



Exploring the Causes and Risk Factors of Interdigital Tinea

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Abstract

Interdigital tinea, commonly known as athlete's foot, is a fungal infection that primarily affects the skin between the toes. This condition is caused by dermatophytes, a group of fungi that thrive in warm, moist environments. The infection is prevalent in individuals who frequently expose their feet to such environments, making athletes, individuals with diabetes, and those living in humid climates particularly vulnerable. This article explores the primary causes of interdigital tinea and identifies key risk factors, such as poor hygiene, wearing tight footwear, and excessive sweating. It also discusses prevention methods, including proper foot care and the use of antifungal treatments. Understanding these causes and risk factors is crucial for the development of effective preventive strategies and treatment plans.

Keywords: Interdigital tinea; Athlete's foot; Dermatophytes; Fungal infection; Risk factors; Prevention

Introduction

Interdigital tinea is a superficial fungal infection that affects the skin between the toes [1]. It is one of the most common types of dermatophyte infections and is primarily caused by *Trichophyton* species. The infection typically thrives in moist, warm environments, where fungi can proliferate. Although it can affect anyone, certain populations, such as athletes, individuals who wear occlusive footwear, and those with compromised immune systems, are at increased risk [2]. This article aims to explore the underlying causes and risk factors of interdigital tinea, shedding light on its pathophysiology, transmission, and preventive strategies.

Materials and Methods

This study employs a comprehensive literature review, including peer-reviewed journal articles, clinical studies, and dermatological reports on interdigital tinea [3]. Data was collected from various online databases, including PubMed, Scopus, and Google Scholar, focusing on the causes, symptoms, and risk factors of the infection. We analyzed studies conducted on diverse populations, including athletes, patients with diabetes, and individuals living in regions with high humidity. The review also includes clinical data on treatment options such as topical and oral antifungal medications.

The primary cause of interdigital tinea is infection by dermatophytes, including *Trichophyton rubrum* and *Trichophyton mentagrophytes*. These fungi are typically transmitted through direct contact with contaminated surfaces, such as floors of public swimming pools, gyms, or locker rooms [4]. Risk factors include poor foot hygiene, prolonged exposure to moisture (such as sweaty feet), wearing tight, non-breathable shoes, and compromised immunity. In individuals with diabetes, neuropathy, and peripheral vascular disease, the risk of infection is higher due to reduced blood flow and altered skin integrity. Our review also identifies the role of environmental factors in the prevalence of interdigital tinea. Humid climates, along with warm temperatures, provide the ideal breeding ground for dermatophytes. Preventive measures include keeping feet dry and clean, using antifungal powders or sprays, and wearing moisture-wicking socks and breathable shoes. In clinical practice [5], early diagnosis and the use of topical antifungal agents, such as clotrimazole or terbinafine, are recommended for managing the infection.

Results and Discussion

The primary causative agents of interdigital tinea are dermatophytes, a group of fungi that have a predilection for keratinized tissues like the skin, nails, and hair [6]. The most common dermatophytes responsible for interdigital tinea are *Trichophyton rubrum*, *Trichophyton mentagrophytes*, and *Epidermophyton floccosum*. Among these, *T. rubrum* is the most frequently encountered pathogen. These fungi thrive in warm, moist conditions, where they can proliferate and cause infection. Fungi reproduce by producing spores, which can spread from contaminated surfaces to human skin. The risk of acquiring these infections is especially high in environments where people walk barefoot, such as gyms, swimming pools, and locker rooms. The infection typically begins in the areas between the toes, where moisture tends to accumulate, and then spreads to the surrounding skin. Interdigital tinea is transmitted primarily through direct contact with infected surfaces, but indirect transmission can also occur through contaminated towels, footwear, or socks. In most cases, individuals with compromised immune systems or pre-existing conditions are at a higher risk. This includes people with diabetes, those undergoing immunosuppressive therapy, or individuals with a history of dermatologic conditions that affect the skin's barrier function (such as eczema). The key risk factors associated with interdigital tinea include the feet are particularly susceptible to fungal infections because they are often enclosed in shoes, leading to excess sweating. The combination of heat and moisture creates an ideal environment for dermatophytes to thrive. This is especially relevant in hot, humid climates where sweat does not evaporate easily.

Inadequate washing and drying of the feet, particularly between the toes, contributes to fungal growth. Fungi can persist in the skin's folds and on keratinized tissue, where moisture gets trapped [7]. Tight, non-breathable footwear, such as plastic sandals, rubber boots, or shoes made from synthetic materials, increases the likelihood of developing interdigital tinea. These types of shoes trap sweat, preventing proper

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ventilation and exacerbating the moisture buildup around the toes. Hyperhidrosis (excessive sweating) significantly elevates the risk of fungal infections. Individuals who sweat more due to physical activity, obesity, or certain medical conditions (e.g., thyroid disorders) are more prone to developing interdigital tinea. Interdigital tinea often presents as erythematous (red) patches with scaling, cracking, and peeling of the skin between the toes, particularly the fourth and fifth toes [8]. In severe cases, blisters or fissures can form, causing pain and discomfort. If left untreated, the infection can spread to the soles of the feet (tinea pedis) or to the nails (onychomycosis). Pruritus (itching) is another common symptom, leading to scratching that further disrupts the skin and promotes the spread of the fungus. In some individuals, the infection can be asymptomatic or very mild, which means it might go unnoticed or be misdiagnosed. Therefore, early detection through clinical assessment and, if necessary, fungal cultures or skin scrapings can help confirm the diagnosis. Accurate diagnosis of interdigital tinea typically requires clinical examination and may be confirmed through diagnostic techniques such as: Skin scrapings from the affected area are examined under a microscope after treatment with KOH, which clears the skin cells and allows visualization of fungal elements. In some cases, a sample of the affected skin is cultured to identify the specific dermatophyte species. A Wood's lamp may sometimes be used to detect fungal infections, although it is less common for dermatophytes.

The treatment of interdigital tinea primarily involves the use of antifungal agents. Topical antifungals such as clotrimazole, terbinafine, and miconazole are commonly prescribed for mild to moderate infections. These agents work by inhibiting fungal cell wall synthesis or disrupting the integrity of the fungal cell membrane, leading to the death of the organism. In more severe cases or if the infection has spread beyond the interdigital areas, oral antifungal medications like terbinafine or itraconazole may be used [9]. Systemic treatment can be particularly effective for infections that involve multiple areas of the foot or for individuals with immunocompromised conditions. Prevention plays a key role in reducing the incidence of interdigital tinea. The following practices can help minimize the risk. Washing the feet daily with soap and water, especially between the toes, and drying them thoroughly is the most basic and effective prevention method. Special attention should be given to drying the toes to reduce the moisture that supports fungal growth. Wearing well-ventilated shoes made of breathable materials like leather or mesh, and avoiding tight-fitting shoes, can significantly decrease the chances of developing interdigital tinea. It is also advised to alternate between different pairs of shoes to allow them to air out. Wearing moisture-wicking socks and changing them regularly, especially after sweating, can help keep feet dry. The use of antifungal powders can also reduce moisture and provide an additional barrier against fungal infection. Avoid walking barefoot in places like gyms, locker rooms, and swimming pools, as these areas tend to harbor fungal spores. Wearing sandals or flip-flops in such environments can help reduce the risk of infection [10]. Certain populations, such as athletes or individuals with diabetes, may require additional precautions. Athletes are particularly at risk due to their

exposure to public showers and their use of tight, non-ventilated shoes during physical activity. For individuals with diabetes, controlling blood sugar levels and maintaining optimal foot hygiene are crucial to prevent fungal infections, as high blood sugar can impair the skin's ability to resist infections.

Conclusion

Interdigital tinea remains a prevalent and bothersome condition, particularly among individuals exposed to environments conducive to fungal growth. By understanding its causes and risk factors such as poor hygiene, excessive moisture, and certain medical conditions healthcare providers can recommend targeted preventive and therapeutic interventions. Early intervention, coupled with good foot hygiene and proper footwear, can significantly reduce the incidence of interdigital tinea. As the prevalence of this infection continues to rise, especially in humid regions, public awareness and education about foot care and fungal infection prevention are essential in mitigating its impact.

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Interest of Conflict

None

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