

Mucormycosis: An ignorance that cannot be ignored

Abstract

Mucormycosis (formerly known as zygomycosis) is a severe but uncommon fungal disease characterized by a clan of moulds known as mucormycetes. These moulds may be found all over the place. Mucormycosis primarily affects those who have chronic illnesses or who use medications that decrease the body's potential to exacerbate infections and infirmity. When individuals inhale fungal spores from the air, it most frequently affects the sinuses or lungs. Steroid usage, diabetes, and improper use of oxygen administration are all risk factors. This infection is characterized by headache, facial pain, nasal congestion, loss of vision or pain in the eyes, swelling in cheeks and eyes, black crests in the nose, coughing, and bloody vomits. Death occurs as a consequence of a lack of awareness of symptoms of Mucormycosis, high cost of therapy and the scarcity of medications, ignoring check-ups, and self-medication. Treatment of this devastating disease includes surgical excision of the involved part followed by antifungal therapy. While the rise of Mucormycosis in Covid instances is concerning, it is time for experts to work together to stop the spread of Mucormycosis. A solid referral and communication system among health professionals (e.g., pulmonologist, ENT surgeon, general physician, and maxillofacial dental surgeon) is the most important step in combating the disease in the current situation.

Keywords: mucormycosis, Covid associated mucormycosis, black fungus, steroid therapy

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Introduction

The threat of COVID-19 pandemic predominates across India. People who are able to endure COVID-19 illness are now at danger of contracting the dreadful fungal disease, Mucormycosis, commonly known as "black fungus," which is being discovered rather often among Covid-19 patients in several areas. Mucormycosis, a fungal infection caused by ubiquitous environmental molds, such as *Rhizopus arrhizus*, *Rhizomucor pusillus*, *Apophysomyces variabilis* and *Lichtheimia corymbifera*, is surging as a COVID-19-associated infection at unprecedented rates throughout India and raising alarm bells around the world.¹ This fungal disease is not uncommon in India, where the pre-Covid case rate was estimated to be 70 times that of the developed world. The current surge of cases, however, is unusual. In India, the infection has been deemed notifiable.² An inflammatory outburst or the use of steroids may impair the immune system in covid-19 patients, particularly those who require oxygen therapy. This may raise the risk of opportunistic infections such as Mucormycosis. Headache, facial pain congestion in the nose, loss of vision or pain in the eyes, swelling of the cheeks and eyes, and black coloured crests in nose, coughing, and bloody vomits are all symptoms of this disease. In most cases, clinical assessment and histological examination are used to make a diagnosis. According to recent Indian reports, the mortality rate of black fungus is gradually raising, and scientists are referring it a "pandemic within the COVID-19 pandemic."³

To treat a devastating black fungus infection, the subject should be continuously observed by a group of medical professionals that includes microbiologists, internal medicine specialists, neurologists, ENT specialists, ophthalmologists, dentists, and surgeons. In India, the

first-line treatment for Mucormycosis is liposomal amphotericin-B, and 60-90 vials of this antifungal injection may be necessary to cure a solitary sick person. In India, the existing price for each vial is estimated to be between Rs.5000 and Rs.6000. Posaconazole is the alternative and second-line medication.³ Mucor, which could get deep into the sinuses or lungs, has already killed many people in India and prompted others to have an eye excised to get rid of the fungus.

In India, the incidence of Mucormycosis has increased more rapidly during the second wave of COVID-19 than during the first wave, with at least 14 872 cases as of May 28, 2021. The vast majority of these cases occurred during ongoing SARS-CoV-2 outbreaks in India, forcing the Central Government of India to proclaim Mucormycosis as pandemic. The prevalence of Mucormycosis in India is estimated to be 140 per million people, which is approximately 80 times greater than the incidence in developed countries.

Maharashtra has 1,500 Mucormycosis cases and 90 fatalities as a result of the disease. In Gujarat, 1,163 instances of mucormycosis have been identified; with 61 deaths. While Madhya Pradesh has 575 instances of Mucormycosis and 31 fatalities. In Haryana 268 instances of Mucormycosis and eight deaths have been reported. Delhi has recorded 203 instances of Mucormycosis and one death. Uttar Pradesh has recorded 169 instances of Mucormycosis and eight fatalities. Bihar has 103 cases and 2 deaths. Chhattisgarh has 101 cases, and one person has died as a result of it. While 97 cases of Mucormycosis have been recorded in the southern state i.e., Karnataka and no deaths were reported, according to government statistics. As many as 90 instances of Mucormycosis have been identified in this state of Telangana, with 10 deaths being reported (Figure 1). Other states, like Rajasthan, Andhra Pradesh, and Uttarakhand, have shown a continuous increase in the number of Mucormycosis cases and deaths.⁴

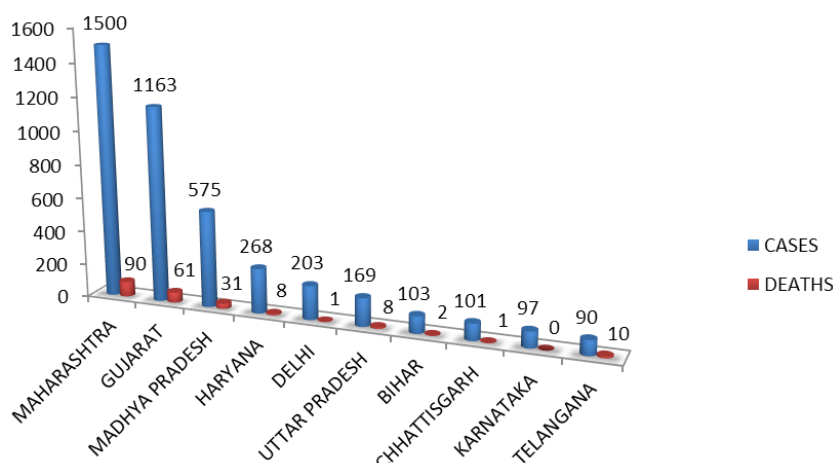


Figure 1 Mucormycosis cases in India.

Cases of black fungus on the rise in Andhra Pradesh

In Andhra Pradesh, the aggregate number of cases of Mucormycosis has escalated to 3,876 with 324 fatalities. So far, 1,671 surgeries on Black Fungus patients have been executed. Guntur district currently leads the state with 626 Black Fungus cases, 242 of which are still active. So far, 586 cases have been recorded in Krishna district, followed by Chittoor (568), Anantapur (485), East Godavari (337), Visakhapatnam (328), Kurnool (275), Kadapa (249), Prakasam (194), and Srikakulam (121). Nellore reported 61, Vizianagaram had reported 23, and West Godavari had 23.⁵

Risk factors

Usage of steroids

Researchers believe that the use of steroids, a life-saving medication for severely and critically ill Covid-19 patients, initiates black fungus, which has a 50% mortality rate. Steroids appear to help avoid some of the harm caused by the body's immune system seizing up to fight off coronavirus by decreasing inflammation in the airways for Covid-19. However, in both diabetic and non-diabetic Covid-19 users, they decrease immunity and elevate blood sugar levels. This reduction in immunity is thought to be a factor in the occurrence of mucormycosis.⁶

Uncontrolled diabetes

According to a research done by the Post Graduate Institute of Medical Education and Research (PGIMER), uncontrolled diabetes and inappropriate steroid usage are major determinants in the development of this condition.⁷ Type -2 Diabetes Mellitus is caused by inadequate insulin production by pancreatic b-cells and/or the failure of insulin-sensitive tissues to respond adequately to insulin. T2DM may enhance the chance of acquiring Mucormycosis in post-COVID-19 patients, with diabetes being responsible for more than 8 out of 10 black fungus infections. Diabetics often have decreased immunological response, which is exacerbated by hypoglycemia medications. Covid-19 individuals with a history of diabetes mellitus should be given special attention.

Inappropriate oxygen therapy

Unsanitary oxygen supply or a low-quality tubing system in hospital ICUs, oxygen cylinders with filthy masks or utilizing

polluted/tap water in ventilators, and continuous use of the same mask for more than two patients are all leading concerns of Post-COVID Mucormycosis.

Reasons for deaths of mucormycosis

- Lacking of awareness regarding Mucormycosis
- Cost of treatment and availability of medicines
- Neglecting check-ups
- Self-medication

Lacking awareness regarding mucormycosis

People assume that the presence of black crests in the nose and cheek indicates the presence of a black fungus. However, black fungus is sometimes camouflaged by sinusitis. Many of them, however, are ignorant of the symptoms of Mucormycosis or how fast it spreads to the tissues. It is necessary to be informed of the disease's signs and symptoms.

Cost of treatment and availability of medicines

Antifungals, in conjunction with surgical debridement, are the mainstays of treatment. Liposomal Amphotericin B, a medication used to treat black fungus, also known as Mucormycosis, is being phased out of the supply chain. Normally, this medicine costs between Rs 2,000 and Rs 3,000, but it is no longer accessible in many drug stores, and there have been instances of it being black marketed. Liposomal Amphotericin B injection, an incredibly expensive and uncommon antifungal medication, has proven to be a lifeline drug for many people combating the black fungus. Acquisition of the drug, on the other hand, has proven to be a major difficulty for many, who require anything between 90 and 120 vials, each of which charges between Rs 6,000 and Rs 8,000, leaving the patient at risk.⁸

Neglecting check-ups

Despite the fact that the majority of instances of black fungus or Mucormycosis occur in patients who have already been hospitalized for Covid-19 treatment, health professionals warn people not to overlook symptoms like swelling in any part of the face, visual difficulties, or pain on one side of the head. If a person recuperating from Covid-19 develops these symptoms, they should visit an ENT surgeon. According to experts, once infected, prompt identification

of this fungal illness can save a patient's life. A Covid patient must inspect the entire face in daylight for facial edema around the nose, cheeks, and eyes, as well as discoloration, discomfort, etc. Other reverants that should be reported to the doctor include tooth loosening and black spots within the mouth. Doctors recommend that patients monitor their blood sugar levels both during and after their recovery from Covid-19. Uncontrolled diabetes and the use of steroids in Covid-19 patients when they are not needed have led to a drastic increase in the frequency of Mucormycosis infections.⁹

Self-medication

Self-medication is explicitly forbidden, and Mucormycosis medications should only be used with a instruction and under medical supervision, according to experts. They also warn about the consequences of steroid over dosage.

Prevention

Prevention of COVID-associated Mucormycosis must focus on addressing the underlying risk factors, such as:

- a. Improving glycemic control in diabetics,
- b. Using systemic corticosteroids appropriately, and
- c. Preventing the overuse of antibiotics, antifungals, and other immunomodulators.

IPC measures at the facility level are critical to preventing the pathogen's transmission in the environment. These include:

- a. Sterilization and disinfection of equipment used by multiple patients (tracheal tubes, ventilators), ventilation systems (if the hospital has inadequate ventilation, this might lead to moisture and dust); and
- b. Proper wound management (bandages, tape, adhesives, and tapes used to fasten medical equipment such as endotracheal tubes and ostomy devices must be disinfected and replaced on a regular basis);
- c. Proper Oxygen linemanagement in health facilities.

Conclusion

While the spread of Mucormycosis in Covid cases is alarmistic it is time for the professionals to act as a team in controlling the

spread of mucormycosis. A sound referral and communication system between health professionals (i.e., Pulmonologist, Ent Surgeon, general physicians, and maxillofacial dental surgeons) is the utmost important step in combating the disease in current circumstances.^{10,11}

Acknowledgments

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Conflicts of interest

Author declares that there is no conflict of interest.

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