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DERMATOPHYTES ISOLATED FROM TINEA PEDIS

(Tinea pedis / *Trichophyton rubrum* / *Trichophyton mentagrophytes*)

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We attempted to isolate dermatophytes from different forms of lesions of tinea pedis. From the 134 lesions, 57 strains of dermatophytes were obtained. The most frequent isolates from the lesions of intertriginous form were *Trichophyton rubrum*, from those of vesiculobullous form, *Trichophyton mentagrophytes* was most frequently isolated.

Tinea pedis is the most common type of dermatophytosis throughout the developed countries including Japan (1-5). Our previous study showed that tinea pedis is also the most common type of dermatophytosis in Izumo City and its vicinity in Japan (6). Thus the present epidemiological study is focused only on tinea pedis, but it is more precise than the previous study.

MATERIALS AND METHODS

Patients diagnosed to have tinea pedis by the discovery of hyphae in the scrapings using a solution composed of 20% KOH and 50% Parker Quink (3,6) were studied. The patients studied were all those seen in our dermatological clinic during the period between May 22, 1985 and May 31, 1986. They were all residents of Izumo City and its vicinity, located in the eastern area of Shimane Prefecture, Japan. For each patient, age, sex, sites of involvement and cutaneous findings were recorded. The scraping from each patient was cultured on Sabouraud's glucose agar plates containing 50μg/ml of chloramphenicol (Sankyo Co., Tokyo) and

500 μg/ml of cycloheximide (Sigma Chemical Co., St. Louis, U.S.A.) at room temperature for 4 weeks (6,7). When the fungal colonies grew, slide cultures were carried out (6,8). The species of dermatophyte was determined by the characteristics of the colony on the agar plate and of the fungal elements on the slide culture(9).

RESULTS

During the one year studied, 253 patients with dermatophytosis came to our clinic. Among them, those with tinea pedis were 134, or 53.0% of all dermatophytotic patients. The patients included 68 males and 66 females (Table 1). Their ages were distributed between 3 and 77 years (47.7 years in average)

Table 1. Numbers of tinea pedis patients according to sex and side of feet involved in each clinical form

Clinical Forms	Sex		Involved Sides			Total
	Males	Females	Right	Left	Bilateral	
Vesiculobullous	21	24	6	7	32	45
Intertriginous	31	25	14	11	31	56
Hyperkeratotic	1	1			2	2
Mixed	15	16	7	5	19	31
Total	68	66	27	23	84	134

Table 2. Numbers of strains of dermatophytes isolated from different forms of tinea pedis

Clinical Forms	*Trichophyton rubrum*	*Trichophyton mentagrophytes*	*Trichophyton violaceum*	*Epidermophyton floccosum*	Undetermined	Total
Vesiculobullous	6	8		1	1	16
Intertriginous	21	4	1	2		28
Mixed	5	5		2	1	13
Total	32	17	1	5	2	57

in males, and between 15 and 72 years (44.5 years in average) in females.

Table 1 also shows the numbers of patients with the different clinical forms of tinea pedis. The most frequent form was the intertriginous one (56 patients), which was followed by the vesiculobullous form (45 patients). The number of patients with the hyperkeratotic form was only 2. The number of patients with more than one form of tinea pedis was 31. The number of patients with lesions on the bilateral feet was a little more than half of all patients with any form of tinea pedis. No difference in the frequency with which the lesions were developed was seen between the right and left sides of the feet. In the patients with intertriginous form, the 4th interdigital space was the most frequently involved and the least frequently involved was the 1st interdigital space.

From 134 lesions, 57 strains of dermatophytes (42.5%) were grown on culturing. In table 2, the numbers of the different species of dermatophytes isolated from the clinically different forms of tinea pedis are shown. From only one lesion of intertriginous form, *Trichophyton rubrum* and *Trichophyton mentagrophytes* were both isolated. From each of the other lesions, only one strain was isolated. The 57 strains of dermatophytes isolated from tinea pedis in the present study were composed of 32 strains of *Trichophyton rubrum* (56.1%), 17 of *Trichophyton mentagrophytes* (29.8%), 5 of *Epidermophyton floccosum* (8.8%), 1 of *Trichophyton violaceum* (1.8%), and 2 of dermatophytes of undetermined species (3.5%). The most frequent isolates from the lesions of intertriginous form were *Trichophyton rubrum* (75.0%), and from those of the vesiculobullous form *Trichophyton mentagrophytes* was most frequently isolated (50.0%). Since, in the present study, only two patients with hyperkeratotic form were seen, we could not obtain any reliable data on this form.

DISCUSSION

In our study, the most frequently isolated organisms from tinea pedis were *Trichophyton rubrum* (56.1%), which was followed by *Trichophyton mentagrophytes* (29.8%). This suggests that the most frequent causative organisms of tinea pedis are *Trichophyton rubrum* , the second most frequent are *Trichophyton mentagrophytes*.

This situation is almost coincident with the findings of many studies in Japan and some other Asian countries and in the United States (4,10-12). However, the most frequent isolates from tinea pedis lesions in Africa, Latin America, Australia and Europe are not *Trichophyton rubrum*, but *Trichophyton mentagrophytes* (13). The prevalent conception of the history of *Trichophyton rubrum* is that it was originally endemic in East Asia and some parts of the United States (13) and that the movement of people during and after World War II has caused its spread to other parts of the world. However, in Africa, Latin America, Australia and Europe, *Trichophyton mentagrophytes* is still most frequently isolated from tinea pedis.

In the present study, *Trichophyton rubrum* was the most frequent isolate from the lesions of intertriginous form (75.0%), and *Trichophyton mentagrophytes* was most frequently isolated from those of the vesiculobullous form (50.0%). These results indicate that the most frequent causative organisms of the intertriginous form are *Trichophyton rubrum*. Those of the vesiculobullous form are *Trichophyton mentagrophytes*. This suggests that the species of causative fungi are different among different forms of tinea pedis. We could not find any recent publications describing the relationship between species of infected fungi and forms of tinea pedis. The present study shows that epidemiological studies on tinea pedis should be performed on each of the different forms respectively. In Japan, the number of patients with tinea pedis has been confirmed to be continuously increasing in recent years (5,11). This situation is probably due to the habit of wearing shoes, which produces a humid environment on the feet. Thus for the hygiene of the skin of the feet, further epidemiological studies on tinea pedis in many areas of Japan are important, especially on the relationship between species of causative dermatophytes and forms of tinea pedis.

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