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Letter to the Editor

Antifungal-resistant ringworm in KwaZulu-Natal: A new challenge in infectious disease management

Dear Editor

Infectious diseases, particularly antimicrobial-resistant bacterial infections kill 1.27 million people and indirectly kill 4.95 million people per year, primarily in low-income countries. Against the context of this substantial worldwide health risk, fungal infections are quietly rising as a matter of public concern, as they become more common and resistant to treatment, with only four classes of antifungal medications currently available (azoles, echinocandins, pyrimidines, and polyenes) [1].

The identification of the first documented instance of antifungal-resistant ringworm in Africa is an important and alarming evolution in infectious diseases. The National Institute for Communicable Diseases (NICD) in KwaZulu-Natal, South Africa, reported this case of Trichophyton indotineae, also known as Trichophyton mentagrophytes type VIII, as another obstacle in the ongoing battle against antibiotic resistance. In the week forthcoming up to Christmas 2023, the NICD verified that two people in KwaZulu-Natal were being treated for this unusual African virus. According to News24, this is the first reported case of this kind of virus in Africa [2].

Ringworm, also known as tinea or dermatophytosis, is a highly infectious fungal disease affecting 20 %–25 % of the global population. Trichophyton indotineae, a fungus, produces difficult-to-treat illnesses due to genetic changes that make it resistant to systemic antifungal medications. The disease has been prevalent in South Asia, particularly India, but has also spread to Europe, the Middle East, and North America. T. indotineae grows on human skin and spreads through direct skin-to-flesh contact or indirectly through infected person-contaminated items. Transmissions through animals are rare, indicating an "anthropozation" of the species towards humans [3].

1. The challenge of diagnosis

Clinical laboratories struggle to differentiate T. indotineae from other dermatophytes due to a lack of focus on fungal diseases and widespread testing for antifungal medications. Antifungal sensitivity testing is not routine due to time-consuming procedures and technical limits. T. indotineae can only be diagnosed using modern molecular techniques like genomic sequencing, which are not available in most laboratories in resource-limited settings. This disparity in diagnostic capability and routine testing leads to an underestimation of this global health risk [3].

2. Contributing factors

Aside from the difficulty in diagnosis, the growth in resistant dermatophyte infections is mostly attributable to the abuse of antifungal drugs, particularly overuse of over-the-counter (OTC) antifungal creams and improper prescriptions [4]. Commercial creams that combine topical steroids with antifungal and antibacterial drugs are a key factor (Fig. 1). These creams consist of a combination of antimicrobials, such as antifungals, antibiotics, and antiseptics. Various fixed-dose combination alternatives such as beclomethasone dipropionate, betamethasone valerate, and mometasone are becoming more popular in the market for being less expensive than single-agent antifungals, easy availability without a prescription and are frequently suggested by chemists in India and other nations. Topical creams' long-term health effects are often overlooked, leading to the development of antimicrobial-resistant organisms. Factors like weakened immune systems, low antifungal action, and specific fungal traits contribute to this. The rising frequency of resistant fungal infections is primarily due to global travel and migration, highlighting the complexity of public health practices, physician prescribing patterns, and global interconnection [5].

3. Public health implications

In 2020, a scoping literature analysis undertaken by WHO indicated that there was no worldwide prioritization of fungal infection concerns. Given this, WHO released a report on October 5, 2022, outlining the first-ever list of "priority fungal pathogens" - a list of the 19 fungi of public health concern [1]. Although Antimicrobial resistance has been an ongoing issue for a few years, the discovery of this particular strain of antifungal-resistant ringworm in Africa marks a continuation of a concerning trend. Given that Africa has 25.5 million HIV patients, they are extremely sensitive to fungal infection [3]; consequently, this situation acts as a wake-up call for both the local and global health communities. Addressing this increasing threat demands a diverse approach.

1. Enhanced Surveillance and Reporting: Surveillance of these cases is critical for determining the scope of antifungal resistance in dermatophytes, as well as updating diagnostic procedures, monitoring, and controlling spread.
2. Antimicrobial stewardship: Antifungal stewardship combines diagnostic tools with optimal antifungal medicine administration to improve clinical outcomes and prevent fungal resistance. This entails healthcare professionals and public health centers following patient care criteria, although many facilities lack such programs due to limited access to diagnostic technologies. Given that fungal culture is not available in most laboratories, physicians who suspect resistant infections may prescribe a combination of antifungals to treat infection while limiting resistance to a single agent. This antimicrobial stewardship can be utilized to slow the propagation of antibiotic-resistant dermatophytes [2,4].

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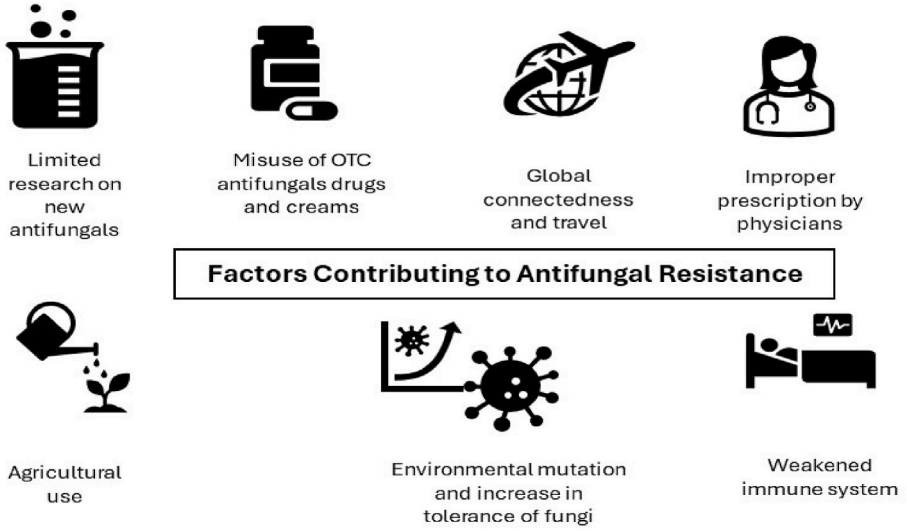

Fig. 1. Factors contributing to Antifungal resistance.

3. One health approach: It emphasizes the interconnectivity of human, animal, and environmental health, gaining traction during the SARS-CoV and influenza outbreaks, as well as in the fight against antibiotic resistance. It emphasizes the growing threat of drug-resistant fungus strains, which are impacted by changes in medical care and antifungal use in agriculture. Embracing a multidisciplinary approach, "One Health" can assist direct and prioritize research and policy to combat fungal threats, taking into account environmental and healthcare sources of antifungal resistance.
4. Public Education: Raising awareness regarding the appropriate use of antifungal and steroid creams under the clinician's direction is critical. Clinicians must also advise patients on infection prevention and control strategies such as frequent handwashing and, the use of antiseptic washes for inanimate objects to help restrict the spread of infection.
5. Research and Development: At this point, urgent research is needed to completely understand how antifungal resistance has emerged, as well as to determine which other antifungal medicines can be utilized safely and efficiently. For example, effective antibacterial combination treatments, preventative immunotherapies, and vaccinations against fungal pathogens should be investigated. As a result, it is critical to make investments in research to better understand mechanisms of resistance and create novel modalities [5].
6. International Collaboration: Global cooperation is required to address this cross-border issue. Countries can actively track and record fungal infections that are emerging; as a result, the outbreaks will be identified early resulting in quick adaptations of interventions. In addition, international research initiatives can shorten the pace of discovering new antifungals and diagnostic devices that are very important in combating drug-resistant fungal strains.

Consent for publication

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Authors' contributions

PS, MNA, AMG & SG conceived and designed the study, conducted research, provided research materials, and collected and organized data. SG, QSZ, SR& AMG analysed and interpreted data. MNA, PS, QSZ & SG wrote the initial and final draft of article, and provided logistic support. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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Declaration of competing interest

We have no conflict of interest to declare.

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