

Asymptomatic and transient dermatophyte carrier state on the skin of university students

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Abstract

Introduction. The transient or permanent presence of dermatophytes in asymptomatic individuals has been evidenced in numerous works.

Objective. The purpose of this work was to assess the likelihood of asymptomatic dermatophyte carrier state, and its persistence in the right foot fourth interdigital space in students of the Mycology course at Facultad de Ciencias Exactas of Universidad Nacional de La Plata during 2006.

Materials and methods. The 27 volunteers received instructions for preparation in advance to the sample collection; none showed lesions compatible with dermatophytosis. Samples were obtained by syndesmotom scraping, inoculation in Sabouraud dextrose agar with chloramphenicol and cycloheximide, and in lactrimel with chloramphenicol, and incubated at 28 °C for 21 days before discharged as negative.

Results. Culture of 3 samples (11 percent) developed colonies of Trichophyton mentagrophytes. No dermatophytes developed from samples obtained five months later from these carriers.

Conclusions. The presence of dermatophytes in asymptomatic individuals is relevant from the epidemiologic standpoint and may also suggest a latent infection, which in favorable conditions could give rise to clinical manifestations of the disease and require antifungal treatment. The transient and asymptomatic feature of the dermatophyte identification could be related to local changes of the skin of the feet in the summer months (Dermatol Argent 2008;14(4):288-291).

Key words: dermatophyte carrier state, dermatophytes, superficial mycoses.

Introduction

Dermatophyte fungi are considered primary pathogens causing superficial mycoses known as dermatophytosis or tinea, that affect skin, hair, and nails in different locations.¹ Notwithstanding this consideration, numerous works have established transient or permanent presence of these fungi in asymptomatic individuals.²⁻⁸ The presence of dermatophyte species in healthy individuals is relevant from the epidemiological, pathological, and therapeutic standpoints, since the affected persons may not only transmit the disease to other susceptible individuals, but also suffer the disease in favorable conditions.⁹ Local treatment of the carrier state may be an efficacious infection control measure.¹⁰ The purpose of this work is to determine the presence and persistence of dermatophyte fungus in the right foot fourth interdigital space of a group of asymptomatic university students taking the subject Mycology at Facultad de Ciencias Exactas of Universidad Nacional de La Plata (UNLP) during the second semester of 2006. As secondary objective, the growth rate and fructification development of the isolated dermatophytes was determined in different culture media employed.

Materials and methods

Sixty three students taking the subject Mycology at Facultad de Ciencias Exactas of Universidad Nacional de La Plata during

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the second semester of 2006 were called to participate in this study. Twenty seven students voluntarily agreed to participate in this study and reported their consent. All participants prepared the skin in advance to the collection of samples.¹¹ Briefly, during the three days prior to the sample collection, each participant washed daily the skin with salty water, during the previous 15 days discontinued application of antifungal or corticosteroid creams, and presented themselves at the sample collection without talc or creams on that area of the skin. Before collecting the samples, a visual inspection revealed absence of lesions compatible with dermatophytes in all participants.

Samples were collected from the right foot fourth interdigital space by scraping performed with a syndesmotom, previously immersed in a container with alcohol and flamed with the burner flame.

The collected flakes were placed between two sterile slides. A potion was used to perform a fresh preparation in 20% potassium hydroxide (KOH) for direct microscopic examination. The other portion of the sample was cultured in 2 test tubes containing Sabouraud agar slant supplemented with chloramphenicol (250 mg/l) and cycloheximide (400 mg/l), and lactrimel supplemented with chloramphenicol (250 mg/l).

The tubes were incubated for 21 days at 28 °C and then visually examined for fungal growth. Microscopic morphology of colonies compatible with dermatophytes was studied in wet dissociated preparations in lactophenol blue.

Results

Only 27 (42.8 percent) of the 63 students convoked to participate were enrolled in the study. Participants were 5 male and 22 female, with an average age of 24 (range: 22-26) years.

Direct microscopy of the samples did not reveal dermatophytes in any of them. Three (11 percent) of the 27 samples studied in October 2006 developed colonies of *Trichophyton mentagrophytes* (Figure 1). No dermatophyte was recovered from the three *T. mentagrophytes* carrier students, two of them male, in a sample obtained 5 months later, in March 2007.

No difference in colony growth rate was observed for the isolated dermatophytes in both culture media employed; however, fructification structures were more abundant in lactrimel.

Six of the materials cultured in lactrimel with chloramphenicol developed colonies of yeasts (n = 4) and of non-dermatophyte mycelial fungus (n = 2), while 2 samples cultured in Sabouraud agar supplemented with chloramphenicol and cycloheximide developed yeast colonies.

Discussion

The obtained results showed the existence of individuals who are dermatophyte carriers on the skin of the feet; in the three cases, the identified species was *T. mentagrophytes*.

Traditionally, based on the gross (cotton-like aspect) and mi-

croscopic (abundant spherical and oval acuminate microconidia), two varieties were recognized within this species: *T. mentagrophytes*, from animals, and *T. interdigitale*, from humans.¹² Currently, molecular studies have differentiated two species, *T. mentagrophytes* (*T. mentagrophytes* var. *quinckeanum*) and *Trichophyton interdigitale* (including the animal *mentagrophytes* and the human *interdigitale* varieties).¹³ Differentiation of the human and animal strains only taking into account morphological features is very difficult, therefore the three isolations were identified as *T. mentagrophytes* (*T. interdigitale*).

Carrier state of dermatophytes has been reported in populations of athletes such as swimmers and marathon runners, with values of 5.3 to 10.6 percent, respectively,^{3,5} and in both studies the most frequently found species was *T. mentagrophytes*.

In a study from the Universidad del Valle de Cali (Colombia), in students with tinea pedis and asymptomatic, Alvarez et al.⁶ found dermatophytes in 10.5 percent of the samples. One third of all isolations were obtained from asymptomatic individual samples, and *T. mentagrophytes* was the most frequently isolated species. Similarly, Díaz et al.⁷ found 7.6 percent dermatophyte carriers in hospitalized patients in Hospital del Salvador, in Chile, and *T. mentagrophytes* and *T. rubrum* were the most frequently recovered species.

In our country, Bonardello et al.⁸ investigated the presence of healthy dermatophyte carriers in an adolescent and adult population of a sports center of the Province of San Luis. 8.7 percent of the samples had dermatophytes, and the isolated species were *T. mentagrophytes*, *T. rubrum*, and *Epidermophyton floccosum*.

Of the 27 participating students, 22 were females, and of the 3 dermatophyte carriers found, 2 were male. This fact would suggest greater male carrier ability for this fungus. However, this finding can only be regarded as an approximation, due to the scarce number of evaluated individuals.

Noteworthy is the asymptomatic presence of *T. mentagrophytes* in these three cases, as well as in other studies, which could be associated to factors determining a greater adaptation of this dermatophyte to human tissues.^{1,14} This species produces small amounts of proteases, with low inflammatory response in tissues where it is well adapted.¹

Additionally, these carrier individuals could be susceptible to dermatophytes in favorable local conditions, such as the increase of humidity and temperature in the area, the use of occlusive shoes, local application of corticosteroids, excoriations produced by other infectious or non-infectious processes, or other underlying systemic diseases.

Regarding the possibility of treating these healthy carriers, it would be a desirable measure, even if they do not have lesions, since they could transmit dermatophytes to other individuals.¹⁵

From the mycological standpoint, no difference in the growth rate of the isolated dermatophyte colonies was observed in both culture media employed, although the presence of conidia was more evident in lactrimel agar.



Figure 1. First replica culture of original isolations of *T. mentagrophytes* obtained from right foot fourth interdigital spaces of the three asymptomatic carriers.

The use of Sabouraud agar with cycloheximide gave rise to the development of a smaller amount of non-dermatophyte contamination, compared to lactrimel agar; but this antifungal agent must be used with care in practice, because it inhibits some opportunistic fungal species which may cause superficial mycosis.

Presence of dermatophytes in the three asymptomatic carriers appeared to be a transient condition, since these fungi were not isolated in the samples collected 5 months later. The change in local conditions of temperature and humidity in the skin of the feet, caused by the use of different shoes during the summer months, may explain the absence of dermatophytes in the

second set of samples. However, this hypothesis should be confirmed in a later study.

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