Can we Prevent Onychomycosis?

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Abstract

Onychomycosis is a fungal infection involving the nail unit. Distal lateral subungal onychomycosis (DLSO) is the most common subtype and usually results from untreated tinea pedis. Once fungus has invaded the nail unit, it can be a challenge to treat. Though onychomycosis has been historically viewed as a cosmetic concern, treating this disease is important due to potential complications, especially in elderly and immunocompromised individuals. As the incidence continues to increase, it is vital for health professionals to understand that onychomycosis may be prevented by treating tinea pedis.

Introduction

Onychomycosis is a fungal infection involving fingernails and toenails. It is the most common infection of the nails and affects approximately 13% of the US population [1,2]. This is a surprising figure considering onychomycosis caused by Trichophyton rubrum was first reported in the US in Birmingham, Alabama, only one hundred years ago [3]. Unfortunately, the incidence is likely to continue to increase making this condition a public health concern. Untreated, complications such as pain, wide spread dermatophytosis, and secondary bacterial infections, including cellulitis, may occur. Persons at greatest risk include the elderly, those with diabetes mellitus, immunodeficiency, and psoriasis. Although no cure or vaccine is available, with proper education onychomycosis can still be prevented in most people. Prevention of infection could save significant health care dollars. The foundation for prevention is understanding that distal lateral subungal onychomycosis (DLSO) begins with tinea pedis, and the other subtypes of onychomycosis are less common and may be unrelated to tinea pedis.

Onychomycosis Overview

Onychomycosis is usually categorized into four subtypes named by the pattern of fungal invasion into the nail unit. The most common subtype is distal lateral subungal onychomycosis (DLSO) (Figure 1). It occurs when the dermatophyte extends from the plantar surface (tinea pedis) to the distal region of the nail bed. Distal onycholysis with subungal hyperkeratosis develops over time. Almost all persons with DLSO have, or have had tinea pedis [4-7]. One exception would be direct inoculation of the fungus into the nail during a pedicure or other nail procedure.

Less common onychomycotic subtypes include superficial white onychomycosis (SWO), proximal white subungal onychomycosis (PWSO), and Candida nail infections. Superficial white onychomycosis affects the nail plate and results in a characteristic white chalky discoloration. It may be caused by dermatophytes, non-dermatophyte molds, or other fungi. Proximal subungal onychomycosis results from proximal nail fold invasion and is associated with immunodeficiency. Candida nail infections may also occur resulting in onycholysis and paronychia. Finally, total dystrophic onychomycosis may be the end result of any subtype [8,9]. The vast majority of infections are of the DLSO variety, and all the medications used to treat onychomycosis are specified for this indication only.

Figure 1: Distal Lateral Subungal Onychomycosis (DLSO). Note distal involvement of the nail bed.

Trichophyton rubrum is currently the most common dermatophyte causing both tinea pedis and onychomycosis. Other dermatophytes frequently isolated are T. mentagrophytes, T. tonsurans and Epidermophyton floccosum [2].

Tinea Pedis Overview and Relationship to Onychomycosis

Tinea pedis is dermatophytosis of the plantar surface and is easily recognizable by the pruritic, red, scaly, sometimes painful, and often fissured eruption most commonly found in the space between the toes or on the soles of the feet (Figure 2). Self-diagnosis is common and consequently there are a variety of over-the-counter (OTC) remedies. Treatments include antifungal creams, sprays, or powders (Table 1).
from the plantar surface to the distal nail bed causing DLSO [12].

undoubtedly, the remaining cases either had treated tinea pedis or

however, tinea pedis is likely the most common precipitating factor for

surprising since this is an infection. Thirty percent of diabetics and

onychomycosis.

Dermatophytes invade the stratum corneum

via keratinolytic proteases with hyphae growing in multiple directions

[10,11]. Left untreated (or only partially treated), the infection extends

from the plantar surface to the distal nail bed causing DLSO [12]. Failure to treat the toenails when treating tinea pedis will likely result

in onychomycosis. Proper treatment of tinea pedis would prevent the

majority of dermatophyte nail infection.

Other Risk Factors for Developing Onychomycosis

Advanced age is a major risk factor for onychomycosis, possibly due
to diminished cell- mediated immunity. Hypothetically, untreated or
ineffectively treated tinea pedis smolders until nail infection is evident.
The prevalence of onychomycosis may be up to 50% in those over the
age of 70 [13]. There is a slight male predominance [9]. Immuno compromised patients are also at a higher risk, which is not
surprising since this is an infection. Thirty percent of diabetics and
20% of HIV-positive individuals have onychomycosis [14,15]. Other
risk factors include psoriasis, nail trauma, genetics, and family history; however, tinea pedis is likely the most common precipitating factor for
onychomycosis.

Prevention and Early Treatment of Onychomycosis

In addition to aggressively treating tinea pedis, patient education
regarding nail care and hygiene may help prevent these fungal
infections. Recommendations include keeping feet cool and dry,
wearing absorbent socks, clipping nails short, wearing appropriate foot
wear in public places and showers, and disinfecting or discarding old
shoes. Other strategies include frequent application of antifungal
products to the nails and feet in those at highest risk for infection.
Once nails are infected with fungi, they will provide a reservoir to re-
infest the skin surface and cause dermatophytosis.

Onychomycosis is a public health concern and treatment remains a
challenge to clinicians and patients. As the incidence of
onychomycosis continues to increase, the importance of disease
prevention cannot be overemphasized. The relationship between tinea
pedis and onychomycosis is an important topic and health care
providers should encourage strategies to prevent onychomycosis
including protective and prophylactic measures in patients presenting
with tinea pedis.

Table 1: Topical Over the Counter Medications for Tinea Pedis

<table>
<thead>
<tr>
<th>Drug</th>
<th>OTC options</th>
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<tbody>
<tr>
<td>Allylamines</td>
<td>Terbinafine, Butenafine</td>
</tr>
<tr>
<td>Azoles</td>
<td>Miconazole, Clotrimazole</td>
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<tr>
<td>Tolnaftate</td>
<td>Tolnaftate</td>
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<tr>
<td>Undecanoates</td>
<td>Undecylenic Acid, Zinc Undecylenate</td>
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References