

# Absence of zygomycetes in the oral niche of patients with oral squamous cell carcinoma and oral potentially malignant disorders

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## Abstract

Mucormycosis is a fungal infection which has been regrouped under emerging infectious disease. In this COVID-19 pandemic, the incidence of mucormycosis has been reported in many parts of India. Systemic condition that weakens one's immune systems like uncontrolled diabetes, chemotherapy or chronic long-term illness poses a grave threat for this fungal infection. Patients with oral cancer and precancer remain at significant risk for developing severe infections regardless of significant developments in therapy. Few studies have reported that this opportunistic fungal pathogen may be cultured from the oral cavity. Our findings disprove the oral carriage of filamentous fungi (Zygomycetes) among the group of patients with oral squamous cell carcinoma, oral potentially malignant disorders who are susceptible to immunological deficits and healthy subjects. This finding strongly supports that the oral niche of healthy as well as the patients with oral lesions do not harbour this filamentous fungi.

**Keywords:** Carcinoma, mucormycosis, oral commensal

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Mucormycosis has been increasingly found in Covid-19 recovered patients. Mucormycosis was also declared as an epidemic following this situation in India. Further with any systemic condition that depresses one's immune system, this poses a grave threat. Neutropenia is the most common predisposing factor; it is often superimposed on other immunological deficits (e.g., impaired cellular or humoral immunity) each of which is associated with a specific spectrum of infection. Bacterial infections preponderate during the early stages of a neutropenic episode, whereas fungal infections occur more often in patients with prolonged neutropenia.

Patients with oral cancer and precancer remain at significant risk for developing severe infections regardless of substantial developments in treatment. Besides neutropenia, chemotherapy and radiotherapy also disrupt the mucosal layer of the mouth, leading to severe oral mucositis, gingivitis, oral candidiasis, cellulitis and viral mucosal eruptions.<sup>[1]</sup> The fungus mucor is prevalent in soil, manure, vegetables and bread mould.<sup>[2]</sup> The infection usually results from inhalation of fungal spores, contamination of traumatized tissue, ingestion or direct

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inoculation.<sup>[3]</sup> Mostly mucor moulds do not infect humans because they are incapable of growing at body temperature. However, thermotolerant species have been identified in Covid-19–associated mucormycosis.

An area of ulceration or an extraction socket in the mouth can be a port of entry for mucormycosis into the maxillofacial region, mainly when the patient is immunosuppressed.<sup>[4]</sup> In this COVID-19 pandemic, the incidence of mucormycosis is reported in many parts of India. As it is claimed that this opportunistic fungal pathogen may be cultured from the oral cavity, nasal passages, throat and stool of healthy patients without clinical signs of infection,<sup>[5]</sup> we were interested in reporting our findings to refute the oral carriage of filamentous fungi (Zygomycetes) among the group of patients with oral squamous cell carcinoma, oral potentially malignant disorders who are susceptible to immunological deficits and healthy subjects.

Unstimulated whole saliva from patients with oral squamous cell carcinoma (n = 97), oral potentially malignant disorders (n = 200) and health (n = 200) was collected in a sterile wide-mouthed container by the 'draining' method. The subject's head was tilted forward so that saliva moves towards the anterior region of the mouth and the pooled saliva was collected into a wide-mouthed sterile container. The samples were immediately transported to the microbiology laboratory and processed. Ten microlitres of the saliva sample was inoculated onto Sabouraud's Dextrose Agar (SDA) with chloramphenicol (50 µg per ml) by spread plate technique to screen for Candidal carriage. The SDA plates were incubated at 37°C for 1 week in aerobic conditions. We were

able to isolate *Candida* and *Pichia* species from nearly 254 saliva samples. The rest of the saliva samples did not show growth of other yeasts and filamentous fungi. There was a complete absence of zygomycetes and other filamentous fungal growth from these saliva samples. This finding strongly supports that the oral niche of healthy as well as the patients with oral lesions do not harbour filamentous fungi (zygomycetes). Zygomycetes are opportunistic pathogens found ubiquitously in the environment and their infection is mainly through inhalation.

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### Conflicts of interest

There are no conflicts of interest.

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