

# Cutaneous Mycosis in a Poultry Farmer Due to *Aspergillus Fumigatus*

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## Abstract

*Aspergillus fumigatus*, a medically important fungus is delineated as the cause of primary cutaneous aspergillosis in a 34-year-old immunocompetent person who got minor trauma while cleaning the cage of poultry. The diagnosis was confirmed both by direct microscopy as well as by cultural isolation of pathogen from the skin biopsy of the patient. Thin, septate hyphae with acute angle branching were demonstrated in the clinical specimen by potassium hydroxide technique. The smoky green coloured colonies of *A.fumigatus* were obtained in pure culture from the biopsied tissue on Sabouraud dextrose agar with chloramphenicol and Pal sunflower seed medium. The examination of isolate in Narayan stain showed typical conidiophores, uniseriate phialides and blue green coloured conidia. The epidemiological investigation confirmed the presence of *A.fumigatus* in the immediate environment of the patient. Itraconazole, an antifungal drug, was given orally for 12 weeks, and the patient showed good clinical response. Immediate attention to traumatic injury to the skin is very essential to avert the adverse outcomes.

**Keywords:** *Aspergillus Fumigatus*; Cutaneous Lesion; Itraconazole; Immunocompetent; Narayan Stain; Soil; Traumatic Injury

## Introduction

Cutaneous diseases of various etiologies are frequently encountered both in medical and veterinary practice worldwide. Mycotic infections primarily caused by opportunistic fungi are gaining significance in recent decades. There are approximately 600 species of *Aspergillus* present in the environment, of which 27 species of *Aspergillus* are involved in diverse clinical disorders of humans and animals [1,2]. *Aspergillosis* is primarily caused by *A.fumigatus*, however, other species like *A.amstelodami*, *A.candidus*, *A.chevallieri*, *A.clvatus*, *A.deflectus*, *A.flavus*, *A.glaucus*, *A.nidulans*, *A.niger*, *A.ochraceous*, *A.restrictus*, *A.syowii*, *A.tamari*, *A.terreus*, *A.udagawae*, *A.ustus*, and *A.versicolor* are also implicated in the etiology of disease [1,2]. All species of

*Aspergillus* are commonly prevalent in the environment, and are isolated from the soil, air, water, decaying plant materials [1,3]. The soil is considered to be the main source of infection. The source of infection is exogenous, and respiratory is considered the principal mode of transmission. However, the fungus may also enter to the body tissue following traumatic injury, wound or surgery. Among many species, *A.fumigatus* is most frequently encountered in human and animal infections throughout the world [4].

The cutaneous aspergillosis is a fungal infection of the skin and is caused by several species of the genus *Aspergillus*, namely *Aspergillus fumigatus*, *A. flavus*, *A.niger*, *A. terreus* and *A. candidus* and *A.ustus* [1,2,5-7]. The disease usually occurs in sporadic form but rarely, outbreaks of cutaneous

aspergillosis are traced to the fungal contaminated biomedical devices. The disease is reported from many countries of the world including India [1,2,5,7-11]. The cutaneous aspergillosis is observed in immunocompromised and also in immunocompetent patients. The disease may be either primary in origin subsequent to traumatic implantation of the fungal agents with contaminated objects, or occurs due to haematogenous dissemination of the infection from the lungs to other sites [4]. It is important to mention that agricultural workers, gardeners, brick manufacturers, etc., who remain in direct contact with the soil are at a greater risk of acquiring fungal infections [1,2,4].

Maximum cases of cutaneous aspergillosis are described in neutropenic cancer patients [12]. The importance of fine needle aspiration cytology for the diagnosis of primary cutaneous aspergillosis is suggested by Venugopal and Venugopal [13]. Cutaneous aspergillosis should be differentiated from *Cryptococcus*'s, herpes simplex, phaeohyphomycosis, and zygomycosis [12]. A number of antifungal drugs such as amphotericin B, caspofungin, itraconazole, posaconazole, terbinafine, and voriconazole have been tried with variable success in the management of aspergillosis [1,2,12]. There is a paucity of information on primary cutaneous aspergillosis due to *Aspergillus fumigatus* in an immunocompetent person from Western region of India and therefore, this communication delineates the role of *Aspergillus fumigatus* in the etiology of primary cutaneous aspergillosis in an immunocompetent person.

## Materials and Methods

A 34-year-old male patient belonging to the rural area of Bharuch with dermatological disorder was presented at the Skin OPD of Welfare Hospital and Research Center, and Shashwat Skin Clinic, Bharuch, Gujarat, India for diagnosis and treatment. The patient was keeping around 25 birds in wooden cages for eggs in his house. The skin biopsy (punch method) was collected aseptically from the cutaneous lesion of the patient for mycological diagnosis. A part of the specimen was subjected for detailed mycological investigation using standard techniques. Direct microscopy was attempted in 10 % solution of potassium hydroxide (KOH), India ink, Gram stain; and the cultural isolation was done on nutrient agar, Sabouraud dextrose agar, Sabouraud dextrose agar with chloramphenicol, and Pal sunflower seed medium [14]. The detailed morphological examination of the fungal isolates under light microscope was conducted under high power light microscope by preparing wet mount in Narayan stain, which contained 6.0 ml of dimethyl sulfoxide (DMSO), 0.5 ml of 3 % aqueous solution of methylene blue, and 4.0 ml of glycerin [15]. The samples of the bird excreta, water, and soil from the patient's house were collected for the prevalence of *Aspergillus fumigatus*.

## Results

The patient did not reveal history of fever, anorexia, coughing, and weight loss. There was no lymphadenopathy. Clinical examination of the patient showed one chronic ulcerated lesion on the left thumb. *Aspergillus fumigatus* was demonstrated in the cutaneous lesion of 34-year-old patient. The patient narrated that he had received minor injury on the left thumb during cleaning the wooden cage of the birds and ignored the injury for many days. The direct microscopical examination of the punch biopsy sample (taken from the edge of the ulcer) in 10% KOH mounts revealed the presence of thin, hyaline, septate, and dichotomously branched hyphae morphologically simulating to *Aspergillus*. However, India ink preparation failed to reveal any capsule of *Cryptococcus neoformans*. Likewise, *Nocardia* was absent in the impression smear when stained by Gram's technique. Further, no growth of bacteria, *Nocardia*, and *Cryptococcus neoformans* was observed on nutrient agar, Sabouraud dextrose agar, and Pal's sunflower seed medium, respectively. The smoky green coloured colonies were isolated in pure and luxuriant from the ulcer biopsy material on Sabouraud dextrose agar with chloramphenicol medium and Pal sunflower seed after 3 days of incubation. Since *A. fumigatus* is sensitive to cycloheximide, it is advised not to incorporate it in the medium. The growth of fungal isolate in Narayan stain showed smooth conidiophores, flask shaped vesicles, uniseriate phialides, and globose shaped conidia. Based on the gross cultural and microscopic morphology, the fungal isolate was identified as *A. fumigatus*. The detailed examination of the patient for HIV, diabetes mellitus, and tuberculosis was non-committal indicating that he was not immunocompromised, and his immune status was normal. Further, the negative culture of blood, and urine on mycological media ruled out the possibility of dissemination of *A. fumigatus* infection. The patient was given itraconazole (200 mg, 12 hourly, orally daily for 4 weeks, followed by 100 mg, 12 hourly orally daily for 8 weeks) therapy for the management of primary cutaneous aspergillosis. The drug was well tolerated as there was no adverse effect. The oral therapy with itraconazole showed good clinical response as indicated by the complete clearance of the lesion. The fungus *Aspergillus fumigatus* was isolated from the samples of the soil, bird droppings and water collected from the house of the patient.

## Discussion

Primary cutaneous aspergillosis is considered as an emerging infection among immunocompromised patients [16]. Cutaneous mycosis is usually caused by opportunistic fungi that are recovered from a wide variety of environmental materials [1]. The transmission of the infection occurs following the traumatic implantation of the fungal agents

into the skin from contaminated soil, wood, thorn etc. [1]. In the present case, clinical symptoms and history of trauma, mycological investigations, and therapeutic response with antifungal drugs confirmed that *A.fumigatus* was implicated as a cause of primary cutaneous aspergillosis. The laboratory findings indicated that our patient was immunocompetent who received traumatic injury while cleaning the wooden cages of birds. The role of trauma in the development of cutaneous aspergillosis is reported by earlier researchers [2,8]. Several investigators described the cases of primary cutaneous aspergillosis in immunocompetent patients [2,8,9,17]. The epidemiological investigation revealed the presence of *A.fumigatus* in the working environment of our patient. The observation of the present investigation goes parallel to the findings of Xiaoyan and co-investigators who isolated *A.fumigatus* from the cutaneous lesions of an immunocompetent patient. Since *A.fumigatus* simulates to other filamentous fungi under direct microscopy, hence, it is incredibly crucial to isolate the fungus to establish an unequivocal diagnosis.

## Conclusion

It is emphasized that an early detection and prompt management of primary cutaneous aspergillosis is highly imperative to prevent the dissemination of disease. Further studies on the etiologic role of *A.fumigatus* in different clinical disorders of humans and animals should be conducted. As Pal sunflower seed medium and Narayan stain are very cheap as compared to other mycological media and stains, therefore, their wider use in public health and microbiology laboratories are recommended.

## Conflict of Interest

The authors declare that they do not have conflict of interest.

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## References

1. Pal M (2007) Veterinary and Medical Mycology, 1<sup>st</sup> (Edn.), Indian Council of Agricultural Research, New Delhi, India.
2. Dave P, Mahendra R, Pal M (2015) Etiologic significance of *Aspergillus terreus* in primary cutaneous mycosis of an agricultural worker. *Molecular Microbiology Research* 5(2): 1-4.
3. Pal M (2015) First mycological investigation of *Aspergillus* species from soil of potted plants. *Ethiopian International Journal of Multidisciplinary Research* 3: 8-9.
4. Pal M, Dave P (2006) Aspergillosis: A sapromycotic zoonosis. *Intas Polivet* 7: 421-428.
5. Gupta M, Weinberger B, Whitley-Williams PN (1996) Cutaneous aspergillosis in a neonate. *Pediatric Infectious Diseases Journal* 15(5): 464-465.
6. Mohapatra S, Xess I, Swetha JV, Tanveer N, Asati D, et al. (2009) Primary cutaneous aspergillosis due to *Aspergillus niger* in an immunocompetent patient. *Indian Journal of Medical Microbiology* 27(4): 367-370.
7. Xiaoyan L, Yang, Jun Y, Weiyuan M (2017) Primary cutaneous aspergillosis caused by *Aspergillus fumigatus* in an immunocompetent patient: A case report. *Medicine* 96(48): e8916
8. Romano C, Miracco C (2003) Primary cutaneous aspergillosis in an immunocompetent patient. *Mycoses* 46: 56-59.
9. Zhang QQ, Li L, Zhu M, Zhang CY, Wang JJ (2005) Primary cutaneous aspergillosis due to *Aspergillus flavus*: a case report. *Chinese Medical Journal* 118(3): 255-257.
10. Tahir C, Garbati M, Nggada HA, Yawe EHT, Abubaker AM (2011) Primary Cutaneous aspergillosis in an immunocompetent patient. *Journal of Surgical Technique Case Report* 3(2): 94-96.
11. Dogra L, Sahay M, Ismal K, Vali PS, Anuradha (2019) Primary cutaneous aspergillosis in a renal allograft recipient. *Indian Journal of Transplant* 13(3): 219-220.
12. Chander C (2009) Textbook of Medical Mycology, 3<sup>rd</sup> (Edn.), Mehta Publishers, New Delhi, India.
13. Venugopal TV, Venugopal PV (2012) Primary cutaneous aspergillosis diagnosed by fine needle aspiration cytology. *Medical Mycology Case Reports* 1(1): 103-106.
14. Pal M (1997) Use of Pal's medium for an early diagnosis of cryptococcosis. *The Antiseptic* 95: 175.
15. Pal M (2004) Efficacy of Narayan stain for morphological studies of moulds, yeasts and algae. *Revista Iberoamericana de Micologia* 21(2): 219.
16. Walsh TJ (1998) Primary cutaneous aspergillosis-an emerging infection among immunocompromised patients. *Clinical Infectious Diseases* 27(3): 453-457.
17. Naidu J, Singh SM, Pournik M (1992) Cutaneous aspergillosis due to *Aspergillus terreus* and *Aspergillus candidus*. *Biome* 5: 101-105.