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Letter to the Editor

Spike in superbug fungus *Candida auris* cases: A lethal risk to fragile hospital patients – are we ready to tackle this emerging menace?

Dear Editor,

In recent years, healthcare facilities across the globe have reported severe infections in hospitalised patients as a consequences of the pathogenicity of a yeast-resembling fungus, *Candida auris*. Typical signs of a *C. auris* infection include fever, chills, sweats, and low blood pressure. Clinical outcomes range from superficial skin infections to life-threatening invasive infections targeting blood, brain and heart.

Similar to other *Candida* species, *C. auris* is an opportunistic pathogen that can infect people of all ages, and is prominent in people who frequently visit hospitals, use high doses of antifungal medications, have multiple health issues, or have recently undergone surgery. Patients who have intrusive medical devices like catheters, feeding tubes, and breathing tubes are especially susceptible to *C. auris* infection. Hospitalised individuals and nursing home residents with low levels of immunity are particularly susceptible to *C. auris*. Due to the weakened immunity, the fungus spreads quickly and invades the bloodstream, ears and open wounds resulting in severe health issues.

Candida auris (*C. auris*) falls under the *Saccharomycetes* family and is a type of yeast-like fungus which grows as white, pink or dark purple colonies on commercial medium. Detailed analyses indicate its unique characteristics, different from other species of the *Candida* genus. Genetically, *C. auris* is a haploid fungus and is closely related to multidrug-resistant (MDR) haploid strains of *C. haemulonii* and *C. lusitaniae*. Worryingly, *C. auris* is resistant to most commonly used antifungal medications, such as fluconazole and amphotericin B [1]. While these pharmacological agents are often used in high doses against *C. auris*, most of its strains are more susceptible to echinocandins. Nonetheless, reports indicate the rapid emergence of multidrug-resistant and difficult-to-control "superbug" strains of *C. auris*.

Unlike other *Candida* species, thermo- and osmo-tolerance of *C. auris* allow it to thrive efficiently under stressful conditions, such as climatic/environmental changes. Additionally, *C. auris* elicits phenotypic differentiation and forms biofilms, which increases its spreading. Ability to form aggregates aids *C. auris* in evading host immune system. Moreover, since *C. auris* can easily survive on human skin, it can be conveniently transmitted between hosts. These abilities are responsible for the high pathogenicity of *C. auris*, allowing it to survive in the environment for an extended period and colonise and replicate in human hosts.

Interestingly, the fungus was only discovered in 2009 in Japan and in a relatively short period, it has increasingly been linked to significant numbers of hospital infections. The Centers for Disease Control and Prevention (CDC) have warned against the potential dangers of the alarming rate of spread of *C. auris*. According to Dr. Meghan Lyman, the chief medical officer of the CDC's Mycotic Diseases Branch, this pathogenic fungus is spreading fast to newer geographical regions. Because of its resistance and high pathogenicity and ability to cause high mortality, it has been classified as an urgent threat by the CDC [2]. In the US, after the identification of the first case in 2016, the number of clinically confirmed cases of *C. auris* infections jumped to 173 in 2017, 476 in 2019, 756 in 2020, 1471 in 2021, and 2377 in 2022 [3]. By the end of December 2021, 3270 clinical cases and 7413 screening cases of *C. auris* infections were recorded in the US. Worryingly, the data suggests that there has been a progressive increase in the incidences of this infection each year, i.e., a 44% rise in 2019 to a 95% increase in 2021 [4]. Further, prescribed doses of echinocandins were found to be tripled in 2021, which may contribute to the rise of more resistant strains, clearly indicating the failure of such treatment options [5].

To assist in protecting individuals for the dangers of *C. auris* infections, the CDC and worldwide public health partners are putting forth great efforts to understand its pathophysiology, including mechanisms of its drug resistance. These studies may answer questions such as whether the fungus strain is new or has been around for a while but only recently developed a pathogenic potential. In the meanwhile, our only hope is to control the spread of *C. auris* infection. Several organisations are working closely to improve response times and are advising healthcare professionals on multiple aspects of *C. auris* pathophysiology. So far, the specificity of *C. auris* in its biology, genetics, resistant mechanism virulence, host adaptation and transmission have made it a tough nut to crack for the scientific community. All is not gloomy, though,there is some good news as recently, the FDA has approved REZZAYO™ as a novel therapeutic agent for the treatment of invasive fungal infections. Researchers have successfully tested NDV-3A vaccine in *C. auris*-infected mice. Hopefully, we are on the verge of discovery an effective control against this superbug.

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Faraz Ahmad: Writing – original draft. **Vineeta Singh:** Writing – review & editing. **Afsheen Raza:** Writing – review & editing. **Darin Mansor Mathkor:** Writing – review & editing, Conceptualization. **Shafiul Haque:** Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Formal analysis, Conceptualization. **Samah Tawil:** Writing – review & editing. **Alfonso J. Rodriguez-Morales:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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