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Case Series

# Dematiaceous Moulds in Onychomycosis: A Case Series on Etiological Agents beyond Dermatophytes

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**Abstract**

**Background:** Onychomycosis is predominantly caused by dermatophytes, although non-dermatophytic moulds can occasionally cause nail infections. Dematiaceous fungi such as *Alternaria* and *Curvularia* are uncommon causes and may be difficult to identify based on clinical findings alone.

**Case Presentation:** We report four cases of onychomycosis caused by dematiaceous fungi in otherwise healthy individuals. The patients presented with nail discoloration, dystrophy, onycholysis, and subungual changes involving fingernails and/or toenails. Direct microscopy of nail specimens demonstrated septate hyphae, while fungal cultures on Sabourauds dextrose agar produced characteristic pigmented colonies. Based on colony morphology, LPCB and slide culture findings, one isolate was identified as *Alternaria alternata* and three as *Curvularia lunata*. The identification of both species was confirmed at the National Culture Collection of Pathogenic Fungi (NCCPF), PGIMER, and Chandigarh. All patients received itraconazole-based treatment and showed clinical improvement during follow-up.

**Conclusion:** Dematiaceous moulds should be considered as potential causes of onychomycosis, particularly when pigmented fungal colonies are recovered from nail specimens. Direct microscopy, culture, and appropriate morphological identification, with reference laboratory confirmation when required, are important for accurate diagnosis and management.

**Keywords:** *Alternaria*; *Curvularia*; Onychomycosis.

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## Introduction

Onychomycosis is a prevalent fungal infection of the nail unit and represents an important cause of nail-associated morbidity worldwide [1].

The condition has an estimated global prevalence of approximately 5.5% [2].

While dermatophytes account for most cases, yeasts and non-dermatophyte moulds (NDMs) are being increasingly reported, particularly in persistent and difficult-to-treat nail infections [3].

Dematiaceous moulds are darkly pigmented fungi due to melanin deposition in their cell walls [4]. They are widely distributed in soil, water, and decaying organic matter [5]. Although often considered contaminants in clinical specimens, several species can cause opportunistic human infections [6]. Cell-wall melanin is an important virulence factor in these fungi [7].

*Alternaria* and *Curvularia*, among dematiaceous fungi, are rare causes of onychomycosis [8,9].

Their environmental ubiquity requires clinical correlation and supportive mycological findings to confirm pathogenicity.

Direct microscopy, culture, colony morphology, and slide culture remain useful for identification,

particularly where molecular methods are unavailable. Here, we report four uncommon cases of dematiaceous mould onychomycosis caused by *Alternaria* species and *Curvularia* species, diagnosed using conventional mycological methods at a tertiary care centre. Species were further confirmed from reference centre of Mycology.

**Case History:**


**Figure 1: Clinical presentation of onychomycosis cases**

Case 1, showing greyish white discoloration and distortion of the nail plate of both feet while Case 2, showing greenish-black discoloration, distortion, and subungual hyperkeratosis involving the fingers of hand and great toe of foot.

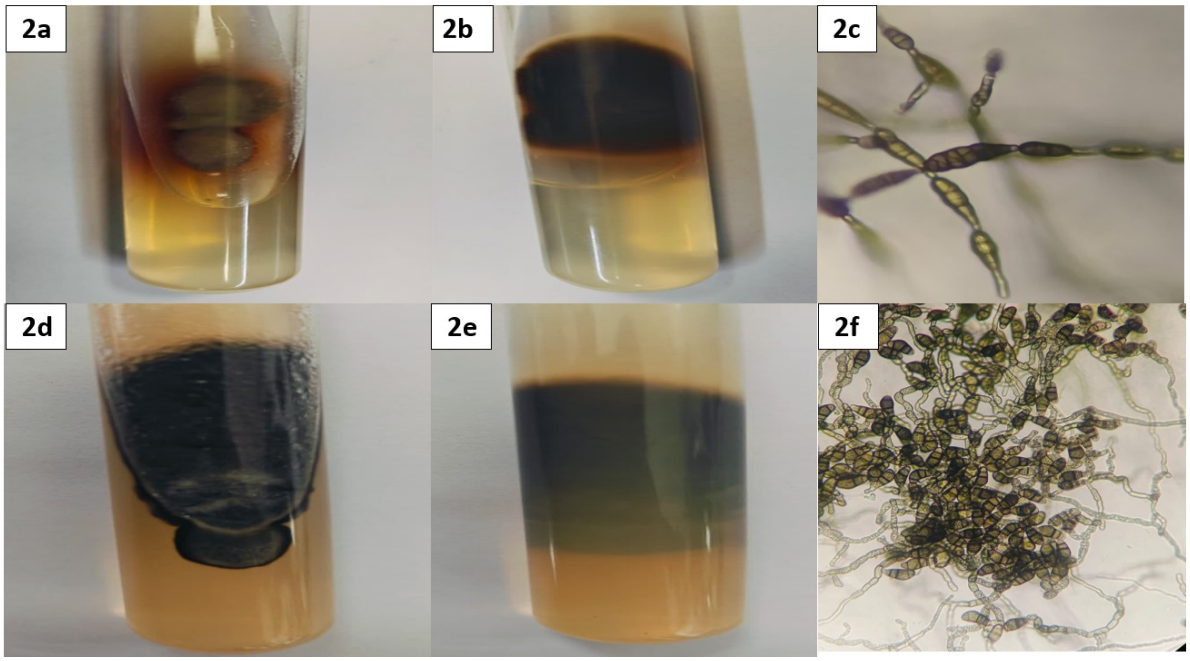


**Figure 2: Morphological and microscopic features of *Alternaria alternata* (2a,2b,2c) and *Curvularia lunata*. (2d,2e,2f)**

(2a) Surface appearance of *Alternaria alternata* cultured on Sabouraud Dextrose Agar (SDA), showing a dark brownish to black, velvety colony.

(2b) Reverse aspect of the same culture demonstrating dark brown to black pigmentation.

(2c) Lactophenol cotton blue (LPCB) preparation revealing septate, pigmented hyphae and multicellular conidia with both transverse and longitudinal septa, including a characteristic tapering beak, consistent with *Alternaria alternata.*

(2d) Obverse view of *Curvularia lunata* cultured on Sabouraud Dextrose Agar (SDA), showing a dark olive-brown to black, woolly colony.

(2e) Reverse view of the colony demonstrating dark brown to black pigmentation.

(2f) Lactophenol cotton blue (LPCB) mount showing septate, pigmented hyphae with brown, multicelled, curved conidia, characterized by an enlarged central cell, consistent with *Curvularia lunata.*

**Case 1**

A 45-year-old male farmer presented with greyish-white discoloration and distortion of the toe nails for 12–15 months. KOH mount showed septate hyphae. Culture on Sabouraud dextrose agar produced brownish-black cottony colonies with dark brown to black pigmentation on the reverse. LPCB demonstrated septate hyphae and large brown, pyriform, multicellular conidia with longitudinal and transverse septations and a characteristic tapering beak. The isolate was identified as *Alternaria alternata* and confirmed by NCCPF, PGIMER, and Chandigarh. The patient received itraconazole 200 mg and showed clinical improvement on follow-up.

**Case 2**

A 63-year-old housewife presented with greenish-black discoloration, nail distortion, and subungual hyperkeratosis involving multiple fingernails and toenails for 2–3 years. KOH mount showed septate hyphae. Culture yielded dark olive-brown to black woolly colonies with dark pigmentation on the reverse. LPCB and slide culture demonstrated pigmented septate hyphae with brown, multicellular, transversely septate conidia, suggestive of *Curvularia*. The isolate was confirmed as *Curvularia lunata* by NCCPF, PGIMER, and Chandigarh. Treatment with itraconazole 200 mg twice daily as pulse therapy for 7 days and weekly Fungi-cross nail lacquer resulted in improvement.

**Case 3:** A 33-year-old immunocompetent female vegetable vendor presented with brownish-black discoloration, dystrophy, and onycholysis of all fingernails for 4 months. KOH mount showed septate hyphae, while culture produced dark olive-brown to black woolly colonies. LPCB and slide culture demonstrated pigmented septate hyphae with characteristic brown, multicellular, transversely septate conidia, consistent with *Curvularia lunata*. She was treated with itraconazole 200 mg twice daily as pulse therapy for 7 days and showed improvement on follow-up.

**Case 4**

A 29-year-old healthy female homemaker presented with discoloration and proximal involvement of the left great toenail for 6–8 months. She reported regular nail polish use, with no history of diabetes, smoking, or immunosuppressive therapy. Direct microscopy and fungal culture supported a diagnosis of onychomycosis, and the isolate was identified as *Curvularia lunata* based on its characteristic morphology. She was treated with itraconazole 200 mg twice daily and showed clinical improvement on follow-up.

**Discussion**

Although dermatophytes remain the main cause of onychomycosis, NDMs are increasingly recognized [2]. NDMs may represent true pathogens when direct microscopy is positive, the same organism is recovered from two consecutive nail specimens, and microbiological findings correlate with the clinical features and characteristic morphology [10]. Dematiaceous moulds, including *Alternaria* and *Curvularia* species, are melanized environmental fungi that possess the ability to survive under a wide range of environmental conditions. Contact with soil and plant material has been recognized as an important predisposing factor because these habitats commonly contain *Curvularia* and *Alternaria* species, thereby facilitating traumatic inoculation into the nail unit [11,12]. *Alternaria* is considered one of the least common non-dermatophyte moulds causing onychomycosis, accounting for approximately 0.08%–2.5% of all cases and 3%–10% of NDM-associated nail infections [13]. Similarly, *Curvularia* species have also been implicated as causative agents of onychomycosis, although such infections are reported very rarely [14]. The isolates showed characteristic morphological features of their respective genera. *Alternaria alternata* exhibited darkly pigmented, muriform conidia with transverse and longitudinal septations, while *Curvularia lunata* showed brown, multicellular, curved, club-shaped conidia with transverse septa. Both isolates were confirmed at NCCP, PGIMER, and Chandigarh. These features allow provisional identification by conventional mycological methods. NDM-associated

onychomycosis is diagnostically challenging due to nonspecific clinical features. Unlike dermatophyte infections, NDMs may cause isolated nail discoloration or dystrophy without significant periungual inflammation [15]. Microbiological confirmation is therefore essential in chronic cases or treatment failures. Available therapeutic options for dematiaceous mould infections, including *Curvularia*-associated onychomycosis, comprise azoles, amphotericin B, terbinafine, and echinocandins [16]. Improved treatment outcomes may be achieved through a combination of systemic antifungal agents, topical therapy, and appropriate nail care, although extended clinical follow-up is generally necessary to assess therapeutic response. The identification of uncommon pathogens such as *Alternaria alternata* and *Curvularia lunata* broadens the range of fungi associated with onychomycosis. These cases emphasize the need to consider rare dematiaceous moulds and the continued relevance of conventional mycological techniques for accurate diagnosis.

**Conclusion:**

Dematiaceous moulds represent uncommon but important causes of onychomycosis beyond the usual dermatophyte pathogens. The identification of *Alternaria* and *Curvularia* species in these cases emphasizes the need for comprehensive mycological evaluation of chronic nail infections. Accurate diagnosis through clinical correlation and laboratory examination enables appropriate therapeutic decisions and improves understanding of rare fungal nail infections.

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