

Research Article

Prevalence of neonatal candidemia in a tertiary care institution in Hyderabad, South India

M. S. Srinivas Rao*, M. Surendernath, M. Sandeepthi

Department of Microbiology, Apollo Institute of Medical Sciences & Research, Hyderabad, Andhra Pradesh, India

Received: 26 May 2014

Accepted: 10 June 2014

***Correspondence:**

Dr. M. S. Srinivas Rao,

E-mail: mottasrao@gmail.com

© 2014 Srinivas Rao MS et al. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Candida species are known to be the most common fungal pathogens isolated from blood cultures of neonates. Recent reports from our country indicates trend towards an increasing prevalence of non-albicans candidemia. Candida species possess a number of virulence factors which enable them to cause hematogenously disseminated infections in susceptible hosts with increased morbidity and mortality. Objective of current study was to know the prevalence of nonalbicans candidemia in neonates and their antifungal susceptibility pattern.

Methods: Blood samples from suspected cases of neonatal septicaemia were subjected to culture, incubated for 7 days and subcultures performed. Culture yielding pure growth of Candida were included for the study and identified by standard methodology. Antifungal susceptibility was performed.

Results: A total of 255/500 (51%) cases were blood culture positive. Pure growth of Candida species was isolated from 52/255 (20.39%) cases. A total of 52 Candida isolates were obtained over a period of one year accounting for 20.39% of all neonatal septicemia cases. Among 52 isolates, 14/52 (26.92%) were Candida albicans, followed by C. tropicalis 19/52 (36.53%), C. glabrata 10/52 (19.23%), C. parapsilosis 4/52 (7.69%), C. guilliermondii 2/52 (3.84%) and C. krusei 1/52 (1.92%). C. tropicalis, the most common species isolated, was 91 per cent susceptible to fluconazole, whereas C. parapsilosis and C. glabrata showed lower sensitivity rates of 67.8% and 62.5% respectively.

Conclusion: In this study non albicans candida was the common isolate & they showed decreased resistance to Fluconazole. In neonatal septicemia speciation& antifungal susceptibility may help in management.

Keywords: Candidemia, Fluconazole

INTRODUCTION

The frequency of invasive, opportunistic mycosis has increased significantly over the past two decades¹. Candida species account for 8-10% of all nosocomial bloodstream infections.¹ Candidemia is a significant cause of mortality and morbidity in neonates admitted in the Neonatal Intensive Care Units (NICUs).² Candida species are the most common fungal pathogen isolated from the blood culture of neonates. A number of risk factors are associated with the development of neonatal

systemic candidiasis, such as low-birth weight babies, prematurity, prolonged antibiotic therapy, parenteral nutrition and artificial ventilation.³ Respiratory insufficiency, apnoea, bradycardia, temperature instability, feeding intolerance and abdominal distension are the various clinical manifestations associated with candidiasis.^{3,4} Prompt treatment with antifungals is required in these babies. Limited data regarding the pattern of neonatal candidemia from this part of the country prompted us to undertake the present study to assess the changing trend of neonatal candidemia from

Hyderabad city. The aim of present study is to evaluate the prevalence of candidemia in neonates and to assess the changing trends of candidemia in neonates.

METHODS

Candidemia was diagnosed by isolation of *Candida* spp. from at least two blood culture samples or at least one positive blood culture containing pure growth of *Candida* species with supportive clinical features. This prospective study was conducted over one year from NICU of tertiary care institutes and private pediatric hospitals located in around Hyderabad, Andhra Pradesh, India.

A total of 500 blood samples of clinically diagnosed septicemic neonates were collected before starting antimicrobial therapy. The blood sample inoculated in the BacT/ALERT 3D pediatric culture bottle was incubated in an automated microbial detection system (bioMerieux) for up to 5 days at 37°C. Any growth indicated was subcultured on sheep blood agar, MacConkey agar plates and Sabouraud dextrose agar slant with antibiotics but without cycloheximide (Hi-Media Pvt. Ltd., Mumbai, India). Identification was performed using API ID32C (bioMerieux, France). Antifungal susceptibility testing was performed against amphotericin B (AMB), 5 flucytosine (5FC), fluconazole (FLU) and itraconazole (ITR) and voriconazole (VOR) by broth microdilution using API system [ATB FUNGUS 3 (259 isolates), bioMerieux, France]. Results were interpreted as per the Clinical Laboratory Standards Institute (CLSI; formerly NCCLS) M27-A2 document.⁶

RESULTS

A total of 255/500 (51%) cases were blood culture positive. Pure growth of *Candida* species was isolated from 52/255 (20.39%) cases. A total of 52 *Candida* isolates were obtained over a period of one year accounting for 20.39% of all neonatal septicemia cases. Of the 52 isolates, 14/52 (26.92%) were *Candida albicans*, followed by *C. tropicalis* 19/52 (36.53%), *C. glabrata* 10/52 (19.23%), *C. parapsilosis* 4/52 (7.69%), *C. guilliermondii* 2/52 (3.84%) and *C. krusei* 1/52 (1.92%) (Figure 1).

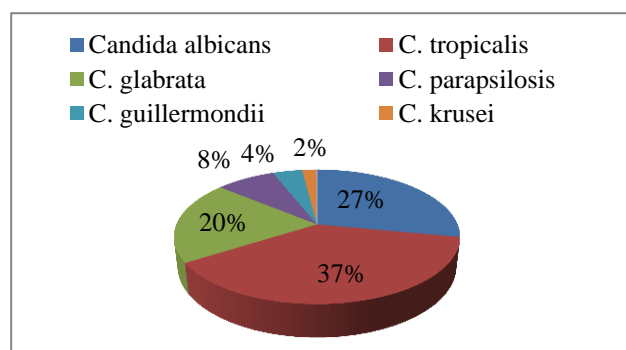


Figure 1: Candida species isolated from neonatal septicemia.

Certain predisposing factors are associated with candidemia in present study as in Table 1.

In present study all 52 cases had history of administration of broad spectrum antibiotics for variable period of time as an important predisposing factor.

Other factors of importance are low birth weight, prematurity, catheterization & corticosteroid therapy etc.

Table 1: Potential risk factors identified in cases of neonatal candidemia (n=52).

Risk factors	Present	
	No. of cases	Percentage
Prolonged IV antibiotics	52	100%
Low birth weight	32	61.53%
Prematurity	16	30.76%
Prolonged central venous line	21	40.38%
Ventilatory support	12	23.07%
Corticosteroid therapy	9	17.3%

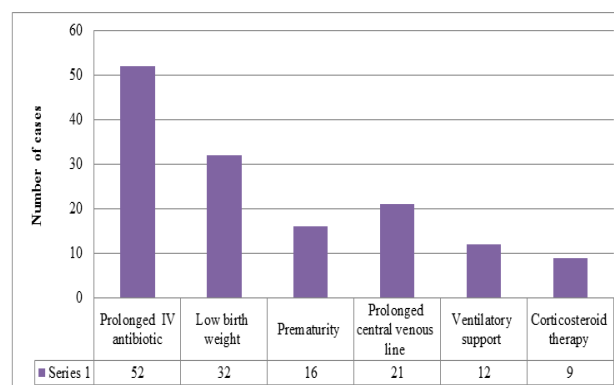


Figure 2: Potential risk factors.

Non candida albicans species, especially *C. tropicalis*, *C. krusei*, *C. glabrata* and *C. parapsilosis*, tend to be less-susceptible to azoles, particularly fluconazole, than *C. albicans*. *C. krusei* is innately resistant to fluconazole.

Studies have also revealed an inherent fluconazole resistance in *C. glabrata* thus emphasizing the need to identify *Candida* up to the species level, especially in the high-risk population.

Table 2 enumerates the antifungal resistance pattern of candida species.

C. tropicalis, the most common species isolated, was 91 per cent susceptible to fluconazole, whereas *C. parapsilosis* and *C. glabrata* showed lower sensitivity rates of 67.8% and 62.5% respectively.

Table 2: MIC profile of Candida isolates to amphotericin B and % sensitivity to other antifungals tested.

Organism	Amphotericin B MIC <1 µg/ml	Flucytosine	Fluconazole	Itraconazole	Voriconazole
C. albicans	100	100	100	95	100
C. tropicalis	100	92	91	56	95.5
C. glabrata	100	100	62.5	21	84.5
C. parapsilosis	100	91.5	67.8	65.6	90.6
C. guilliermondii	100	100	69	53	100
C. krusei	88.8	10.8	0	0	100

DISCUSSION

There are varied reports regarding the prevalence of *C. albicans* and non-*albicans* *Candida* in bloodstream infections from the Indian sub-continent. As per the initial reports, most cases of neonatal candidemia were caused by *Candida albicans*.¹

But in our study, *C. tropicalis* (36.53%) to be the major etiological agent. Our report is in concordance with other reports.²⁻⁴

In present study prolonged IV antibiotics is most important predisposing factor associated with candidemia followed by other factors like low birth weight, prolonged central venous line etc. In the current study, amphotericin B (100%) was the most effective antifungal agent. In India, amphotericin B is the drug of choice for invasive candidiasis with low or no resistance reports.³

Our susceptibility data showed that reduced susceptibility to fluconazole was common in *C. glabrata* and *C. parapsilosis*. Reduced susceptibility to fluconazole in *C. glabrata* was consistent with previously reported data.^{7,8}

Sarvikivi et al.⁹ have reported that the use of fluconazole prophylaxis contributed to the emergence of subclones of *C. parapsilosis* with decreased susceptibility among isolates responsible for BSI in neonatal ICU. A significant epidemiological shift to higher isolation of non-*albicans* *Candida* species was noticed. The high usage of fluconazole appeared to have played a role in this shift, however, it may be recognised that other events like patient specific risk factors might have also contributed in selection of different species.

CONCLUSION

To conclude, our study highlights that within our country the epidemiology of neonatal candidemia differs markedly and therefore it is important for every setting to speciate and perform the antifungal susceptibility testing. This information will help us to recognize the emerging fungal pathogens and increasing drug resistance.

Key messages

- Non-*albicans* *Candida* are gaining importance as cause of neonatal septicemia.
- Upto three fourth of *Candida* species isolated from single blood culture specimen from neonates with clinically suspected septicemia, may be significant.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Pfaller MA, Pappas PG, Wingard JR. Invasive fungal pathogens: current epidemiological trends. *Clin Infect Dis*. 2006;43:S3-14.
2. Rani R, Mohapatra NP, Mehta G, Randhawa VS. Changing trends of *Candida* species in neonatal septicemia in a tertiary North Indian hospital. *Indian J Med Microbiol*. 2002;20:42-4.
3. Narain S, Shastri JS, Mathur M, Mehta PR. Neonatal systemic Candidiasis in a tertiary care centre. *Indian J Med Microbiol*. 2003;21:56-8.
4. Ariff S, Saleem AF, Soofi SB, Sajjad R. Clinical spectrum and outcomes of neonatal candidiasis in a tertiary care hospital in Karachi, Pakistan. *J Inf Dev Ctries*. 2011;5:216-23.
5. Chander J. Candidiasis. In: Chander J, eds. *A Text Book of Medical Mycology*. 3rd ed. New Delhi: Mehta Publishers; 2009: 266-290.
6. National Committee for Clinical Laboratory Standards. Reference method for broth dilution antifungal susceptibility testing of yeasts. In: Michael A. Pfaller et al., eds. *Approved Standard M27-A2*. 2nd ed. Wayne, PA: National Committee for Clinical Laboratory Standards; 2002: 1-30.
7. Odds FC, Hanson MF, Davidson AD, Jacobsen MD, Wright P, Whyte JA, et al. One year prospective survey of *Candida* bloodstream infections in Scotland. *J Med Microbiol*. 2007;56:1066-75.
8. Tan TY, Tan AL, Tee NW, Ng LS. A retrospective analysis of antifungal susceptibilities of *Candida*

- bloodstream isolates from Singapore hospitals. *Ann Acad Med Singapore* 2008;37:835-40.
9. Sarvikivi E, Lyytikäinen O, Soll DR, Pujol C, Pfaller MA, Richardson M, et al. Emergence of fluconazole resistance in a *Candida parapsilosis* strain that caused infections in a neonatal intensive care unit. *J Clin Microbiol.* 2005;43:2729-35.
10. Narang A, Agarwal PR, Chakrabarti A, Kumar P. Epidemiology of systemic candidiasis in a tertiary care neonatal unit. *J Trop Pediatr.* 1998;44(2):104-8.

DOI: 10.5455/2320-6012.ijrms20140858

Cite this article as: Srinivas Rao MS, Surendernath M, Sandeepthi M. Prevalence of neonatal candidemia in a tertiary care institution in Hyderabad, South India. *Int J Res Med Sci* 2014;2:1016-9.