

Superficial Fungal Infections



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KEYWORDS

- Superficial fungal infection • Tinea pedis • Tinea capitis • Tinea corporis
- Tinea barbae • Tinea versicolor • Candidiasis • Antifungal treatment

KEY POINTS

- Superficial fungal infections are caused by numerous fungi, which invade the skin, mucosal sites, and systemic body.
- Superficial fungal infections are caused by dermatophytes affecting keratinized epithelium, *Candida* sp, which infects warm areas, and *Malassezia* sp, which requires a warm and lipophilic environment in which to thrive.
- The fungal infections can have various presentations on the human body.
- Many treatment options are available, such as creams and oral antifungal agents.

INTRODUCTION

Superficial fungal infections are caused by many fungi, which can invade various aspects of the human body.^{1–3} These infections include dermatophytes, which infect keratinized epithelium, hair follicles, and nail apparatus; *Candida* sp, which needs a warm, humid environment; *Malassezia* sp, which requires a humid microenvironment and lipids to grow; and *Trichosporon* sp and *Hortae* sp. Dermatophytes infect nonviable, keratinized cutaneous structures such as stratum corneum, nails, and hair.^{1–3} An epidermal dermatophytosis infection is called *epidermomycosis*, dermatophytosis of hair and hair follicles is called *trichomycosis*, and dermatophytosis of the nail apparatus is called *onychomycosis*. Three genera of dermatophytes exist: *Trichophyton*

Disclosure Statement: The authors have nothing to disclose.

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Prim Care Clin Office Pract 42 (2015) 501–516

<http://dx.doi.org/10.1016/j.pop.2015.08.004>

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sp, *Microsporum* sp, and *Epidermophyton* sp. *Trichophyton rubrum* is the most common cause of epidermal dermatophytosis and onychomycosis.⁴

Transmission

Dermatophyte infections can be transmitted from person to person through fomites, transmitted from animals to humans, and, least commonly, acquired from soil. Predisposing factors for complicated dermatophyte infections include atopic diathesis, such as cell-mediated immune deficiency for *T rubrum*, prolonged immunosuppression with use of topical glucocorticoids, and systemic immunocompromised states.⁴

Classification

Dermatophytes are classified in several ways. There are many species of *Microsporum* and *Trichophyton* and one species of *Epidermophyton*. Dermatophytoses of keratinized epidermis include tinea facialis, tinea corporis, tinea cruris, tinea mannis, and tinea pedis. Dermatophytoses of nail apparatus include tinea unguium (toenails, fingernails). Dermatophytoses of hair and hair follicles (trichomycosis) include dermatophytic folliculitis, tinea capitis, and tinea barbae.

Diagnosis

It is important to recognize characteristic patterns of inflammation to diagnose fungal infections. The highest numbers of hyphae are located in the active border of infection, the best area to obtain a sample for potassium hydroxide examination. The active border is scaly, red, and slightly elevated. One can find vesicles in the active border when inflammation is intense. Many ways of obtaining a diagnosis exist through laboratory examinations.^{5,6}

The most important test for the diagnosis of dermatophyte infection is direct visualization under microscopy of the branching hyphae in keratinized material. One should collect scale with a scalpel blade, place on the center of a microscopy slide, and cover with a coverslip. Potassium hydroxide, 5% to 20% solution, is applied at the edge of the coverslip. The preparation should be gently heated under low flame until bubbles begin to expand, clarifying the preparation. Potassium hydroxide dissolves the material that binds cells together but does not distort the epithelial cells or fungi. Under microscopy, dermatophytes will be recognized as septated, tubelike structures called *hyphae* and *mycelia*. A slight back-and-forth rotation of the focusing knob can aid in visualization of the entire segment of the hyphae, which may be at different depths.^{5,6}

A Wood's lamp can be used to visualize hairs infected with *Microsporum* species, which fluoresce in a greenish color in a dark room. Fungal cultures are grown on Sabouraud's glucose medium, but it is usually not necessary to know the species of dermatophyte infecting the skin, as the same oral and topical agents are effective against all of them.

Distal and lateral subungual onychomycosis are best visualized using periodic acid-Schiff or methenamine silver stains, which are more sensitive than potassium hydroxide preparation or fungal culture.

TINEA PEDIS

Dermatophyte infections are classified by body regions. *Tinea* means fungus infection. As noted in Fig. 1, tinea pedis is the dermatophyte infection of the foot (athlete's foot). Warmth and sweating promote fungal growth. Tinea should be considered in the differential diagnosis of children with foot dermatitis.⁷

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