

Characterization and Risk Factors of Candida Species in Nosocomial Blood Stream Infections

Jyoti Pal¹, Dakshina Bisht^{2,*}

Department of Microbiology, Santosh Medical College, Santosh University, Ghaziabad

*Corresponding Author:

Email: dakshinabisht@hotmail.com

ABSTRACT

Background: Blood Stream Infections (BSIs) due to *Candida* species are known to cause significant morbidity and mortality. The epidemiology of *Candida* infection has changed over the last two decades and the proportion of BSIs due to Non Albicans *Candida*(NAC) species has also increased.

Aim: To detect the pattern of *Candida* species in blood stream infected patients.

Materials and Methods: *Candida* isolates were speciated by conventional techniques (Germ tube, Hi-Crome Agar, Corn Meal Agar and Sugar fermentation Test). Clinical details and risk factors were recorded and analyzed.

Results: A total of 141 *Candida* strains were isolated from 132 patients of which 109(82.6%) were reported in adults followed by 23 (17.4%) in children <20 years of age. Most common *Candida* spp. isolated was *C. tropicalis* (22.7%) followed by *C. haemulonii* (21.2%), *C. albicans* (18.4%), *C. parapsilosis* (17.7%), *C. glabrata* (9.2%), *C. pelliculosa* (5%), *C. guilliermondii* and *C. krusei* (3%). Mixed strains of *C. albicans* and NAC species were found in nine cases.

Conclusions: Spectrum of *Candida* BSIs has shifted dramatically from *C. albicans* to NAC spp. Hence, this study makes it clear that routine screening is essential for accurate diagnosis and to start timely treatment appropriately which is essential towards saving patient's lives.

Key Words: Candidemia, *C. albicans*, NAC species, Blood Stream Infections (BSIs)

INTRODUCTION

Candida spp. is one of the most frequent pathogens isolated in Blood Stream Infections (BSIs), and is associated with significant morbidity and mortality^(1,2).

Candidemia has been associated with many risk factors like long- term hospitalization, antibiotic therapy, use of intravascular catheters and underlying diseases like diabetes and malignancy. Although, *C. albicans* continues to be the most common cause of *Candida*BSIs, the epidemiology of species causing Candidemia is changing. Recent longitudinal studies have detected an increased proportion of BSIs by Non-Albicans *Candida* (NAC) species^(3,4).

Clinicians now depend on identification of *Candida* to the species level in order to optimize the selection of antifungal agents allowing them to provide the best possible patient care⁽⁵⁾.

Hence, appropriate speciation of *Candida* species is essential to allow selection of appropriate antifungal drug and to prevent the emergence of drug resistance towards saving patient's lives.

MATERIAL AND METHODS

A total of 141 *Candida* species isolated from fungemia suspected patients were included in the study. Culture was considered true Candidemia only when *Candida* spp. was isolated from two culture bottles or

from clinically significant blood samples among hospitalized patients.

All positive blood cultures were gram-stained for preliminary identification of the microorganism and sub-cultured on SDA agar and incubated at 37°C for 24 hrs. Identification of the species was done by germ tube test, Hi-Crome Agar, and Corn Meal Agar (CMA) and Sugar Fermentation Tests as per standard methods.

RESULTS

A total of 141 *Candida* species were isolated from 132 fungemia suspected patients. Candidemia occurred more among males (65%) than females. Of the 132 distinct episodes of Candidemia 109 (82.6%) were from adults cases while 23(17.4%) were below 20 years of age.

The common underlying conditions documented prior to Candidemia were patients on prolonged antibiotics, catheterization, hypotension, neutropenia, diabetes and respiratory dysfunction.

The most common *Candida* spp. isolated was *C. tropicalis* 32(22.7%) followed by *C. haemulonii* 30(21.2%), *C. albicans* 26(18.4%), *C. parapsilosis* 25(17.7%), *C. glabrata* 13(9.2%), *C. pelliculosa* 7(5%), *C. guilliermondii* and *C. krusei* 4(3%)(Fig. 1). Mixed strains of *C. albicans* and NAC species were observed in nine cases.

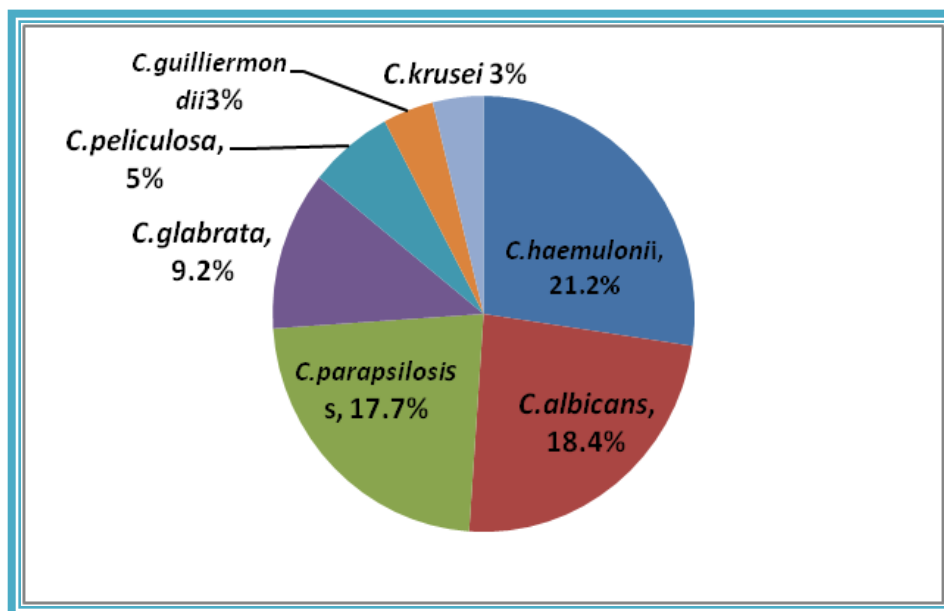


Fig. 1: Distribution of Candida species

DISCUSSION

Candidemia is an emerging problem in healthcare settings. Patients in ICU and underlying disease are at a higher risk of acquiring nosocomial infections compared with patients in general wards due to the iatrogenic factors related to the high frequency of invasive procedures needed for the monitoring and treatment⁽⁶⁾.

Xess et al⁽⁷⁾ from AIIMS, New Delhi, found a prevalence rate of 6% for Candida species while our study reports 6.8% isolation rate of the total blood culture similar to a study by Sahni et al⁽⁸⁾ from Maulana Azad Medical College, New Delhi who also found an incidence rate of 6.9% for Candida spp. in contrast to Verma et al⁽⁹⁾ who reported an incidence rate of 1.61%. Another study by Goel N et al⁽¹⁰⁾ from Rohtak, North India, reported an isolation rate of 8.1% for Candida species from cases of neonatal septicaemia while a study in South India reported by Kumar C.P et al⁽¹¹⁾ reported incidence rate of 5.7% for Candidemia among children. A New Delhi based study by Kothari A et al⁽¹²⁾ gave a prevalence rate of 18%.

Our study reports *C. tropicalis* as the most common species isolated followed by *C. haemulonii*, *C. albicans*, *C. parapsilosis*, *C. glabrata*, *C. pelliculosa*, *C. guilliermondii* and *C. krusei*. Findings of our study is quite similar to a study by Vibhor Tak et al⁽¹³⁾ who also reported *C. tropicalis* as the most common followed by *C. parapsilosis*, *C. albicans*, *C. glabrata*, *C. rugosa*, *C. haemulonii*, *C. guilliermondii*, *C. famata*, and *C. lusitaniae*. Another study by Chaskar P, Anuradha et al⁽¹⁴⁾ and Kaur R et al⁽¹⁵⁾ also reported *C. tropicalis* as the most predominant species which is responsible for most of the cases of Candidemia.

Mixed *C. albicans* and NAC species were found in nine cases which was also reported in a study by Shyamala K et al⁽¹⁶⁾ who reported ten mixed cases.

Potential risk factors for developing Candidemia in surgical ICU patients identified in previous studies have included diabetes mellitus, prior surgical procedure, prior ICU admission, prolonged cardiopulmonary bypass time, mechanical ventilation and receipt of TPN, presence of CVCs, diarrhea and bacteremia. However, these are risk factors for fungemia due to all species of Candida and are limited to patients hospitalized in a single type of ICU⁽¹⁸⁻²⁰⁾.

In our study we found prolonged antibiotics (89%), catheterization (77.8%), hypotension (38.5%), neutropenia (37.8%), diabetes (28%) and respiratory dysfunction (22%) as the most common risk factors which was in accordance to a study by Chander et al.⁽²¹⁾ who also reported previous antimicrobial therapies (92.5%), hospitalization (88.9%), placement of central venous catheters (81.4%) and neutropenia (29.6%) as the main risk factors associated with development of Candidemia.

CONCLUSION

The spectrum of Candida BSI has shifted dramatically from *C. albicans* to NAC spp. and rapid changes in the rate of infection and potential risk factors. Hence, it is essential to detect the speciation pattern of Candida species which is crucial for initiating treatment and is essential towards saving patient's lives.

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CONFLICT OF INTEREST: None

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