



Sensitization to House Dust Mite Allergens in Individuals with Asthma and Allergic Rhinitis

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DESCRIPTION

A very diverse group of organisms, mites are present in practically every ecosystem. They are more frequently discovered in environments that are more closely related to man, such as beds, bedlines, sofas, clothes, curtains, window stills, floors, and carpets. All members of the family Pyroglyphidae (order Astigmata) that reside continuously in household dust go by the moniker House dust mites. Pyroglyphidae is the family in which the majority of the mites that cause allergies reside, however other mite families, such as storage mites, are also significant clinically. House dust mites are the most frequent allergen-producing mites found in houses around the world and are linked to the emergence of asthma and a wide range of other allergic illnesses.

The *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, and *Dermatophagoides farinae* species of house dust mites are the three most significant types. With an incidence of roughly 78.8%, *Dermatophagoides pteronyssinus* is often the most prevalent and frequently discovered mite species in household dust. *Dermatophagoides pteronyssinus*, a Pyroglyphid mite, is found in temperate and tropical locations. *Dermatophagoides farinae* and *Euroglyphus maynei* are Pyroglyphid mites found in drier regions and temperate regions, respectively. Over 90% of HDM allergies globally are caused by the species *Dermatophagoides pteronyssinus* and *D. farinae*. Around the world, household dust mites are a key contributor to allergy disease and atopic sensitization. The four most common allergenic dust mites, *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Euroglyphus maynei*, and *Blomia tropicalis*, are present in the dust.

Astigmatic mites lack a respiratory system; instead, they breathe via their cuticle and take in water and gases. The respiratory

organs of many mite species are composed of branching tubes called trachea that connect the cuticle's surface with the internal organs. The mites become dependent on humidity as a result. The hemocytes that make up a mite's blood and circulatory system are suspended in hemolymph. It consists of a pool of fluid that is moved by the internal organs and musculature of the body. Abiotic factors significantly affect mite population. Temperature and humidity affect the life cycle and fertility of house dust mites.

The main elements for mite survival and development include an ideal environment with temperatures between 18°C and 27°C, relative humidity between 45%-75%, and sufficient food. As mites need a high ambient air humidity to prevent excessive water loss, the relative humidity of the area affects the mite population. Numerous studies found an association between the number of mites or allergy levels and the relative or absolute humidity of the home's air. In humid areas, there are many dust mites in every home, but in dry climates, there are fewer residences with dust mites and a lower level of dust mite population and allergen. However, using evaporative coolers to increase the indoor humidity may help the mites survive.

Given the characteristics of the home, there may be some correlation between socioeconomic conditions and the density of mite populations. Significant variances within and across homes have demonstrated that elements like home age, floor level, ventilation, orientation, or human living behaviours may contribute to the variations in indoor humidity that impact the growing circumstances of dust mites. Osmoregulating through their cuticle, house dust mites also actively take up ambient water vapour through their supracoxal glands.

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