

A Case Study of Onychomycosis Caused by *Aspergillus Fumigatus*

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ABSTRACT

Onychomycosis is known as a nail fungal infection brought on by dermatophytes, yeast, and non-dermatophyte mold. According to epidemiological investigations, *Aspergillus fumigatus* has been identified as an egregious fungal cause of toenail onychomycosis. Here, we present a case of *A. fumigatus*-related multiple toenail infections in a 47-year-old woman in good health. The causing agent was determined to be *A. fumigatus* based on the culture's macroscopic and microscopic features.

Keywords: *Aspergillus fumigatus*, toenail & Onychomycosis

INTRODUCTION

Onychomycosis is a frequent nail infection caused by dermatophytes, yeasts and non-dermatophyte molds. [1] Among them, non-dermatophytic onychomycoses represent 1.45–17.6% of all fungal nail infections. Out of all these infections, *Aspergillus* has been reported to be the most common agent causing onychomycosis after *Scopulariopsis* spp. [2,3] The clinical selection of *Aspergillus* isolates however has to be carefully ascertained in nails because of the ubiquitous distribution of this agent and its frequent isolation as a lab contaminant. [4]

In this study, we describe a case of multiple toenail onychomycosis due to *Aspergillus fumigatus* occurring in an otherwise healthy,

middle-aged, immunocompetent lady without any other risk factor.

CASE REPORT

A 47-year-old housewife from an affluent urban background, presented to the Dermatology OPD with discoloration and disfigurement of all the toenails of the right foot for 11 months [Fig. 1]. She gave a history of jogging daily barefoot on grass in the morning. There were no lesions elsewhere in her body. The patient had no medical co-morbidity and no attendant history of trauma. She denied any suggestive history of contact in the family or with animals. Examination of the affected toenails revealed yellowish green discoloration with thickening and subungual debris. On microscopic examination, fungal hyphae were observed in 20% potassium hydroxide (KOH) preparations which were abundant, hyaline and septate with dichotomous branching at a 45-degree angle. [Fig. 2] The nail sample was cultured at 25°C on Sabouraud's dextrose agar (SDA) and dermatophyte test medium (DTM). The growth on SDA was rapid and had a granular texture with bluish green pigmentation on the obverse and a lack of pigmentation on the reverse of the slants. [Fig. 3,4]

DTM slants did not yield any fungal growth. Lactophenol cotton blue mount of the fungal growth revealed the presence of a uniseriate columnar vesicle that had been emerging

from the upper two-thirds of the vesicle and curving to be roughly parallel to each other. The conidia were arranged in long chains and were globose to sub globose (2.5-3.0 µm in diameter), green and finely roughened. [Fig. 5 (a) & (b)] Similar growth was observed from a repeat sample collected from the patient after an interval of 2 weeks. The fungal isolation was

identified as *A. fumigatus* and the patient was administered a 12-week course of oral terbinafine 250 mg once daily along with terbinafine cream. Follow up visit 4 months later revealed improvement in the disfigurement and discoloration of the nails and no fungal elements in KOH mount and repeat culture.

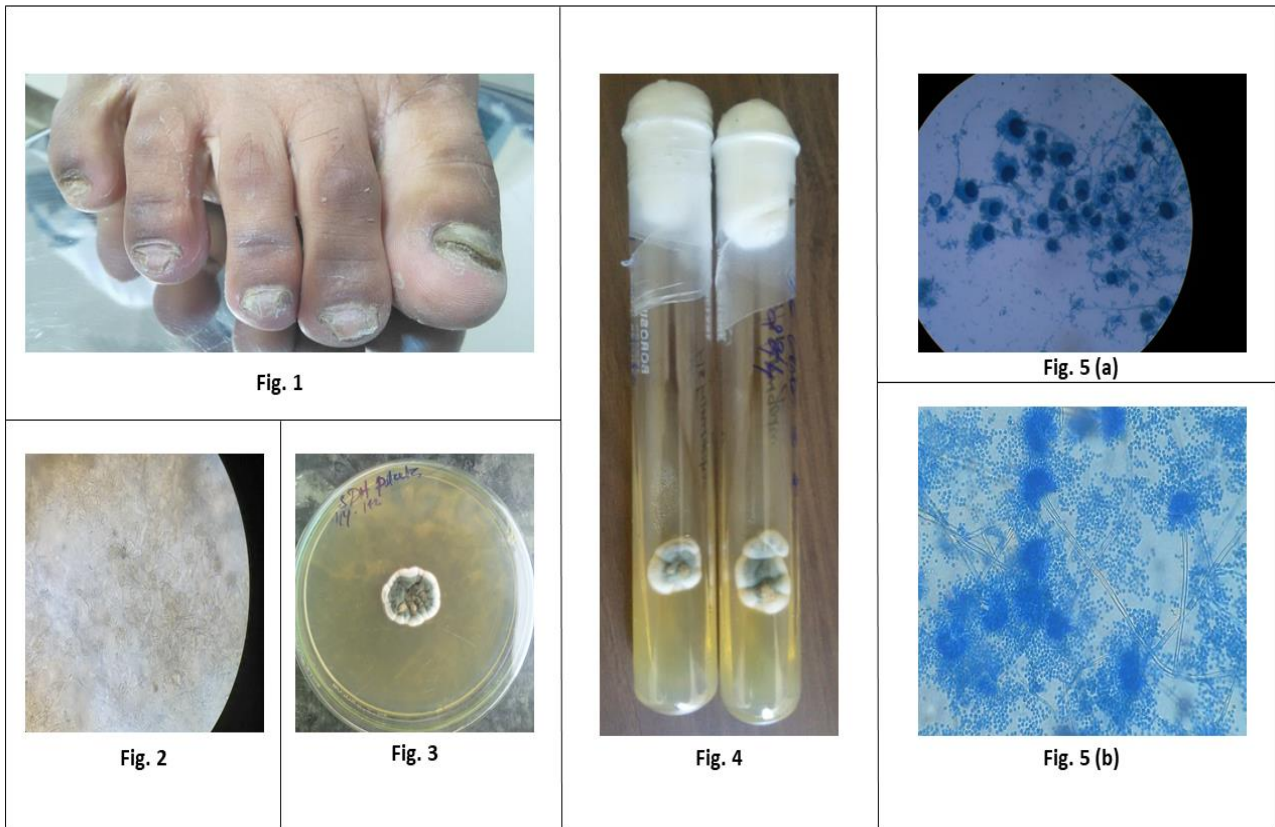


Figure Legend

1. All toes nail shows a total dystrophic variant of onychomycosis.
2. 20% potassium hydroxide (KOH) preparations which were abundant, hyaline and septate with dichotomous branching at a 45-degree angle.
3. Nail samples were cultured on SDA media (Culture Plate).
4. Nail samples were cultured on SDA media (Slant).
Culture showing a smoky green, velvety powder appearance suggestive of *Aspergillus fumigatus* (Included in Fig. 3 & 4)
5. (5 (a) and (b)) Lacto phenol cotton blue (LPCB) Characteristics of conidia over a flask-shaped vesicle of *Aspergillus fumigates*. (At 40X High Power field).

DISCUSSION

We report the isolation of *Aspergillus fumigatus* as the causative agent of onychomycosis in a middle-aged, immunocompetent patient belonging from an affluent background and with no precipitating risk factors. The elderly, people with skin conditions that damage the nails, and immunocompromised patients are those that have onychomycosis the most frequently. Additionally, because the causative molds are common fungi found in soil, water, and decomposing vegetation, toenails are 25 times more likely to become infected than fingernails. [5] Onychomycosis affects employees in a variety of occupations, but *Kaur et al.*

discovered that housewives, farmers, labourers, industrial workers, clerical workers, and students were the most frequently affected. The majority of cases involved ill-fitting usages and barefoot walking among other risk variables. [6] In the present case, though the patient was in good health with no co-morbid illness, she has a history of jogging daily barefoot on grass in the morning which could be the predisposing factor.

A. fumigatus is a rare cause of onychomycosis, and it could be considered as an emergent pathogen causing toenail onychomycosis. [3,7] According to reports from earlier investigations, non-dermatophytes account for 59.6% of all onychomycosis cases and 6.8% of all infections caused by other *Aspergillus* species (of which *Aspergillus fumigatus* is 27.6 percent alone). A sizable family of widespread saprophytic molds, *Aspergillus* spp. is frequently isolated from soil, air, and plant matter. [7,8]

F Zaini et al. reported that toenail onychomycosis among non-dermatophyte molds, *Aspergillus flavus* (11.78%) was the commonest species of all non-dermatophytic molds followed by *A. fumigatus* (6.08%), *A. niger* (3.04%) and *Penicillium* spp. (2.66%). [9] Similarly, *A. niger* was the most prevalent organism (32.0 percent), followed by *A. fumigatus* (26.05%), *A. flavus* (16.0 percent), *A. terreus* (4.0 percent), and *A. sydowii* (1/50, 2.0 percent). [2] In a similar manner, *Sung Min Hwang et al.* discovered that *Aspergillus* spp. was the most frequently isolated etiologic agent of onychomycosis due to NDM (83.1 percent in a case of *Aspergillus fumigatus* toenail onychomycosis that was described by *Stanley A. et al.* in 1998, the patient was immunocompetent. [10]

From India, only a few studies have documented Onychomycosis caused by *A. fumigatus*. [11] Even though *Aspergillus* spp. is a frequent laboratory contaminant, it might be challenging to distinguish between the pathogen and the contaminant when onychomycosis is caused by one of these

species. [12] In our case, direct KOH mount preparation showed the presence of abundant hyaline and septate hyphae with dichotomous branching and it could be correlated with the results of the culture additionally, the same results were seen when a lacto phenol cotton blue stain was used. Also, repeat samples showing the same results strengthen the possibility of infection with this ubiquitous fungus in this immunocompetent patient. Follow-up of the patient revealed improvement with Terbinafine therapy and negative KOH and culture findings which also confirm our diagnosis.

Non-dermatophyte onychomycosis treatment is not well standardized and can be challenging. However, research indicates that *Aspergillus* onychomycosis responds favourably to treatment. [13,14] Recent research has shown that terbinafine achieves high long-term cure rates for onychomycosis that are superior to those attained with itraconazole or other antifungals. [15-16] In our case, the patient received terbinafine cream paired with an oral dosage of 250 mg once a day for 12 weeks.

We did not perform antifungal susceptibility testing on the isolate in our patient and morphological identification could not be confirmed by molecular methods due to the lack of facility in our laboratory at the time of this study.

CONCLUSION

Awareness among Dermatologists and Microbiologists about the aetiological association of *A. fumigatus* with onychomycosis is required despite the common notion that the recovery of this fungus is an indicator of culture contaminant.

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