

CANDIDA ISOLATES IN TERTIARY HOSPITALS IN NORTHEASTERN BRAZIL

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Submitted: March 27, 2008; Returned to authors for corrections: July 01, 2008; Approved: February 25, 2009.

ABSTRACT

Candida is an opportunistic pathogen that affects high-risk patients who are either immunocompromised or critically ill and is associated with almost 80% of all nosocomial fungal infections, representing the major cause of fungemia with high mortality rates (40%). *Candida albicans* is the main cause of candidemia and among the non-*albicans* species *C. parapsilosis*, *C. glabrata* and *C. tropicalis* are the most frequent agents. The aim of this study was to evaluate the distribution of *Candida* species in two tertiary hospitals in Recife, Northeastern Brazil. It began by surveying all positive *Candida* cultures processed by the microbiology laboratory from September 2003 to September 2006. The cultures, originated from various types of biological material (blood, urine, tracheal, catheter and others), were processed by Vitec[®] system (Biomérieux SA, France). A total of 1.279 (hospital A: 837; hospital B: 442) sample isolates were positive for *Candida*. The most frequent species in both hospitals were: *C. albicans* (367), *C. tropicalis* (363), *C. parapsilosis* (147), *C. glabrata* (81), *C. krusei* (30) and *C. guilliermondii* (14). The isolates were obtained from 746 hospitalized patients. A total of 221 positive hemocultures were detected in 166 different patients in both hospitals, and 113 (68.1%) of these patients with positive hemocultures presented *Candida* in other body sites. This study shows that *Candida non-albicans* was the main isolated agent and evidences the importance of *C. tropicalis* in nosocomial fungal infections.

Key words: *Candida*, candidemia, candida isolates.

Candida is an opportunistic pathogen that affects high-risk patients who are either immunocompromised or critically ill (4,6,14,15).

Throughout the 1990s, the incidence of invasive fungal infections such candidiasis increased significantly worldwide, a concern because invasive fungal infections which are also difficult to diagnose, prevent, and treat (7,14,15,17).

Candida is associated with almost 80% of all nosocomial fungal infections, representing the major cause of fungemia with high mortality rates (40%) (4,6,8,14).

Candida albicans is the main cause of candidemia and among the non-*albicans* species *C. parapsilosis*, *C. glabrata* and *C. tropicalis* are the most frequent agents (4,6,7,14,18).

Studies have demonstrated direct association between the number of body sites colonized and the incidence of candidiasis. Cultures are positive in only 50% of patients with invasive candidiasis, and diagnosis is confirmed and mortens in only 15 to 40% of cases (4,6,7,14,15,18,19,23).

The aim of this study is to evaluate the distribution of *Candida* species in tertiary hospitals in Northeastern Brazil.

This observational prospective study was performed at two tertiary private hospitals (hospital A: 217 beds; hospital B: 54 beds) in Recife, Pernambuco state, northeastern, Brazil. It began by surveying all positive *Candida* cultures processed by the microbiology laboratory from September 2003 to September 2006. A database was created with the following

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variables: age, gender, types of biological material, including urine, blood and other body sites and *Candida* species distribution.

During this period, all cultures originated from various types of biological material (blood, urine, tracheal, catheter and others) were processed by Vitec® system (*Biomérieux SA, France*). Cultures were processed in accordance with NCCLS- National Committee for Clinical Laboratory Standards (14).

The statistical analysis was performed with the Epi-Info-6.04 software through descriptive analysis for relative frequency and prevalence.

The study protocol was approved by the Institutional Ethics Committee (N° 1263/2003) and the resources for the development of the project were obtained from Cerpe Diagnosticos.

During the period of study, a total of 1.279 sample isolates were positive to *Candida* in both hospitals (Hospital A: n= 837; Hospital B: n= 442) and the isolates were obtained from different body sites from 746 hospitalized patients (Hospital A: n= 496; Hospital B: n= 250) (Tables 1 and 2). The age of patients ranged from zero to 101 years with mean of 61.5 years (Median = 69 years), and 55.1% were female and 44,9%, male.

The most frequent species in both hospitals were: *C. albicans* n= 367; *C. tropicalis* n= 363; *C. parapsilosis* n= 147; *C. glabrata* n= 81; *C. krusei* n= 30; *C. guilliermondii* n=14 (Tables 1 and 2).

A total of 221 positive hemocultures were detected in 166 different patients in both hospitals. 113 (68.1%) of these patients with positive hemocultures presented *Candida* in other body sites (Tables 1 and 2).

Brazilian reports (in public tertiary hospitals at southeastern) have revealed that *C. albicans* is the main agent of candidemia (20-50%), followed by *C. parapsilosis* (17-35%), *C. tropicalis* (12- 27%), and *C. guilliermondii* (2-10%) (2,9).

The appearance of *non-albicans* isolates among patients admitted to tertiary care hospitals have been reported by different centers, including medical institutions from Brazil (1,4,8,14,18,20).

In a candidemia study in a reference public tertiary hospital in Fortaleza, Ceará (Northeast Brazil) *non- albicans* species of *Candida*, were responsible for a total of 72% of fungemia cases. *C. parapsilosis* (n= 18) was the most isolated agent, followed by *C. albicans* (n= 14), *C. tropicalis* (n= 8), *C. guilliermondii* (n= 6), *C. glabrata* (n= 2) and *Candida spp.* (n= 2) (14). In our study *C. parapsilosis* and *C. tropicalis* were the most frequent agents isolated in blood (n= 148; 67,0%).

The increased use of invasive medical procedures as well as the prophylactic and empirical use of antifungal drugs, especially those of azolic derivation, has been blamed for the emergence of the *non-albicans* species of *Candida* (10,12,19).

C. parapsilosis is widely recognized as a cause of fungemia among hospitalized patients (4,14). *C. parapsilosis* is part of the endogenous microbiota of human beings and is a commensal organism, which penetrates the blood by rupturing the skin. The yeast is capable of forming biofilm in glucosylated solutions and adhering to plastic materials, such as catheters used for parenteral nutrition. Over the last few years, outbreaks and clusters of cross-transmission, total parenteral nutrition solutions, intravascular devices, and medications have been related to *C. parapsilosis* fungemia (5,10,21). In addition, *C. parapsilosis* is an important pathogen of onychomycosis in fingernails (3,11).

C. tropicalis presents as an important cause of fungemia in oncological and nononcological patients with diabetes, central venous catheters taking broad-spectrum antibiotics. The risk factors and presentation of *C. tropicalis* fungemia in comparison to that of *C. albicans* have been incompletely characterized (3,17,19).

Table 1. Identification and sources of all 837 *Candida spp.* isolates, between September, 2003 and September, 2006 in the Hospital A* in Recife, PE, Brazil.

SPECIES	(Number)	Blood	Urine	Tracheal	Catheter	Miscellaneous**
<i>C. albicans</i>	(253)	18(7.1%)	62(24.5%)	105(41.5%)	15(5.9%)	53(20.9%)
<i>C.tropicalis</i>	(228)	30(13.2%)	45(19.7%)	89(39.0%)	31(13.6)	33(14.5%)
<i>C. parapsilosis</i>	(96)	42(43.8%)	6(6.3%)	5(5.2%)	31(32.3%)	12(12.5%)
<i>C. glabrata</i>	(59)	9(15.3%)	31(52.5%)	8(13.6%)	1(1.7%)	10(16.9%)
<i>C. guilliermondii</i>	(7)	4(57.1%)	0(0%)	2(28.6%)	0(0%)	1(14.3%)
<i>C. krusei</i>	(18)	3(16.7%)	2(11.1%)	2(11.1%)	4(22.2%)	7(38.9%)
<i>C. lusitaniae</i>	(6)	0(0%)	2(33.3%)	4(66.7%)	0(0%)	0(0%)
<i>C. famata</i>	(4)	0(0%)	0(0%)	3(75.0%)	1(25.0%)	0(0%)
<i>Candida spp.</i>	(166)	3(1.8%)	41(24.7%)	23(13.9%)	7(4.2%)	92(55.4%)
Total	837	109(13.0%)	189(22.6%)	241(28.8%)	90(10.8%)	208 (24.9%)

(*) Hospital A: 217 beds (**)Miscellaneous: wound material and others.

Table 2. Identification and sources of all 442 *Candida spp.* isolates, between September, 2003 and September, 2006 in the Hospital B in Recife, PE, Brazil.

SPECIES	(Number)	Blood	Urine	Tracheal	Catheter	Miscellaneous**
<i>C. albicans</i>	(114)	23(20.2%)	27(23.7%)	18(15.8%)	6(5.3%)	40(35.1%)
<i>C. tropicalis</i>	(135)	44(32.6)	19(14.1%)	29(21.5%)	13(9.6%)	30(22.2%)
<i>C. parapsilosis</i>	(51)	32(62.7%)	3(5.9%)	4(7.8%)	7(13.7%)	5(9.8%)
<i>C. glabrata</i>	(22)	2(9.1%)	12(54.5%)	4(18.2%)	0(0%)	4(18.2%)
<i>C. guilliermondii</i>	(7)	3(42.9%)	0(0%)	1(14.3%)	1(14.3%)	2(28.6%)
<i>C. krusei</i>	(12)	5(41.7%)	1(8.3%)	3(25.0%)	1(8.3%)	2(16.7%)
<i>C. lusitaniae</i>	(2)	1(50.0%)	0(0%)	1(50.0%)	0(0%)	0(0%)
<i>C. famata</i>	(3)	1(33.3%)	0(0%)	1(33.3%)	1(33.3%)	0(0%)
<i>Candida spp.</i>	(96)	1(1.0%)	25(26.0%)	24(25.0%)	6(6.3%)	40(41.7%)
Total	442	112(25.3%)	87(19.7%)	85 (19.2%)	35(7.9%)	123(27.8%)

(*) Hospital B: 54 beds (**)Miscellaneous: wound material and others.

Most infections appear to originate from the patients' alimentary tract microflora (22). The higher proportion of *C. tropicalis* in adult patients and older children hospitalized in oncology-hematology units might be partially explained by the prophylactic or empirical use of antifungal drugs (19). However, other differences, such as host defense deficiency and mucosal integrity, may be related to this discrepancy.

C. tropicalis appears to be more virulent than *C. albicans* in patients with hematological malignancies, and disseminated infection is associated with high mortality rates (3,11,12). Among adults with or without cancer, systemic infections due to *C. tropicalis* have been associated with higher rates of mortality and dissemination than infection due to *C. parapsilosis* (3,4,12).

Contrary to the United States and Europe where *C. glabrata* is the second or third most commonly species of *Candida* isolated from patients with invasive infections (20), *C. glabrata* and *C. krusei* isolates together represented only 8,8% of all yeast isolates in our study in Northeastern Brazil. In agreement with data reported by other investigators in Southeastern, Brazil who found 9,0%, but higher than in other study in Northeastern, Brazil (5,0%) (2,9).

Concluding, our study confirmed data from previous studies that demonstrated high prevalence of candidemia in Brazil caused by species other than *C. albicans*, and shows that *Candida non-albicans* was the main isolated agent and evidences the importance of *C. tropicalis* and also, *C. parapsilosis*, in nosocomial fungal infections.

ACKNOWLEDGEMENTS

This study was supported by CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico).

RESUMO

Isolados de *Candida* em hospital terciário no nordeste do Brasil

Candida é um patógeno oportunista que afeta pacientes de alto risco que estão também imunocomprometidos ou criticamente doentes, estando associada a quase 80% de todos os casos de infecções fúngicas nosocomiais, representando a maior causa de fungemia com alta taxa de mortalidade (40%). *Candida albicans* é a principal causa de candidemia e dentre as espécies não-*albicans* a *C. parapsilosis*, *C. glabrata* e *C. tropicalis* são os agentes mais frequentes. O objetivo deste estudo foi avaliar a distribuição das espécies de *Candida* em dois hospitais terciários no Recife, nordeste do Brasil. Foi realizado um levantamento de todas as culturas positivas para *Candida* processadas pelo laboratório de microbiologia de Setembro de 2003 a Setembro de 2006. Todas as culturas originadas de vários tipos de material biológico (sangue, urina, traquéia, catéter e outros) foram processadas pelo sistema Vitec® (*Biomerieux SA, France*). Um total de 1.279 amostras (hospital A:837; hospital B: 442) foram positivas para *Candida*. As espécies mais frequentes em ambos os hospitais foram: *C. albicans* (367), *C. tropicalis* (363), *C. parapsilosis* (147), *C. glabrata* (81), *C. krusei* (30) e *C. guilliermondii* (14). Os isolados foram obtidos de 746 pacientes hospitalizados. Um total de 221 hemoculturas positivas foram detectadas em 166 diferentes pacientes em ambos os hospitais, e 113 (68,1%) destes pacientes com hemoculturas positivas apresentavam *Candida* em outros locais do corpo. Este estudo mostrou que *Candida non-albicans* foi o principal agente isolado e prova a importância da *C. tropicalis* em infecções fúngicas nosocomiais.

Palavras-chave: *Candida*, candidemia, isolados de *Candida*

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