


Letter to the Editor

Antifungal drug shortage in India amid an increase in invasive fungal functions during the coronavirus disease 2019 (COVID-19) pandemic

Ashitha B. Arun¹, Mohammad Mehedi Hasan² , Sudhan Rackimuthu³, Irfan Ullah⁴, Tanveer Mir⁵ and Anwesha Saha⁶

¹St Joseph's College, Bangalore, India, ²Department of Biochemistry and Molecular Biology, Faculty of Life Science, Mawlana Bhashani Science and Technology University, Tangail, Bangladesh, ³Father Muller Medical College, Mangalore, Karnataka, India, ⁴Kabir Medical College, Gandhara University, Peshawar, Pakistan, ⁵Department of Internal Medicine, Wayne State University, Detroit, Michigan, United States and ⁶Department of Biotechnology; Heritage Institute of Technology, Kolkata, West Bengal, India

To the Editor—Even as India is struggling to recover from an annihilating second wave of the coronavirus disease 2019 (COVID-19) pandemic, a rare yet lethal fungal infection mucormycosis caused by *Mucormyces*, colloquially called the “black fungus,” is wreaking new havoc at alarming rates. This opportunistic disease is infecting patients that have recovered or are recovering from COVID-19.^{1,2}

More concerning than the infection itself is the shortage of the antifungal drug used for its treatment, amphotericin B. The pandemic has disrupted entire global supply and manufacture chains, causing a dire shortage of this essential drug. As the country witnesses a 2-fold increase in the number of mucormycosis cases, the government is scrambling to provide treatment for the increasing in-flow of patients. The central government is working to provide free treatment in public hospitals, incentivizing import by exempting custom duty on import of the drug, redistributing the drug based on urgency and need, and creating new facilities for treatment. Very little improvement has followed, however, and access to the antifungal amphotericin B remains inadequate.³

Manufacturing volumes have been low in India due to previously low occurrence rates. Following the sudden increase in cases, the current volumes of manufacture by Bharat Serums & Vaccines, BDR Pharmaceuticals, Sun Pharma, Cipla, and Life Care Innovations (companies that currently produce the drugs) are not sufficient to meet the needs of the country. Hence, India is more likely to become dependent on imports from companies like the major US pharmaceutical producer Gilead Sciences, which could be significantly delayed.^{4,5}

An added burden amid the distressing situation is the emergence of other invasive fungal infections, such as candidiasis, also referred to as “white fungus,” alongside aspergillosis. *Candida auris*, one of the organisms implicated in candidemia, is known to cause serious multidrug-resistant nosocomial infections. In a recent study, nearly all cases of *Candida auris* were fluconazole resistant, and close to 40% were resistant to amphotericin-B.² Further increases in drug-resistant fungal infections would prove

disastrous in India, where the health system has already been stressed to its maximum capacity by the COVID-19 pandemic.⁶

The drug resistance that is increasingly occurring in a variety of pathogens especially in the Indian context can be attributed to the widespread and injudicious use of medications prescribed by physicians as well as self-medication among the public. With drug-resistant fungi surfacing, research is urgently needed to identify effective drugs and alternative treatment modalities to curb the negative health outcomes related to these deadly and invasive infections. Just as urgently, antibiotic stewardship must be promoted and practiced throughout the healthcare system.⁷

With the pandemic still looming, local pharmaceutical production must be undertaken to meet these demands and to simultaneously reduce dependency on expensive imports. Better policies related to drug manufacture, contingency, import, and distribution should be developed and enforced. In-house production must be encouraged to combat the pandemic and to prepare for future outbreaks. Apart from all this, the ancient field of herbal and indigenous medicine in India, such as Ayurveda and Unani, should be re-examined and probed in the hope of finding replacements and/or cheaper, safe treatment options.⁸

Acknowledgments.

Financial support. No financial support was provided relevant to this article.

Conflicts of interest. All authors report no conflicts of interest relevant to this article.

References

1. Rocha ICN, Hasan MM, Goyal S, *et al.* COVID-19 and mucormycosis syndemic: double health threat to a collapsing healthcare system in India. *Trop Med Int Heal* 2021;26:1016–1018.
2. Ghosh S, Patelia S, Hasan MM, Ghosh A, Jain S, Patel T. Drug-resistant white fungus: another catastrophic fungus emergence amidst COVID-19 in India. *Pathog Glob Health* 2021. doi:10.1080/20477724.2021.1960762.
3. Gowda SS. Fresh allocation of amphotericin B in view of rising mucormycosis cases. India Ministry of Chemicals and Fertilizers website. <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1720822>. Published 2021. Accessed September 22, 2021.
4. Explained: Why there is shortage of black fungus drug in India. *The Indian Express* website. <https://indianexpress.com/article/explained/shortage-of-black-fungus-drug-cases-india-7330327/>. Published 2021. Accessed August 8, 2021.

Author for correspondence: Mohammad Mehedi Hasan, E-mail: mehedi.bmb.mbstu@gmail.com

Cite this article: Arun AB, *et al.* (2021). Antifungal drug shortage in India amid an increase in invasive fungal functions during the coronavirus disease 2019 (COVID-19) pandemic. *Infection Control & Hospital Epidemiology*, <https://doi.org/10.1017/ice.2021.426>

5. Black fungus: another batch of amphotericin B injection reaches India. Livemint website. <https://www.livemint.com/news/india/black-fungus-another-batch-of-amphotericin-b-injection-reaches-india-11622337883645.html>. Published 2021. Accessed August 8, 2021.
6. Ghosh S, Moledina N, Hasan MM, Jain S, Ghosh A. Colossal challenges to healthcare workers combating the second wave of coronavirus disease 2019 (COVID-19) in India. *Infect Control Hosp Epidemiol* 2021. doi: 10.1017/ICE.2021.257.
7. Rajendran A, Kulirankal KG, Rakesh PS, George S. Prevalence and pattern of antibiotic self-medication practice in an urban population of Kerala, India: a cross-sectional study. *Indian J Commun Med* 2019; 44 suppl 1:S42.
8. Mishra A, Bentur SA, Thakral S, Garg R, Duggal B. The use of integrative therapy based on Yoga and Ayurveda in the treatment of a high-risk case of COVID-19/SARS-CoV-2 with multiple comorbidities: a case report. *J Med Case Rep* 2021;15:95.