ORIGINAL ARTICLE

Candidemia Experience at a Tertiary Care Hospital: Is there Cause for Concern?

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Abstract

Background: *Candida spp. are known to be the most common fungal pathogens isolated from blood cultures of neonates and pediatric population. During recent decades there has been a change in the epidemiology of Candida infections, characterized by a progressive shift from a predominance of Candida albicans to non albicans Candida species. This study was undertaken to estimate the incidence of candidemia and determine species profile in the neonatal and pediatric intensive care units at a tertiary care hospital, Mumbai over a period of 20 months.* ***Method:*** *The study was conducted in Department of Microbiology at a tertiary care Hospital, India. In a prospective analysis, a total of 2250 clinically suspected cases of sepsis in neonatal and pediatric intensive care unit were studied from April 2014 to November 2015. 1-3 ml of peripheral blood was collected aseptically from each case in BD BACTEC Peds Plus/F culture vials of an automated blood culture system and positive flashed samples showing budding yeast cells on Gram stain smear and/or culture positive for Candida spp were studied further. Candida speciation was done by germ tube test and microscopic morphology on cornmeal agar (CMA).* ***Results:*** *A total of 113 Candida species were recovered from suspected cases of neonatal/ pediatric sepsis over a period of 20 months (5.02%). Amongst these, Candida albicans constituted 6.19%, Candida glabrata44.24%, Candida parapsilosis11.5%, Candida tropicalis9.73% and Candida krusei0.88% while remaining 31 were non-albicans Candida spp (27.43%) which could not be speciated.* ***Conclusion:*** *Reporting of fungal blood stream infection and the spectrum of spp involved are essential measures in neonatal ICU and pediatric ICU in order to implement appropriate preventive and therapeutic strategies. In the present study, non Albicans Candida predominated among Candida isolates that was speciated. The striking feature of this study was the predominance of Candida glabrata among total number speciated which is a cause for concern.*

Keywords*: Candida species, Candidemia, Neonatal septicemia, Neonatal ICU*

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Introduction

Candida spp. are known to be the most common fungal pathogens isolated from blood cultures of neonates and paediatric population. They account for 9 to 13% of all blood stream isolates in neonatal intensive care units. [1, 2] During recent decades there has been a change in the epidemiology of Candida infections, characterized by a progressive shift from a predominance of *Candida albicans* to *non albicans Candida* species. Recently, non-albicans *Candida* has emerged as an important opportunistic pathogen, notably *C. tropicalis, C. Glabrata* and *C. Parapsilosis.*[3] This could be because of selection of lesser susceptible non-albicans species due to the frequent use of fluconazole. [4] Importance of *Candida* spp in the nursery and intensive care setup is increasingly being recognized. As there are differences between *Candida albicans* and non *albicans Candida* species in their antifungal susceptibility, patient profile etc, it has become imperative to speciate *Candida* isolates. This study was undertaken to estimate the incidence

of candidemia and determine species profile in the neonatal and paediatric intensive care units at a tertiary care hospital, Mumbai over a period of 20 months.

Methods

The study was conducted in Department of Microbiology at T.N.M.C & B.Y.L Nair Ch Hospital,
Mumbai, India. This is a tertiary care, 2500 bedded hospital. In a prospective analysis, a total of 2250 clinically suspected cases of sepsis in neonatal and pediatric intensive care unit were studied. Institutional Ethical committee permission for the study was obtained. 1-3 ml of peripheral blood was collected aseptically from each case in BD BACTEC Peds Plus/F culture vials of an automated blood culture system (BACTEC 9120, Becton Dickinson, USA). Positive flashed samples showing budding yeast cells on Gram stain smear and/or culture positive for *Candida* spp were studied further. *Candida* speciation was done by germ tube test and microscopic morphology on cornmeal agar (CMA).

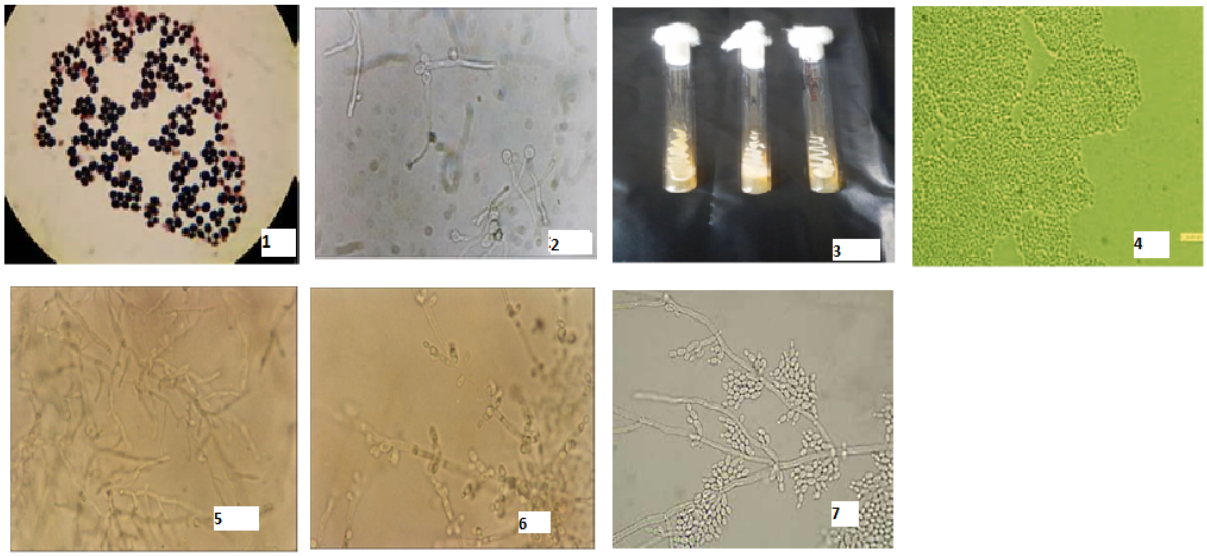

Fig 1: Gram stain smear showing budding yeast cells on 100X; **Fig 2**: Germ tube formation by *Candida albicans* on 40X; **Fig 3**: SDA showing cream coloured, pasty, smooth colonies; **Fig 4**: *Candida glabrata* on CMA: yeast cells (40X); **Fig 5**: *Candida parapsilosis* on CMA: blastospore singly along with pseudohyphae (40X); **Fig 6**: *Candida tropicalis* on CMA: blastosporessingly & groups along pseudohyphae(40X); **Fig 7**: *Candida albicans* on CMA: blastospore in clusters along with pseudohaphae(40X)

Table 1: Showing the number of samples, positive cases and species identified

	Total blood culture samples	Total positives for Candida spp	Total number speciated	Species identified
NICU	**1596**	**68**	**60**	*C.glabrata*(28.33%) *C.parapsilosis*(6.25%) *C.tropicalis*(7.5%) *C. albicans*(3.45%) *C. Krusei*(0.88%).
PICU	**654**	**45**	**22**	*C.glabrata*(15.91%) *C.parapsilosis*(5.25%) *C.albicans*(2.74%), *C. tropicalis*(2.23%)

Results

A total of 113 *Candida* species were recovered from suspected cases of neonatal/ pediatric sepsis over a period of 20 months (5.02%). Amongst these, *Candida albicans* constituted 6.19%, *Candida glabrata*44.24%, *Candida parapsilosis*11.5%, *Candida tropicalis*9.73% *and Candida krusei*0.88% while remaining 31

were *non Albicans Candida* spp (27.43%) which could not be classified.

Discussion

Candidemia is a life-threatening fungal infection associated with mortality rates up to 38% and it also prolongs the duration of hospital stay. [5] There is a growing trend of change with the emergence of non-albicans *candida* (NAC) species, it is a strain that increases mortality and antifungal drug resistance in severely ill patients. [6] In the present study isolation rate of *Candida* from clinically suspected cases of sepsis in neonatal and pediatric intensive care unit in our study was 5.02% which is lower than other published reports. [1, 2 4, 7] In a similar study by Jagdish Chander *et al*; [8] on the epidemiology of *Candida* blood stream infection in a tertiary care hospital of North India isolated 5.79% *candida* species, this is similar to what we obtained in the present study. The most common *Candida* species isolated by them was *C. tropicalis* (40.8%) and in the present study, we found most common isolated species as *C. glabrata* in 44.2% of samples. The frequency of isolation *C. glabrata* by Jagdish Chander *et al*; [8] was *(*18.5%). Studies have shown that the incidence of nosocomial candidemia and the proportion of bloodstream infection due to non-albican *candida*, particularly *C. tropicalis, C. Glabrata* and *C. Parapsilosis* have increased [9-11] the change has been attributed mainly due to increased use of prophylactic antifungal agents in critically ill patients. [12, 13]

The high rate of fungemia (22.8%) in neonates has been reported by a group and they also noted that 71.4% of neonates were colonized with yeasts within 24 hours of admission and colonization was more in LBW babies. [14] Systemic candidias is in 3.2% of admissions in NICU has been reported by another study [15] and *C. tropicalis*, *C. Albicans*and *C. Guillermondii*were the commonest isolates.

In the present study, non Albicans *Candida* predominated among *Candida* isolates that was speciated. The striking feature of this study was the predominance of *Candida glabrata* among total number speciated which is a cause for concern. *Candida glabrata* candidemia in critically ill patients have been reported by Gupta *et al;* [16] and Chakrabarty *et al;*[17]*Candida glabrata* candidemia is difficult to manage and patients have high mortality as it shows relatively higher resistance to azoles especially fluconazole. [18] Resistance to fluconazole is both intrinsic & acquired. Acquired resistance results from mutations that are selected by drug pressure. This necessitates the speciation and antifungal susceptibility testing of *Candida* isolates from cases of sepsis.

Conclusion

Reporting of fungal blood steam infection and the spectrum of spp involved are essential measures in neonatal ICU & pediatric ICU in order to implement appropriate preventive and therapeutic strategies. The present study indicates the importance of speciation of *Candida* isolates from sepsis cases.

Conflict of Interest: *None declared*
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References

1. Beck Sague CM, Azini P, Fonseca SN. Blood stream infection in neonatal intensive care unit patients: results of multicenter study. Pediatr Infect Dis J 1994;13: 1110-16.
2. Stoll BJ, Gordon T, Korones SB. Early onset sepsis in very low birth weight neonates: a report from the National Institute of Child Health and Human Development Neonatal Research Network. J Pediatr1996;129:72-75.
3. Garbino J, Kolarova L, Rohner P, Lew D, Pichna P, Pittet D. Secular trends of candidemia over 12 years in adult patients at a tertiary care hospital. Medicine 2002; 81:425-33.
4. Smith H, Congdon P. Neonatal systemic candidiasis. Arch Dis Child 1985;60: 365-69.
5. Wey SB, Mori M, Pfaller MA, Woolson RF, Wenzel RP. Hospital-acquired candidemia: The attributable mortality and excess length of stay. Arch Intern Med 1998; 148:2642-45.
6. Horvath LL, Hospenthal DR, Murray CK, Dooley DP. Direct isolation of *Candida* species from blood cultures on the chromogenic medium CHROMAgar Candida. J Clin Microbiol 2003;41: 2629-32.
7. Narain S, Shastri J.S, Mathur M, Mehta P.R. Neonatal systemic Candidiasis in a tertiary care center. 2003;21(1):56-58.

8. JagdishChander, NidhiSingla, Shailpreet Kaur Sidhu, SatinderGombar. Epidemiology of *Candida* blood stream infections: an experience of a tertiary care center in North India.J Infect Dev Ctries2013; 7(9):670-75
9. Al Jasser AM, Elkhizzi NA. Distribution of *Candida* species among blood stream isolates. Saudi Med J 2004; 25: 566-69.
10. Verma AK, Prasad KN, Singh M, Dixit AK, Ayyagari A. Candidemia in patients of a tertiary health care hospital from north India. Indian J Med Res 2003;117: 122-28.
11. Malini RC, Deepthi N, Monorama D, Pardeep KV, Lakshmi S, Pushpa A. Emergence of non-*albicans Candida* species and antifungal resistance in tertiary care hospital. Jpn J Infect Dis 2005; 58: 344-48.
12. Nguyen MH, Peacock JE Jr, Morris AJ, Tanner DC, Nguyen ML, Snydman DR, Wagener MM, Rinaldi MG, Yu VL. The changing face of candidemia: Emergence of non-*albicans Candida* species and antifungal resistance. Am J Med 1996; 100: 617-23.
13. Colombo AL, Nucci M, Salomao R, Branchini ML, Richtmann R, Derossi A, Wey SB. High rate of non-*albicans*candidemia in Brazilian tertiary care hospitals. DiagnMicrobiol Infect Dis 1999; 34: 281-86.
14. Singh K, Chakrabarti A, Narang A, Gopalan S. Yeast colonization and fungemia in preterm neonates in a tertiary care center. Indian J Med Res 1999; 110: 169-173.
15. Narang A, Agarwal PB, Chakrabarti A, Kumar P. Epidemiology of systemic candidiasis in a tertiary care neonatal unit. J Trop Ped 1998; 44:104-108.
16. Gupta A, Gupta A, Varma A. *Candida glabrata*candidemia: An emerging threat in critically ill patients. Ind J of Crit Care Med. 2015;19:151-154.
17. Chakrabarty A. *Candida glabrata*candidemia. Ind J of Crit Care Med. 2015;19(3):138-139.
18. Kumar S, Baradkar V, De A, Mathur M. A study of Neonatal sepsis due to Candida spp. Bombay Hospital J. 2011; 53.