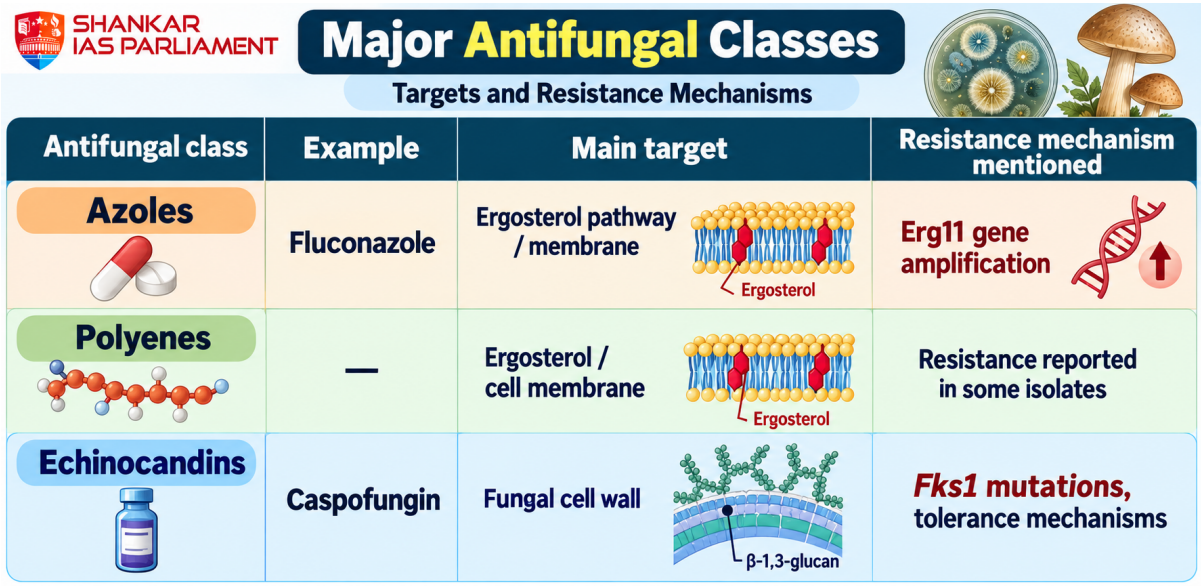
Rethinking the Chemical 'Arms Race' Against Fungi

Prelims: *Current events of national and international importance | Science & Technology*

Why in News?

A Nature Communications study found Indian Candida auris isolates showing genetic mechanisms driving antifungal drug resistance.

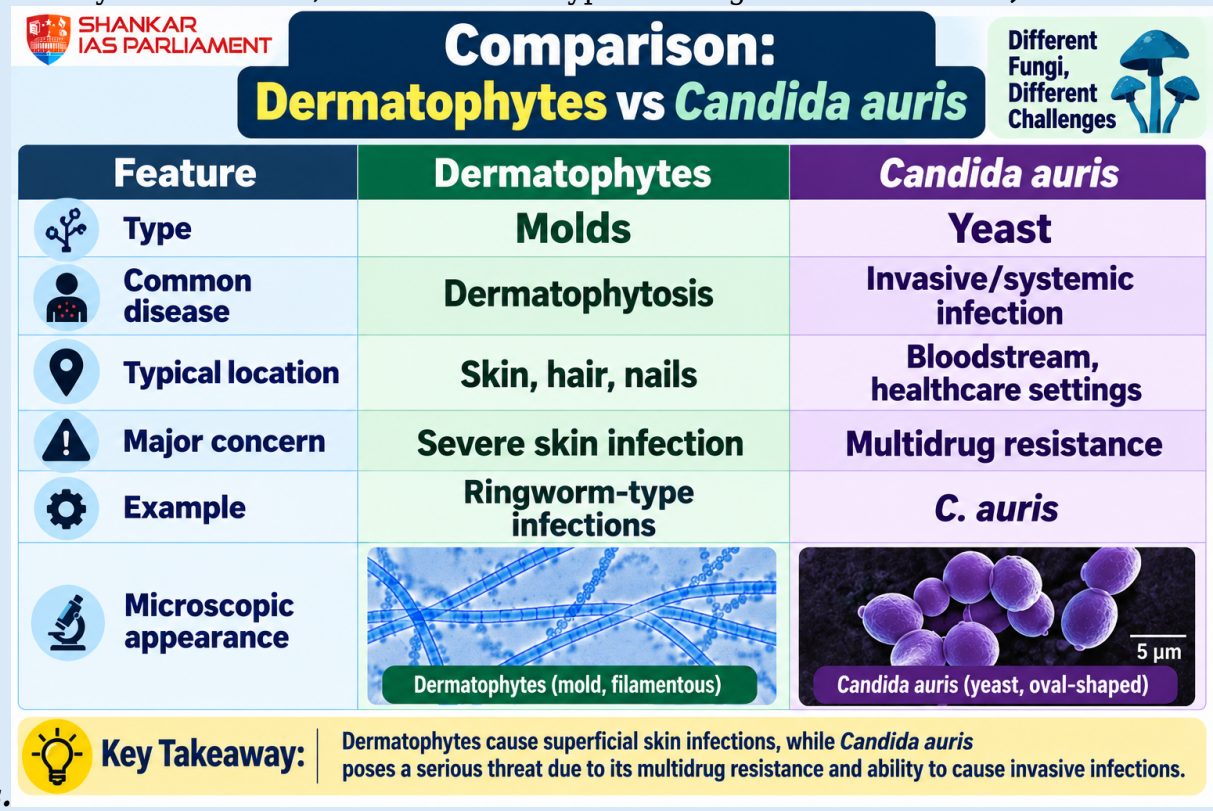
- **Key finding –** Fungal pathogens can evade antifungals through **gene mutations, gene amplification and cellular compensatory mechanisms**, highlighting the growing challenge of **antifungal resistance**.



- **Candida auris (C. auris) –** It is an emerging yeast species that exhibits multidrug resistance.
- **First reported in – 2009, Japan.**
- This pathogen is capable of causing **invasive bloodstream infections.**
- C. auris poses a significant risk in hospital and intensive care unit (ICU) settings.
- Identification and treatment of C. auris can be challenging.
- Reported mortality rates among infected patients range from 30% to **40%.**
- In contrast to many superficial fungal infections, C. auris is capable of causing systemic or **invasive disease**.

Fungi

• Fungi (singular fungus) are eukaryotic, non-phototrophic living organisms with rigid cell walls that belong to the fungi kingdom.
• Fungi are neither plants nor animals, and belong to their own distinct kingdom, the fungi kingdom.
• **3 main types of fungi**
• Fungi are divided into many different types, including molds, mushrooms, rusts, smuts, mildews and yeast. Of these, the three main types of fungi are ***mushrooms, molds and yeasts.***



• Fungi typically thrive in ***warm and moist environments***; however, the human body temperature of ***approximately 37°C*** has historically provided protection against many fungal species.

Fungal infection–mammalian selection hypothesis

Global warming leads to the selection of heat-tolerant fungi, which subsequently develop an increased ability to survive at mammalian body temperatures, thereby raising the potential for human infection.

Conventional Approach: Evolutionary Arms Race

- The typical cycle involves a drug targeting the fungus, which then evolves resistance.
- This leads to the development of stronger drugs, followed by further resistance.
- This results in a continuous escalation that resembles an evolutionary arms race.

Proposed Alternative Strategy

- The proposed approach shifts the focus to less critical pathways rather than targeting essential survival molecules.
- **Aim –** To reduce fungal pathogenicity instead of eliminating the fungus entirely.

- **Advantage –** It applies lower selection pressure, which may slow the evolution of resistance.

Reference

The Hindu | Rethinking the Chemical ‘Arms Race’ Against Fungi

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