DOI: 10.46991/JISEES.2025.SI1.013

Natural Product Discovery from Indian Endophytic Fungi: A Promising Avenue for Drug Development

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ABSTRACT

Fungi are a prolific source of bioactive secondary metabolites, many of which possess unique chemical scaffolds and mechanisms of action. Due to their adaptation to extreme and competitive environments, fungi produce a chemically diverse array of compounds, including alkaloids, quinones, furanones, pyrones, benzopyranoids, xanthones, terpenes, steroids, peptides, and acyclic metabolites. These compounds exhibit a broad spectrum of biological activities, such as anticancer, antibacterial, antifungal, antiviral, anti-inflammatory, and anti-Alzheimer's effects. Our research focuses on the discovery of novel bioactive metabolites from fungi native to the Indian subcontinent, particularly endophytic and marine-derived species. This region presents a rich and largely untapped resource for drug discovery, as India is home to two of the world's twelve mega biodiversity hotspots. Notably, over one-third of the 17,500 flowering plant species found in India are endemic, thriving in a range of habitats—from tropical and coastal ecosystems to alpine and desert regions—supporting a wide diversity of fungal symbionts. In our drug discovery efforts, we have screened over 50,000 fungal Isolates using cell-based, target-based, and enzyme-based assays to identify compounds with anticancer, anti-inflammatory, and antimicrobial potential. Additionally, select fungi have been evaluated for cosmeceutical applications and natural pigment production for the food industry. This presentation will highlight key bioactive compounds identified and discuss strategies for rapid lead generation in natural product-based drug discovery.

Keywords: endophytic fungi, bioactive metabolites, anticancer, anti-inflammatory, antimicrobials, epigenetic modifiers, pigments

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