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A Bibliographic Review of Airborne Fungal Allergens from Dominant and Undercharacterized Genera

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Airborne Fungi and Allergy Risk:

New Study Highlights Understudied Allergens



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Allergies are a major public health concern, and identifying their triggers is essential both for establishing an accurate diagnosis and for developing an effective treatment plan. The study conducted by Prof. Dr. Habil. Nicoleta Ianovici and Assist. Prof. PhD Candidate Noemi Musta, published in the journal *Medicina*, reviews scientific literature published between 2000 and 2025 and analyzes eight fungal genera consistently present in the atmosphere.

Four of these — *Alternaria*, *Cladosporium*, *Aspergillus*, and *Penicillium* — are widely recognized as major causes of allergic sensitization worldwide and are referred to in the study as dominant genera. The other four — *Epicoccum*, *Pithomyces*, *Torula*, and *Rhodotorula* — remain far less studied, despite being increasingly associated with allergic reactions and cross-reactivity phenomena. The authors classify these as undercharacterized genera.

In addition to synthesizing immunological data — including the allergenic proteins involved, sensitization mechanisms, and the risk of cross-reactivity between species — the study highlights the connection between climate change and exposure to fungal allergens. Rising temperatures, drought, and air pollution contribute to the increased presence of spores in the atmosphere and alter their annual distribution, thereby amplifying their potential to trigger allergic reactions.

The article also reviews modern methods for detecting these allergens, ranging from traditional Hirst-type spore traps, used for outdoor air monitoring, to advanced techniques such as ELISA, FTIR spectroscopy, and biosensors. These newer approaches offer the promise of faster and more accurate identification of fungal species with allergenic potential.

The bibliometric analysis includes articles indexed in Google Scholar and PubMed on fungal allergies, examined to assess both general and specialist interest in this field. The findings confirm a clear gap: while each of the dominant genera generates more than ten thousand results in Google Scholar, an undercharacterized genus such as *Pithomyces* barely exceeds 900 results, and in PubMed it is represented by only a few dozen studies.

The study concludes with a call for more in-depth research into less well-known fungal groups, whose effects on respiratory health remain insufficiently documented. Integrating these genera into diagnostic and monitoring strategies for patients with allergies could contribute to more effective management of these conditions and improve patients' quality of life.

The full study is available free of charge as an open-access article here: <https://www.mdpi.com/1648-9144/62/6/1186>.



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