



COVID-19 Associated Mucormycosis and Anbarnesa: Concerning about Important Source of Spores

*Mohsen Pourazizi¹, Rasoul Mohammadi², *Bahareh Abtahi-Naeini³*

1. *Isfahan Eye Research Center, Department of Ophthalmology, Isfahan University of Medical Sciences, Isfahan, Iran*
2. *Department of Medical Parasitology and Mycology, School of Medicine, Infectious Diseases and Tropical Medicine Research Center, Isfahan University of Medical Sciences, Isfahan, Iran*
3. *Skin Diseases and Leishmaniasis Research Center, Isfahan University of Medical Sciences, Isfahan, Iran*

***Corresponding Author:** Email: abtahi.bahareh@yahoo.com

(Received 10 Nov 2021; accepted 22 Nov 2021)

Dear Editor-in-Chief

Simultaneously with the pandemic of coronavirus disease 2019 (COVID-19), several cases of COVID-19-associated mucormycosis (CAM) were reported. The possible explanation for these rare infections in post COVID-19 period can be attributed to the several factors including newer variants (Delta variant) of virus, acute hyperglycemia, ketoacidosis, immune dysregulation following severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, iron metabolism disturbance and etc. (1).

Currently, India is one of most prevalent foci of CAM. In addition, CAM was reported in several other countries including USA, Pakistan, Syria, Brazil and Iran (2). Previously, mucormycosis was considered as a rare opportunistic infection in Iran. During a period of 25-year in Iran, less than 100 cases was reported. In the fifth wave of COVID-19 during the summer and fall of 2021, CAM has seen a surge in Iran (3).

In one hand, some of CAM cases occurred in healthy individuals without confirmed classic risk factors of mucormycosis, and in the other hand most of reports are from limited countries. There-

fore, it seems that in addition to multifactorial etiology for pathogenesis of CAM, environmental and ecological factors have played a major role.

Based on Iranian traditional medicine, “Anbarnesa” (female donkey dung) in either form of fresh or smoke has been used for treatment of various medical conditions including wide range of infectious diseases. Currently there are limited and ambiguous data about efficacy, safety and mechanism of action of Anbarnesa on claimed medical conditions. Moreover, there are some evidences about toxicity of Anbarnesa especially in the form of smoke (4). In recent year’s use of the smoke of Anbarnesa, widely suggested in Iran by traditional healers or non-medical practitioner for treatment of various conditions (5, 6).

Currently use of Anbarnesa for COVID-19 patients with claim of antimicrobial effect is a pivotal concern in Iran. To date, there is no clinical and experimental scientific data for benefit of Anbarnesa in any form of application to improve the outcome of COVID-19.

With this hypothesis that Anbarnesa smoke can be as an environmental important factor in Iranian patients for susceptibility to mucormycosis in post COVID-19 period, we evaluated a sample of



Anbarnesa that was used as a form of smoke in one of confirmed case of CAM in Isfahan, Iran in 2021.

A suspension of each Anbarnesa was made in sterile saline solution 1:10 (w/v) containing chloramphenicol (0.3 mg/ml) and mixed for 5 min and allowed to settle down for 20 min (Fig. 1a). Five microliters of the supernatant was added to sabouraud glucose agar (Difco, Detroit, MI), and

incubated at 30 °C for 5 days (7). Fuzzy colonies were examined microscopically using 10% KOH, and photographed (Fig. 1b). Microscopic feature of the Mucorales after 5 days at 30 °C showing sporangium, sporangiophore, and sporangiospores. In addition to the experimental data, our clinical experiences showed that many patients with CAM were used Anbarnesa in course of SARS-COV2 infection.

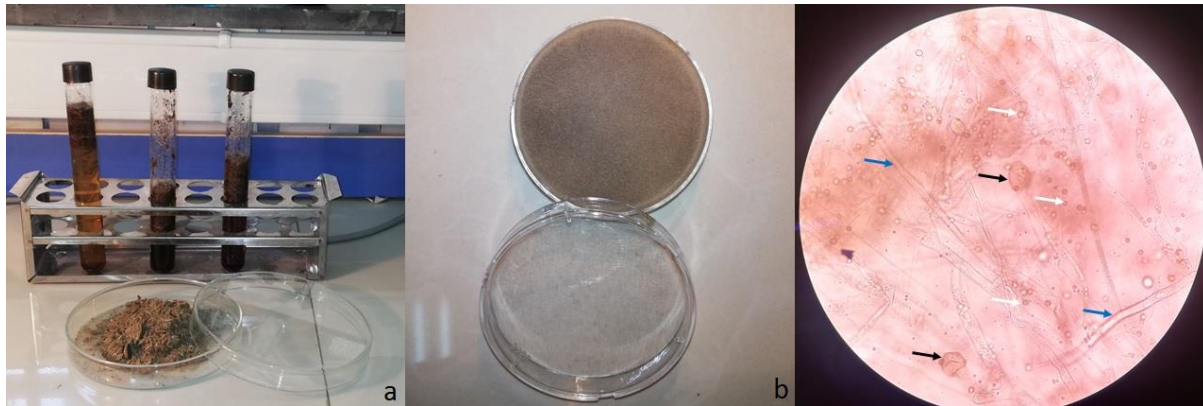


Fig. 1: Experimental evaluation of a sample of Anbarnesa that was used in one of confirmed case of COVID-19-associated mucormycosis. a) Making a suspension of Anbarnesa in sterile saline solution 1:10 (w/v). b) Fuzzy colonies of zygomycetes on sabouraud glucose agar after 5 days at 30 °C. c) Microscopic feature of the Mucorales after 5 days at 30 °C showing sporangium (Black arrows), sporangiophore (blue arrows), and sporangiospores (white arrows)

As a conclusion and based on our results, Anbarnesa contains spores of the Mucorales and it can be as an important source of spore inhalation. It is therefore important to be aware of its risks. Although our present knowledge about use of Anbarnesa and CAM is inadequate, due to the medical serious conditions related to CAM, in the interest of consumers' safety, it is recommended to refuse of Anbarnesa in COVID-19 patients. The experimental and stimulatory laboratory study of this area should be encouraged.

Acknowledgements

The authors would like to thank Dr. Farzad Afshar, resident of Ophthalmology, for his contribution to the primary conceptualization of this hypothesis.

Conflict of interest

The authors declare that there is no conflict of interests.

References

1. Sen M, Honavar SG, Bansal R, et al (2021). Epidemiology, clinical profile, management, and outcome of COVID-19-associated rhino-orbital-cerebral mucormycosis in 2826 patients in India - Collaborative OPAI-IJO Study on Mucormycosis in COVID-19 (COSMIC), Report 1. *Indian J Ophthalmol*, 69(7):1670-92.
2. Singh AK, Singh R, Joshi SR, Misra A (2021). Mucormycosis in COVID-19: A systematic review of cases reported worldwide and in India. *Diabetes Metab Syndr*, 2021-102146:(4)15; .Epub 2021/05/21.

3. Vaezi A, Moazeni M, Rahimi MT, de Hoog S, Badali H (2016). Mucormycosis in Iran: a systematic review. *Mycoses*, 59(7):402-15.
4. Ahmadian-Attari MM, Amrollahi Z, Safavi Momeni P, Khodaii Z, Bitab A, Hajiagha Bozorgi A (2019). Chemical Constituents of Donkey Dung (Anbarnasara): Questioning the Recent Claims Concerning Therapeutic Effects. *Int J Enteric Pathog*, 2019;7(1):19-22.
5. Joharchi K, Anaraki Firouz SM, Mashhadiabbas F, Mansouri A, Shafiee H, Taheri JB (2020). Wound Healing and the Effect of ANNAS; a New Product of AnbarNesa. *Jundishapur J Nat Pharm Prod*, 2020;15(2):e66668. Epub 2020-01-01.
6. Shafiee HA, Moravej-Salehi E (2015). Anbarnesa: The Past Tradition, the Future Medicine. *Iran Red Crescent Med J*, 2015;17(12):e29536-e.
7. Ziaee A, Zia M, Bayat M, Hashemi J (2016). Identification of Mucorales isolates from soil using morphological and molecular methods. *Curr Med Mycol*, 2016;2(1):13-9.