

ASPERGILLUS SPECIES IN TEN HOSPITALS FOOD UNITS FROM LISBON

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1 - Introduction

Hospital environment is a source of acquired infections.

(Gammage and Kaye, 1985)

Microbiologic control of hospital environments may play a role in the prevention of cross infection.

(Ekhaise, Ighosewe and Ajakpovi, 2008)

1 - Introduction

Fungal exposure in hospitals is of particular interest due to the possible patient's susceptibility.

Effects due to fungal exposure are dependent on the:

- species present;
- metabolic products;
- concentration and exposure duration;
- individual susceptibility.

(Goyer *et al.*, 2001)

1 - Introduction

It is important to contribute to the increase of knowledge referring air fungal contamination in hospitals indoor spaces, such as food units, in order to identify most effective preventive measures to avoid such contamination.

This investigation was designed to describe environmental air fungal contamination by *Aspergillus* species in ten hospitals food units from Lisbon.

2 – Material and Methods

A descriptive study was developed to monitor air fungal contamination in ten hospitals food units from Lisbon.

Fifty air samples of 250 litres were collected through impaction method using malt extract agar with chloramphenicol as a bacteria growth inhibitor (MEA).



2 – Material and Methods

Air samples were collected at 140 L/minute and at one meter tall, in:

- food storage facilities;
- Kitchen;
- food plating;
- canteen and also;
- outside premises, since this was the place regarded as reference.

Subsequently, samples were incubated at 27 °C for 5 to 7 days.

2 – Material and Methods

After laboratory processing and incubation of the collected samples, quantitative (CFU/m³) and qualitative results were obtained, with identification of isolated fungal species.

Whenever possible, filamentous fungi were identified to the species level, since adverse health effects vary according to fungal species.

(Rao, Burge and Chang, 1996; Hoog *et al.*, 2000).

2 – Material and Methods

Identification of filamentous fungi was carried out on material mounted in lactophenol blue and achieved through morphological characteristics listed in illustrated literature .

(Hoog *et al.*, 2000).

Yeasts were identified through biochemical API test.

(Ghannoum *et al.*, 2000).



3 – Results and discussion

- Thirty two species of fungi were identified in air.
- The two most commonly isolated were *Penicillium* sp. (43, 6%) and *Cladosporium* sp. (23, 2%).
- Regarding yeasts, only *Rhodotorula* sp. (84,2%) and *Trichosporon* sp. (15,8%) were isolated.
- There was coincidence between prevailing genera in interior and outside premises, however all ten food units presented fungal species different from the ones isolated outside.
- Nine food units presented more CFU/m³ in indoor than outdoor premises.

3 – Results and discussion

Nine of the ten food units presented *Aspergillus* species and the two most commonly species isolated were ***Aspergillus versicolor* (32,4%)** and ***Aspergillus niger* (29,4%)**.

A. niger was isolated only in food storage facilities, while *A. versicolor* was isolated in kitchens, food plating and canteens.

<i>Aspergillus</i> species	Frequency (%)
<i>Aspergillus versicolor</i>	32,4
<i>Aspergillus niger</i>	29,4
<i>Aspergillus flavus</i>	11,8
<i>Aspergillus ochraceus</i>	8,8
<i>Aspergillus candidus</i>	8,8
<i>Aspergillus fumigatus</i>	5,9
<i>Aspergillus niveus</i>	2,9

3.1 - Discussion

All ten food units monitored had one or more spaces with fungal species that differed from the ones isolated outside, and also nine of them presented more CFU/m³ in indoor than outdoor air, suggesting, both situations, fungal contamination from within.

(Nevalainen, 2007)

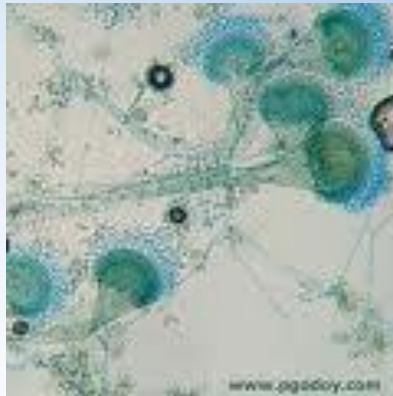
There were isolated *Aspergillus* species and thought these fungi were seen in few numbers, their mere existence in the hospital air is of concern, because *Aspergillus* sp. are known to cause children allergic reactions as well as opportunistic infections, especially in immunocompromised patients.

(Lugauskas, 2004)

3.1 - Discussion

Aspergillus fumigatus and *Aspergillus versicolor*, should be regarded as indicators of humidity problems and/or a potential risk to health.

(Goyer *et al.*, 2001)



According to the American Industrial Hygiene Association (AIHA), in 1996, the confirmed presence of the species *A. versicolor*, *A. flavus* and *A. fumigatus* requires implementation of corrective measures. In the present study, the three *Aspergillus* species were identified in the analyzed food units.

3.1 - Discussion

Taking into account what is mentioned in Portuguese Technician Norm NT-SCE-02, presence of both opportunistic fungi most isolated in air, namely *Aspergillus versicolor* and *Aspergillus niger*, shows a lack of air quality in indoor space.

Faure *et al.*, (2002) used the acceptability threshold for hospital settings > 2 CFU/room without *A. fumigatus*. This threshold was used to interpret air results and to perform, as soon as possible, corrective measures in the contaminated areas. In our study one of the ten food units presented *Aspergillus fumigatus* and all the units present, at least, one room with more than 2 CFU.

3.1 - Discussion

Aspergillus versicolor was isolated in kitchens, food plating and canteens, whereas *Aspergillus niger* was isolated only in food storage facilities. These can be explain by the effect of environmental variables influencing fungal spreading, namely:

- occupants number (Scheff *et al.*, 2000);
- environmental variables such as relative humidity (Arundel *et al.*, 1986);
- temperature (Kakde, Kakde and Saoji, 2001);
- developed activities that may also affect fungal concentration (Buttner and Stetzenbach, 1993).

3.1 - Discussion

Surveillance strategies



knowledge of environmental air fungal contamination
control of maintenance and cleaning procedures



leading to the education of health care workers
definition of acceptable levels



introduce immediate corrective measures

(Lebeau *et al.*, 1998; Brocard-Lemort, 2000).

4 - Conclusions

It was possible:

- to characterize fungal burden, especially concerning *Aspergillus* species in air of several food units;
- to observe that food units can be a possible source of fungal contamination within hospital wards.

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