Occupational exposure to toxigenic *Aspergillus versicolor* in Portuguese swine buildings

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1. INTRODUCTION

Biological factors associated with airborne dust are the most important hazards in pig buildings and include allergenic and/or toxic compounds, as well as infectious agents such as fungi and their metabolites, like mycotoxins. Inhalation of such agents can be a potential occupational treat (Kim et al., 2008).

Exposure of workers from swine confinement buildings to respiratory hazards has been reported elsewhere in Europe (Portengen et al., 2005; Radon et al., 2002; Simpson et al., 1999), Asia (Kim et al., 2008; Chang et al., 2001) and America (Cormier et al., 1990; Donham, 2000). Analogous data has not been reported for Portugal and this omission has hindered the development of policies in the area of occupational health and farm safety.

*Aspergillus versicolor* is known as being the major producer of the hepatotoxic and carcinogenic mycotoxin sterigmatocystin. The toxicity of this mycotoxin is manifested primarily in liver and kidney (Engelhart et al., 2002).

This study aimed to determine occupational exposure due to fungal contamination caused by *A. versicolor* in seven Portuguese swine.

2. MATERIALS AND METHODS

Air samples were collected with the Millipore Air Tester (Millipore) by impactation method at a velocity of 140 L / minute and at one meter height, using malt extract agar supplemented with chloramphenicol (0.5%). Air sampling was also performed outside premises, since this is the place regarded as reference. Concerning surfaces samples, they were collected by swabbing the surfaces of the same indoor places, using a 10 by 10 cm square stencil disinfected with 70% alcohol solution between samples according to the International Standard ISO 18593 – 2004. The obtained swabs were then plated onto MEA. All the collected samples were incubated at 27 °C for 5 to 7 days.

After laboratory processing and incubation of the collected samples, quantitative (colony forming units/m³ and colony forming units/cm²) and qualitative results were obtained, with the identification of the isolated fungal species (Hoog et al. 2000).

3. RESULTS AND DISCUSSION

Twelve different *Aspergillus* species were identified among the 62 collection points from where *Aspergillus* isolates were collected. In the studied settings, *A. versicolor* presents the highest airborne spore counts (3210 cfu/m³) and the highest overall prevalence (41.9%), followed by *A. flavus* and *A. fumigatus* (8.1%). From the analyzed surfaces, *A. versicolor* was also detected in higher values (>300 cfu/cm²).

Due to their easier detection, fungi are often used as an indirect indicator of mycotoxins presence both in agricultural and occupational settings, and because of that we must consider the eventual exposure not only to fungal particles, but also to the hepatotoxic and carcinogenic mycotoxin sterigmatocystin (Thane et al., 2004). These mycotoxin is closely related to aflatoxin mycotoxins as a precursor of aflatoxin biosynthesis (Barnes et al., 1994) and is classified as an International Agency for Research on Cancer classes 1B carcinogen (i.e., as possibly carcinogenic to humans) (International Agency for Research on Cancer, 1987).

4. CONCLUSIONS

It was possible to characterize the contamination caused by *A. versicolor* in the seven swine units. This study raises the concern of occupational treat due not only to the detected fungal load, but also to the toxigenic potential of these species. Exposure to sterigmatocystin by inhalation of air and dust should be consider a route of exposure in this setting.

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6. REFERENCES


International Agency for Research on Cancer, Lyon, France.