

L15

A new approach to assess fungal burden and mycotoxins occupational exposure in waste trucks workers

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A large number of people work in waste management units and exposure to microorganisms is considered an occupational health problem. Besides fungal burden, it is important to consider the co-occurrence of mycotoxins in this setting. Additionally, it is known that in waste industry it is common to use vehicles to transport waste and other products within the facilities, increasing the risk of exposure.

Considering the above information, the aim of this study was to assess exposure to fungal burden and mycotoxin presence (aflatoxins including B1, agroclavin, deoxynivalenol, deoxynivalenol-3-glucoside, nivalenol, fusarenon X, deepoxy-deoxynivalenol, 3-acetyldeoxynivalenol, neosolaniol, monoacetoxyscirpenol, diacetoxyscirpenol, HT-2 toxin, T-2 toxin, beauvericin, enniatins (B, B1, A1 and A) hydrolyzed fumonisin B1, fumonisins (B1 and B2), ergovalin, dihydroergosin, ergotamin, ergocornin, moniliformin, patulin, ochratoxin (α , β and A), verrucaric acid, verrucarol, zearalenone-4-glucoside, α -zearalenol, β -zearalenol, zearalenone-4-sulfate, zearalenone) in filters from the air conditioning system that supply trucks cabinet as a different approach to assess occupational exposure of the drivers working in waste industry. Filters from eleven vehicles were collected and subject to further macro- and microscopic observations. Additionally, real-time quantitative polymerase chain reaction (qPCR) amplification of genes from *Aspergillus* sections *Fumigati*, *Flavi*, *Circumdati* and *Versicolores* was also performed. The mycotoxins were analyzed using LC-MS/MS system and detection was carried out using high performance liquid chromatograph (HPLC) Nexera (Shimadzu) with a mass detector API 4000 (AB Sciex).

Although none of the analysed mycotoxins were detected, fungal contamination was observed. The filter with less fungal contamination presented 500 CFU/m² and the one with higher fungal load presented 40×10³ CFU/m². *Aspergillus* genus sections *Fumigati* (24.7%) and *Circumdati* (24.3%) were the most prevalent, followed by *Nigri* (16.9%), *Aspergilli* (8.5%), *Versicolores* (6.6%) and *Flavi* (1.5%). *Penicillium* sp. was found in only one filter in high amounts (16.6%). Among all *Aspergillus* sections targeted by molecular tools only *Aspergillus* section *Fumigati* was detected and it was present in all assessed filters.

Considering the fungal burden found, filters replacement should be more regular to avoid workers exposure to fungi and mycotoxins since some of these species are toxigenic and can potentially, produce mycotoxins. Further studies should be developed to understand if the conditions present in the filters allow the production of mycotoxins and their dissemination in the cabinet during the normal use of the vehicles.