

RHIZOPUS HOMOTHALLICUS-CASE SERIES FROM A TERTIARY CARE CENTRE-THANJAVUR

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Abstract

Background: To report three cases of zygomycosis caused by *Rhizopus homothallicus* that occurred in march 2023 to april 2024 at a tertiary care center-Thanjavur, South India. Case details: All three patients were Men aged more than 50yrs,two were dead even after the treatment,the only case to survive is Necrotising fasciitis(cutaneous mucormycosis).Clinical presentation include Rhino-orbital-cerebral mucormycosis, Pulmonary mucormycosis and Cutaneous mucormycosis presented with typical risk factors like Diabetes mellitus, on treatment with corticosteroid, underlying lung pathology and other risk factors. Diagnoses confirmed by fungal culture and Histopathology. First line treatment includes **Materials and Methods:** This prospective study was conducted at Thanjavur Medical college,a tertiary care centre at Thanjavur, from march 2023 to april 2024.A total of 180 clinically suspected samples of Mucormycosis of all age groups were included.Samples were sent to Microbiology and Histopathology lab.P riliminary test using KOH mount Was done in microbiology lab, followed by culture in SDA slant/plate and Blood agar plate.Result: A total of 3 cases of *Rhizopus homothallicus* were successfully isolated and treated with IV Amphotericin-B deoxycholate in all three cases due to financial cost and availability at our setup. **Conclusion:** This case series highlights the prevalence of *R.homothallicus* in our locality and its importance in early diagnosis and prompt treatment to prevent morbidity and mortality due to zygomycosis.

INTRODUCTION

Rhizopus SPP are the most common mucorales causing opportunistic infection in humans. It is typically involved in diabetic ketoacidosis, neutropenia, malignancy, immunocompromised, immunosuppressive therapy trauma hemochromatosis. With worldwide distribution, this saprophytic fungus is easily recovered from environment in decaying matters. Among the genera *Rhizopus*, *R.homothallicus* is an emerging pathogen being reported in large number of cases. The genus *Rhizopus* is characterized by the presence of stolons and darkly pigmented rhizoids.^[1] The sporangiospores can get inoculated in the surface epithelium and germinate rapidly into coenocytic hyphae. The hyphae is angioinvasive causing thrombosis in distant capillaries resulting in necrosis and blackening of affected region.^[2] *Rhizopus* has been grouped into stolonifer grp, oryzae grp and microsporus grp, based on the temperature it grows. *Rhizopus homothallicus* comes under microsporus grp.^[3] Based on clinical manifestation, mucormycosis is classified into the following types: Rhinocerebral, pulmonary, gastrointestinal,

cutaneous, disseminated. Among these rhinocerebral is the most common manifestation. We reported 3 cases of mucormycosis caused by *R.homothallicus* in our tertiary care centre from march 2023 to april 2024:1 pulmonary, 1 rhinocerebral, 1 necrotising fasciitis case. In this article we provide a detailed case report of necrotizing fasciitis caused by *R.homothallicus*.

CASE PRESENTATION

CASE 1:



Figure 1: Necrotizing fasciitis of left forearm

56 yrs old male presented with c/o blackening and necrosis of left forearm since 3 weeks. He had an h/o trauma to his left forearm while farming 1 month back, for which he applied some native medicines like cow dung. He is a known case of diabetes since 13yrs, was taking sitagliptin and metformin irregularly. O/E patient was afebrile, conscious, oriented. The patient's breath sounds were normal during auscultation, and a urinalysis revealed ketonuria with an RBS of 482 mg/dl upon admission. HbA1c levels was 7.5%. His left upper limb shows extensive necrosis with gangrene involving entire forearm. Several tissues and swabs were removed from the lesion prior to surgery, and they were sent for histopathological and microbiological analysis. The patient's left upper limb was amputated below the elbow right away. Additionally, post-op samples were also forwarded to the laboratory.



Figure 2: Left upper limb after below elbow amputation

Microbiological Analysis

1. 10% KOH MOUNT:

Swabs and tissues were examined under light microscope which shows 10-15 μ m wide, aseptate, thin-walled hyphae with irregular branching under high power(40x) [Figure 3].

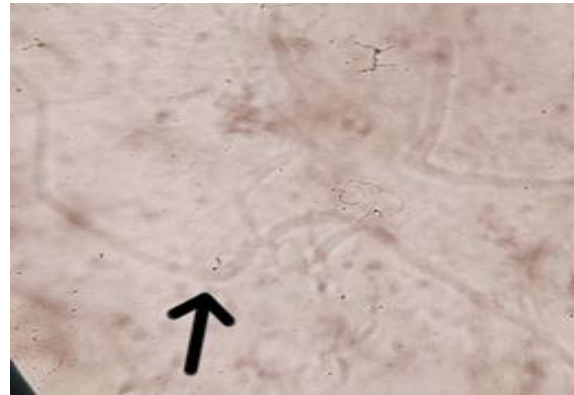


Figure 3: Koh mount showing 10-15 μ m wide, aseptate, thin-walled hyphae with irregular branching under high power(40x)

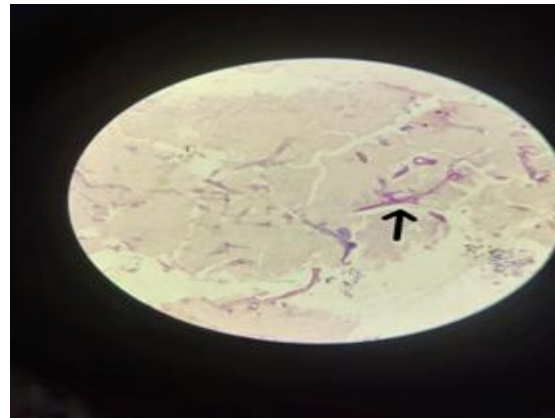


Figure 4: H&E stain showing broad ribbon like aseptate hyphae

2. Fungal Culture on SDA Slant:

Macroscopy: Obverse- initially cottony white and then becomes greyish white giving salt and pepper appearance [Figure 5] Reverse-white. **Microscopy:** LPCB stain -Broad, hyaline, aseptate hyphae producing very few sporangiophores opposite poorly developed rhizoids, abundant homothallic, thick walled zygosporangia that are golden brown in color including stellate spines. Suspensor cells are uneven in size [Figure 6] Based on the findings, *Rhizopus homothallicus*, which was isolated from both pre- and post-operative samples, was identified as the pathogenic fungus.



Figure 5: SDA slant showing cottony white growth which turns greyish giving salt and pepper appearance

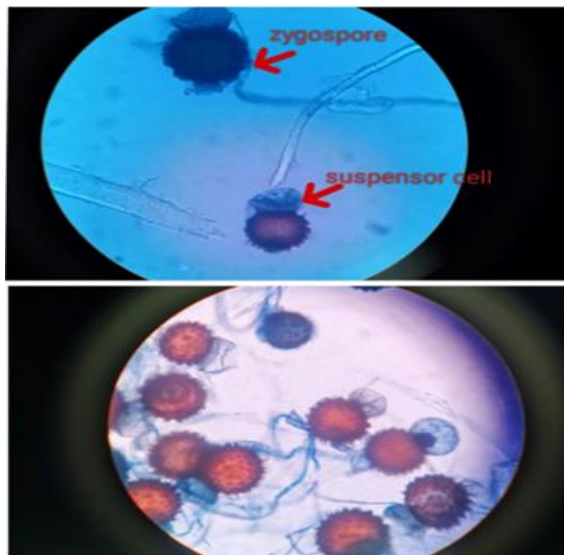


Figure 6: LPCB stain showing Broad, hyaline, aseptate hyphae producing very few sporangiophores opposite poorly developed rhizoids, abundant homothallic, thick walled zygosporangia that are golden brown in color including stellate spines. Suspensor cells are uneven in size

Histopathology: On H&E stain- broad ribbon like aseptate hyphae, suggestive of mucorales [Figure 2]. Treatment and outcome after amputation: Pt was given IV Amp-B deoxycholate 60mg daily (1mg/kg/day), oral Itraconazole loading dose:200mg TDS followed by 200mg OD along with subcutaneous insulin for 14 days. Sr Potassium, Magnesium, Blood glucose levels, LFT, RFT were monitored regularly. Followup samples were taken on post-op day 7 & 14 and cultured, which shows no fungal growth. Pt was discharged on oral Itraconazole and oral hypoglycemic drugs. patient was still alive and well at two months follow-up, with good glycemic control.

CASE 2:

53yrs old male presented with chief complaints of right sided facial pain, swelling and blackish discoloration over right side of face for past 15days, swelling was progressive with pain and blurring of vision involving the right eye [Figure 7]. He is a known case of Diabetes mellitus for past 8yrs, on irregular treatment, chronic smoker and alcoholic. CT brain shows fissure fracture of anterolateral and posterolateral wall of left maxillary sinus, left orbito-maxillary sinus and soft tissue hematoma present. Nasal swabs and corneal scrappings sent for fungal culture shows growth of *R.homothallicus*. Treatment started with IV Amphotericin-B deoxycholate starting with low dosage and increased to total dosage amount of 5.45g, but his clinical condition deteriorated and the patient died on day 9 on ICU admission.



Figure 7: Right side facial swelling, corneal ulcer and discharge from right eye

CASE 3:

64yrs old male, chronic smoker and a COPD patient on treatment with prednisolone, presented with chief complaints of fever, productive cough, breathlessness, chest pain for 5days. He was intubated, chest x-ray and CT chest revealed right middle and lower lobe consolidation [Figure 8]. Sputum and BAL samples were sent for culture, Antibiotics were initiated. SDA revealed the growth of *R.homothallicus* and *Klebsiella pneumoniae* in Macconkey agar. Patient was given IV Amphi-B along with the antibiotics after positive fungal culture report. However patient condition was deteriorated and succumbed to death on day 12 on ICU admission.

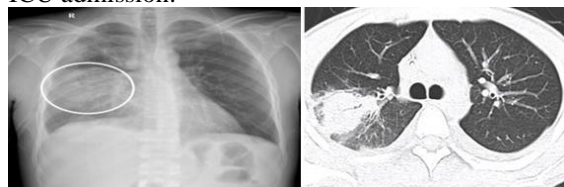


Figure 8: Right lung middle and lower lobe consolidation on CXR and CT chest

DISCUSSION

According to WHO, In India the prevalence is estimated as 140 per million population, which is about 80 times higher than the prevalence in developed countries. Case fatality was observed to be highest among disseminated mucormycosis (68%) and lowest among cutaneous disease (31%).^[4-6] *Rhizopus* is the most commonly isolated fungi from the patients of mucormycosis. *Apophysomyces elegans*, *Apophysomyces variabilis* and *Rhizopus homothallicus* are reported to be emerging species. The incidence of the disease is high in India and also rising globally with the rise in cases of diabetes mellitus. Hyperglycemia and low pH due to DKA cause phagocytes to become dysfunctional in diabetic ketoacidosis (DKA), impairing chemotaxis and defective intracellular killing of the pathogen. The growth of the *Rhizopus* in the body causes extensive vascular thrombosis and tissue necrosis, as a result of which the fungus disseminates to other organs. Our case of Necrotising fasciitis which is a rare case, survived due to immediate amputation, early diagnosis and treatment. Microscopy and Culture identification along with HPE remains gold standard to establish the cause. Genomic identification using molecular methods was not done.^[7-9]

CONCLUSION

Rhizopus homothallicus is an emerging fungal pathogen with high mortality rate. From March 2023 to April 2024, we identified three cases of *R. homothallicus* at our tertiary care centre. one pulmonary and one rhinocerebral, one cutaneous mucormycosis. out of the three cases; the only case to survive was necrotizing fasciitis, for which

amputation was performed. Compared to developed countries, India has a notably higher death rate from mucormycosis as a result of delayed medical attention, delayed diagnosis, and difficulties treating the disease at an advanced stage.

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