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Occupational exposure to fungi and mycotoxins in cork industry – An exploratory study

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Background: Cork oak is the second most dominant forest species in Portugal and makes this country the world leader in cork export. This type of industry has already been associated with occupational exposure to several fungal species, most commonly with *Penicillium glabrum* (belonging to *Penicillium* section *Aspergilloides*) and *Chrysonilia sitophila*. However, occupational exposure to mycotoxins has never been studied. Here we describe an exploratory work developed in a cork industry located in Portugal aiming at assessing exposure to fungi and mycotoxins.

Materials and Methods: Air and surface samples were collected for fungal burden assessment and subject to further macro- and microscopic observations. Additional air samples were collected in order to perform real-time quantitative polymerase chain reaction (qPCR) amplification of genes from *Penicillium* section *Aspergilloides* and *Aspergillus* section *Fumigati*. Nineteen urine samples of workers were analyzed for multiple mycotoxins according to the methods of Gerding et al. (2014) and Hövelmann et al. (2016).

Results: The most prevalent fungus found on air by conventional methods was *Cladosporium* sp. (42.8%). *Lichtheimia* sp. (21.2%), *Pencillium* sp. (19.2%) and *Geomyces* sp. (16.8%) were also isolated in air samples. The molecular analysis performed on air samples in the same sampling allowed the detection of *P. glabrum* and of *Aspergillus* section *Fumigati*. Regarding surfaces, *Penicilium* sp. (66.4%) was the most abundant, followed by *Cladosporium* sp. (11.7%). *Geomyces* sp., *Chrysonilia* sp., *Alternaria* sp. and *Aureobasidium* sp. that were also isolated in surfaces sampled but with much lower counts. *Chrysonilia* sp., *Alternaria* sp. and *Aureobasidium* sp. were only identified in surfaces. Nine different mycotoxins were found in workers urine samples: DH-CIT, DON-3-GlcA, EnA1, EnB, EnB1, OTA, 2´R-OTA, TeA and allo-TeA. Most of the samples presented more than one mycotoxin (63.1%) and some samples presented up to four different mycotoxins. The most reported mycotoxin was TeA (94% >LOQ) followed by allo-TeA (44.4% >LOQ). OTA was found in 5 samples (26.3%) and DH-CIT in 4 samples (21%).

Discussion: This is the first study intending to assess the exposure to multiple mycotoxins of a group of workers from a specific occupational setting. However, the low values found suggest that exposure is most likely related with food consumption. Different results were obtained in other settings where there was a higher exposure to mycotoxins related with higher prevalence of toxigenic species.

References:

Gerding, J., B. Cramer and H. U. Humpf (2014). "Determination of mycotoxin exposure in Germany using an LC-MS/MS multibiomarker approach." Molecular Nutrition & Food Research 58(12): 2358-2368.

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