Tinea corporis and tinea pedis are reportedly the most common dermatophytoses in the US and are each estimated to affect approximately 20 percent of the population, however true incidence may be underestimated. Some dermatophyte infections are more common in certain populations. For example, tinea pedis, tinea cruris or “jock itch,” and tinea corporis are more common complaints among athletes than is onychomycosis. In contrast, onychomycosis affects an estimated 12 percent of the US population; Incidence increases with age and is highest among those over age 65. Both tinea pedis and onychomycosis are more common in those with diabetes.

Diagnosis of tineas tends to be straightforward for specialists, and the diagnosis can be confirmed with KOH preparation. Note that contact dermatitis of the feet or hands may mimic tinea pedis or manuum, respectively, and must be considered in the final diagnosis. Of note, a dermatitis that develops on both hands and both feet is more likely to have a systemic cause rather than to be a contact dermatitis. Conversely, involvement of two feet and one hand suggests a primary fungal infection of the foot that has been transferred to one hand only. It is unknown why the other hand is not involved. Other similar presentations include one foot/two hands, and even one foot/one hand.

**DIAGNOSTIC PEARL:**
If the webspace between the fourth and fifth toe is spared, consider a diagnosis other than tinea.

Superficial cutaneous yeast infections may be predominantly caused by Candida. Among immunocompetent individuals, candidiasis may be especially common in the inframammary folds or genital crease region (more so for women than men). Culture can be used to distinguish Candidiasis from dermatophytosis. Topical antifungals are standard treatment for candidiasis, particularly clotrimazole or ketoconazole. Oral fluconazole is the primary systemic agent with anti-Candida activity.
Most tineas can be managed with topical antifungals (Table 1). Treatment must be selected that is expected to address the causative organism and in a vehicle formulation that the patient can easily apply to the treatment site. A broad-spectrum antifungal is preferred. Oral antifungals typically are reserved for extensive or chronic involvement or when application of a topical agent is physically challenging for the patient.

New to the market is a novel azole called luliconazole, available in a 1% cream (Luzu, Valeant) for the management of interdigital tinea pedis or tinea corporis. The key feature of this formulation is its dosing schedule. For the treatment of tinea pedis, luliconazole cream is applied once-daily for two weeks. For the treatment of tinea cruris, it is applied once-daily for one week.

Also new to the market are new 2% cream and gel formulations of naftifine (Naftin, Merz) for the treatment of interdigital tinea pedis, tinea cruris, or tinea corporis. It is indicated for once-daily application for two weeks in all three indications.

Prophylactic topical antifungal therapy applied at intervals may be indicated for those at high risk for or with a history of recurrence of dermatophytosis, although this is an off-label use.

Treatment of tineas is important for reasons beyond symptom control. Tinea pedis or manuum may provide a reservoir of dermatophytes leading to onychomycosis, though in some cases nail involvement is a primary presentation.

**UPDATE ON ONYCHOMYCOSES**

In contrast to tineas of the skin, most cases of onychomycosis require oral therapy. Development of topical therapies for onychomycosis has proven challenging, due to the difficulty of penetrating the nail plate to deliver drugs to the nail bed, the site of infection. The lengthy period the nail takes to grow, the hardness of the nail plate, and location of the infection between the nail bed and plate are major contributing factors.

Poor nail penetration is the main factor limiting the use of topical antifungal agents in the treatment of onychomycosis, and directly relates to the nail plate’s unique properties: its thickness and relatively compact cellular structure.

Currently, systemic antifungal therapy with terbinafine or itraconazole is the mainstay of treatment. FDA last year issued a warning about potential risks associated with ketoconazole, including potentially fatal liver injury and risk of drug interactions and adrenal gland problems, and indicated that the agent should not be used as a first-line treatment option for fungal infections. Systemic terbinafine and itraconazole are shown to be effective and generally safe for the management of onychomycosis, but there are potential risks associated with therapy.

Mycologic cure (i.e., the eradication of the causative organism proven by negative culture) is widely accepted as the main treatment goal, with complete clinical clearing occurring after this stage has been achieved. Reported
mycologic cure rates in the phase III studies for oral itraconazole and terbinafine were 54 percent and 70 percent, respectively.\textsuperscript{13,14} Relapse may occur in up to one fifth of those treated with terbinafine, and one-quarter of those treated with itraconazole. Relapse has been attributed to chronic or recurrent tinea pedis, genetic predisposition, and re-exposure to pathologic organisms.\textsuperscript{15}

**DIAGNOSTIC PEARL:**

Onychomycosis of the fingernails in the absence of toenail involvement is virtually non-existent.

Common side effects of terbinafine include gastrointestinal upset, headache, and minor rashes. Serious side effects are reported in less than one percent of patients,\textsuperscript{16} but include serious or even fatal liver toxicity one in 54,000. Thus, systemic therapy is not recommended in patients with chronic or active liver disease, and liver-function testing is advisable. Monitoring liver function at four to six weeks is recommended by several experts.\textsuperscript{17} The side effects of itraconazole are similar to those of terbinafine but also include congestive heart failure, which represents a contra-indication.

Relatively new to the market is Onmel (Merz), a new once-daily 200mg single tablet formulation of itraconazole indicated for the oral treatment of onychomycosis of the toenail caused by Trichophyton rubrum or T. Mentagrophytes in non-immunocompromised patients. The tablets are manufactured with what is described as a "melt extrusion" or Meltrix Technology that enables the single tablet formulation.

Ciclopirox 8% nail lacquer is the only topical treatment currently approved by the FDA for the treatment of onychomycosis.

Currently under FDA review, efinaconazole 10% solution is the first triazole antifungal specifically developed for the topical treatment of mild to moderate distal subungual onychomycosis. It is believed that low surface tension of the alcohol-based formulation helps efinaconazole to first penetrate through the nail plate, then access the nail bed by wicking into the air gap and spreading over the site of infection, as it may have been damaged and dystrophic appearance, as it may have been damaged and dystrophic before the infection occurred.

Despite successful elimination of fungus from the nails, patients undertaking treatments for toenail onychomycosis should be advised that successful eradication of fungus from the nail may not necessarily restore a toenail to a normal appearance, as it may have been damaged and dystrophic before the infection occurred.

Checking the foot for early signs of re-infection is key so that topical treatment can be instigated at an early stage. Maintenance therapy at proper intervals may also be indicated, though not formally studied.

Dr. Bikowski has served as an advisory board member/consultant to Promius Pharma.

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**REFERENCES**