Pet Hamsters as a Source of Rat Mite Dermatitis

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GOAL

To understand the causes of rat mite dermatitis

OBJECTIVES

Upon completion of this activity, dermatologists and general practitioners should be able to:

1. Explain the role of mites as human pathogens.
2. Recognize the symptoms of mite bites.
3. Discuss treatment options for rat mite dermatitis.

CME Test on page 440.

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Rat mite dermatitis is characterized by pruritic papules in a patient exposed to the tropical rat mite Ornithonyssus bacoti. *We report a case of a woman with rat mite dermatitis who developed this eruption after exposure to her pet hamster. Mites were collected from the hamster and identified as* O bacoti. *Reported sources of rat mites, as well as avian mites and other mites that bite humans, are reviewed.*

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Rat mite dermatitis is a pruritic eruption in humans caused by bites from the tropical rat mite *Ornithonyssus bacoti*. Other biting mite species that have been reported to cause a similar dermatitis in humans include *Dermanyssus gallinae* (red mite or poultry mite), *Ornithonyssus sylviarum* (northern fowl mite), and *Ornithonyssus bursa* (tropical fowl mite).[1-6] The eruptions caused by

Figure 1. Excoriated erythematous papules on the wrist.

these mites are clinically indistinguishable. Initial case reports of mite dermatitis identified the sources of these mites to be rat-infested homes or bird nests around the home.[1-6] Rat mite dermatitis also was reported in a patient who had contact with mite-infested laboratory mice.[7] More recently, avian mite dermatitis was reported in patients who had mite-infested pet gerbils.[8] This report describes a patient with rat mite dermatitis acquired from a pet hamster. Based on the variety of mites and sources of infestations, mite dermatitis may be more common than generally thought.

Case Report

A 48-year-old healthy woman presented with a complaint of pruritic papules on the wrists (Figure 1) and waist for several weeks. History revealed she maintained a small menagerie of animals including horses, dogs, cats, and hamsters. She was informed that her skin lesions were most likely the result of insect bites and she should evaluate her animals and their environment for evidence of infestation. She returned 2 days later and reported that her hamster had died the previous day. When she went to bury it, she noticed numerous red specks in its fur. She placed the hamster in a plastic bag in the freezer until she could bring it in for examination. Examination of the hamster (Figure 2) revealed numerous red mites (Figure 3). The patient's symptoms resolved over the following few weeks. The mites were identified as the tropical rat mite *O bacoti*. No necropsy was performed on the hamster, and a specific cause of death was never determined. This mite ingests blood and can cause debility, anemia, decreased reproduction, and death in small animals, suggesting that it may have contributed to the hamster's death.

Comment

Mites are arthropods in the class Arachnida, which includes ticks, spiders, and scorpions. The arachnids are characterized by 4 pairs of legs and 2 body regions, a cephalothorax and an abdomen. Mites and ticks are further classified in the subclass Acari. Mites of medical importance can be grouped by their pathology in humans.[9] House dust mites (*Dermatophagoides and Euroglyphus* ssp) cause respiratory allergies, whereas human follicle mites (*Demodex* spp) infest hair follicles and associated sebaceous glands. Neither group of mites causes cutaneous lesions in the form of bites or burrows. The scabies mite (*Sarcoptes scabiei*) is a primary human parasitic mite in which the adult mite burrows and feeds on skin cells. Chiggers (family Trombiculidae) and common animal mites bite humans but do not reside on humans as a primary host. Many mite species are opportunistic, often feeding on various hosts they encounter.[10] The common animal mites that bite humans include several avian mites, the rodent mites, and fur mites of rabbits (*Cheyletiella parasitivorax*), dogs (*Cheyletiella yasguri*), and cats (*Cheyletiella blakei)*. Mites infesting grain, hay, and straw occasionally cause dermatitis in humans.

The usual hosts of the tropical rat mite *O bacoti* are the brown rat (*Rattus norvegicus*) and the black rat (*Rattus rattus*). This mite is yellow to dark red, when blood-fed, and ranges in size from 0.75 to 1.4 mm. It will feed on humans when its rodent hosts

Figure 2. Deceased pet hamster with numerous red mites in its fur.

Figure 3. Red mite from the hamster was identified as O*rnithonyssus bacoti* (magnified from original size of 1.5 mm).

are killed or abandon their nests.[11-16] O *bacoti* also infests mice and hamsters in research laboratories.[7]

The common avian mites *D gallinae*, O *sylviarum*, and O *bursa* occur on both domestic and wild bird species, including chickens, ducks, pigeons, sparrows, canaries, starlings, robins, tiger finches, and doves.[1] *D gallinae* has been identified on commensal and laboratory rodents, and in one case it was found on a farm dog.[17-19] The species are similar in size and appearance, but differ in their life cycle. The adult mite of these species ranges in color from brown to red and in size from 1 to 3 mm. *D gallinae* lives most of its life cycle off the hosts in nests, crevices, and cracks in buildings. It feeds on the host nocturnally for 1 to 2 hours at a time, and may live up to 8 months without a host. O *sylviarum* and O *bursa* spend their entire life cycle on the host. The mites will leave the host and bite humans in close proximity, especially in heavily infested quarters. The O*rnithonyssus* species live only 2 to 3 weeks without a host.[9]

Mite bites typically produce urticarial, pruritic papules on the skin. These papules result from an inflammatory cutaneous reaction to mite saliva as it takes a blood meal. Clinically, the bites are nonspecific, but pruritus is the most consistent feature. The

lesions may be vesicular, urticarial, eczematous, or any combination of these. Secondary lesions such as persistent nodules, postinflammatory hyperpigmentation, excoriations, and secondary infection may be present. The bites tend to occur in asymmetric groups, most commonly on the abdomen and extremities. Often a patient presents with a combination of these clinical features, but denies a history of any "bites."

On pathologic examination, the lesions are nonspecific mild arthropod reactions with superficial and mid-dermal perivascular infiltrate. Eosinophils may be present. The epidermis may be mildly spongiotic.

The diagnosis of mite dermatitis should be considered in unexplained pruritic dermatitis. The rodent and avian mites are rarely found on the human host because the mites leave after feeding. History of exposure can include bird handling, bird nests or roosts near the home, rat infestations, pets, and occupational exposure to laboratory rodents. The mite may be discovered in abandoned bird or rodent nests, on pets, or in pet bedding. Speciation of the mite usually requires assistance of an entomologist or acarologist. To facilitate microscopic identification of mites, specimens can be temporarily slide-mounted in a drop of mineral oil under a coverglass. However, if they are to be sent to an acarologist or other specialist for identification, it is best to place them in 70% alcohol, rather than mineral oil. It is very difficult to remove mineral oil from mite specimens before clearing and slide-mounting them in other appropriate mounting media. This may be required to discern fine structural details needed for making species determinations.

Cheyletiella mite dermatitis also may present as a nonspecific pruritic dermatitis. These mites are parasitic on dogs, cats, and rabbits and may be discovered on the pet as "walking dandruff."[20]

Bites from chiggers, or red bugs, may be distinguished from other mites by the location of bites at sites of clothing constriction, such as the waistline, sock line, and beneath undergarments. These bites typically appear as papules with hemorrhagic puncta.

The scabies mite burrows in the skin and thus can be distinguished from other mites that cause dermatitis. In addition, scabies may be distinguished clinically by lesions in the interdigital web spaces and on the genitals. The mite, its eggs, and its feces can be visualized by a routine scabies preparation during the patient visit.

Other arthropod bites, including those from fleas, human body lice, and pubic lice, should be included in the differential diagnosis of mite dermatitis. In addition, systemic pruritus with excoriations, drug hypersensitivity reaction, and neurodermatitis should be considered.

Treatment focuses on reducing or eliminating problem mites in infested areas, often requiring involvement of veterinarians and pest control agencies. In the case of *D gallinae*, which does not live on the host, acaricides must penetrate into crevices and cracks in buildings.[21] Both the host and the area of infestation must be treated to exterminate *O sylviarum* and *O bursa*. Elimination of rats and removal of their nests are important for controlling *O bacoti*.[22] Patients may be treated with antihistamines and topical corticosteroids for symptomatic relief. The dermatitis is self-limited when the exposure is eliminated.

Two important mite-borne diseases of humans are tsutsugamushi disease (scrub typhus) and rickettsialpox, caused by the rickettsial organisms *Orienta tsutsugamushi and Rickettsia akari*, respectively. In the case of tsutsugamushi disease, chiggers are the vectors, whereas in rickettsialpox, the vector is the house-mouse mite (*Liponyssoides sanguineus*). These are the only 2 groups of mites that play a significant role in transmission of human pathogens.[23]

Mite dermatitis should be considered in any unexplained dermatitis. When considering a diagnosis of mite dermatitis, it is important to determine if there is a history of exposure to mice, hamsters, other rodents, or birds. Although the mites are rarely found on the patient, they may be discovered around the home or on pets. Demonstrating the presence of mites is important in diagnosing cases of mite-induced dermatitis. In many cases, reliable identification of the mite species is important in not only confirming the diagnosis but also identifying the sources of mite infestations so that they can be eliminated. The diagnosis should not be overlooked simply because the patient denies having rats or birds in the home.

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