



Black fungus

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Introduction

Black fungus, also known as mucormycosis is a serious fungal infection, usually in people who are immunocompromised. Symptoms depend on where in the body the infection occurs. It most commonly infects the nose, sinuses, eye, and brain.

It mainly affects people who are on medication for health problems that reduce their ability to fight environmental pathogens. Sinuses or lungs of such individuals get affected after they inhale fungal spores from the air. Usually, the black fungus does not pose a major threat to those with a healthy immune system.

Impact of the Black fungus

COVID-19 patients generally suffer from a decreased level of lymphocytes, particularly helper T-cells and cytotoxic T-cells. These cells play a vital role in the inflammation-mediated immune response of the body, and their reduced level makes COVID-19 patients extremely vulnerable to secondary bacterial and fungal infections. In addition, doctors administer immunosuppressing steroidal drugs to COVID-19 patients that can further debilitate their immunity. However, the steroidal drugs reduce the phagocytic activity of neutrophils and macrophages in COVID-19 patients. Also, steroidal drugs cause a sudden increase in blood sugar levels in diabetic patients that is another vital risk factor for developing black

fungus. Moreover, an iron-rich environment is favorable for this fungal infection. Increased cytokine levels such as interleukin-6 increase the ferritin level of COVID-19 patients, making them even more vulnerable to the infection. Also, unsanitized oxygen cylinders and ventilators might be responsible for this fungal infection outbreak. Some hospitals were using ventilators on a shared basis. Some of the oxygen cylinders being used were contaminated and this unhygienic condition could have contributed to this sudden rise of black fungus cases. Therefore, COVID-19 patients with diabetes mellitus and who had been prescribed immunosuppressant corticosteroid drugs for their treatment are most vulnerable to the infection. Also, several unhygienic practices could have contributed to this sudden rise of black fungus as well.

Covid-19 leads to immunosuppression in people resulting from dysregulated immunity that the viral disease causes in the body. This holds for the entire world. But India has a huge diabetic population that is at risk. Even if it's a tiny fraction of the population, it is a large number. And along with that, steroids and antibiotics are being used quite irrationally for Covid-19 patients.

Anything that causes an immunocompromised state can expose an individual to a fungal infection. We all carry bacteria and fungi, some of which help maintain a healthy biological ecosystem in the body. That gets disturbed and the good bacteria and fungi die when you use medications irrationally. Doctors have called for judicious use of anti-cancer drugs such as tocilizumab to treat Covid-19. Tocilizumab is an immunomodulator, which can compromise immunity and in turn make the patient prone to various infections including black fungus.

A recent summary of Covid-19-associated black fungus showed 94% of patients had diabetes and it was poorly controlled in 67% of cases. When diabetes is poorly controlled, blood sugar is high and the tissues become relatively acidic – a good environment for Mucorales fungi to grow. This was identified as a risk for black fungus.

People with diabetes tend to develop more severe Covid-19 infections. This means they're more likely to receive corticosteroids, which are frequently used to treat Covid-19. But the corticosteroids, along with diabetes, increase the risk of black fungus. Meanwhile, the virus that causes Covid-19 can damage airway tissue and blood vessels, which could also increase susceptibility to fungal infection. So damage to tissue and blood vessels from Covid-19 infection, treatment with corticosteroids, high background rates of diabetes in the population most severely affected by the coronavirus, and, importantly, more widespread exposure to the fungus in the environment are all likely to be playing a part in the situation we're seeing with black fungus.

Symptoms

Following are the symptoms for black fungus:-

- Local pain on the cheekbone, one-sided facial pain, numbness or swelling
- Blackish discoloration over the bridge of nose/palate
- Loosening of teeth, jaw involvement
- Blurred or double vision with pain
- Thrombosis, necrosis
- skin lesion
- Chest pain
- pleural effusion
- worsening of respiratory symptoms
- Sinusitis- nasal blockade or congestion, nasal discharge (blackish/bloody)

Prevention

Preventive measures include-:

- wearing a face mask in dusty areas
- washing hands
- avoiding direct contact with water-damaged buildings
- protecting skin, feet, and hands where there is exposure to soil or manure such as gardening or certain outdoor work.

Treatment

Treatment involves a combination of antifungal drugs, surgically removing infecting tissue and correcting underlying medical problems such as diabetic ketoacidosis.

Medication:

Once the black fungus is suspected, [Amphotericin B](#) at an initial dose of 1 mg is initially given slowly over 10–15 minutes into a vein, then given as a once-daily dose according to body weight for the next 14 days. It may need to be continued for longer. [Isavuconazole](#) and [Posaconazole](#) are alternatives.

Surgery:

Surgery can be very drastic, and in some cases of disease involving the nasal cavity and the brain, removal of infected brain tissue may be required. Removal of the palate, nasal cavity, or eye structures can be very disfiguring. Sometimes more than one operation is required.

Other considerations:

The disease must be monitored carefully for any signs of re-emergence. Treatment also requires correcting sugar levels and improving neutrophil counts. Hyperbaric oxygen may be considered as adjunctive therapy because higher oxygen pressure increases the ability of neutrophils to kill the fungus. The efficacy of this therapy is uncertain.