

IIT-Hyderabad develops drug delivery system to treat fungal infections

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Dr Mudrika Khandelwal, associate professor, IIT Hyderabad, with her PhD student Shivakalyani Adepu (left) at a laboratory on the University campus.

HYDERABAD: A team of researchers at the Indian Institute of Technology (IIT) Hyderabad have developed a new drug delivery system to treat fungal infections, without running the risk of inducing drug resistance.

The method, which is based on essential oils, can also counter those fungi that have developed resistance to conventional antifungal drugs. Microorganisms such as bacteria and fungi have a remarkable capacity to evolve resistance to antimicrobial agents used to destroy them. There are several instances of this and the drug industry is facing a big challenge with many antibiotics becoming less effective.

The research was led by Dr Mudrika Khandelwal, associate professor, department of materials science and metallurgical engineering, IIT-H. The research paper was co-authored by her student Shivakalyani Adepu. Highlighting the need for developing alternate, non-resistance inducing treatment options for fungal diseases Khandelwal says, "Given the prevalence of fungal afflictions such as vaginal infections, diaper rash, athlete's foot and nail fungus caused by the Candida family of fungi, drug resistance can become life-threatening."

To find a solution for the issue, the IIT-H team turned to natural products. "Herbal essential oils and their ingredients are a promising class of effective antimicrobials. Thymol found in oregano oils, carvacrol found in thyme and eugenol found in clove oil, have excellent antimicrobial action against all types of Candida fungi," she added.

A way to overcome this problem is to design a suitable carrier system that can protect the oils/active principles from these factors, and yet, release them in a controlled manner so that the antifungal action can be fully harnessed, say the researchers. The researchers found that using the microcapsules alone as the carrier can cause uncontrolled, burst release of the ingredients.

As a follow-up of the findings, the researchers are developing a prototype, anti-fungal hygiene product with funding from the Biotechnology Industry Research Assistance Council (BIRAC).The research was supported by the Department of Science and Technology (DST) and Corporate Social Responsibility (CSR) grants from the US conglomerate AT&T.

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