

# THE FREQUENCY OF TINEA PEDIS IN PATIENTS WITH TINEA CRURIS

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**Abstract** - The frequency of tinea pedis in patients with tinea cruris has not been elucidated. The main objective of this study is to define this frequency. All patients referred to the Mycological Laboratory of Razi Hospital, Tehran, during a 3-month period in 1997, who had a positive KOH smear for dermatophyte in the groin area were included in the study. A culture from this site, and a smear and culture from the foot (regardless of the presence of any lesion), were performed. Sixty patients (46 males and 14 females) entered the study. *Epidermophyton floccosum* was the most frequent isolated fungus in tinea cruris. Four patients (6.4%) had concurrent tinea pedis proved by smear and culture; and the sole isolate from the foot, was *Trichophyton mentagrophytes*. In three of them, the corresponding dermatophyte in the groin was *E. floccosum*. In this study, the frequency of tinea pedis in patients with tinea cruris was low.

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**Key Words:** Dermatophytes, dermatophytoses, tinea cruris, tinea pedis.

## INTRODUCTION

Tinea pedis may serve as a reservoir for tinea cruris (1,2,3), especially in *T. rubrum* infections (1,4). This species is the most common cause worldwide of tinea cruris and tinea pedis (2,5,6,7,8,9). Although the presence of fungal infection of both the foot and the groin is mentioned in different texts and articles, we couldn't find any actual percentage regarding the frequency of tinea pedis in patients with tinea cruris. This frequency is expressed imprecisely as "numerous cases" (5), "frequently" (10) "usually" (2,11) and even "nearly always" (12) in some books.

This study was undertaken to determine the frequency of tinea pedis in patients with tinea cruris in Razi Hospital (a major referral center for skin diseases in Tehran, Iran), during a 3-month period.

## MATERIALS AND METHODS

The population under study included all patients suspected with tinea cruris who were referred to the

Mycological Laboratory, Razi Hospital, Tehran, by dermatologists, and had a positive KOH smear for dermatophytes from the groin. The study was performed during a 3 month period from July 23, till October 22, 1997. A culture from the groin and a smear and culture from the foot, were performed. Any clinically suspected lesion, if present, was chosen for foot sampling. If not, the lateral toe webs (the most common site in tinea pedis) were scraped. The sampling, and interpretation of smear and culture were performed by an expert mycologist (MFS). KOH 20% was used for smear and the Sabouraud - Dextrose Agar - Chloramphenicol - Cycloheximide as the culture medium. Demographic data (age, sex), duration of disease, the presence of suspected foot lesion, the presence of foot symptoms, exercise, use of communal bath, personal and family and associated history of fungal infection, and body mass index were all recorded. The data were analyzed by Epi-info 6.

## RESULTS

Our study included 60 cases of tinea cruris. Forty-six (76.7%) patients were male and 14 (23.3%) female with a male to female ratio of 3.3:1. The mean age was 33.6 + 12.8 with the age range of 18-65 years. 53.3% (32 cases) were under 30 years of age. 36.6% (22 cases) and 10.1% (6 cases) were between 30-50 and older than 50, respectively.

Only 20% (12 patients) of our cases used communal baths. Thirteen cases (21.7%) exercised regularly and 19 cases (31.7%) irregularly; the remainder never exercised. The duration the disease was between 1-4 weeks in 35% (21 cases), 1-6 months in 51.7% (31 cases) and longer than 6 months in 13.3% (8 cases) of patients. Nine cases (15%) had a past history of fungal infection and 14 cases (23.33%) gave a present history of fungal infection in their family or among their associates. A suspected dermatophyte lesion was noted in 18.3% (11 patients) in the foot and 15% (9 cases) complained of symptoms such as itching and burning. Mild obesity was noted in 32.5% (20 cases) of the patients: 10.1% (6 cases) were moderately obese (30 < BMI < 40) and the remainder were not.

The results of culture of the groin were as follows

(Table 1) : 65% (39 cases), *E. floccosum*; 18.3% (11 cases) *T. mentagrophytes*; 6.7% (4 cases), *T. verrucosum*; 3.3% (2 cases), *T. rubrum*. In 4 of the smear positive cases, no fungus was isolated. Of the 60 cases of tinea cruris, only 4 (6.7%) had a positive smear for dermatophyte in their foot. The culture revealed *T. mentagrophytes* in all these 4 patients, and *Candida albicans* was grown in 2 (3.3%) additional cases. The culture results of the groin in patients with tinea pedis were as follows (Table 2): *E. floccosum* in 3 cases and no growth in one. *T. mentagrophytes* were not isolated from the groin in any of these cases.

The patients with tinea pedis were 18, 45, 54 and 60 years old. All of them were male, 3 of them never used communal baths, 3 patients exercised regularly and 3 patients had tinea cruris for longer than 6 months. One case had a positive family or associate history of active fungal infection. 2 patients had a past history of fungal disease. All of the four patients had a suspected lesion in the foot on physical examination; they had symptoms attributable to tinea pedis as well.

Twenty - five cases (64.1%) of tinea cruris infections with *E. floccosum* exercised: this frequency in the remaining cases was 33.3% (7 cases) and the difference was significant with a P value of 0.02 and risk ratio of 1.92.

**Table 1-** Relative frequency of various dermatophyte species in tinea cruris, Razi Hospital, 1997.

Species	Frequency
<i>E. floccosum</i>	39 (65%)
<i>T. mentagrophytes</i>	11(18.3%)
<i>T. verrucosum</i>	4 (6.7%)
<i>T. rubrum</i>	2 (3.3%)
No growth	4 (6.7%)
Total	60 (100%)

**Table 2-** The isolated dermatophyte species in patients with both tinea cruris and pedis, Razi Hospital, 1997.

No/age(y) /Sex	Groin	Foot
1/18/M	<i>E. floccosum</i>	<i>T. mentagrophytes</i>
2/45/M	<i>E. floccosum</i>	<i>T. mentagrophytes</i>
3/54/M	<i>E. floccosum</i>	<i>T. mentagrophytes</i>
4/60/M	No growth	<i>T. mentagrophytes</i>

## DISCUSSION

*T. rubrum*, *T. mentagrophytes* and *E. floccosum* are considered the three most common agents involved in tinea pedis and tinea cruris, worldwide (2,3,5,6,13). But the relative numerical importance of these main species is different (5) and has been changing over the past decades (2,6). In the 70's, the most common agent in tinea pedis and tinea cruris were *T. mentagrophytes*

and *E. floccosum*, respectively. In most parts of the world, these two species are replaced by *T. rubrum* during 80s and 90s, (2,6). Historically, *T. rubrum* was endemic as chronic tinea corporis in Africa and Southeast Asia. In the late nineteenth century, it found a new population group, European soldiers and colonialists, and a new ecological niche, the shod foot. Slaves and their masters probably took it to America. The species has since spread throughout the world, especially during the world war II(2) and is now the most common dermatophyte (2,6). However, the dermatophyte profile in Iran follows the world pattern seen in 70s for both tinea cruris and pedis: concordant with other studies from Iran (14-19), in our series, the most common agent in tinea cruris was *E. floccosum*, and in tinea pedis, *T. mentagrophytes*. It is remarkable that in Saudi Arabia (20,21), Italy (22), and Spain (12) *E. floccosum* was the most common pathogen in tinea cruris, followed by *T. rubrum*, in the first two countries.

The isolation of *T. verrucosum* in tinea cruris is noteworthy. Although the relative frequency of this zoophylic dermatophyte was 4.5% in patients with tinea cruris in Shokoobi's report (16) and the fact that Chadeghani found that this species was the commonest pathogen in dermatophytosis in Isfahan (15), this finding in an urban population is remarkable. The presence of cattle breeding centers in suburban areas of Tehran, the refereral nature of Razi Hospital, and increased traveling during summer months to villages, may be responsible.

An important epidemiological consideration in tinea cruris is the role played by dermatophytoses elsewhere on the body in providing a reservoir for autoinfection (1,2,3,5,10,11,12). The most common association in tinea cruris and pedis is caused by *T. rubrum* (1,4). Only 4 patients (6.4%) with tinea cruris had tinea pedis, and surprisingly, with different species: *T. mentagrophytes* was the sole isolate from the foot, and *E. floccosum* the corresponding fungus from the groin in 3 of 4 cases (in one patient no growth was seen). This situation reflects concurrent infection in the foot and groin, with two different species (at least in three cases). No culture revealed *T. rubrum* co-infection. The low frequency of tinea pedis in our study could be explained as follows: 1) the role of *T. rubrum* is especially emphasized in infections involving both the feet and groin. In Iran, as stated above, unlike the present situation worldwide, *T. rubrum* is not the predominant pathogen in tinea cruris and pedis. 2) improvement of hygienic standards in recent decades and earlier treatment may have decreased the chance of widespread infections.

Demographic data of the population of our study are consistent with other results. For example 53.3% of patients with tinea cruris were young adults in the age range of 18-30 years. As stated in most references,

tinea pedis is commoner in middle age (5). The mean age in our survey was 44.2 years. Males outnumber females in patients with cruris by a ratio of 3.3:1, consistent with other reports (5,9,14,20). In tinea pedis, all of our 4 patients were male, but the paucity of cases does not allow further comment.

Communal bathing facilities are always considered important in the transfer of fungal infections especially tinea pedis (1,3,5). Only 20% of cases with tinea cruris and one of the four patients with tinea pedis used communal baths. This frequency was 13% in patients with dermatophytoses in Bahrami-Abedini's study (23).

Exercise is a predisposing factor for dermatophytoses especially tinea cruris and tinea pedis (1,5). 53.4% (32 cases) of our patients with tinea cruris, and 3 of the 4 tinea pedis cases, performed exercise. The relationship of exercise and tinea cruris with *E.floccosum* was significant with a Pvalue of 0.02, and relative risk of 1.92. Further studies are necessary to evaluate the predisposing role of exercise in tinea cruris with *E.floccosum*.

Three of the 4 cases with tinea pedis in this study had tinea cruris for longer than 6 months. This frequency in the tinea cruris group was, 13.3% moreover 3 of 4 patients with tinea pedis had a family or associated history of dermatophytoses compared with the frequency of 15% seen in the whole study group. The presence of fungal infection in family members or close associates is considered a route for acquiring dermatophytoses: 23.4% of our cases were positive for such a history.

All patients with tinea pedis had a suspected foot lesion and complained of symptoms from their foot. This proves the fact that dermatophytes are not part of the normal flora of the foot and healthy carrier state is not possible for dermatophytes (5). Dermatophyte infection in the foot is exceptional without respective signs and symptoms.

Obesity is considered a risk factor in tinea cruris, and in high risk patients for tinea pedis, weight reduction is recommended (3). In this study, none of the those with tinea pedis, and only a minority of those with tinea cruris, were obese.

The culture was positive in 100% of patients with smear - positive tinea pedis, and in 93.3% of the positive smears of the groin. These values underline the high quality of the culture techniques.

Finally, it's important to mention that despite the relatively low frequency of tinea pedis in our patients with tinea cruris, we still recommend a search for this association in clinical practice.

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