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Candida glabrata among *Candida* spp. from environmental health practitioners of a Brazilian Hospital

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ABSTRACT

The incidence of the species *Candida albicans* and non-*albicans Candida* was evaluated in a Brazilian Tertiary Hospital from the environment and health practitioners. In a 12-month period we had a total positivity of 19.65% of *Candida* spp. The most recurring non-*albicans Candida* species was *C. glabrata* (37.62%), generally considered a species of low virulence, but with a higher mortality rate than *C. albicans*. Subsequently, *C. parapsilosis* (25.74%) and *C. tropicalis* (16.86%) were the second and third most commonly isolated species. Considering the total samples collected from the emergency room and from the inpatient and the pediatric sector, 19.10% were positive for *Candida* spp., with the predominance of non-*albicans Candida* species (89.42%). The high percentage of positivity occurred in the hands (24.32%) and the lab coats (21.88%) of the health care assistants. No sample of *C. albicans* presented a profile of resistance to the drugs. All the non-*albicans Candida* species presented a decreased susceptibility to miconazole and itraconazole, but they were susceptible to nystatin. Most of the isolates were susceptible to fluconazole and amphotericin B. As expected, a high resistance rate was observed in *C. glabrata* and *C. krusei*, which are intrinsically less susceptible to this antifungal agent. The contamination of environmental surfaces by *Candida* spp. through hand touching may facilitate the occurrence of *Candida* infections predominantly in immunocompromised patients. In addition to that, the antifungal agents used should be carefully evaluated considering local epidemiologic trends in *Candida* spp. infections, so that therapeutic choices may be better guided.

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Introduction

The frequency of *Candida* spp. hospital infections has increased worldwide in recent years and it has been accompanied by a significant rise in morbidity and mortality. An important issue of public health involves the long time hospital stay due to the difficulty in the diagnosis, prevention, and treatment of invasive fungal infections.[1,2]

Candida spp. may cause serious nosocomial infections and it represents the fourth most frequent agent isolated from bloodstream infections in many regions. *Candida albicans* is the main species that causes hospital-acquired infections, although other species of non-*albicans Candida*, such as *C. tropicalis*, *C. parapsilosis*, *C. glabrata*, *C. krusei* and *C. lusitaniae* have shown an increased incidence of nosocomial infections.[3,4] While *C. albicans* remains the most common *Candida* species in infections, *C. glabrata*, generally considered a species of low virulence but with a higher mortality rate than *C. albicans*, has represented approximately 15–20% of all *Candida* infections in the United States and has been considered the most common non-*albicans Candida* isolated species.[5]

The hospital environment is inevitably a large reservoir of opportunistic pathogens, which may be transmitted to individuals in different ways. The modes of transmission and input port to hospital-acquired fungal infections vary according to the pathogen involved. *Candida* spp. infections are predominantly of an endogenous origin, but the cross-infection transmitted through the hands of health care practitioners or relatives, or even through hospital devices, has occurred constantly.[6] Furthermore, it is known that antifungal resistance is an important concern related to almost all main groups of pathogenic microorganisms, including the *Candida* species. The increasing use of prophylactic fluconazole in high-risk patients has played an important role in decreasing the incidence of *C. albicans* infections without affecting the incidence of infections caused by non-*albicans Candida* species, such as *C. glabrata* and *C. krusei*.[7]

An inappropriate antifungal therapy and the occurrence of resistant species may have an impact on the mortality rates. A correlation between reduced antifungal susceptibility in non-*albicans Candida* species and the use of antifungal prophylaxis have been suggested. Data about patterns of resistance of etiological agents are powerful tools to guide a prophylactic, preemptive, and empiric antifungal therapy.[4,8]

The aim of this study was to evaluate the incidence of *C. albicans* and non-*albicans Candida* isolated from the environment and from health practitioners to identify the hospital reservoirs of *Candida* spp. in a Brazilian tertiary-care hospital and to evaluate the susceptibility of the isolated samples to antifungal agents.

Materials and methods

Isolates

Samples from the environment and from health care practitioners were compiled throughout a 1-year period (2008–2009), from a tertiary care center with 140 beds that provides general and specialized assistance as well as surgical and intensive care. After the isolation, the pure cultures were stored at −20 °C in 15% glycerol.

Sample collection

The samples were collected from three different sources in the hospital environment: surfaces of hospital departments (including emergency room, inpatient sector, and pediatric sector), hands and lab coats of health care practitioners, totaling 445, 37 and 32 samples in each source respectively. Samples were collected with sterile swabs soaked in physiological solution supplemented with 0.5 g/l chloramphenicol and placed in brain-heart infusion (BHI) broth supplemented with 0.5 g/l chloramphenicol. Samples from the lab coats of health care professionals were collected by pressing a Petri dish, measuring 4 cm in diameter and containing BHI agar supplemented with 0.5 g/l chloramphenicol, on the frontal part of the lab coats, about 5 cm proximal to the pockets. All plates were incubated at 35 °C for 48 h.

Sample identification

An analysis of the growth in a chromogenic culture medium (CHROMagar Candida®) facilitated the determination of purity of colonies and the identification of *Candida* spp. Macromorphological/micromorphological analysis and physiological tests such as zymograms and auxanograms were performed to confirm the results of the chromogenic culture medium.[9,10]

Determination of the pattern of response to antifungal drugs

30 samples of *Candida* spp. were pre-selected according to their best growth pattern and thereby antifungal tests were conducted with these 30 pre-selected samples of *Candida* spp. through disk diffusion methodology and the results were interpreted as susceptible (S), susceptible dose-dependent (SDD), or resistant (R), based on documents M44-A2.[11] The susceptibility profile of *Candida* spp. was analyzed with the antifungal drugs fluconazole (25 μg disk), amphotericin B (100 μg disk), nystatin (100 IU disk), itraconazole (10 μg disk), miconazole, and ketoconazole (50 μg discs). *C. krusei* (ATCC 6258) and *C. parapsilosis* (ATCC 22019) were used as test controls. The evaluation of response profiles of *Candida* spp. to different antifungal agents was performed in triplicate and on different days.

Statistical analysis

The Chi-square test or the statistic of Fisher was applied to evaluate the significance of differences in the frequency distribution of the isolates. Differences with $p < 0.05$ were considered significant.

Results

514 samples were collected from the hospital environment and from health care practitioners, of which 445 were