is with the absence of a common nexus that would explain the correlation between bronchial asthma, allergic rhinosinusitis, mites, and cockroaches. The discovery of these protozoal forms that we have observed in nasal and bronchial secretions, as well as in the intestinal contents of mites and cockroaches, may be the key necessary to connect these diseases with the arthropods mentioned.

As well as this nexus, the synthesis by various protozoal forms of foreign proteins from inorganic compounds (autotrophic nutrition) is described.²⁶ It is our belief that the foreign proteins may contribute to the complex symptomatology of asthma, where peculiar inflammatory local changes appear (increase in eosinophils, histamine, interleukins, etc.).

The existence of these protozoal forms should open new lines of investigation into asthma and allergic rhinitis.

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