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A short review on Mucormycosis

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ABSTRACT

Covid-19 triggered black fungus infection, which progressively rising in India. The fungal infection called mucormycosis is caused by a group of moulds called "mucormycetes" that are present in the air and cause difficulties in those with acute illnesses such as severe Covid, or in people with lesser immunity. They can beblow out in hospitals and homes by air humidifiers or oxygen tanks containing dirty water. So far, over 7,000 people have been infected with the disease and over 200 have lost their lives. Misapplication of steroids during Covid treatment was a major cause behind this infection. Patients who are diabetic or Covid positive and are taking steroids have an increased chance of contracting the infection.Amphotericin-B is a widely used drug to treat serious fungal infections and leishmaniasis and which plays a crucial role in treatment of black fungus.

Keywords: Covid-19, Mucormycosis, Steroids, Amphotericin-B, Leishmaniasis.

INTRODUCTION

Mucormycosis previously called zygomycosis is a serious but rare fungal infection caused by a group of molds called mucormycetes. These molds live throughout the environment. Mucormycosis mainly infects the people who have health problems or taking medicines that lower the body's capability to fight germs and sickness.[1] It most usually affects the sinuses or the lungs after inhaling fungal spores from the air. It can also occur on the skin after a cut, burn, and other type of skin injury. [2]Mucormycosis, a rare but dangerous fungal infection, has now been found to be affecting some coronavirus patients. This disease (Mucormycosis) can affect the face, infecting nose, orbit of eye, brain, which can produce loss of vision. [3]

STEROIDS IMPACT ON COVID – 19

Mucormycosis, which has an overall mortality rate of 50%, may be being triggered by the use of steroids, a life-saving treatment for critically ill Covid-19 patients. Steroids reduce inflammation in the lungs and appear to 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 increase the blood sugar levels in both diabetics and non-diabetic Covid-19 patients. So, that this drop in immunity could be triggering these cases of mucormycosis.[4] (Figure 1).

Fig 1: Some Serious effects of Mucormycosis

RISK WITH DIABETES

Diabetic patients who have recently recovered from Covid-19 infection after being treated with steroids especially remain at risk of contracting Mucormycosis or Black Fungus infection. Reports have cited unpublished medical studies reporting over 80% of Black Fungus infections only with the diabetic Covid survivors.[5]A person affected with mucormycosis needs early detection and potent diagnosis for the treatment. It may turn in, affect other organs such as the kidneys.For diabetes patients, this is life-threatening Others peoples who remain at the risk of black fungus disease include the organ transplant and cancer patients being given immunosuppressant drugs.[6]Uncontrolled diabetes is emerging as a main factor in acquiring black fungus infection or mucormycosis, which is growing in Covid-19 patients after recovery and is leading to further complications. These fungal spores are existing in the air, soil and on decomposed debris and gain entry into sinuses and lungs by breathing contaminated air. Covid-19 patients with uncontrolled diabetes, undergoing treatment with steroids, are at sensitiveto the infection. [7]

LINK TO COVID-19

Immunity system compromised people are more susceptible to infection including Covid-19 patients, diabetic patients, people who consuming steroids, and with other comorbidities like cancer or organ transplants. Covid patients are mostly susceptible because not only does the virus affect their immune system. Drugs used for treatments, can also suppress their immune response.[8]Due to these factors, COVID-19 patients face a renewed risk of failing the battle against mucormycetes. Covid patients undergoing oxygen therapy in ICUs may have humidifiers in the ward which can raise their contact to moisture, and make them more liable to fungal infection. The fungus takes the window of opportunity, invades the body. This body has a small opening because of Covid, because of the high glucose levels and so many other things, black fungus gets a foothold. [9]

ROLE OF AMPHOTERICIN

Amphotericin-B is an anti-fungal drug that is used in the treatment of a rare infection called mucormycosis, or black fungus. Amphotericin B is an antifungal antibiotic produced by the bacterium Streptomyces nodosus[10].Amphotericin B is an antifungal used to treat fungal infections in neutropenic patients, cryptococcal meningitis in HIV infection, fungal infections, and leishmaniasis. Amphotericin B shows a high order of in vitro activity against many species of fungi. Histoplasma capsulatum, Coccidioides immitis, Candida species, Blastomyces dermatitidis, Rhodotorula, Cryptococcus neoformans, Sporothrix schencki, Mucor mucedo, and Aspergillus fumigatus are all inhibited by concentrations of amphotericin B ranging from 0.03 to 1.0 mcg/mL in vitro.[11,12] (Figure 2)

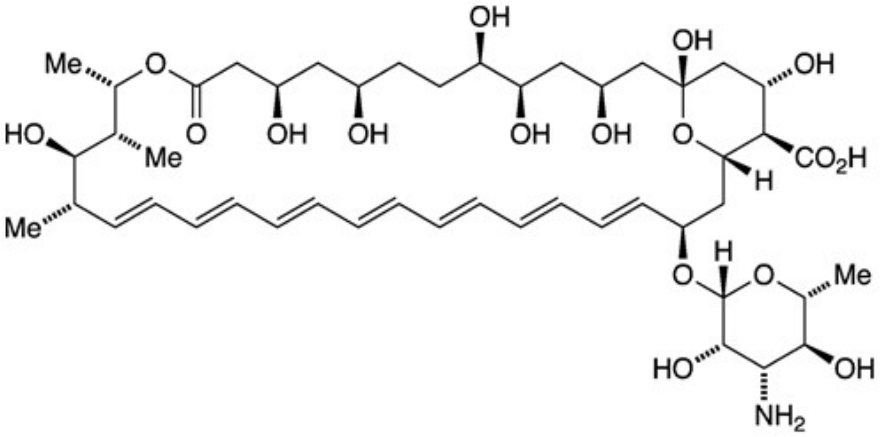

Fig.2 Structure of Amphotericin B

Amphotericin B acts by binding to the sterol component, ergosterol, of the cell membrane of susceptible fungi. It forms transmembrane channels leading to alterations in cell permeability through which monovalent ions (Na+, K+, H+, and Cl-) leak out of the cell, resulting in cell death.While amphotericin B has a higher affinity for the ergosterol component of the fungal cell membrane, it can also bind to the cholesterol component of the mammalian cell, leading to cytotoxicity.[13] (Figure 3)

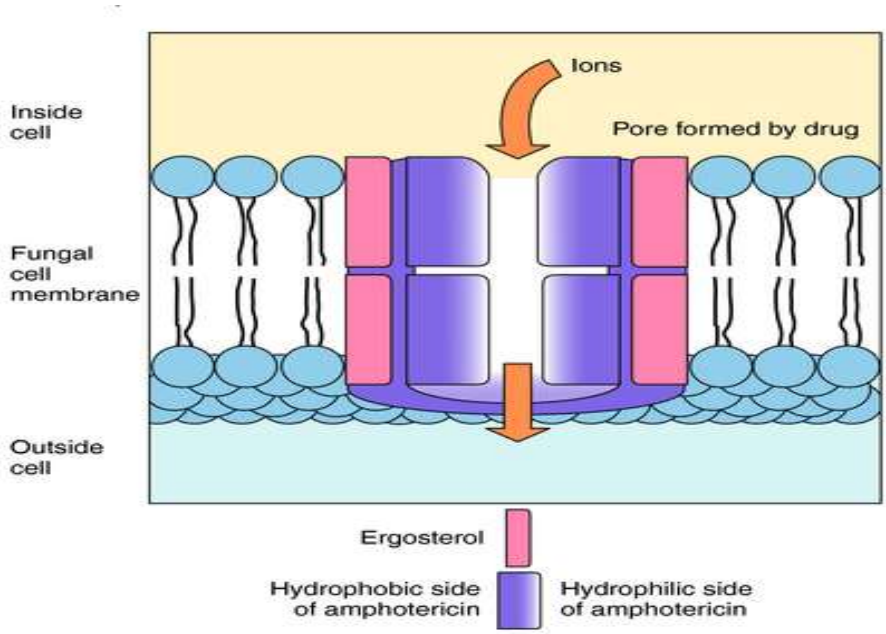

Fig.3 Amphotericin Mechanism of action

PRECAUTION MEASURES FOR BLACK FUNGUS INFECTION

The patients needs to be cautious about their health for at least 2 weeks post getting recovered from coronavirus. Make sure to follow these measures to prevent the Black Fungus infection. Make use of masks while visiting dusty places andensure to keep yourself well-covered while handling soil, moss or manure.Control hyperglycemiakeep on check with blood glucose levels after getting discharged from COVID-19. To be Cautious with the timing and dosage of taking steroids. Maintain the humidifiers with clean water while undergoing oxygen therapy. Use antibiotics or antifungals properly.[14]

CONCLUSION

The Self-medication by Covid patients at home without any expert supervision has become a major concern as they become vulnerable to black fungus. A lot of people are using drugs without any prescription. Some of them start using steroids on their own for three to four days after detecting Covid.Steroids are lifesaving. But these have to be used at the right time and in the right dose for the right patient and right duration.

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