



Adolescent Scalp Dermatitis Associated with *Dermatophagoides* spp. (Acariformes; Pyroglyphidae) Mite

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Abstract

Purpose *Dermatophagoides* spp. (Acariformes; Pyroglyphidae), house dust-mite well known as the causative agent of atopic hypersensitivity and allergy could potentially cause severe dermatitis. Herein we report an uncommon case of scalp dermatitis associated with the presence of *Dermatophagoides* spp.

Methods A 17-year old male presented with patchy alopecia on the scalp without intense peeling or itching, surround by unchanged skin and hair. Initially, superficial fungal infection was suspected; however, parasitological examination revealed the presence of live mites.

Results All the anatomical measurements and parameters from the specimens were compatible with *Dermatophagoides* spp.

Conclusions *Dermatophagoides* spp. are not yet confirmed as causative agents of parasitic infestation, but the presence of these mites could have caused an allergic reaction followed by dermatitis with mild-to-moderate clinical manifestations. However, true parasitism as well as phoresy could also be considered. The clinical manifestations caused by house-dust mite cannot be easily recognized and the lack of diagnostic tools is a hindrance that often leads to misdiagnosis and inadequate therapy.

Keywords Dermatitis · *Dermatophagoides* spp. · House dust-mites · Phoresis

Introduction

Ectoparasitic arthropods are of major concern in human medicine, exerting their pathogenic role not only as vectors of infectious agents but also directly, by causing conditions, such as dermatitis [1]. Numerous species of mites may cause dermatitis in humans due to allergens they produce (i.e., feces, saliva, and cuticle) and/or due to injuries they cause on the skin [2]. For example, scabies caused by *Sarcoptes scabiei* [3, 4] is induced by mite burrows in the epidermis

of the skin of humans and many other animal species (e.g., dogs, pigs, and cats). In addition, *Demodex folliculorum* resides in hair follicles and sebaceous glands [5], often causing redness, itching and acne-like blemishes on the skin.

Apart from these well-known ectoparasites, numerous other arthropods that can have dermatological deleterious effects are sporadically reported. House dust-mites are often recorded as causative agents of allergies (e.g., asthma, allergic rhinitis) [6] and atopic dermatitis [7]. They are also associated with urticarial lesions from erythematous papules to papulosquamous eruptions with extensive lesions [8]. In particular, *Dermatophagoides pteronyssinus* (syn. *D. schereffskyi*) has been reported as a cause of scalp and facial dermatitis [9–13] and is often associated with infested feather pillows. This species, along with *Dermatophagoides farinae* [14], are cosmopolitan and were identified in domestic and industrial environments. Morphologically, adults of both species of house-dust mites are creamy white and oval in shape, with striated cuticle (dimensions of female 420 × 320 and male 420 × 245 µm). Their life cycle is, depending on environmental conditions, completed in 19 to 30 days. These

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mites go through a number of developmental stages including egg, larva, nymph and adult form [15]. It is generally considered that *Dermatophagoides* spp. in the house environment feed on shed skin of humans. When present in large numbers, mites being in constant contact with human skin may cause allergic reaction.

In this study we report an unusual presentation of severe scalp dermatitis possibly associated with the presence of *Dermatophagoides* spp. dust-mites.

Case Report

A 17-year-old male patient was referred for dermatological consultation and mycological analyses, with suspected superficial fungal infection of the hairy part of the head. Physical examination revealed patchy alopecia area (approximately 4.0 cm in diameter) with no-intense peeling, nor itching, surround by unchanged skin and hair, with a few visible furuncles. The patient's personal history was unremarkable. He was a student living in the urban area of the City of Nis, Serbia (longitude 43°19'14.47" N, latitude 21°53'44.46" E) healthy, immunocompetent, and did not keep pets. No

history of traveling abroad or prolonged outdoor activities was recorded.

A surface scrape of the lesion was performed using a sterile surgical blade no 23G. The dermal material was placed in a watch slide in a keratinolytic solution of KOH 10% to reveal the presence of possible mites. Microscopic examination of the dermal flakes revealed the presence of three mites and one egg. The measures of each mite were determined as well as sex and biological stage. Measurements and photographs were taken using a DM-LB2 microscope and Leica las version 4.5.0 software (Leica Microsystems, Wetzlar, Germany). One protonymph, one female and one male sample were identified after observation. Conventional mycological examination did not determine fungal infection.

Examination of Morphology

Specimen A1 (Female Adult)

The mite had oval shape body (length 364 μm and maximum width 188 μm), idiosoma white with brownish legs (Fig. 1a–c). Gnathosoma short and conical (length 62 μm ,

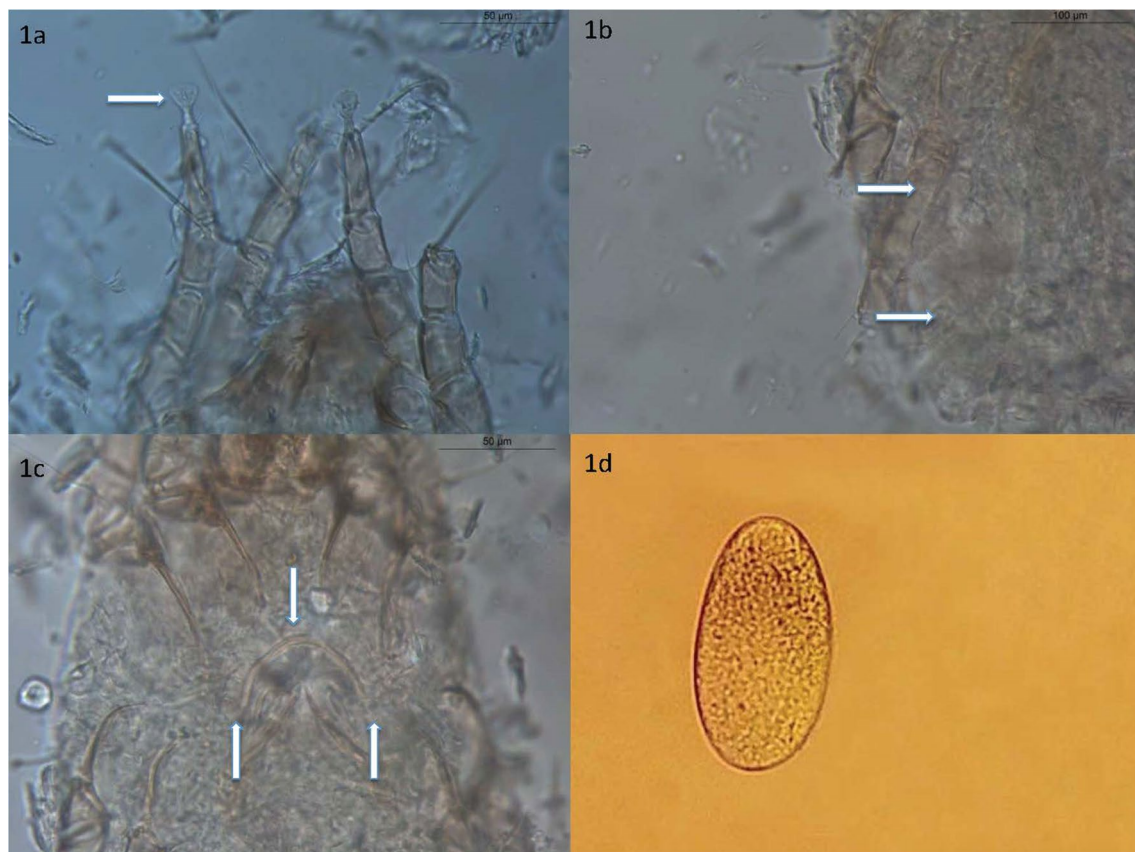


Fig. 1 **a** Female capitulum and leg with caruncles and setae; **b** female with legs broken; **c** female, ventral view, apodemes and genital open, **d** egg

width 47 μm) with short palps and chewing chelicerae. Length of legs I and legs II were 129 μm and 142 μm , respectively (the other legs were broken). Body chaetotaxy of the studied mite was broken and altered in structure; therefore, a study on chaetotaxy is incomplete. There were bell-shaped suckers (caruncles) on pedicels short and not segmented of umbrella-shape on the tarsi I and II. Ventrally, all the coxae did not carry shields, female with ellipsoidal and long vulvar lip opening between apodemes IV. The anus was ventral and near the posterior margin. Beside female adult on the same samples of material only one ellipsoidal egg was observed, with brownish shell, uneven wall, measure $131 \times 72 \mu\text{m}$ (Fig. 1d).

Sample A2 (Male Adult)

Idiosoma was rounded with the presence of a pair of brown, well-formed globose adanal suckers (copulatory dish) and terminally without tubercles (Fig. 2a).

After parasitological analyses it was apparent that all anatomical measurements and parameters from the specimens were compatible with *Dermatophagoides* spp. [6, 9].

Specimen A3 (Protonymph)

Mite with oval body (length 207 μm and maximum width 143 μm); idiosoma brownish, with evident streaks on the tegument. Gnathosoma short and conical, length 42 μm and 44 μm width with short palps. All legs were well developed, long and projected beyond the margin of the body. Length of the legs was: legs I 83 μm , legs II 100 μm , legs III 71 μm , and legs IV 75 μm . Body-chaetotaxy, of the studied mite was broken and altered in structure; therefore, a study on chaetotaxy is incomplete; a pair of long setae arise from propodosoma and two long pairs from near the lateral margin of metapodosoma. Only one seta at the posterior margin of the body was visible. Leg-chaetotaxy, showed the presence of two long setae on the tibia I and II and on the tarsus I and II of 4 setae. All the legs had ambulacral apparatus with suckers and pedicels short and not segmented ($12 \times 9 \mu\text{m}$) of umbrella-shape (Fig. 2b–d) [16].

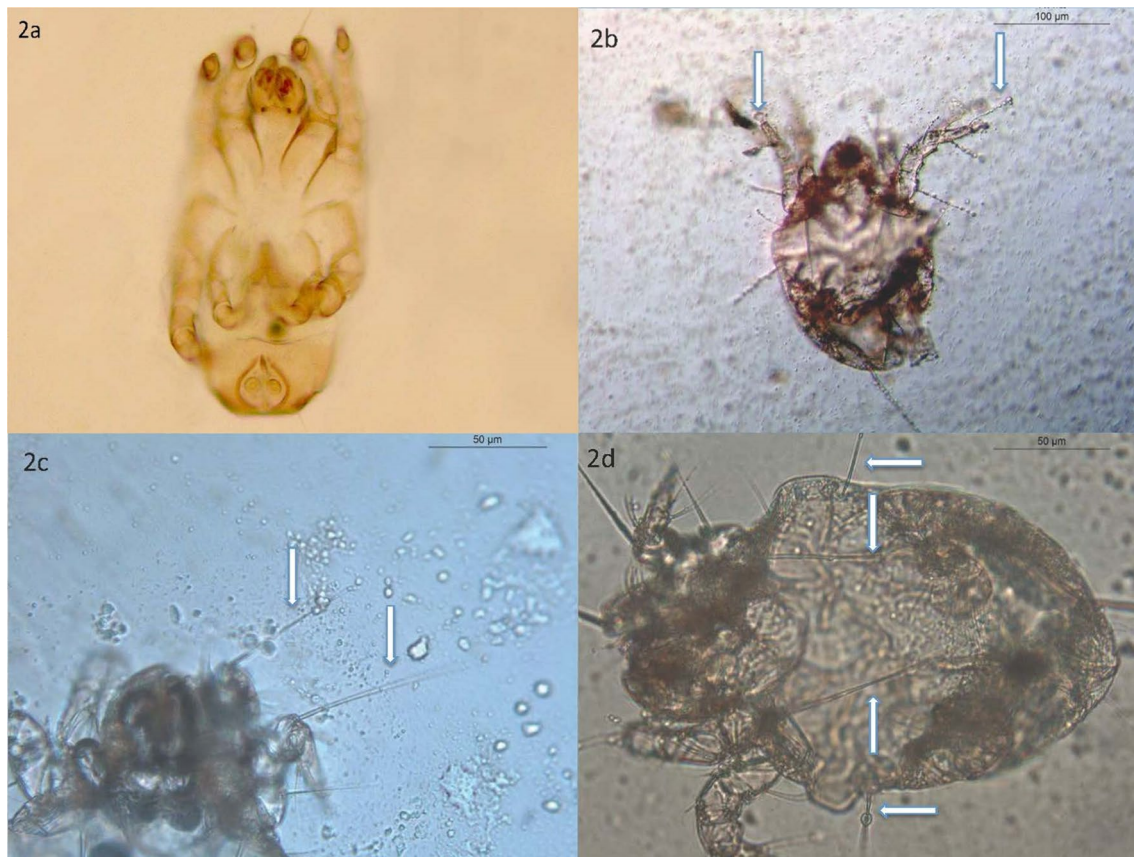


Fig. 2 a Male mite-ventral view; b, c protonymphs, legs with caruncles and setae; d protonymphs, setae

Treatment and Monitoring of Patient

Following mite identification, based on clinical examination and finding of all developing forms of the mites (i.e., adult, larva, egg), in consultation with a dermatologist, treatment with two applications of 5% permethrin cream, 1 week apart, was recommended. Furthermore, patient was advised to wash and sundry his clothing, bedding, covers, linen, and if they use feather pillows, to avoid it. After finishing the course of therapy, mites' eggs were found in two consecutive days. Therefore, a treatment with sulfur shampoo and local application of sulfur ointment in a concentration of 5–10% for 14 days was recommended. Parasitological examination after 14, 30, 60 and 180 days after second treatment did not show any form of the previously observed mites, furuncles disappeared, while the hair started growing back.

Conclusions and Discussion

The finding of an arthropod that morphologically resembled a mite of the Acarina subclass, along with the site of lesion, created confusion and led to diagnostic dilemma. At first, based on our knowledge and experience, *Sarcoptes scabiei*.

Infestation was suspected on the ground of morphology alone. Likewise, *Otodectes cynotis*, an ear mite of dogs and cats, was also considered as it has been previously reported as human parasite [17]. The mite also appeared as *Dermatophagoides* sp., in other words a house dust-mite, which is why it was initially believed to be an incidental finding [18]. Three repeated parasitological analyses revealed different forms of dust-mite and along with clinical findings indicated that detection of mite in material was not accidental, but a possible cause of the dermatological alterations. Since *Dermatophagoides* spp. is not yet confirmed as causative agent of parasitic infection, the presence of these mites could have caused an allergic reaction followed by dermatitis with mild to moderate clinical manifestations. In addition, true parasitism or phoresy, should be further investigated for dust-mites. Phoresy is not a form of parasitism it is commensal interaction between phoretic animal and the host, where only superficially attached to a selected interspecific host, phoretic animal obtains a benefit as advantage by migrating [19].

In conclusion, we highlight that epidemiological, clinical, histo-pathological and immunological knowledge on *Dermatophagoides* spp. parasitic and pathological potential is limited [20]. The clinical manifestations caused by house-dust mite cannot be easily recognized and the

lack of diagnostic tools is a hindrance that often leads to misdiagnosis and inadequate therapy. Indeed, etiological diagnosis is important for optimal treatment, but is also necessary for proper control and prevention.

Author contributions All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by ST-O, MG, JAM-R, RPL, DO the first draft of the manuscript was written by ST-O and MG and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

Ethics approval The University of Nis Ethics Committee has confirmed that no ethical approval is required, since this study is case reports that do not meet the legal definition of research.

Consent to participate Informed consent was obtained from the caregivers.

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