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Isolations of dermatophyte from clinically normal scalps in *M. Canis* infections using the hairbrush method

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Abstract

The scalp hair of patients with dermatophytosis due to *M. canis* but without scalp lesions, and that of their family members without dermatophytosis were examined using the hairbrush method. The dermatophyte was detected in 93.8% of the scalps of those who lived in homes where cats were kept, and in 25% of those without cats. After the source of infection had been treated, the dermatophyte showed a gradually decreasing presence, finally disappearing altogether, so that no case of the disease on the scalp hair could be found.

We inferred from the above findings in *M. canis* infections that, since the dermatophytes are seen in a high proportion of cases without scalp lesions, the dermatophytes, in many cases, exist only as saprophytes on the hair.

Introduction

The infectiousness of dermatophytes varies with the species concerned. *Microsporum canis*, which has recently become widespread in Japan, is extremely infectious, and infection of all family members is common. Yamamoto [6] isolated a large amount of this fungus from house dust, and demonstrated that it was widely distributed within the patient's home. To study the spread of this dermatophyte we examined patients with dermatophytosis but without scalp lesions, and the scalps of their family members, using the hairbrush method.

Subjects

The subjects of this study were patients with dermatophytosis due to *M. canis* but without scalp lesions, and their healthy family members. They were examined in the Department of Dermatology, School of Medicine, Tokyo Medical and Dental University, between January 1987 and September 1988. The distribution of these subjects follows:

Thirty six subjects from 12 households were studied. Thirty were adults, and 6 were children. Eleven had tinea corporis, while in the remaining 25, no lesions were observed. Seven households (accounting for 16 subjects) kept one or more infected cats, but the other five households (20 subjects) had no cat.

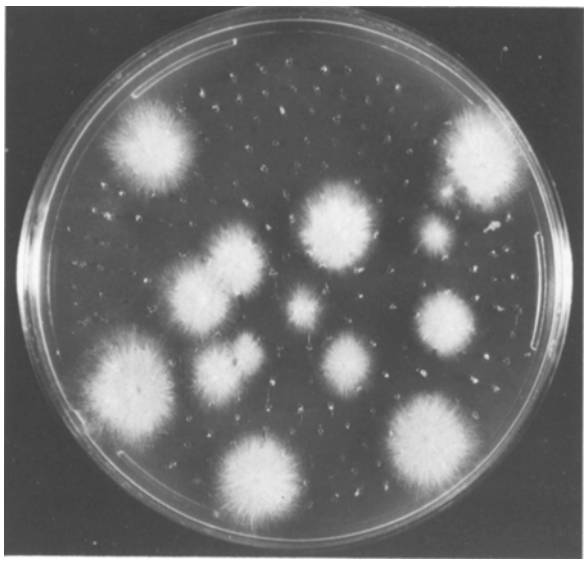

Fig. 1. Culture for dermatophytes using the hairbrush method. *M. canis* was cultured from 15 bristles.

Methods

The modification made by Rosenthal *et al.* [5], Ive [1], Midgley *et al.* [4] and Yamamoto [6] to the hairbrush method of Mackenzie [2, 3] were followed. Thus, a round plastic scalp massage brush with a diameter of 8.5 cm and with 232 bristles, was brushed 10 times through the hair. Then it was pressed into Sabouraud's cycloheximide-chloramphenicol medium in a petri dish, which was incubated at 26 °C for two weeks (Fig. 1). Cultures were performed at the time of the initial examination, and approximately every one or two weeks during and after treatment.

Results

Cultures at initial examination. In the five households that did not keep a cat, we examined three patients with tinea corporis and 17 healthy family members. The dermatophyte was detected in five cases (25%). In the seven households that kept cats, on the other hand, examinations of eight patients with tinea corporis and eight family members, revealed the presence of the dermatophyte in 15 cases (93.8%).

Cultures during and after treatment. In a total of 11 patients with tinea corporis, one child and three adults in whom the disease was widespread were treated systemically with griseofulvin or itraconazole, and the others were given topical antimycotics only on the lesions. The 25 family members who did not have tinea corporis received no treatment. The infected cats were also given griseofulvin systemically.

No patients who were negative for dermatophytes at the initial examination became positive during and after these treatments, and no case of the disease in the scalp was seen. In those patients who were positive at the initial examination, the presence of the fungus was reduced, and all cases who were followed for a long period of time eventually became negative, and there was not one case of the disease in the scalp.

The dermatophyte positive period was between one and five weeks (mean: 3 weeks) in the five cases living in homes without cats. Only eight cases from households with cats could be followed, but the dermatophyte positive period was from four to eight weeks, with a mean of six weeks. Comparison of cases by type of treatment showed that the four patients treated with griseofulvin or itraconazole were positive for between four and eight weeks (mean: 5.3 weeks), those three given topical antimycotic treatment were also positive for between four and eight weeks, but the mean period was 6.7 weeks, and the six untreated cases were positive for between one and six weeks (mean: 3.7 weeks).

Discussion

The 'hairbrush method' was devised by Mackenzie [2, 3], and was later used for investigations by Rosenthal *et al.* [5], Ive [1], Midgley *et al.* [4] and Yamamoto [6]. The principal characteristics of the hairbrush method are these: Since the removal of hair is unnecessary, the execution is very quick, and no pain or discomfort for the subject is involved. The technique can therefore be used for children and animals, as well as adults. Moreover, it is suitable in areas without lesions and for posttreatment examinations.

We employed the hairbrush method in the present study for scalp hair examinations of patients with dermatophytosis due to *M. canis* without scalp lesions and of their healthy family members. In the present study the dermatophyte was detected in 55.6% of the patients. Midgley *et al.* [4], in their similar study of the scalp hair of patients with dermatophytosis without scalp lesions detected dermatophytes in 5.6% of *Trichophyton rubrum* cases, 19.6% of *Epidermophyton floccosum* cases, and 5.4% of *T. mentagrophytes* cases. The rate of detection of the dermatophyte in *M. canis* infections is therefore considerably higher than in other infections. Dermatophytes are present in the environment where there are patients with *M. canis* infections, and large amounts of the fungus can be retrieved from the house dust of the dwellings of such patients [6]. Moreover, the findings of the present study show that where *M. canis* infection is present in the household, this dermatophyte could be isolated from clinically normal scalps of other family members, with more isolations occuring in households where cats are present.

Yamamoto *et al.* [7] detected dermatophytes by using the hairbrush method in patients with tinea corporis due to *M. canis*, but without scalp lesions. Since tinea capitis superficialis appeared after approximately two months in these cases, the initial examination was inferred to have been conducted within the preclinical latent stage. On examining children in Nigeria by the hairbrush method, Ive [1] detected dermatophytes (mostly *M. audouinii*) in 24.7% of subjects without scalp lesions. Four months later, tinea capitis was present in 21.1% of the dermatophyte-positive cases. In another 42.1%, no lesion was seen, but since these children were still positive for the dermatophytes, they were considered to be persistent carriers.

It was thought, however, that most of the positive cases in our study were not at the preclinical latent stage, and were not persistent carriers. Rather, they were at an earlier stage, at which the fungus persist merely saprophytically on the hairs of the scalp, without either reaction from the host or proliferation of the fungus. The reasons to support this supposition were: (1) Tinea capitis superficialis and kerion celsi did not appear, even when the case was followed for some time. (2) Oral administration of antimycotics did not alter the time taken for a dermatophyte-negative result to be obtained, and thus appeared to depend upon the amount of fungus in the environment, rather than on the proliferation of the dermatophyte itself.

Tinea capitis superficialis and kerion celsi due to *M. canis* are overwhelmingly more common in children than in adults. However, cases in which the fungi were detected in the scalp hair were seen in both children and adults. Thus, up to the saprophytic stage of fungus, the same process appears to be in operation, but the factors that determine whether the disease will occur or not in the two groups are believed to be entirely different, although the factors are still unknown.

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