

Family Pets as a Source of *Microsporum canis* Infection

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Summary

The present investigation confirms the zoonotic significance of *Microsporum canis* infection in five patients who had direct contact with diseased dogs and cats. Typical ringworm type lesions were mainly encountered on the exposed areas of the body. *M. canis* was isolated from the cutaneous lesions of man and infected pets; and also directly demonstrated in skin materials. However, the fungus could neither be recovered from the non-contact group nor from the saprobic environment. The isolates from man, dog, and cat showed similar gross as well as microscopic morphology. Further genetic studies also indicated that all the human and animal isolates of *M. canis* were (-) mating type. It is believed that transmission of zoophilic dermatophytes from animal to man occurs more commonly with direct exposure. In addition, the epidemiology and preventive measures are also discussed.

Introduction

Dermatophytosis (ringworm, tinea) is an important infectious, mycotic, zoonotic disease,^{1,7,19,25,29} is caused by three species of dermatophytes viz., *Trichophyton*, *Microsporum* and *Epidermophyton*.^{4,7} The infection is world-wide in distribution and is frequently reported from man and many species of animals.^{1,5,6,24}

Among zoophilic dermatophytes, *M. canis* has been considered as one of the important causative agents of tinea capitis and tinea corporis.^{6,7} Intra-familial infection due to *M. canis* is usually acquired from cats and dogs which act as principal

reservoir of this fungus.^{2,9,19,29,30} The present paper describes the anthroozoonotic significance of *M. canis* in persons who gave the history of continuous exposure with family pets.

Materials and Methods

A total of seventy-six skin specimens were obtained from 51 persons (37 contact and 14 non-contact), 20 dogs and 5 cats. The infected sites were sponged with 70% alcohol and scraped with sterile scalpel in the sterile paper/petri plate. The details regarding the name, age, sex, occupation, site of lesion, contact with animal etc. were

collected on epidemiological schedule especially designed for this study. Each specimen was mounted in a mixture of sodium hydroxide, Parker blue black ink and glycerol and examined microscopically for fungal elements. Samples were directly inoculated on to slopes of Sabouraud's dextrose agar with chloramphenicol (0.05mg/ml) and cycloheximide (0.5mg/ml) and rice grain medium, and incubated at 25°C for 30 days before discarding them as negative.

In order to find out the environmental prevalence of *M.canis*, 15 samples of surface soil from the vicinity of positive patients were collected into sterile plastic containers and examined for the fungus by hair-bait technique.²⁸⁾ Ten petri dishes of Sabouraud's medium were also exposed in the environment of 5 patients.

Sexual reproduction of 6 out of 10 strains of *M.canis* was studied on diluted sunflower agar with salts.²¹⁾ These isolates were crossed against mt "+" (MP-2005) and mt "-" (MP-2006) tester strains of *Arthroderma simii*. The sexual mating results were observed after two weeks at 20°C.

The identification of the organism was made in lactophenol cotton blue mount by studying the macroconidial characteristics.²²⁾

Results

The findings of this study are presented in Table 1 and 2. *M.canis* was cultured in pure and luxuriant growth from the hair and scales of 5 patients and 5 pet animals (Table 1).

All the five persons had direct contact with the sick animals. The fungus was not recovered from the non-contact group (Table 1). These patients gave no history of contact with pets.

The informations regarding the name of the patient, age, sex, occupation, site of lesions, contact with animals etc. are given in table 2. The lesions mainly occurred on exposed parts of the body such as face, arm, scalp, leg.

The skin scrapings with hairs in direct mounts showed branched, septate mycelium with arthrospores.

M.canis could neither be recovered from the air

Table 1. Isolation of *M. canis* from Hair and Scale Samples of Man and Animals

Source of specimen	Number examined	Number yielded growth on	
		Sabouraud's medium	Rice grain medium
Man (with contact)	37	5	5
Man (non-contact)	14	0	0
Dog	20	4	4
Cat	5	1	1
Total	76	10	10

Table 2. Age and Sex-wise Distribution of Ringworm Cases in Man

S.N.	Name	Age	Sex	Occupation	History of contact with animal	Site of lesions
1	A.K.G.	29yrs	M	Veterinarian	Dog	Fore arm
2	F.S.	21yrs	M	Animal attendant	Dog	Arm and fore arm
3	N.M.	13yrs	M	Student	Dog	Face and neck
4	S.B.	9yrs	F	Student	Cat	Lower leg
5	R.P.	7yrs	M	Student	Dog	Scalp

nor from the environmental materials.

Good growth of *M.canis* was observed on Sabouraud's and rice grain media at 25°C. All the isolates produced yellow to yellowish brown pigment which was more prominent on reverse side of the slant.

Microscopic examination of the isolates in lactophenol cotton blue mounts revealed many large, spindle shaped macroconidia and fewer small, clavate shaped microconidia.

Examination of growth from mated colonies showed globose cleistothecia, dichotomously branched, peridial hyphae. It was noteworthy that all the six isolates of *M.canis* when tested on modified sunflower seed medium, proved to "—" mating type.

Interestingly none of the isolates of *M.canis* both from man and animals revealed any difference in their cultural, morphological and sexual characteristics.

Discussion

The foregoing observations of this study clearly elucidated the direct zoonotic significance of *M. canis* as all the persons acquired ringworm infection from their family pets who were positive for the fungus. *M. canis* is frequently demonstrated as chief causative agent of dermatophytosis in cats and dogs.^{5, 19, 30} The pathogen has also been occasionally isolated from cattle, horse, lion, tiger, deer, monkey, fox, rabbit, guinea-pig and bird.^{1, 2, 5, 20, 23} Sometimes, animals may carry the fungus on their coat without any clinical signs²⁶ and act as an inapparent or asymptomatic carriers. The role of such carrier animals in the epidemiology of the disease should be further studied as they may pose a potential threat to human health.

Dermatophytoses in domestic, pet, laboratory, zoo and wild animals are of paramount public health importance since the animals are the main reservoirs of zoophilic dermatophytes.^{1, 2, 10, 12, 13, 17,}

¹⁸) The disease constitutes an occupational hazards to those who either work in close contact with animals or with their bye-products. However, in a recent study, Chatterjee and coworkers³) reported that no isolations of zoophilic dermatophytes could be achieved from the persons who had no history of exposure with sick animals, whereas contact group yielded significant numbers of *T. verrucosum*, *T. mentagrophytes* and *M. nanum*. Similar findings have been recorded in the present investigation where *M. canis* was not isolated from the persons who had no apparent association with dogs and cats. Sporadic as well as epidemic of *M. canis* infection has been described in persons^{8, 14, 15, 19}) who had direct contact with animals. The role of animals as vector of dermatophytes has been discussed by Georg¹¹) who mentioned that fifty percent of the ringworm cases gave a history of exposure with pets.

The epidemiological investigation indicated that all the five patients contracted ringworm infection from diseased dogs and cats. The skin scrapings from the family pets were found highly positive for *M. canis* both by culture and direct microscopy. The significance of different fomites such as bedding, carpet, sofas, furniture, basket, wollen garment etc. as potential transmitter of dermatophytes has been described by Mackenzie¹⁶) and De Vroey.⁶) An interesting case of ring worm due to *Arthroderma simii*(mt-) in a 3-year-old female child has been recorded by De Vroey.⁶) The girl had contracted the ringworm infection from the clothes of her young mother who was working in a Mycology Laboratory. Hence, the possibility of saprobic reservoir in the indirect transmission of zoophilic dermatophytes should be considered.

The isolation of *M. canis* from the air²⁷) indicates that arthrospores after being shed from the infected crust become air-borne and may contaminate non-living objects. The dissemination of infective particles may however, pose a great environmental hazard. We still do not know the exact survival of *M. canis* arthrospores not various fomites. The

conditions which favour the transmissibility of infective inoculum from inanimate objects to man are not well understood. It seems imperative to undertake further detailed studies on the ecological association of *M. canis* with different saprobes.

Since dermatophytosis is an important public health problem, effective measures should be instituted to prevent the occurrence of the disease. Nevertheless, an early diagnosis, prompt treatment, detection of reservoir, avoid contact with sick animals, proper formalization of fomites and health education would certainly help to reduce the prevalence and incidence of this fungal anthroponosis which is cosmopolitan in distribution.

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Microsporum canis 감염원으로서의 애완동물

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요 약

*Microsporum canis*에 감염된 개 및 고양이와 직접 접촉한 경험이 있는 5명의 환자를 조사하여 동물기생체로서의 이 진균의 중요성을 확인하였다. ring worm의 전형적인 병변은 신체의 노출된 부위에만 발생하였다. *M. canis*는 환자와 감염된 애완동물의 피부병변에서 분리되었으며 피부 시료로부터 직접 증명되었다. 그럼에도 불구하고 비접촉군과 死物性環境으로부터는 증명되지 않았다. 사람, 개 및 고양이에서 분리된 진균들은 육안적으로나 현미경적으로 서로 비슷한 형태를 나타내었다. 이 진균들의 유전학적 연구결과는 교배(-)형이었다. 동물기호성 표재성진균의 전염은 직접적인 접촉에 의해 자주 일어나는 것으로 사료된다. 이 감염증에 대한 역학과 예방방법에 대해 고찰하였다.