

Case Report:

Onychomycosis caused by *Fusarium dimerum*

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ABSTRACT

Fusarium is a non-dermatophytic hyaline mould found as soil saprophytes and plant pathogens. Human infections are probably a result of various precipitating predisposing factors of impaired immune status. Immunocompetent individuals of older age group are also vulnerable to various unassuming saprophytic and plant pathogen. We report 5 cases with onychomycosis caused by a rare species of *Fusarium*, namely, *Fusarium dimerum*. *Fusarium* is known to cause a variety of infections like keratitis, eumycetoma, onychomycosis, skin lesions and sometimes disseminated infection in individuals with impaired immunity. Hence it is of utmost importance to identify this newly emerging fungal pathogen correctly and institute appropriate treatment to control human infections at the earliest so that disseminated infections can be avoided.

Key words: *Fusarium dimerum*, Onychomycosis, Immunocompetent individuals

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INTRODUCTION

Onychomycosis refers to fungal infection of the nail that results in thickening, discolouration, disfiguring and splitting of finger and toe nails. It is frequently caused by dermatophytes: but now, non-dermatophytic moulds are known to account for 2%-12% of the nail infections.¹

Fungal infections may occur following trauma or wound contamination.² In many cases continuous exposure to physical and chemical aggressions facilitates penetration by different fungal species including the less pathogenic species.³ Majority of fungi which are implicated in human infections are saprophytic and are present in soil and environment.⁴ *Fusarium* infections in human are usually opportunistic but the fungus sometimes infects healthy persons causing onychomycosis and keratomycosis. Disseminated fusariosis is seen in high risk patients with haematological

cancers, organ transplant recipients and in burn patients.^{5,6} Here we report 5 cases with onychomycosis caused by a rare species of *Fusarium*, namely, *Fusarium dimerum*.

CASE REPORTS

Five patients presented to Dermatology out-patients department (OPD) between June-September months at our hospital in Kolkata, West Bengal. All were from suburban area of Kolkata. Sample of nails (nail clippings and scrapings) previously cleaned with 70% alcohol were collected using a sterile scalpel blade from all of them. Direct microscopy with 40% potassium hydroxide (KOH) wet mount and inoculation onto both Sabourauds dextrose agar (SDA) and SDA with chloramphenicol (SDCA) followed by incubation at 25 p C were performed to isolate and identify the pathogenic fungi. Their details are shown in Table 1, Figure 1.

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Table 1: Clinical presentation

| Case | Age (years), Gender, Occupation | Chief complaint, Duration | Clinical Types | History of trauma | Co-morbidity with treatment history |
|--------|---------------------------------|--|----------------|--|--|
| Case 1 | 52, F house-wife | White spots appeared on all toe nails of both feet; since 6 months | WSO | Unnoticed trauma several times while walking on barefoot | Type 2 mellitus since 6 years, good glycaemic control on oral glimepiride 1 mg once-a-day, hypothyroidism, on oral levothyroxine replacement therapy, (50 µg) once daily for last one month. |
| Case 2 | 35, F House-wife | Greyish white superficial lesion on her left great toe; 5 months | WSO | Yes | No |
| Case 3 | 48, M gardner | Whitish discoloration and brittleness of both great toe nails and also right thumb nail, almost 1 year | WSO | Yes | Type 2 diabetes mellitus since 2 years well controlled with diet and exercise |
| Case 4 | 61, M Farmer | Greyish white lesion with pitted appearance and disfigured, involving almost all toe nails and finger nails for the last one year. | PSO | Unable to narrate proper history | Essential hypertension on oral amlodipine 5 mg once-a-day |
| Case 5 | 45, M labourer | Greyish discolouration, thickened and distorted nails of both great toe and also right little finger nail | WSO | Yes | No |

F = female; M = male; WSO = white superficial onychomycosis; PSO = proximal superficial onychomycosis

Direct microscopy of 40% KOH wet mount revealed hyaline septate branched hyphae. Culture on SDA and SDCA grew white floccose with aerial mycelia fringes on obverse (Figure 2) but on reverse the colour of the growth was salmon to orangish brown which turned to dark brown on aging of culture (Figure 3). Microscopic examination of the mould by teased mount in lactophenol cotton blue (LPCB) preparation showed septate and branched hyaline hyphae with many sickle shaped macroconidia which were characteristically smaller in size in comparison to other species and had 0-3 septa (Figure 4). Macroconidiophore were short, simple and usually unbranched with monophialides. Microconidia were significantly absent and plenty of chlamydoconidia were noticed in old cultures (Figure 5). The above macro and microscopic picture was suggestive of *Fusarium dimerum*.⁷

These patients were prescribed oral itraconazole (400mg/day in divided doses) thrice-a-week for three weeks. The course was again repeated after a gap of 1 week. The duration of treatment for lesions on finger nail was for 3-4 months but for involvement of toe nails, duration was 8-9 months. The patients were followed-up in the Dermatology OPD after 4 weeks. All patients responded well to treatment.

DISCUSSION

New opportunistic pathogens have now emerged as a cause of life threatening infections worldwide sometimes. Extensive literature search reveals that *Fusarium dimerum* though appear as a rare species are notorious in causing various human infections like post operative endophthalmitis,⁸ peritonitis⁹ and cutaneous fusariosis in a patient with acute myeloblastic leukaemia (AML).¹⁰ But there is no documented report of *Fusarium dimerum* as a causative agent of onychomycosis in the literature till date to the best of our knowledge.

In human with normal immune system fusarial infections may occur only in nails and in cornea. Onychomycosis caused by fusarial species usually involves the toe nails and enter the body through trauma.¹¹ This was noted in all cases mentioned above and the likely route of entry was probably due to unnoticed trauma as mostly they walk on barefoot. Fusarial onychomycosis is seen as white superficial lesion (WSO) in immunocompetent patients. Rarely, proximal subungual onychomycosis (PSO) caused by *Fusarium* species has been reported.¹² The frequently isolated species of *Fusarium* causing onychomycosis are namely *Fusarium solani* and *Fusarium oxysporum*. We have also isolated these *Fusarium* species in several occasions from onychomycosis cases in our laboratory. *Fusarium proliferatum* is an uncommon aetiological agent causing onychomycosis. We have isolated *Fusarium dimerum* in 5 patients with onychomycosis which are clinically typed as WSO and PSO. All of them were from suburban area of Kolkata and presented between June to September months which may signify the seasonal influence. These lesions require long term treatment only for its cosmetic effect. In immunocompromised patients they can cause disseminated infections with poor response to antifungal agents. Among five patients of onychomycosis, two patients were suffering from diabetes mellitus. Considering their immune status they should be treated promptly. In immunocompromised individuals onychomycosis may act as a portal of entry for life threatening systemic infections.⁶ These infections require proper diagnosis and early treatment.

Hence, severely immunocompromised patients with skin, nail or other tissue breakdown conditions should avoid exposure to environmental sources of *Fusarium* species like tap water, soil which may be potentially contaminated with *Fusarium* species. Infections



Figure 1: Clinical photograph (case 3) showing white superficial onychomycosis



Figure 2: Colony morphology of *Fusarium dimerum* on SDCA (obverse)



Figure 3: Colony morphology of *Fusarium dimerum* on SDCA (reverse)



Figure 4: Photomicrograph showing *Fusarium dimerum* showing plenty of macroconidia with one /two septa (Lacto phenol cotton blue, $\times 400$)

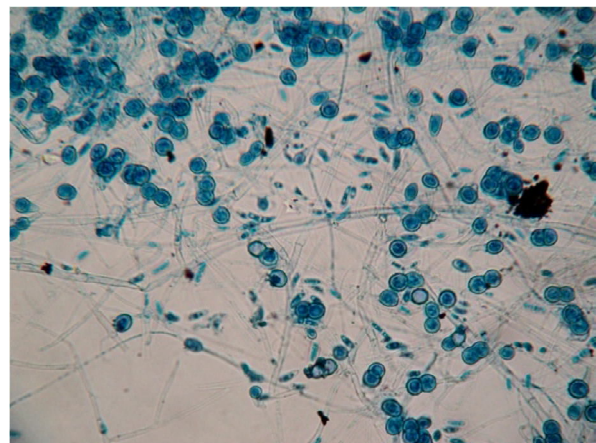


Figure 5: Photomicrograph showing abundant chlamydoconidia are seen in old culture (Lactophenol cotton blue, $\times 400$)

due to *Fusarium* involving skin and nail should be thoroughly investigated¹³ in the laboratory down to species level before discarding them as laboratory contaminants. Subsequently reporting the same to the treating clinicians is a must keeping in mind the invasive potential¹⁴ of the emerging pathogen. This can bring down mortality with appropriate treatment particularly among agricultural workers and labourers¹⁵ and also for people who are at risk of acquiring this infection.

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