



BRIEF REPORT

Epidemiological and etiological characterization of superficial mycoses in a general hospital in Buenos Aires



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Abstract Superficial mycoses are prevalent worldwide. This study analyzed their epidemiology and etiological agents in a general hospital in Buenos Aires. A descriptive, retrospective, and observational study was conducted, including 1584 patients and 1726 samples processed between September 2021 and June 2024. Overall, 57.5% of the samples were positive. Dermatophytosis accounted for 91.3% of the isolates, mainly affecting adult women and pediatric patients. The most frequent clinical manifestations were onychomycosis (66%), *tinea corporis* (17%), and *tinea capitis* (14.5%). The predominant species were *Trichophyton rubrum* (50.1%), *Trichophyton tonsurans* (36.0%), and *Microsporum canis* (10.6%). In children, *tinea capitis* predominated, associated with *T. tonsurans* and linked to barbershop-related exposure, while in adults, onychomycosis caused by *T. rubrum* was most common. These findings highlight the need to strengthen epidemiological surveillance and optimize diagnostic and preventive strategies to reduce the impact on the population.

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PALABRAS CLAVE

Dermatofitos, Micosis
superficiales,
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Caracterización epidemiológica y etiológica de las micosis superficiales en un Hospital General de agudos de Buenos Aires

Resumen Las micosis superficiales son frecuentes a nivel mundial. Este estudio analizó su epidemiología y agentes etiológicos en un hospital general ubicado en la Ciudad de Buenos Aires. Se realizó un estudio descriptivo, retrospectivo y observacional con 1584 pacientes y 1726

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muestras procesadas entre septiembre de 2021 y junio de 2024. El 57,5% de las muestras fueron positivas. Las dermatofitosis representaron el 91,3% de los aislamientos, afectando principalmente a mujeres adultas y a la población pediátrica. Las manifestaciones más comunes fueron onicomicosis (66%), tiña corporis (17%) y tiña capitis (14,5%). Los agentes predominantes fueron *Trichophyton rubrum* (50,1%), *Trichophyton tonsurans* (36,0%) y *Microsporum canis* (10,6%). En niños predominó la tiña capitis, asociada a *T. tonsurans* y vinculada a la concurrencia a barberías, mientras que en adultos prevaleció la onicomicosis por *T. rubrum*. Los hallazgos subrayan la necesidad de fortalecer la vigilancia epidemiológica y optimizar las estrategias diagnósticas y preventivas para reducir el impacto en la población.

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Superficial mycoses (SM), also referred to as dermatomycoses, are fungal infections restricted to the stratum corneum of the skin, as well as the hair and nails. Their etiology varies across populations, representing a significant public health concern due to their symptomatology, prolonged healing times, potential for transmission, and complications involving secondary bacterial infections. Globally, these infections affect approximately 25% of the population¹⁰.

The principal etiological agents include dermatophytes and, to a lesser extent, *Candida*, *Trichosporon*, and *Malassezia*⁷. Dermatophytes are classified within the Phylum *Ascomycota*, Class *Eurotiomycetes*, Order *Onygenales*, and Family *Arthrodermataceae*⁶. These filamentous, hyaline, septate fungi exhibit both mycelial and conidial forms. In their asexual stage, they produce multicellular macroconidia, unicellular microconidia, and arthroconidia³. Transmission from their natural reservoirs (humans, animals and the environment) occurs via direct or indirect contact, with outbreaks occasionally resulting from airborne or surface-mediated dissemination⁴. Dermatophyte infections, or dermatomycoses, are anatomically categorized as follows: *tinea capitis* (scalp, hair, eyebrows, eyelashes), *tinea barbae* (beard and mustache), *tinea corporis* (glabrous skin), *tinea cruris* (inguinal region), *tinea pedis* (feet), *tinea manuum* (hands), and *tinea unguium* (nails)¹. Given the variability in etiological agents and the dynamic epidemiological profile of these infections, the objective of this study was to evaluate the current status of superficial mycoses at a general hospital in Buenos Aires, Argentina. A descriptive, retrospective, and observational study was conducted using data from the Microbiology Laboratory of J. M. Ramos Mejía General Hospital.

Variables recorded included: the total number of samples received between September 1, 2021 and June 30, 2024; sample collection dates; specimen type; patient demographics (age and sex); and potential risk factors (e.g., prior contact with animals, visits to barbershops, contact with individuals with fungal lesions, or recent travel). All samples were collected following the protocols detailed in the laboratory's standard operating procedures manual⁹.

For diagnostic purposes, direct microscopic examination was performed using 40% potassium hydroxide (KOH).

Samples showing hyaline, septate, and branched hyphae consistent with dermatophytes or ectothrix/endothrix hair invasion were identified as positive. In cases suggestive of pityriasis versicolor, adhesive tape samples were examined under a microscope using a drop of KOH with Parker ink (Quink), permanent blue-black, Albert's solution or methylene blue (1%) to identify yeast cells and short filamentous structures compatible with *Malassezia* spp.^{2,8,12}. Samples were cultured on Sabouraud glucose agar (SGA) and SGA supplemented with chloramphenicol and cycloheximide. Cultures were incubated at 28 °C for up to 21 days. Fungal identification was performed based on colony macro-morphology and micromorphology, complemented by matrix assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF MS) using the MALDI Biotyper Microflex LT/SH system coupled with the filamentous Fungi library 5 (Bruker Daltonics, Bremen, Germany). During the study period, a total of 1726 clinical specimens from patients with suspected SM were analyzed.

Diagnosis was confirmed in 994 samples (57.5%) through direct examination and/or positive culture. Of them, 26.6% (n = 459) showed positive results in both (direct microscopic examination and culture). Another 23.4% (n = 405) were positive on direct examination. In 7.5% (n = 130), no findings were observed on direct examination, or the sample was insufficient for analysis; however, culture results were positive (Fig. 1).

Of the 589 positive cultures, 91.3% (n = 538) were attributed to dermatophytes, while 7.5% (n = 45) were due to *Candida* species including 3% (n = 18) *Candida albicans* and 2% (n = 12) *C. parapsilosis* complex. Less frequent isolates included *Trichosporon* spp. 0.6% (n = 3) and non-dermatophyte filamentous fungi 0.6% (n = 3), comprising one case of *Neocosmopora solani* (*Fusarium solani*) from a nail sample and two cases of *Scopulariopsis brevicaulis*, isolated from a toenail and a cutaneous lesion, respectively. When stratified by age group, 67.2% (n = 321) of pediatric patients were diagnosed with SM, compared to 53.9% (n = 673) among adults.

Among the 538 dermatophytosis cases, species associations with clinical presentations were analyzed across both age groups (Table 1). In pediatric patients, the most common clinical manifestation was *tinea capitis* (63%), fol-

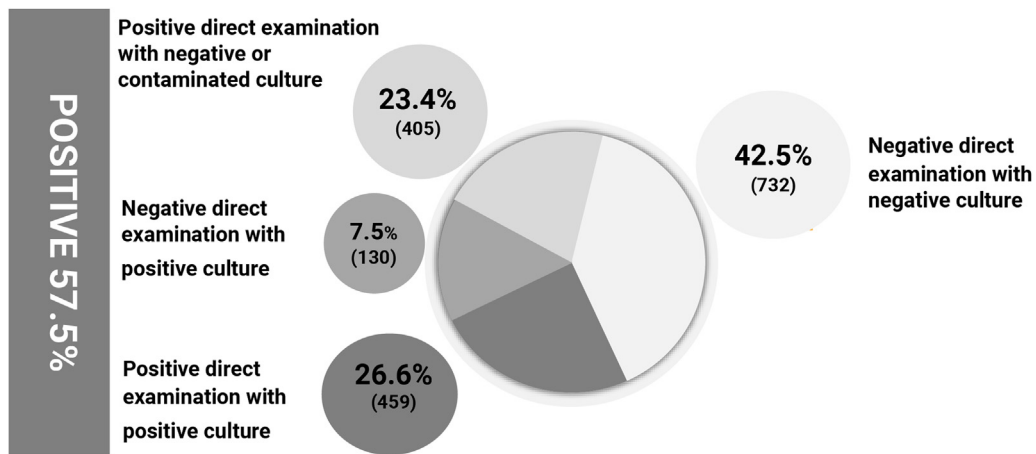


Figure 1 Diagnosis of superficial mycoses in total samples.

Table 1 Distribution of dermatophytes by age group and clinical presentation.

Age group	Clinical presentation	% of cases (within group)	Predominant species	Notable epidemiological factors
Pediatric	<i>Tinea capitis</i>	63%	<i>T. tonsurans</i> 70.9% <i>M. canis</i> 24.7% <i>T. rubrum</i> / <i>N. gypsea</i> / <i>T. mentagrophytes</i> complex 5.2%	79% male cases; 61% linked to barbershop visits Equal prevalence in females, linked to pets or cohabitants
	<i>Tinea corporis</i>	25%	<i>T. tonsurans</i> 63% <i>M. canis</i> 16% <i>T. rubrum</i> 13% <i>N. gypsea</i> / <i>Epidermophyton floccosum</i> 8%	Barbershop exposure or contact with infected individuals
	<i>Tinea unguium</i>	12%	<i>T. rubrum</i> 78% <i>T. tonsurans</i> 22%	–
Adult	<i>Tinea unguium</i>	81%	<i>T. rubrum</i> 86.7% <i>T. tonsurans</i> 8.2% Others species 5.1%	Higher frequency in females
	<i>Tinea corporis</i>	11,5%	<i>T. rubrum</i> 62.5% <i>T. tonsurans</i> 37.5%	–
	Other forms	7,5%	<i>T. rubrum</i> 62%	Rare occurrences

lowed by *tinea corporis* (25%) and *tinea unguium* (12%). The primary agents isolated from scalp samples included *Trichophyton tonsurans*, 70.9% (n = 112), *Microsporum canis*, 24.7% (n = 39), *Trichophyton rubrum*, 2.5% (n = 4), *Nannizzia gypsea*, 1.3% (n = 2), *Trichophyton mentagrophytes* complex, 0.6% (n = 1). *T. tonsurans* was also the predominant agent in pediatric *tinea corporis* cases, whereas *T. rubrum* was most frequently recovered from nail samples. In adults, *tinea unguium* was the predominant clinical form (81%), followed by *tinea corporis* (11.5%) and other types in lower proportions (7.5%). *T. rubrum* was the leading etiologic agent in adult nail infections, accounting for 86.7% of *tinea unguium* cases.

Of the 158 pediatric *tinea capitis* isolates 124 were obtained from male patients. Among these, *T. tonsurans*

was the predominant etiologic agent, isolated in 79% (n = 98) of cases, while *M. canis* accounted for 19% (n = 24). It is noteworthy that 61% of male patients with positive isolation of *T. tonsurans* reported recent visits to barbershops. In contrast, the 34 female *tinea capitis* cases demonstrated a 1:1 distribution between *T. tonsurans* and *M. canis*, with epidemiological links to household pets or cohabiting individuals who had attended barbershops. Among the 67 *tinea corporis*, 32 were from male patients; *T. tonsurans* was recovered in 25 of these cases. With a high frequency (84%) of patients reporting barbershop exposure or close contact with previously exposed individuals. These findings underscore the predominance of anthropophilic dermatophytes as causative agents of *tinea capitis* in the pediatric population, with a mean age of 8 years. In contrast, infections caused

by zoophilic species occurred at a younger mean age of 4.5 years.

In a retrospective study conducted in Colombia by Zuluaga and colleagues, the most common superficial mycosis in pediatrics was *tinea capitis*, with a mean age of 5.4 years; however, the most frequently isolated etiologic agent was *M. canis* (86%)^{14,16}.

Since the COVID-19 pandemic, a noticeable increase in *tinea capitis* cases attributed to anthropophilic species, particularly *T. tonsurans*, has been observed in health centers of Buenos Aires City. This trend has been associated with the boom of barbershops, where young people regularly have their hair cut in modern styles.

The most common clinical presentation among pediatric patients observed was non-scarring alopecia with scattered scaly patches. A smaller subset of patients presented with kerion and accompanying lymphadenopathy. Delay in the diagnosis of tinea caused by anthropophilic species can increase the risk of transmission to other family members and spread to other areas of the skin. The ease of transmission of these dermatophytes allows us to predict a rise in the incidence of *tinea capitis*, as it can sometimes go unnoticed and be diagnosed late, potentially becoming a public health concern. This fungus is transmitted from person to person through direct or indirect contact via fomites, and it can survive in the environment for several months when hygiene is inadequate. The high transmissibility of this pathogen can lead to community and school outbreaks, primarily manifesting as lesions on the scalp. Likely, shaving or cutting the scalp hair can produce microtraumas that serve as entry points for the pathogen, especially if the equipment or shaver blade is contaminated with the fungus¹⁵. Among adult patients, *T. rubrum* was the principal pathogen associated with *tinea unguium* coinciding with what has been reported in previous studies^{5,11,13}.

In general, in our setting, women seek medical consultation more frequently for these types of alterations, which carry significant aesthetic implications and may lead to feelings of social discrimination or embarrassment when showing their nails.

In conclusion, the most frequent clinical manifestation diagnosed in the pediatric population was *tinea capitis* (56%), followed by *tinea corporis* (31%) and *tinea unguium* (13%). The most frequent causative fungal pathogens was *T. tonsurans*, responsible for 63% of infections, followed by *M. canis* (20%) and *T. rubrum* (11.5%). In adults, the most common clinical manifestation was *tinea unguium* (83.7%), followed by *tinea corporis* (11.6%), with other forms appearing in much lower proportions. The most frequent was *T. rubrum*, responsible for 82.2% of infections, followed by *T. tonsurans* (12.2%), with other agents at a much lower frequency. Since 2021, an increase in scalp tinea cases (*tinea capitis*) due to *T. tonsurans* has been observed, particularly in boys attending barbershops. In adult patients, *tinea unguium* was more frequent, especially in females. Over the course of this study, a decrease in contaminated cultures was observed, which was likely due to improvements in sample collection, processing, and result management. A good correlation was found between clinical suspicion and diagnostic results. Despite its limitations, this study allowed for the analysis of superficial mycoses (SM), especially dermatophytosis, providing epidemiological data that enables the

medical team to take appropriate measures while awaiting culture results.

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Conflict of interest

The authors declare that there is no conflict of interest.

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