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COVID 19 and Nutrition in Mucormycosis (Black Fungus)

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Mucormycosis or black fungus is usually a rare but life-threatening infection resulting from commonly distributed fungi belonging to the *Mucorale* orders. The disease was previously known as zygomycosis, since Rhizopus species, such as *Rhizopus arrhizus, Rhizopus microsporus,* and *Rhizopus oryza* were more isolated from infected patients than Mucor (Chegini *et al.*, 2020, Spellberg, 2017).

These saprophytic fungi are commonly reproduced and found in soil, air, agricultural compost, decade fruits and vegetables, mouldy bread, and even in the nose mucus of healthy people (Spellberg, 2017).

Since these fungi are acidophilic, saccharolytic, and thermophile fungi, their growth dramatically increased in the acidic and high glucose environments; therefore, they are threaten patients with diabetic ketoacidosis (Chegini *et al.*, 2020).

There are several underlying factors associated with this disease (**Figure 1**), including diabetes (especially ketoacidosis diabetic patients), malnutrition, increased iron, severe immune system failure, long term immunosuppressive treatments, neutropenia, burns, hematological disorders, metabolic ketoacidosis, and even renal insufficiency (Dantas *et al.*, 2021, Patel *et al.*, 2020, Shariati *et al.*, 2020).

Mucormycosis was previously known as an extraordinary, and rare fungal infection reported in uncontrolled diabetes mellitus and immunocompromised status with a high mortality rate to 90% (Kontoyiannis *et al.*, 2005). It has become urgent since 2020, following the outbreak of coronavirus pandemic (Mekonnen *et al.*, 2021) individually in India (Patel *et al.*, 2021); known as COVID-19 associated mucormycosis (CAM). Following India, there have been reports of the CAM from other 18 countries (Garg *et al.*, 2021), including more recently from Iran (Tabarsi *et al.*, 2021). This simultaneous occurrence of this fatal fungal infection with COVID-19 patients caused great concern particularly in Iranian social media (Taghinejad *et al.*, 2021).

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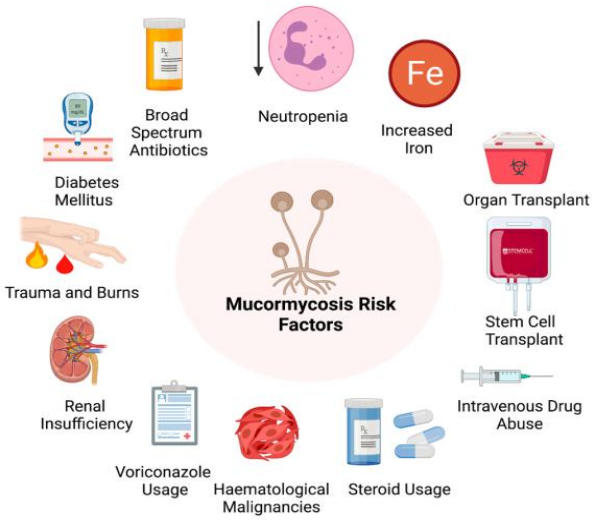

Figure 1. Risk factors associated with the development of mucormycosis (Mahalaxmi et al., 2021)

Several epidemiologic studies in literature reported different predisposing factors for mucormycosis worldwide. For example, hematological malignancies in Europe (Skiada *et al.*, 2020), diabetes mellitus in Iran (Dolatabadi *et al.*, 2018), India (Chamilos *et al.*, 2008), Mexico (Corzo-León *et al.*, 2018), middle east, and north of Africa (Stemler *et al.*, 2020) are reported as the most incline aspects for mucormycosis.

Nowadays the world has widely been facing the outbreak of the COVID-19 pandemic. About two-thirds of the world's adult population is overweight, and approximately 6 percent are diabetic (Hjartåker *et al.*, 2008). Obesity and diabetes are observed in two-thirds of mucormycosis cases along with the other predisposing factors (Gleissner *et al.*, 2004). Accordingly, rather than COVID 19, weight control, controlling of blood glucose and iron levels, and the elimination of malnutrition, are very critical for preventing mucormycosis in COVID-19 subjects. In addition to persistent hyperglycemia resulting from high blood glucose levels, which caused acidic conditions in the diabetic patient favored by mucormycosis agents, it also leads to suppression of the host immune cells. It provides desirable environments for various opportunistic pathogens especially mucor and rhizopus species (Rammaert *et al.*, 2012).

Therefore, in addition to clarifying mucormycosis pathophysiologic mechanisms in COVID 19 patients, and improving new control and treatment protocols, diet and weight modification are also crucially needed for their outcome improvements.

Shirazi *et al.*, in an animal model of obesity using *Drosophila melanogater* female flies infected with *R. oryza* to induce mucormycosis, reported a higher survival rate in normal-weight flies with low blood sugar (treated with metformin) than the obese as well as untreated flies (Shirazi *et al.*, 2014). The rhino-cerebral form of mucormycosis, known as the most prevalent clinical form in COVID 19 patients, is also concomitant with diabetes mellitus. Thus controlling blood glucose levels, using a low-sugar diet, weight control, and elimination of malnutrition are very important to consider in Iranian COVID 19 patients.

References

Chamilos G, Lewis R, Lamaris G, Walsh T & Kontoyiannis D 2008. Zygomycetes hyphae trigger an early, robust proinflammatory response in human polymorphonuclear neutrophils through toll-like receptor 2 induction but display relative resistance to oxidative damage. *Antimicrobial agents and chemotherapy*. **52 (2)**: 722-724.

[Downloaded from jnfs.ssu.ac.ir on 2026-10-07]
[DOR: 20.1001.1.24767417.2022.7.1.14.3]
[DOI: 10.18502/jnfs.v7i1.8526]

Chegini Z, et al. 2020. Epidemiology, clinical features, diagnosis and treatment of cerebral mucormycosis in diabetic patients: a systematic review of case reports and case series. *Mycoses.* **63 (12)**: 1264-1282.

Corzo-León DE, Chora-Hernández LD, Rodríguez-Zulueta AP & Walsh TJ 2018. Diabetes mellitus as the major risk factor for mucormycosis in Mexico: Epidemiology, diagnosis, and outcomes of reported cases. *Medical mycology.* **56 (1)**: 29-43.

Dantas KC, Mauad T, de André CDS, Bierrenbach AL & Saldiva PHN 2021. A single-centre, retrospective study of the incidence of invasive fungal infections during 85 years of autopsy service in Brazil. *Scientific reports.* **11 (1)**: 1-10.

Dolatabadi S, et al. 2018. Mucormycosis in Iran: A six-year retrospective experience. *Journal de mycologie medicale.* **28 (2)**: 269-273.

Garg D, et al. 2021. Coronavirus disease (Covid-19) associated mucormycosis (CAM): case report and systematic review of literature. *Mycopathologia*. 1-10.

Gleissner B, Schilling A, Anagnostopolous I, Siehl I & Thiel E 2004. Improved outcome of zygomycosis in patients with hematological diseases? *Leukemia & lymphoma.* **45 (7)**: 1351-1360.

Hjartåker A, Langseth H & Weiderpass E 2008. Obesity and diabetes epidemics. *Innovative endocrinology of cancer*. 72-93.

Kontoyiannis DP, et al. 2005. Zygomycosis in a tertiary-care cancer center in the era of Aspergillus-active antifungal therapy: a case-control observational study of 27 recent cases. *Journal of infectious diseases.* **191 (8)**: 1350-1360.

Mahalaxmi I, et al. 2021. Mucormycosis: An opportunistic pathogen during COVID-19. *Environmental research.* **201**: 111643.

Mekonnen ZK, et al. 2021. Acute invasive rhino-orbital mucormycosis in a patient with COVID-19-associated acute respiratory distress syndrome. *Ophthalmic plastic and reconstructive surgery*. **37 (2)**: e40-80.

Patel A, et al. 2021. Early Release-Multicenter Epidemiologic Study of Coronavirus Disease–Associated Mucormycosis, India. *India. Emerg Infect Dis.* **27**: 210934.

Patel A, et al. 2020. A multicentre observational study on the epidemiology, risk factors, management and outcomes of mucormycosis in India. *Clinical microbiology and infection.* **26 (7)**: 944. e949-944. e915.

Rammaert B, Lanternier F, Poirée S, Kania R & Lortholary O 2012. Diabetes and mucormycosis: a complex interplay. *Diabetes & metabolism.* **38 (3)**: 193-204.

Shariati A, Moradabadi A, Chegini Z, Khoshbayan A & Didehdar M 2020. An overview of the management of the most important invasive fungal infections in patients with blood malignancies. *Infection and drug resistance*. **13**: 2329.

Shirazi F, et al. 2014. Diet modification and metformin have a beneficial effect in a fly model of obesity and mucormycosis. *PloS one.* **9 (9)**: e108635.

Skiada A, Pavleas I & Drogari-Apiranthitou M 2020. Epidemiology and diagnosis of mucormycosis: an update. *Journal of fungi.* **6 (4)**: 265.

Spellberg B 2017. Mucormycosis pathogenesis: beyond rhizopus. *Virulence.* **8 (8)**: 1481-1482.

Stemler J, et al. 2020. Mucormycosis in the Middle East and North Africa: Analysis of the FungiScope® registry and cases from the literature. *Mycoses.* **63 (10)**: 1060-1068.

Tabarsi P, et al. 2021. Case Report: COVID-19-associated Rhinosinusitis Mucormycosis Caused by Rhizopus arrhizus: A Rare but Potentially Fatal Infection Occurring After Treatment with Corticosteroids. *American journal of tropical medicine and hygiene.* **105 (2)**: 449-453.

Taghinejad Z, Asgharzadeh M, Asgharzadeh V & Kazemi A 2021. Risk Factors for Mucormycosis in COVID-19 Patients. *Jundishapur journal of microbiology*. **14 (8)**: 1-7.

[Downloaded from jnfs.ssu.ac.ir on 2026-10-07]

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