

## ***Detection of dermatophytes in the environment of a podiatry clinic***

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### **Objectives**

Podiatry is a healthcare profession that specializes in the management of disease and disorders of the lower limb and foot. Podiatric treatments such as the reduction of thickened toenails, onychomycotic nails, foot calluses, or corns have the potential to generate substantial concentrations of organic dusts. Occupational exposure to bioaerosols in podiatry clinics has been studied, but it was never assessed in a deeply manner for fungi. The detection of dermatophytes in podiatric clinics is a matter of concern since the environmental presence of these fungi can contribute to spread the infection to podiatry workers and to other patients consulted in the podiatry clinics.

The aim of the present study was to characterize the dermatophyte burden during podiatric activities by the use of cultural methods but also molecular methodologies for fungal DNA detection directly from the collected samples.

### **Methods**

During the period of 4 weeks, environmental samples from a podiatric clinic were collected for both conventional and molecular methodologies. For culture, 44 air samples and 39

swabs from surfaces were inoculated in Mycosel agar. Fourteen air samples from the same sampling sites were collected for direct detection of fungal DNA. Air samples ranging from 88 to 300L were collected using a calibrated impinger device (Midget Impinger WITH Universal Sample Pump, SKC (PA, USA), at 2.2L/min airflow rate.

Five milliliters of the collection liquid was used for DNA extraction using the ZR Fungal/Bacterial DNA MiniPrep Kit. Detection of dermatophytes species (in general) and *Trichophyton rubrum* (in particular) were both achieved by using the Dermatophyte PCR kit, (SSI Diagnostica, Herredsvejen Hillerød, Denmark). PCR amplifications were performed using 2 µL and 5 µL of the extracted DNA.

## Results

In the first week, 1 out of 17 samples had a positive result for *Trichophyton rubrum* (detected in an air sample), whereas in the remaining weeks, no dermatophytes were identified in the remaining 129 samples (weeks 2, 3 and 4).

The molecular detection of dermatophytes was performed in the 14 air samples using two different DNA volumes: 2 and 5 µL. Using 2 µL of the extracted DNA, 1 out of 14 samples gave a positive result for *T. rubrum* and none of the PCR reactions was inhibited. Using a 5 µL volume of DNA, 5 samples were positive for *T. rubrum* but the PCR reaction was inhibited in 6 of them (Table 1). Globally, 5 out of the 14 (36%) samples analyzed showed positive results for the detection of *T. rubrum* DNA.

## Conclusions

Given the ratio of positive/inhibited PCR reactions, we cannot rule out the hypothesis of more positive samples. Nevertheless, the obtained results emphasize the importance of the application of new methodologies for an air quality assessment approach and reinforce the complementarity of both cultural and conventional methodologies.

To our knowledge, this study presents for the first time, the application of the Dermatophyte PCR kit for dermatophyte DNA detection directly from environmental samples (air). The promising results indicate the need of optimization of this procedure specifically in this type of samples in order to use this methodology in a routine basis, for occupational and indoor air quality exposure assessments.

Table 1. Culture and molecular detection of dermatophytes in air samples of a podiatry clinics

Air Sampling Code	Culture for dermatophytes	Dermatophyte PCR result (using 2 µl of the extracted DNA)	Dermatophyte PCR result (using 5 µl of the extracted DNA)
S01	Negative (air and surfaces)	Negative	Negative
S02	Positive for <i>T. rubrum</i> (air)	Negative	PCR Reaction inhibited
S03	Negative (air and surfaces)	Negative	PCR Reaction inhibited
S04	Negative (air and surfaces)	Negative	PCR Reaction inhibited
S05 PBS1	Negative (air and surfaces)	Negative	PCR Reaction inhibited
S05 PBS2	Negative (air and surfaces)	Negative	Negative
S06	Negative (air and surfaces)	Positive for <i>Trichophyton rubrum</i>	Positive for <i>Trichophyton rubrum</i>
S07 PBS1	Negative (air and surfaces)	Negative	Positive for <i>Trichophyton rubrum</i>
S07 PBS2	Negative (air and surfaces)	Negative	Positive for <i>Trichophyton rubrum</i>
S08	Negative (air and surfaces)	Negative	Positive for <i>Trichophyton rubrum</i>
S09	Negative (air and surfaces)	Negative	Positive for <i>Trichophyton rubrum</i>
S10 PBS1	Negative (air and surfaces)	Negative	Negative
S10 PBSB	Negative (air and surfaces)	Negative	PCR Reaction inhibited
S11	Negative (air and surfaces)	Negative	PCR Reaction inhibited