



## SHARP RISE OF THE CASES OF MUCORMYCOSIS OR BLACK FUNGUS AMONG COVID-19 PATIENTS IN INDIA

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### ABSTRACT

The second wave of covid-19 effected India substantially. India contributed to approximately 45% of the new cases detected globally and nearly 34% of the deaths globally during the third week of May, 2021. As India continues to achieve stability over the existing situation, another imminent threat has emerged as a challenge to India in the form of corona virus disease-associated mucormycosis (Black fungus). Patients suffering from the fungal infection typically have symptoms of stuffy and bleeding nose; swelling of and pain in the eye; drooping of eyelids; and blurred and finally, loss of vision. There could be black patches of skin around the nose. Patients have lost their vision in both eyes. And in rare cases, doctors have to surgically remove the jaw bone in order to stop the disease from spreading. An anti-fungal intravenous injection which costs 3,500 rupees (\$48) a dose and has to be administered every day for up to eight weeks is the only drug effective against the disease.

**KEYWORDS:** Black Fungus, Mucormycosis, Covid-19, Diabetes, Steroid

There are increasing case reports of rhino-orbital mucormycosis in people with coronavirus disease 2019 (COVID-19), especially from India. Diabetes mellitus (DM) is an independent risk factor for both severe COVID-19 and mucormycosis. Mucormycosis is a fungal infection that mainly effects people who are on medication for other health problems that reduces their ability to fight environmental pathogens. Sinuses or lungs of such individuals get affected after fungal spores are inhaled from the air. The primary reason that appears to be facilitating Mucormycosis spores to germinate in people with COVID-19 is an ideal environment of low oxygen (hypoxia), high glucose (diabetes, new-onset hyperglycemia, steroid-induced hyperglycemia), acidic medium (metabolic acidosis, diabetic ketoacidosis [DKA]), high iron levels (increased ferritins) and decreased phagocytic activity of white blood cells (WBC) due to immunosuppression (SARS-CoV-2 mediated, steroid-mediated or background comorbidities) coupled with several other shared risk factors including prolonged hospitalization with or without mechanical ventilators.

Dexamethasone was identified as a key medicine in COVID management for hospitalized patients. Steroids like Dexamethasone, Methylprednisolone and Budenoside were identified as key medicines for COVID management for hospitalized patients, especially for those

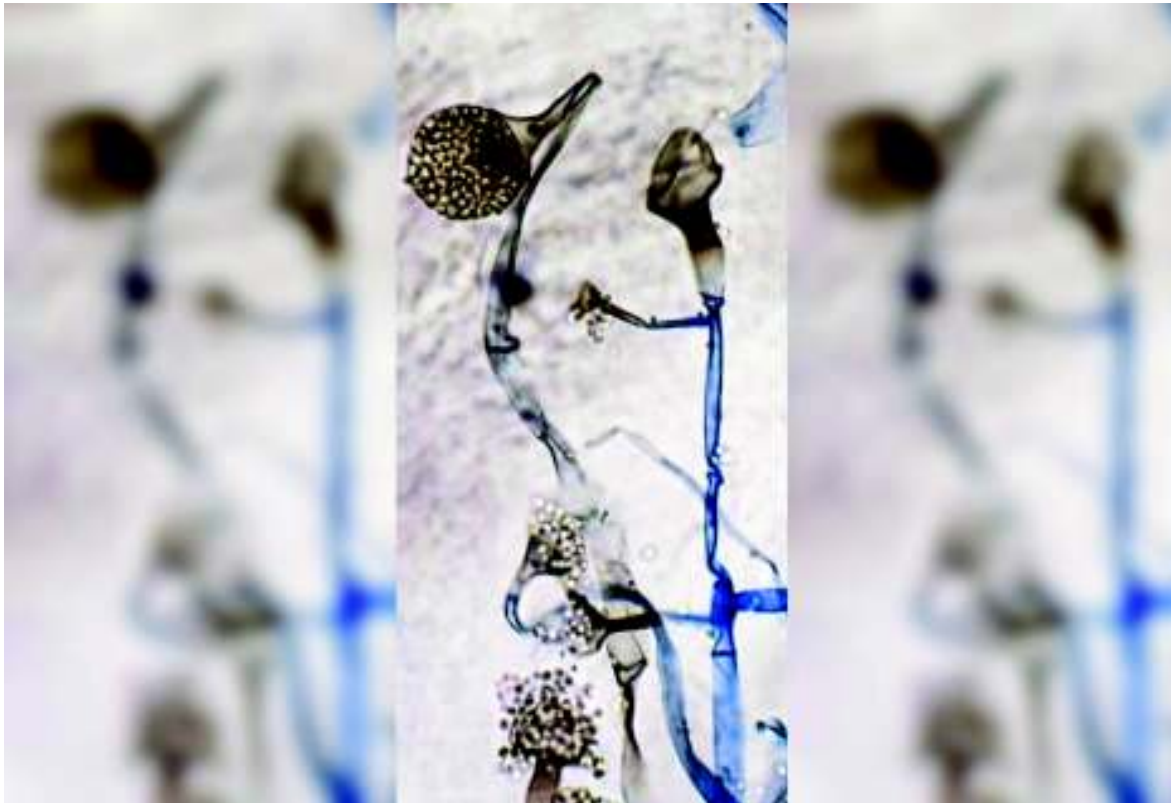
on oxygen support. Steroids weaken the immune system to fight bacterial or fungal infections.

According to T.S. Suryanarayanan and R. Uma Shaanker Like most fungi, Mucor produces millions of microscopic spherical, dark-hued structures called spores, which are dispersed in air. When the spores land on moist surfaces, like soil or plant material, they begin to germinate and produce thread like structures called mycelia. The mycelia branch out and feed on sugars in their surroundings and grow.

Fungal spores measure one thousandth to one hundredth of a millimeter. The density of the spores – the number of spores per cubic meter of atmosphere – varies depending on the fungus, the location (vegetation and exposed earth) and season. In tropical areas like in India, spore counts are generally higher during the summer than during the monsoons. But compared to the 1,000-5,000 spores per cubic meter outdoors, the count inside homes is typically 100-250 only. Five to 10 species account for more than 90% of the total spore density in the air (Figure-1).

As it happens, hospitals are not free from these spores. A study in Tehran in 2014 suggested that hospital air could carry many opportunistic pathogenic fungi like *Candida*, *Aspergillus*, *Penicillium* and *Rhizopus*.

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**Figure 1: Mucor viewed through a microscope showing dark spherical spores**

Patients on either a high steroid dose or longer steroid duration are at risk of catching Black Fungus. Another risk factor involves usage of unclean humidifier or oxygen tube in hospital. They should be especially vigilant during the recovery phase. Overall, unnecessary usage of steroids, antibiotics and anti-fungal medications must be avoided.

Doctors believe mucormycosis, which has an overall mortality rate of 50%, may be being triggered by the use of steroids, a life-saving treatment for severe and critically ill Covid-19 patients.

Steroids reduce inflammation in the lungs for Covid-19 and appear to help stop some of the damage that can happen when the body's immune system goes into overdrive to fight off coronavirus. But they also reduce immunity and push up blood sugar levels in both diabetics and non-diabetic Covid-19 patients.

It's thought that this drop in immunity could be triggering these cases of mucormycosis.

Increase in mucormycosis in Indian context appears to be an unholy intersection of trinity of diabetes (high prevalence genetically), rampant use of corticosteroid (increases blood glucose and opportunistic fungal infection) and COVID-19 (cytokine storm,

lymphopenia, endothelial damage). All efforts should be made to maintain optimal hyperglycemia and only judicious evidence-based use of corticosteroids in patients with COVID-19 is recommended in order to reduce the burden of fatal mucormycosis.

### **SYMPTOMS OF BLACK FUNGUS**

According to AIIMS However, when the immune system has been breached by another illness, fungi that are otherwise harmless take advantage and invade human tissues. These are called opportunistic infections. Even so, unlike their pathogenic bacterial counterparts, fungi rarely cause life-threatening diseases. A few fungi, like the Candida yeast, can sometimes kick off a serious infection. Candida lives on the skin and inside the mouth, throat and vagina of healthy persons without causing any problems. But if the host's body has been weakened by another disease or drugs, it can cause oral thrush, diaper rash and vaginal infections.

Severe headache, nasal congestion, black lesions on the nose or upper side of the mouth, chest pain, breathlessness, and affects vision too. It can further cause difficulty in chewing or opening the mouth and loosening of teeth, include numbness of nose, congestion in face due to mucus build-up, black secretions or eye-swelling. It affects nasal passages, eyes, brain and lungs.

## BLACK FUNGAL INFECTION TREATMENT

This fungal infection can be diagnosed after clinical and radiological diagnosis. If the infection has spread to the brain, intracranial decompression becomes necessary to prevent it. If the infection has spread to the nasal cavity, then it will need to separate the infected shells from the body. Eye infections can only be prevented by surgery. Once the infection is confirmed, it can be prevented from spreading through surgery. Some medicines are being prescribed for the treatment of ROCM. How effective these medicines are is being investigated.

Antifungal drugs are also being used in Black Fungus Treatment. The use of injectable liposomal amphotericin-B has been reported in these drugs. Amphotericin deoxycholate is an older form of this drug which is now considered to be largely nephrotoxic. In comparison, injected liposomal amphotericin-B is considered to be quite safe and effective. If you are unable to obtain an injection, then posonazole tablet is available in its suspension and intravenous market and can be used in exchange for amphotericin-B.

Depending on the symptoms seen, the patient is given a dose of oral posaconazole sustained-release tablets for several months. The drug Isavuconazole is also being used by doctors as an alternative. After clinical and radiological examination of the disease, these medicines are stopped according to the health of the patient. Steroids, antibiotics and other antifungal drugs are used by the doctor at the time of treatment according to the patient's symptoms.

## PREVENTION FROM BLACK FUNGUS

It is difficult to avoid breathing fungal spores because the fungi that causes black fungus is very common in the environment. There is no vaccine to prevent black fungus. For people with weakened immune systems, there may be ways to reduce the chance of developing black fungus.

## PROTECT YOURSELF FROM ENVIRONMENTAL INFLUENCES

- It should be noted that although these measures are recommended, they have not been proven to prevent black fungus.
- Try to avoid dusty places such as construction sites or excavation sites. If you cannot avoid these areas, wear an N95 respirator (a mask) there.
- Avoid direct contact with water-damaged buildings and floods after hurricanes and natural disasters.
- Avoid activities that are in close contact with dirt or dust, such as yard work or gardening. Clean skin lesions thoroughly with soap and water, especially when they are exposed to soil or dust.
- Wear shoes, long trousers, and long-sleeved shirts when you are engaged in outdoor activities such as gardening, yard work, or visiting forest areas.

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