ABSTRACT

INTRODUCTION: Fungi are a significant source of molecules that can induce respiratory hypersensitivity reactions. *Alternaria, Aspergillus, Cladosporium*, and *Penicillium* are most often mentioned among the allergenic fungi species. The climate crisis is expanding the group of plants and their fungal parasites that can cause allergies and changing the geographical range of their occurrence.

HYPOTHESIS AND OBJECTIVE: The aim of the study was the biochemical characteristics of eight species of phytopathogenic microscopic fungi and the assessment of their ability to induce pro-inflammatory responses underlying allergies in *in vitro* studies.

MATERIAL AND METHODS: Microscopic methods and molecular phylogenetics were used to identify the collected species of phytopathogenic microscopic fungi. Biochemical characteristic of the spores was performed by gas-liquid chromatography combined with mass spectrometry. Crude fungal extracts were tested *in vitro* using two cell lines: A549 and BEAS-2B. The effect of the extracts on cell viability was assessed using the colorimetric MTT test and flow cytometry. The generation of reactive oxygen species in the cells was measured by flow cytometry. ELISA tests were used to determine the production of metalloproteinases and pro-inflammatory cytokines. The presence of cell integrity markers was assessed by immunofluorescence.

RESULTS: Spores synthesize diverse fatty acids, and their relative content varies between species. The carbohydrate profiles are characterized by high qualitative similarity but significant quantitative differences. Depending on the type of extract, A549, and BEAS-2B cells were characterized by increased sensitivity to their effects, which was revealed by an increase in the percentage of cells in the early and/or late phase of apoptosis and/or necrosis. In addition, selected extracts were able to induce ROS production in cells. Depending on the type of cell line and the type of extract, a significant increase in the concentration of pro-inflammatory cytokines (most often IL-1β and GM-CSF) and disturbed synthesis of E-cadherin and occludin were noted.

CONCLUSIONS: Thus far, unexplored phytopathogenic microfungi may be a potential inducer of allergic reactions, especially for which the causative factor has not been identified.

KEYWORDS: Phytopathogenic microfungi, allergy, alveolar epithelial cells, bronchial epithelial cells

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