

Short Report

Microsporium canis Infection in a Cat Breeder Family and an Investigation of Their Breeding Cats

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ABSTRACT

Two pediatric cases of *Microsporium canis* infection that occurred in a cat breeder family and the isolation of dermatophytes from their 166 breeding cats are reported. The patients were a 16-month-old girl and her 26-month-old sister who both had tinea capitis. Their family consisted of six members: the sisters, their great-grandmother, grandmother, grandfather, and mother. Except for the two sisters, the family had no history of skin lesions. The grandmother had been a cat breeder for 20 years. We tested the cats using the hairbrush technique, and 56 of the 158 cats (35%) tested were positive for *M. canis*. In particular, cultures performed from 4 cats developed *M. canis* colonies that grew densely from all spikes on the hairbrush. On the basis of observations of the cultures, cutaneous infection was suspected when five or more colonies grew on a single plate medium (9 cats), whereas growth of fewer colonies was thought to suggest saprophytic colonization on cat hair. *M. canis* is known to be highly transmittable among cats, but 65% of the cats investigated remained negative. It was thus considered possible to prevent further spread of infection by practicing basic infection control and improving the environment.

Key words : breeding cats, cat breeder family, infection control, *Microsporium canis* infection, tinea capitis

Introduction

Microsporium canis infections have occurred sporadically throughout Japan¹⁾. However, the actual status of infection among cat breeders in Japan is unknown, and there have been few published reports on them^{2,3)}. Overbreeding of animals can cause not only deterioration of breeding animal conditions, but also diminished quality of life of the owners and inconveniences for the neighbors, such as odors and hygiene problems. Thus, on March 26, 2021, the Ministry of the Environment in Japan announced the formulation of the “Guidelines for appropriate large-scale animal breeding for people, animals, and communities—aiming towards collaboration among multiple agencies in social welfare and humane treatment and management of animals” (<https://www.env.go.jp/press/109357.html>). The guidelines indicate that measures for overbreeding of animals should be developed by not just the bureau of animal welfare and management in local

governments, but also through collaboration with the bureau of social welfare and public health, the bureau of environmental health, the police, animal welfare volunteers, social welfare service providers, and other relevant agencies in both the public and private sectors. For this reason, an increase in cases requiring cooperation from the medical field for issues associated with overbreeding of animals is expected.

Given this situation, the control of *M. canis* infection in an overbreeding environment is an important problem. In this study, we report two pediatric cases of *M. canis* infection that occurred in a cat breeder family and isolation of dermatophytes from their 166 breeding cats to plan for control of the infestation.

Cases

The patients were a 16-month-old girl and her 26-month-old sister. Approximately 6 months prior to their visit, patchy hair loss occurred on the left side of the head of the younger

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Fig. 1. The younger sister has a poorly demarcated, palm-sized patch of hair loss with pityroid scales on the left side of her head.



Fig. 2. The dermoscopy findings in the older sister include white perifollicular scales, broken hairs, and whitish sheath hairs.

sister and on the top of the head of the older sister around the same time. Since treatment with ketoconazole cream administered by the previous doctor was ineffective, the sisters were referred to our hospital. Their family consisted of six members: the sisters, their great-grandmother, grandmother, grandfather, and mother. Except for the two sisters, the family had no history of tinea corporis or tinea capitis. The grandmother had been a cat breeder for 20 years, and they had approximately 200 breeding cats at any given time. The patients' house and their grandmother's cattery were general residential homes located adjacent to each other. Only the great-grandmother lived in the house with the cattery, where the sisters played with the cats and took a bath every day.

As for the present illness, the younger sister had a poorly demarcated, palm-sized patch of hair loss with pityroid scales on the left side of the head (Fig. 1). In the older sister, an egg-sized patch of hair loss with scales and crusts was observed on the top of the head, and the dermoscopy findings included white perifollicular scales, broken hairs, and whitish sheath hairs (Fig. 2). In both patients, yellow to green fluorescence was seen in the hair and scales under Wood's light (Fig. 3). The two sisters tested positive in the hairbrush test. Unfortunately, however, the rest of the family members were not tested.

Upon mycological examination, many small and spherical arthroconidia were detected around the hair roots in the head lesions of the patients. Microscopy of infected hairs showed small-spore ectothrix in both patients, and culture examinations of the hairbrush test showed colony formation at almost all spikes. Plate-culture and slide-culture results were morphologically consistent with *M. canis* (Fig. 4). Sequence analysis of the internal transcribed spacer regions of ribosomal DNA of the isolates showed 100% homology with *M. canis*. On the basis of these findings, the cases were diagnosed as

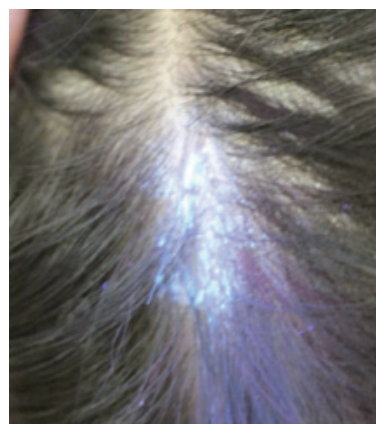


Fig. 3. In both patients, yellow to green fluorescence is seen in the hair and scales under Wood's light. The photo shows the findings for the older sister.

non-inflammatory tinea capitis caused by *M. canis*.

For treatment, both sisters received 3 mg/kg/day of itraconazole (ITZ) orally for 6 weeks⁴⁾. The symptoms gradually improved. The hairbrush test performed 3 months after the completion of ITZ therapy yielded negative results.

As for the investigation of the 166 breeding cats (the age is from shortly after birth to about 4 years old), the source of infection was thought to be among the cats bred by the grandmother; therefore, her cooperation was obtained, and the investigation was conducted using physical examination, Wood's light, and hairbrush technique. Hairbrush examination showed the growth of *M. canis* colonies in 56 of the 158 cats tested (35%). Four newborn cats showed many colony formations at all spikes of the hairbrush. On the basis of observations of the cultures, those producing five or more colonies on a single plate medium were suspected to have cutaneous infection (9 cats). For the remaining 47 cats, there

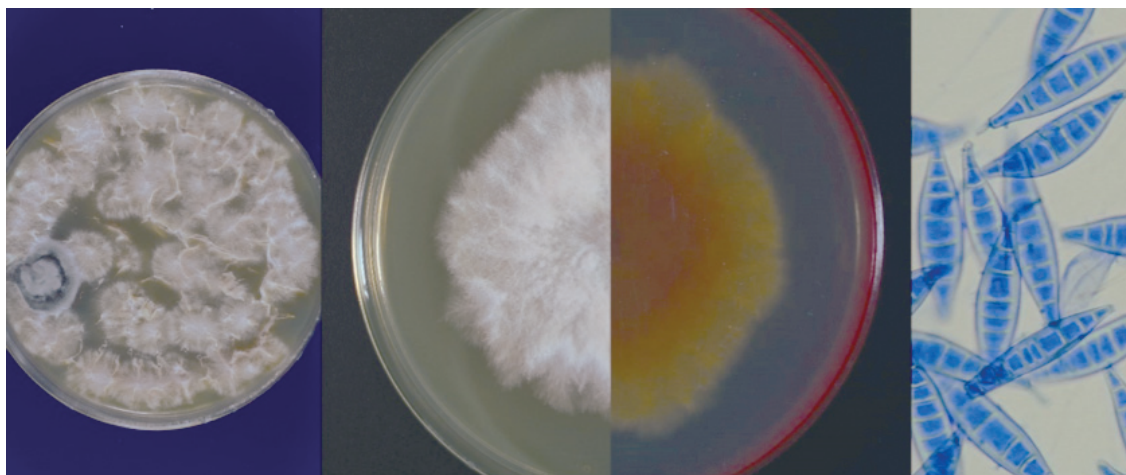


Fig. 4. Upon mycological examination, the hairbrush test showed colony formation at almost all spikes. Plate-culture and slide-culture results are morphologically consistent with *M. canis*.

Table 1. Results of the investigation of the breeding cats: correlations of hairbrush technique, hair loss, and Wood's light examination

Number of colonies using hairbrush technique	Hair loss-positive	Hair loss-negative	Wood's light-positive	Wood's light-negative
≥ 5 colonies (9 cats)	4 cats	5 cats	8 cats	1 cat
1-4 colonies (47 cats)	1 cat	46 cats	24 cats	23 cats
Negative (110 cats)	3 cats	107 cats	47 cats	63 cats

were no skin lesions, and the isolated colony counts were 4 or less. Thus, these isolates were considered to be saprophytic on cat hair. On physical examination, 8 cats exhibited hair loss, of which 4 showed formation of many colonies on hairbrush culture. Wood's light examination showed fluorescence in 79 of the 166 cats, mostly seen in the scales attached to hairs, and only 8 cats showed strong fluorescence in the hairs (Table 1).

Discussion

M. canis is a zoophilic dermatophyte and is considered to account for about 99% of feline dermatophytoses⁵⁾. The transmission route is direct contact infection through affected and reservoir animals or indirect contact infection through the fungus dispersed into the environment. In some cases, lesions may not be obvious because the fungus adheres to animal hair (saprophytic or transient adhesion). Therefore, it has been reported that animals with suspected *M. canis* infection should not be left untreated even in the absence of skin lesions due to the possibility of their being carriers⁶⁾.

In the present cases, the source of *M. canis* transmission was considered to be among the cats bred by the grandmother. The two sisters often played at the grandmother's cattery (Fig. 5). With the cooperation of the grandmother, her 166 breeding cats were investigated.

In the investigation, the issues potentially contributing to the disease transmission among the cats were thought to be: 1)



Fig. 5. Photograph of the cat-breeding environment.

The two sisters often played at the grandmother's cattery.

insufficient confinement of infected cats due to overbreeding; 2) incomplete treatment in many of the infected cats; and 3) the environment harboring a large number of carriers as a result.

The following steps are necessary as preventive measures against the spread of infection. 1) Conduct periodic observation using Wood's light to identify carriers and carry out thorough environmental hygiene practices (e. g., hand washing and use of disposable gloves). 2) In large-scale breeding of animals, divide the environment into three zones

(isolation of clinically affected animals, asymptomatic carriers, and healthy animals). 3) Treat infected animals according to the guidelines (twice weekly application of ITZ 25 mg per animal for 4–6 weeks via pulse administration), and use the hairbrush technique every 1–2 weeks to confirm two negative results and elimination of the infection^{7, 8)}.

In the investigation of the above cases and of the transmission source, the sisters were found to have developed tinea capitis caused by *M. canis* in a highly contaminated environment, but the other family members were not infected with the dermatophytosis. Therefore, young age and insufficient hair/scalp washing were considered to be causative factors. *M. canis* is known to be highly transmissible, but 65% of the cats investigated were negative for the dermatophyte despite the contaminated environment in which they lived. It was thus considered possible to prevent further spread of infection by practicing basic infection control and improving the environment.

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