Monkey finger mycology? First case of otomycosis externa caused by *Trichophyton simii* after encounter with a monkey

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**ARTICLE INFO**

Keywords: Ototmycosis, *Trichophyton simii*, Otitis, Simian, Travel history

**ABSTRACT**

Unilateral ear pain, ear canal blockage and reduced hearing in an 18-year-old Canadian male who had travelled to India revealed, on examination of a swab, secretions bearing unusual fungal filaments visually suggestive of dermatophyte elements. Culture yielded *Trichophyton simii*, an unusual skin infecting species with a worldwide distribution but most often seen from India. The patient recalled swimming in the Ganges River but also had his ear manipulated by a street monkey.

1. Introduction

Otomycosis is a fungal infection of the external auditory canal and can occur as a primary infection or can develop along with a bacterial otitis externa, usually as a result of antibiotic treatment. In cases not influenced by antibiotic treatment, introduction of a foreign object or soil or debris often precedes infection, especially in young children who are the most commonly affected group. The causative agents are mostly members of the genera *Aspergillus* and *Candida*, especially the *A. niger* complex, *C. albicans*, *A. flavus* and *A. fumigatus*, with *Candida* species predominating in immunocompromised patients and *Aspergillus* in the immunocompetent [1,2].

Members of the dermatophytes, normally seen from infected skin and nails, have seldom been implicated in otomycosis, and when they have, no case details have been given. Reports include three involving morphologically identified *Trichophyton mentagrophytes* complex members [1,3,4], and one involving *T. rubrum* [1]. *Trichophyton simii* is a dermatophyte closely related to the *T. mentagrophytes* complex. It was long thought to be endemic to the Indian subcontinent but is now suspected to have a cosmopolitan distribution, although it is unusual or rare in most localities [5]. Records exist from Belgium, France, Brazil, Iran, Saudi Arabia, Ivory Coast, Argentina and the U.S.A. The species is mainly known from tinea of the nails and glabrous skin. It has not been reported to cause otomycosis.

We herein wish to report a case of otomycosis seen in Canada but featuring an imported *T. simii* isolate from India.

2. Case

The patient was an 18-year-old male in excellent health who visited family in the city of Haridwar, Uttar Pradesh State, India, during the summer. He noted that he swam in the Ganges River, possibly exposing his external acoustic meatus to the highly eutrophic waters [6], but recalled as well that during his travels, while he was driving a car and stopped at a crossroads, he had had a monkey enter through the open window and manipulate his right ear while confronting him momentarily before exiting again. He was uncertain about which monkey species was involved.

The patient had had a long-standing practice of assiduously removing the cerumen daily from his ear canals with a cotton swab. On returning to Canada, he described his right ear as being swollen and painful, and yielding a liquid discharge. He experienced diminished hearing on the right side.

His family physician prescribed topical antibiotics but these yielded no benefit. An otolaryngologist was consulted who carried out debridement and noted that a white waxy paste-like material was present deep in the bony ear canal. The skin was erythematous and irritated. A sample was sent for microscopy and culture. A pure growth was obtained of numerous colonies morphologically compatible with *Trichophyton simii* (Fig. 1a). The isolate could be unequivocally confirmed

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https://doi.org/10.1016/j.mmcr.2022.06.001
Received 26 April 2022; Received in revised form 31 May 2022; Accepted 5 June 2022
Available online 9 June 2022

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as a member of that species by a fully compatible mating reaction with one of two tester isolates (UAMH 2943 and 2944) leading to production of rounded, fuzzy sexual fruiting bodies (ascomata) (Fig. 1c) and fertile sexual ascospores (Fig. 1a). The ear secretions were seen microscopically to be invested with unusual fungal filaments (Fig. 1b) showing a beaded structure consistent with dermatophytic substrate arthroconidia [7]. Pure Canesten® ( clotrimazole) was instilled in the ear canal and a follow-up visit after 14 days revealed a pristine ear canal. The etiologic isolate was not preserved.

3. Discussion

Trichophyton simii is an infrequently seen fungus that has been reported as an etiologic agent of tinea corporis, tinea cruris, tinea capitis and onychomycosis. This fungus has most frequently been seen in the Indian subcontinent, where it has been isolated from the soil as well as from infected animals and humans. For some years, the preponderance of known isolates was from monkeys, as implied by the epithet 'simii,' but in time, a regular association with poultry and poultry farm work was also noticed [5,8,9]. With isolates from disparate sources like soil in the Ivory Coast [5] and cattle in southern India [10] the species has formed a pattern most consistent with geophilic ecological classification, i.e., breaking down hair, feathers and other keratinous remains in contact with soil, but it cannot be ruled out as a possible zoophile connected with soil-dwelling animals.

Although dermatophytes do not inhabit aqueous habitats, their dry spores and their somewhat water-repellent substrates, like bits of feather, may float on water. Thus, there is no clear resolution as to which event experienced by the patient - swimming in the Ganges or having his ear touched by a wild monkey - was the more likely source of his aural event experienced by the patient - swimming in the Ganges or having his feather, may float on water. Thus, there is no clear resolution as to which

case, that the marginal nature of the habitat for this species contributed to the rapidity of its cure with topical application of clotrimazole. It would be of interest if additional cases of dermatophyte involvement in ootomycosis were studied with attention to the unusual aspects of the infections.

Declaration of competing interest

None.

Acknowledgements

Lynne Sigler, former curator of the University of Alberta Microfungus Collection and Herbarium (UAMH) is acknowledged for supplying mating tester isolates of T. simii.

References

[1] K. Degerli, T. Ecemis, K. Günhan, T. Başkesen, E. Kal, Agents of ootomycosis in Manisa region, Turkey, 1995-2011, Mikrobiyoloji Buluşu 46 (2012) 79-84.
[2] B. Vizwana, D. Samatha, M.S. Vijayashree, Ootomycosis in immunocompetent and immunocompromised patients: comparative study and literature review, Ear Nose Throat J. 91 (2012) 114–121.
[3] V.K. Fahwa, P.C. Chamiyal, P.N. Suri, Mycological study in ootomycosis, Indian J. Med. Res. 77 (1983) 234–238.
[4] P. Agarwal, L.S. Devi, Ootomycosis in a rural community attending a tertiary care hospital: assessment of risk factors and identification of fungal and bacterial agents, J. Clin. Diagn. Res. 11 (2017). DC14–18.
[5] H. Beguin, K. Goen, M. Hendrickx, C. Planard, D. Stubbe, M. Detandt, Is Trichophyton simii endemic to the Indian subcontinent? Med. Mycol. 51 (2013) 444–448.
[6] D.G. Miller, S.K. Gurus, J.T. Bunce, V. Tare, R. Sinha, P.E. Carbonneau, Population density controls on microbial pollution across the Ganga catchment, Water Res. 128 (2018) 82–91.
[7] 2000 R.C. Summerbell, Form and function in the evolution of dermatophytes, in: R.K. Sushitwaha, J. Gourau (Eds.), Biology of Dermatophytes and Other Keratinophilic Fungi, Revista Iberoamericana de Micologia Supplement, Bilbao, Spain, 2000, pp. 30–43.
[8] S. Ansari, M.T. Hedayati, S. Nouripour-Sisakht, A. Rezaei-Matehkolaei, R. Jannesar, H. Mohammadi, Y. Faizi, M. Ilk, S. Seidyemosavai, A 9-month-old girl from Iran with extensive erythematous plaques due to Trichophyton simii, a zoophilic dermatophyte, Mycopathologia 181 (2016) 451–455.
[9] A. Dögen, R. Güümral, Z. Öksüz, E. Kaplan, M.S. Serin, M. Ilk, Epidemiology of dermatophytosis in junior combat and non-combat sports participants, Mycoses 56 (2013) 95–100.
[10] S. Ranganathan, S.A. Balaji, S.M. Raja, A survey of dermatophytosis in animals in Madras, India, Mycopathologia 140 (1997-1998) 137–140.
[11] J.F. Guest, M.J. Green, A.C. Robinson, A.F. Smith, Impacted cerumen: composition, production, epidemiology and management, J. Otolaryngol. 34 (2004) 477–488.
[12] H. Sobel, J. Marmaroston, H. Arzangoolian, The fungistatic action of squalene on certain dermatophytes in vitro, Science 119 (3101) (1951) 816–817.
[13] F.W. Chattaway, J.D. Townsley, A.J. Barlow, Effect of steroids and related compounds on the growth of dermatophytes, Nature 184 (22) (1959) 1731–1732.