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Brief Communications

Phenotypic characteristics of filamentous and yeast fungi in a surgical center

Fenotipicidade de Fungos filamentosos e leveduriformes em um centro cirúrgico

Fenotipicidad de hongos filamentosos y levaduras en un centro quirúrgico

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ABSTRACT

Background and Objectives: Due to the high mortality rates associated with fungal infections, methods for their detection and diagnosis are important for an adequate and effective treatment of these microorganisms. The objective of the present study was to verify the cell incidence of fungi on some of the surfaces of a surgical center. **Methods:** Sample collection was performed with the aid of a sterile swab, which was soaked in peptone water and rubbed on 20 cm^2 quadrants of the following studied areas: medication cart, operating room table, marble countertops and air conditioning grills. The analyses were performed in duplicate, using decimal dilutions from 10^{-1} to 10^{-6}. After incubation at 25 °C/72h, quantitation of fungi was performed. The colonies were evaluated for their color, size, edge and pigment production, and then differentiated between yeast and filamentous fungi. **Results:** The results indicated a variable number of colony-forming units (CFU)/cm^2 of fungi, both for the same points, as well as in different sampling points, in addition to data containing CFU/cm^2 <1. **Conclusion:** This study demonstrated the presence of yeast and filamentous fungi on some surgical room surfaces. We conclude it is necessary for professionals working in the hospital area to constantly undergo training and continuing education aiming at changes in habits and infection prevention.

KEYWORDS: Surgicenters. Fungi. Cross Infection.

RESUMO

Justificativa e Objetivos: Devido às altas taxas de mortalidade associadas às infecções fúngicas, os métodos para detecção e diagnóstico são importantes para um tratamento adequado e eficaz contra esses microrganismos. Objetivo do presente estudo foi verificar a incidência celular de fungos em algumas das superfícies de um centro cirúrgico. **Métodos:** a coleta foi realizada com o auxílio de um *swab* esterilizado e embebido em água peptonada 0,1% e friccionada em quadrantes de 20 cm^2 das seguintes superfícies estudadas: mesa de medicação, mesa cirúrgica, bancada de mármore e grades de ar condicionado. As análises foram realizadas em duplicatas, empregando-se as diluições decimais a partir de 10^{-1} até 10^{-6}. Após incubação 25ºC/72h, foi realizada a quantificação dos fungos. As colônias foram avaliadas com relação à cor, tamanho, borda e produção de pigmentos, sendo então caracterizadas entre fungos leveduriformes ou filamentosos. **Resultados:** Os resultados apontam para uma variabilidade de resultados no número de Unidades Formadoras de Colônias (UFC) /cm^2 de fungos, tanto para os mesmos pontos como em diferentes pontos de amostragem além de dados com UFC/cm^2 < 1. **Conclusão:** Este estudo demonstrou a presença de fungos filamentosos e leveduriformes em algumas superfícies de salas cirúrgicas. Conclui-se que são necessários que os profissionais da área hospitalar sejam constantemente estimulados a realizar atualização, treinamento e educação continuada para mudanças de hábitos e prevenção de infecções.
DESCRITORES: Centros Cirúrgicos. Fungos. Infecção Hospitalar.

RESUMEN

Justificación y Objetivos: Debido a las altas tasas de mortalidad asociadas a las infecciones fúngicas, los métodos de detección y diagnóstico son importantes para un tratamiento adecuado y eficaz contra estos microorganismos. El objetivo del presente estudio fue verificar la incidencia celular de hongos en algunas de las superficies de un centro quirúrgico. **Métodos:** Los datos fueron recolectados con la ayuda de un hisopo estéril y empapado en agua peptonada y frotados en cuadrantes de 20 cm2 de las siguientes áreas estudiadas: mesa de medicamentos, mesa de operaciones, encimeras de mármol y parrillas de aire acondicionado. Los análisis se realizaron por duplicado, usando diluciones decimales de 10-1 a 10-6. Después de la incubación a 25°C / 72 h, se realizó la cuantificación de los hongos. Las colonias se evaluaron en cuanto a color, tamaño, borde y producción de pigmento, y luego se distinguió entre levadura y hongos filamentosos. **Resultados:** Los resultados apuntan a un resultado de variabilidad en el número de unidades formadoras de colonias (CFU) / cm2 de hongos, ambos para los mismos puntos que en diferentes puntos de muestreo además de los datos CFU / cm2<1. **Conclusiones:** este estudio demostró la presencia de hongos en algunas superficies de salas quirúrgicas. Se concluye que es necesario que los profesionales en el área del hospital pasen constantemente por capacitación y educación continua para cambios en los hábitos.
PALABRAS CLAVE: Centros Quirúrgicos. Hongos. Infección Hospitalaria.

The concentration of microorganisms is an extremely important factor that depicts the degree of hygiene in the hospital environment. Therefore, systemic fungal infections constitute a major problem in critically-ill patients in intensive care settings and account for a growing proportion of health care-associated infections.[1]

Areas contaminated with microbial agents play a significant role in the occurrence of cross-transmission, which are considered to be sources of contamination, including the hands of health care workers.[2] Fungal infections that can be carried by the hands cause pain, discomfort, physical and occupational limitations. [3]

It is known that air-conditioned environments, such as the surgical center and Intensive Care Units, can be a gateway for the growth of anemophilous fungi.[4] Due to the high mortality rates associated with fungal infections, methods for their detection and diagnosis are necessary for an adequate and effective treatment.[5]

Patients susceptible to infection are transplanted ones, those affected by different factors such as exposure to pathogens, skin and muscle tear, metabolism, immunodeficiency, neutropenia, constant use of anti-rejection drugs and immunosuppressants.[6]

The acknowledgement of the biological risks present in the surgical center has prompted the researchers to investigate them. The aim of the present study was to verify the cell incidence of fungi on some of the surfaces found in a surgical center.

This was a quantitative study, performed at the Surgical Center of a medium-sized hospital in the city of São Paulo, state of São Paulo, Brazil. It was evaluated and approved by the internal Research Ethics Committee of the institution, by the Hospital Infection Control Commission and the Nursing Management. It was carried out between November 2010 and February 2011, in the preoperative period of elective orthopedic surgeries.

The samples were collected using a sterile swab soaked in 0.1% peptone water and rubbed on 20 cm^2 quadrants of the assessed surfaces[6]: medication cart, operating room table, marble countertops and air conditioning grills. Petri dishes containing Sabouraud Glucose Agar (SGA) were used as medium for microbial growth and collections were performed in the afternoon.[7]

The material was transported to the Laboratory of Microbiology and Biomolecules (LaMiB) in DMP/CCBS/UFSCar in Styrofoam boxes containing ice to minimize microbial growth and to preserve the microorganisms, without exceeding the 120-minute period until the beginning of the microbiological analyses. The analyses were performed in duplicate, using decimal dilutions from 10^{-1} to 10^{-6}. After incubation at 25 ° C for 72h, the quantification was performed.[6] The colonies were evaluated for color, size, edge and pigment production, and were then differentiated between yeast or filamentous fungi.

Table 1 shows the mean of the results obtained for filamentous and yeast fungi, as well as the variability in the number of Colony Forming Units (CFU)/cm^2 of fungi at the different collection sites.

Table 1 – Mean fungal count of the sampling distribution (CFU / cm^2).

Sites	Mean yeasts	Mean filamentous	Not countable yeasts	Not countable filamentous	CFU < 1 yeasts	CFU < 1 filamentous
AC	$8.52x10^5$	$2.0x10^2$	2	0	4	11
MC	$2.43x10^6$	$2.94x10^4$	2	0	2	10
OT	$1.20x10^6$	$3.13x10^4$	4	0	1	14
ET	$1.27x10^6$	$7.33x10^2$	2	0	1	11

AC – air-conditioned grills; MC – marble countertops; OT – operating room table; ET – medication cart. CFU<1 there was no growth. Source: the Author.

When analyzing the samples coming from the air conditioning grills of the hospital being studied, most of the yeast fungi cultivated in Sabouraud Agar was quantifiable. The results indicated a variable number of colony-forming units (CFU)/cm^2 of fungi, both for the same points, as well as in different sampling points, in addition to data containing CFU/cm^2 <1.

Studies based on the hospital internal air conditioning and its relation with fungal infections disclose the association between them, corroborating our data. Therefore, a study isolated 50 colonies and identified 12 fungal genera in one hospital and the presence of fungi was observed in all sectors, which demonstrates the need for monitoring the hospital environment.[8]

The most common source for fungal infection risk was the colonization of the oral mucosa by *Candida spp*., one of the organisms that constitute the oropharynx and gastrointestinal tract microbiota.[6] Fungal contamination before and after the final cleaning and disinfection of hospital mattresses used by patients contaminated with *Candida spp*. has been demonstrated in different sectors. The most commonly isolated species was *Candida parapsilosis*.[2]

The hands can carry microorganisms from one environment to another; a study detected fungi in the hands of workers and food handlers, in which *Candida* species predominated.[3]

The increasing number of immunocompromised patients may suffer from invasive aspergillosis and other opportunistic infections.[9] Thus, it is considered necessary to

review the cleaning and air exchange processes in the air-conditioned hospital environment.[4]

The results of this study demonstrated the presence and reported the fungal count on some surfaces of the surgical room and verified their incidence. We conclude that it is necessary to intervene in all mechanisms related to microorganism control and care of air-conditioned environments. Therefore, the training and continuing education of health care workers are necessary to prevent infection outbreaks and contribute to reduce hospital admission inconvenience and costs.

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