

Fungal Contamination in White Medical Coats of Dentistry Professionals

ORIGINAL

Benicio Barros Brandão¹, Jhonatas Cley Santos Porto², Carlos Alberto Mendonça Filho³, Maria Clara Lima Oliveira⁴, Thiago Lima Monte⁵, Luana Kelle Batista Moura⁶, Iraci de Melo Noieto Salmito⁷, Ivonizete Pires Ribeiro⁸, Mitra Mobin⁹

Abstract

Background: The white medical coats used by health professionals may serve as a source of infection in health services because it is a potential vehicle for transmission of microorganisms. There are several studies that warn of the inherent dangers in bacterial contamination in lab coats, but there are few reports of fungal contamination in this personal protection equipment.

Aims: The study aims to identify fungi in dental lab coats and to propose an adequate cleaning methodology for these lab coats.

Method: Samples were collected from ten dentists from a dentistry-school clinic of a higher education institution of Teresina, Piauí, Brazil, using sterile swab, soaked in sterile saline contained in a test tube. Each sample was inoculated on chloramphenicol-containing Saboroud Dextrose agar and incubated at room temperature for fungal growth. Phenotypic and biochemical methods were used to identify the colonies.

Results: Fungal growth was observed in all samples of the lab coats, and 19 isolates were counted. The genera *Cladosporium* and *Aspergillus* were the most frequent in this study. The results emphasize the role of fungi as contaminants in lab coats; and, as an effective means of transmission of pathogens in the community.

Conclusions: This study suggests to wash the coat after each working day using water and soap to remove the first dirt. Then immerse in solution one liter of water to 3ml of bleach for five minutes. Furthermore, this work advocates the need to implement more rigid norms

- 1 Dentist by UNINOVAFAPI University Center, Teresina, Piauí, Brasil.
- 2 Biomedicine student at UNINOVAFAPI University Center, Teresina, Piauí, Brasil.
- 3 Department of Dentistry from UNINOVAFAPI University Center, Teresina, Piauí, Brasil.
- 4 Dentistry student at UNINOVAFAPI University Center, Teresina, Piauí, Brasil.
- 5 Coordination of Dentistry of the UNINOVAFAPI University Center, Teresina, Piauí, Brasil.
- 6 Graduate Program, Professional Master's in Family Health in UNINOVAFAPI University Center, Teresina, Piauí, Brasil.
- 7 Department of Dentistry at UNINOVAFAPI University Center, Teresina, Piauí, Brasil.
- 8 Department of Nursing at UNINOVAFAPI University Center, Teresina, Piauí, Brasil.
- 9 Department of Microbiology at UNINOVAFAPI University Center, Teresina, Piauí, Brasil.

Contact information:

Mitra Mobin.

Address: Rua Vitorino Fernandes Orthiges 6123, Teresina PI 64073-505, Brasil.

 mitra_mobin@yahoo.com.br

in concern to the use of lab coats, as well as educational campaigns to guide dentists about the correct use of this Personal Protection Equipment.

Keywords

Individual Protection Equipment; Fungi; Cross infection.

Introduction

Biosafety behaviors should be adopted by health professionals in the workplace to avoid exposure to secretions, objects and contaminated areas by different types of pathogenic microorganisms, including fungi. One of the main measures to prevent the contagion and consequent dissemination of these microorganisms is the correct use of Personal Protection Equipment (PPE's) [1, 2].

In Brazil, according to the Ministry of Work and Employment (*Ministério do Trabalho e Emprego*), in *Norma Regulamentadora* no. 6, published on June 8, 1978 and amended on April 16, 2015, it is considered to be PPE any device or product of individual use, used by worker, and destined to the protection of susceptible risks that threaten the health and safety of the professional [3].

Masks, gloves, goggles and a lab coat are examples of PPE, and are essential for the daily safety of the health professional, and it is indispensable to use them in an appropriate place. In addition, the routine of exchange, its handling after use, and proper washing are fundamental variables to ensure the health and well-being of the professional and the community as a whole. In this way, storage and washing improper of the lab coat propitiate to contamination of this PPE by bacteria, fungi and virus [4, 1].

Several reports of contamination in lab coats with different bacterial species such as *Staphylococcus*, *Streptococcus* and *Enterococcus* can be found in

the literature [5]. However, there are few reports of fungal contamination in lab coats, which does not mean that fungal contamination is uncommon or less harmful than the bacterial contamination in this type of PPE.

Based on this problem and considering the individual and collective dangers that the fungi adhered in lab coats can cause, this study aims to identify fungi in lab coats of Dentistry professionals and to propose an adequate cleaning methodology for these lab coats.

Materials and Methods

This is an experimental and descriptive study on fungal contamination in dental lab coats.

The lab coats were received from professionals after the end of the dental clinic-school attendance at one higher education institution at Teresina, Piauí, Brazil. Samples of each coat were collected with sterile swab, soaked in 5 ml of saline contained in a test tube, and rubbed on the surface of the lab coat. The samples were then transported to the laboratory, where 100µl of saline from each tube were withdrawn for inoculation in duplicate petri dishes containing Sabouraud Dextrose agar (HiMedia Laboratories PVT Ltd., Mumbai, India), plus chloramphenicol (INLAB, São Paulo, Brazil) at a concentration of 0.05g/L. Subsequently, inoculated plates were incubated for 72 h at room temperature for colony growth [6].

After the growth of filamentous fungal colonies, microcultures were separated for the observation of structures and identification of fungal species under an optical microscope [7].

Yeast colonies were inoculated into BBL™ CHROMAGAR™ Candida (BD-Difco, New Jersey, USA) and incubated for 24h at 37°C for presumptive identification of Candida species. Biochemical tests were also performed as a complementary identification method [8].

The study was submitted to the Research Ethics Committee of the University Center UNINOVA-FAPI, and approved through protocol under No. 0432.0.043.000-09.

Results e Discussion

The fungi growth was observed in all the analyzed coffins, counting nineteen isolated, belonging to nine species. It was verified that the most frequent species belong to the genus *Cladosporium* and *Aspergillus*, summing both 80% of the isolates. The other species are expressed in **Table 1**.

Table 1. Fungi found in dental profession coats of a dentistry-school clinic of a higher education institution.

Species	Nº	%*
<i>Cladosporium oxysporum</i> Berk. & Curt.	5	50.0
<i>Cladosporium cladosporioides</i> (Fres.) de Vries	5	50.0
<i>Aspergillus niger</i> v. Tiegh.	3	30.0
<i>Penicillium aurantiogriseum</i> Dierckx	1	10.0
<i>Rinocladiella aquaspersa</i> (Borelli) Schell et al.	1	10.0
<i>Ulocladium botrytis</i> Preuss	1	10.0
<i>Curvularia clavata</i> Jain	1	10.0
<i>Curvularia geniculata</i> (Tracy & Earle) Boedijn	1	10.0
<i>Candida krusei</i> (Castellani) Berkhout	1	10.0
Total ^a	10	100.0

*: The percentages do not sum up to 100% because one coat had more than one species of fungus.

a: Refers to the total of analyzed coats.

Source: Laboratory of Microbiology of UNINOVA-FAPI University Center, Teresina, Piauí, Brazil.

In dental service offices there are many sources of infection that involve various pathogens such as fungi. These microorganisms are considered opportunistic and affect mainly individuals with low immunity, such as: children, the elderly, people living with HIV and transplanted. In addition, fungi can be found throughout the dental setting, and transported to any other environment through the patient or the professional himself [9].

Dental equipment that has not undergone adequate disinfection or poorly used or sanitized PPE improperly are important routes of fungal contamination. Among the PPE's, the lab coat is the most common source of transmission of these microorganisms, since many dental professionals and academics consider it as an aesthetic and not a protection tool [10, 2].

The use of the lab coat is adopted as a biosafety measure for both the professional and the patient, but the risk of its use outside the work environment must be observed. Lab coats contaminated with pathogenic and even resistant microorganisms, become an effective vehicle of transmission of pathogens to the whole community. In addition, this PPE can bring into community health micro-organisms, which can become resistant [11, 12].

An interview with fourteen academics of dentistry in the city of Araraquara, State of São Paulo, Brazil, with the aim to investigating the forms of infection prevention and control in the health services, found that most of the professionals are concerned about the contamination, but ignores or does not use the barriers of protection and biosafety protocols, mainly due to the lack of good hygiene habit. However, even knowing the microbiological risks contained in the work environment, the study reports that 48% of the seventy-three study subjects changed their lab coat only once a week [13].

Another study evaluated three dental offices of the Dental Specialties Center of the Public Health Network (*Centro de Especialidades Odontológicas*

da Rede Pública de Saúde) in the city of Itanhém, State of Bahia, Brazil, and identified fungi such as: *Pseudallescheria*, *Wangiela*, *Scedosporium*, *Fusarium*, *Coccidioides* and *Bipolaris* [14]. It is of notable importance to express the multicentric character of these findings, meaning that fungal contamination is more frequent than previously expected.

A study on the water reservoirs and tubing of the high rotation pens of seven dental clinics identified twenty two bacterial species and twelve different genus of fungi, with prevalence of *Cladosporium* and *Penicilium*. The high-speed pen is a source of dispersion of several microorganisms, therefore its use promotes contamination of the dental surgeon's work environment, including the lab coat [15].

All the species found in this study are pathogenic and may cause infections ranging from cutaneous to systemic infections. *Cladosporium oxysporum* and *Cladosporium cladosporioides*, the most frequent species in this study, are often associated with ugly hyphomycosis, a rare, slowly progressive infection, and often associated with immunocompromised patients. In addition, these fungi have greater resistance to conventional treatment because it presents melanin in its cell wall, this pigment being a resistance factor [10].

Aspergillus niger is often isolated from hospital settings and may cause pulmonary aspergillosis, endophthalmitis, endocarditis and peritonitis and cutaneous infections [16, 10]. Already *Curvularia clavata*, *Curvularia geniculata*, *Rinocladiella aquaspersa* and *Candida krusei* can cause invasive sinusitis with cerebritis, endocarditis, chromoblastomycosis and systemic candidiasis, respectively [10]. *Ulocladium botrytis* is not very associated with human diseases, having in the literature only a report of dysto-lateral onychomycosis caused by this fungus [17].

Thus, this and several others study evident why the inadequate use of the lab coat by health professionals and related areas is considered a serious public health problem. In this way, a more effective educational and oversight action is necessary,

by making clear the role of the community as the central agent of this supervision.

Conclusion

Fungal growth was observed in all samples of the lab coats, with 19 isolates counted. The genera *Cladosporium* and *Aspergillus* were the most frequent in this study.

The results of the present study highlight the role of fungi as contaminants in lab coats; and as an effective means of pathogenic transmission among the most diverse social environments, being a serious and neglected public health problem.

Thus, it is advised to wash the coat after each working day, separated from the other clothes, using water and soap to remove the first dirt. Then immerse in solution one liter of water to 3ml of bleach for five minutes.

Finally, this study defends the need to implement, in the work environment, stricter rules regarding the use of lab coats, as well as educational campaigns on the correct use of this PPE.

Authors contribution

BB Brandão and CAM Filho collected and inoculated the samples; M Mitra performed the identification of the species and wrote the manuscript; JCS Porto assisted in the laboratory and in writing the manuscript; MCL Oliveira assisted in the laboratory; TL Monte, LKB Moura, IP Ribeiro and IMN Salmito performed the review of the manuscript.

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