

Two Feet-One Hand Syndrome - A short Case Report

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Abstract

The genus Trichophyton is particularly important and complex; it comprises many recognized species. Two feet-one hand syndrome is a superficial fungal infection of the skin which involves both feet and one hand. Trichophyton rubrum and occasionally Trichophyton mentagrophytes are the usual causative organisms. Trichophyton interdigitale is a clonal line within sexual species Trichophyton mentagrophytes and hence cannot be reliably differentiated from T. mentagrophytes by cultural techniques or MALDI-TOF mass spectrometry, and therefore ITS region DNA sequencing is recommended.

A 45-year-old male farmer who presented with itching and diffuse scaling localized over plantar and palmar skin of bilateral feet and left hand, respectively. The

development of tinea pedis preceded the onset of tinea manuum.

Potassium hydroxide (KOH) mounts from the skin scrapings revealed fungal hyphae. Trichophyton mentagrophytes was isolated from growth on SDA. Genotypic identification was done by sequencing ITS1 and ITS4 region of ribosomal DNA. The patient was treated with oral terbinafine 250 mg tablets daily for 16 weeks and topical miconazole nitrate 2% cream for 16 weeks. The mycological cure was achieved after 14 weeks, however the treatment was extended for 2 more weeks to prevent relapse.

Early diagnoses and treatment of tinea pedis and education about prophylaxis, constant care and regular medical assistance would minimize this problem in predisposed individuals.

Keywords: Trichophyton interdigitale, Two feet-one hand syndrome, MALDI TOF

Introduction

Dermatophytes are keratinophilic fungi that infect keratinized tissues of human and animal origin. Trichophyton mentagrophytes is considered to be a species complex composed of several strains, which include both anthropophiles and zoophiles. Accurate discrimination is critical for comprehensive understanding of the clinical and epidemiological implications of the genetic heterogeneity of this complex. Dermatophytes are common fungal pathogens that cause superficial fungal infections of the skin, hair and nails. Tinea pedis dermatophytosis of the feet, is thought to be the world's most common dermatophytosis. It can present in four distinct clinical patterns namely, chronic hyper keratosis or moccasin, chronic intertriginous acute ulcerative and vesiculobullous type. Tinea unguium is a frequent accompaniment and its presence leads to chronicity and recurrence. It is a fungal infection of the interdigitale toe web spaces as well as the skin of the feet. The most common etiological agents are anthropophiles, including Trichophyton rubrum, which is the most frequent, followed by Trichophyton mentagrophytes complex and Epidermophyton floccosum^[1] Although the true prevalence of co-existing onychomycosis and tinea pedis is unknown, a number of surveys have suggested that about one third of patients with toenail onychomycosis also have tinea pedis.^[2,3,4] In a large survey of over 2700 patients with toenail onychomycosis, 42.8% had concomitant fungal infections, with tinea pedis being most common (seen in 33.8% of patients).⁷ Interdigital tinea pedis was the most common subtype noted in over 65.4% of cases.^[2]

A recent study in subjects with diabetic foot complications also showed a high prevalence of both types of infection, with tinea pedis observed in 46.7% and onychomycosis in 53.3% of subjects, compared to a prevalence of 14.7% and 22.7% in matched controls.^[5]

Several publications deal with the high frequency of tinea pedis in recreation sports, however, the role of common indoor swimming pools or modern fun bathes in the spread of tinea pedis has been well established^[6,7]

The coetaneous presentation of tinea pedis is dependent on the host's immune system and the infecting dermatophyte. Breach and maceration of the skin may aid in dermatophyte invasion. Environmental influences like hot and humid climates, hyperhidrosis and wearing shoes are other factors responsible for tinea pedis. There are four types of tinea pedis: interdigitale or intertriginous type, chronic erythematous squamous/ hyperkeratotic (moccasin-type), vesiculobullous or inflammatory type and ulcerative tinea pedis.^[8,9]

In the two feet-one hand syndromes, the development of tinea pedis with or without onychomycosis generally preceded the development of tinea manuum. Patients whose occupation involves a high frequency of use of the hands are more likely to develop the disease at an earlier age. Patients are more likely to seek attention once tinea manuum develop, particularly if there is a family history of tinea.

Here we present a case of the "two feet-one hand syndromes" in an immunocompetent male farmer due to Trichophyton mentagrophytes complex infection.

Case report

A 45-year-old healthy male farmer a resident of Uttar Pradesh presented to the Dermatology outpatient of a tertiary care centre situated in East Delhi with complaints of itchy lesions on both feet and left hand for 2 years and

1 month respectively. The lesion first appeared on feet for last 1.5 years spread to his hand. Itching was present on the bilateral feet and he often used his left hand to scratch them. He was self-medicating with herbal medicines without any significant relief. Physical examination revealed ill-defined diffuse dry, scaling papular on plantar aspect of bilateral feet and left hand. (Fig 1).

He was apparently healthy with no other co-morbidities and he was not on any other medications. Routine laboratory investigations were normal. Specimens were obtained by scraping the edge of the lesion of the both feet and left hand. Mycological examination, with 10% potassium hydroxide (10% KOH) mount of scales revealed abundant thin septate hyphae were visualized on direct microscopy from all sites. Culture was performed on Sabouraud dextrose agar with an antibiotic (0.05 mg/ml chloramphenicol and 0.5 mg/ml cycloheximide) and was incubated at 28°C in BOD incubator. Culture was examined thrice weekly for the appearance of growth. Fungal growth was identified by colony morphology followed by microscopic examination by tease mount technique in lactophenol cotton blue (LPCB) mount. On LPCB mount fungal spores, macroconidia and mycelia resembled *Trichophyton mentagrophytes* complex. The culture on SDA was subjected to DNA extraction using a commercially available DNA extraction kit (HiYield Genomic DNA Kit; Real Biotech Corporation, Taiwan). Genomic DNA was subjected to polymerase chain reaction (PCR) using pan fungal primers; Internal Transcribed Spacer (ITS)-1 (5'-TCCGTAGGTGAACCTGCGG-3') and ITS-4 (3'-TCCTCCGCTTATTGATATGC-5') region of 18s rRNA. was performed for ITS1 and ITS4 region commercially. The sequences were analyzed and compared with the

sequences deposited in GenBank by using the BLAST (<http://www.ncbi.nlm.nih.gov/BLAST/Blast.cgi>). The ITS sequences showed $\geq 99\%$ similarity with *Trichophyton interdigitale*.

The patient was treated with Terbinafine 250 mg daily for sixteen weeks and topical miconazole nitrate 2% cream for 16 weeks. On follow up the patient showed complete cure and a repeat KOH examination and fungal culture was negative.

Discussion

Trichophyton mentagrophytes is one of the most Common agents causing dermatophytoses world-wide. Culture softy pical strains can readily be identi ed, but there cognition fun usual varieties can beratherd if @ cult. *Trichophyton mentagrophytes* is one of the most Common agents causing dermatophytoses world-wide. Culture softy pical strains can readily be identi ed, but there cognition no fun usual Z varieties can beratherd if @ cult. *Trichophyton mentagrophytes* is one of the most Common agents causing dermatophytoses world-wide. Culture softy pical strains can readily be identi ed, but there cognition no fun usual varieties can beratherd if @ cult.

In 1964, Curtis first described the “two feet one hand disease”, later called a syndrome [10]. Two feet–one hand syndrome (bilateral plantar tinea pedis with coexistent unilateral tinea manuum). This syndrome is commonly seen in dermatology clinics, but the cause of the unilateral hand involvement remains unresolved.[11]

Trichophyton mentagrophytes complex is one of the most common causative organisms implicated in superficial fungal infections worldwide and in India. *T. mentagrophytes* isotype VIII has been found to be the most important pathogen associated with the current epidemic of recurrent and chronic dermatophytosis in

India. Tinea pedis is a common skin infection with high frequency among soldiers and men who take part in recreational or professional sport activities. In the study of Cohen et al. [12] the clinical and mycological point prevalence of tinea pedis among soldiers were 60.1% and 27.3%, respectively. According to Sabad in et al. [13], the prevalence of tinea pedis among athletes was 26%. In India, however, tinea pedis is the one of the least common clinical form of dermatophytosis, probably due to infrequent use of closed footwear. The first type of tinea pedis – the interdigital or intertriginous type, commonly referred to as “athlete’s foot” presents as scaling, maceration, fissuring and/ or erythema of the web spaces between the toes, with the space between the fourth and fifth toes most commonly affected. Moccasin-type tinea pedis presents as generalized scaling and hyperkeratosis of the plantar surface of the foot. This form of infection is frequently associated with nail involvement and can extend onto the dorsum of foot. The inflammatory vesiculo-bullous type is followed by painful, pruritic vesicular eruption on the arch or sides of the feet while the ulcerative type of tinea pedis is characterized by rapidly spreading vesiculo-pustular lesions and ulcers typically localized to the web spaces in immunocompromised and diabetic patients [9].

Although the “two feet-one hand syndromes” is not rare, there have been only few large case series investigating this condition. In the study of Zhan et al., *Trichophyton rubrum* was the most common pathogen isolated (93.3%) followed by *Trichophyton mentagrophytes* (4.0%) and *Epidermophyton floccosum* (2.7%).¹⁴ Clinical presentation of the “two feet-one hand syndromes” is usually with chronic bilateral, Papulosquamous form and is characterized by minimal inflammation and a patchy or diffuse moccasin-like scaling over the soles. In this

syndrome, the development of tinea pedis generally precedes the development of tinea manuum, which usually occurs on the hand that excoriated the pruritic feet or picked the toenails with tinea unguium. Our patient the typical generalized scaling of the plantar surface of bilateral feet and diffuse dry scaling of the left palm. Chronic tinea pedis must be differentiated from chronic eczema and psoriasis. While irritant and allergic dermatitis of the hands or palmar psoriasis can mimic tinea manuum, they are typically bilateral and concurrent presence of tinea unguium and help differentiate these entities clinically. In doubtful cases KOH mount and culture can help in confirming the diagnosis. The study conducted on 113 patients with this disorder has shown that 80.5% patients developed tinea pedis approximately 6 years before hand infection [15]. Daniel et al. [10] reported that in 91% of cases tinea pedis preceded tinea manuum with an average time interval between infections at the two sites of 8.8 ± 1.3 years. Our patient developed foot infection 1.5 years before hand infection.

Socks, closed footwear and leather shoes are risk factor for the development of tinea pedis as they supply the wet, warm and closed environment favorable for dermatophyte growth.^[11] Conversely, the hands are in an open and relatively dry environment and are washed more frequently than feet, so pathogens on the surface are removed easily. Early diagnoses and treatment of tinea pedis and education about prevention, constant care and regular medical assistance would minimize this problem in predisposed individuals.

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Legends figures

Fig 1: Sharply demarcated papular erythematous and squamous lesions on dorsal aspect of the feet with numerous superficial erosions.

