

Research Article

An emerging threat of Non-Albicans Candida infection in Tertiary care neonatal intensive care units (NICUs)

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Abstract: The objective is to study the prevalence of hospital acquired fungal infections in the NICU in relation to sub-species identification, anti-fungal sensitivity pattern and complications. This was a prospective study done in a Tertiary care NICU between August 2013 to January 2015. Babies with suspected nosocomial infection were subjected to blood and CSF culture. Those who grew Candida species were included in the study and followed up with anti-fungal. In results prevalence of 7.1% was noted for culture proven candida infection with a higher incidence in preterm babies (14%). Candida krusei (94%) was the most common sub-species isolated with a high resistance to fluconazole and/or Amphotericin B. All those treated with Voriconazole showed good outcome in comparison to other anti-fungal. End-organ involvement with fungal ball in the kidney and fungal meningitis was more common in the C. Krusei group. In conclusion Non-albicans species are increasingly being reported in NICUs. They are associated with more complication and a higher degree of resistance to conventional anti-fungals.

Keywords: fungal infections , fluconazole, Candida krusei

INTRODUCTION

Nosocomial Candida infection is reported world-wide to be the most common fungal infection in the neonatal intensive care setting, with increasing prevalence by the day. It is associated with prolonged hospital stay and increased healthcare costs. In neonates with risk factors such as low birth weight and prematurity, candida infection is associated with higher mortality and morbidity [1, 2]. Although C. albicans remains the most common fungal pathogen isolated, recent literature shows an increasing prevalence of non-albicans species such as Candida krusei and Candida glabrata [3, 4]. This changing trend is a matter of concern due to the emerging resistance of the non-albicans species to azoles. Often, empiric anti-fungal therapy is initiated in prolonged neonatal sepsis due to limited data available in India on the prevalent strains and their susceptibility. This study aims at presenting the prevalence of Candida infection, subspecies isolation and their anti-fungal sensitivity pattern.

METHODOLOGY

A prospective study was conducted between August 2013 to January 2015 at a tertiary care NICU in Indira Gandhi Institute of Child Health, Bangalore. Neonates included in the study were: (1) Admitted in the neonatal care unit for more than 7 days, [2]

Ominous clinical signs present, [3] Thrombocytopenia < 1, 00,000/cmm and (4) Negative blood culture at admission. Babies with these criteria are subjected to fungal blood culture and CSF culture on BACTEC media on day 7 of admission. The VITEK system was used for assessing anti-fungal susceptibility. Those who test positive for fungi were started with anti-fungal medication and underwent repeat blood culture after 5 days. Those with negative cultures for fungi were treated for 7 days with anti fungal medication and those who were positive were treated for 14 days till the last negative blood culture. Routine blood cultures were sent for all babies on the day of admission to NICU and repeat cultures were sent on clinical suspicion of fungal sepsis. All babies were screened for end organ involvement with ultrasound of kidneys for renal fungal ball, ultrasound cranium for fungal abscess, echocardiogram for fungal vegetations, ophthalmological evaluation for endophthalmitis and retinopathy of prematurity (ROP) in preterm babies. The anti-fungals used were based on the sensitivity pattern. Those resistant to fluconazole and/or amphotericin B were treated with Voriconazole at 6 mg/kg/day on the first day followed by 4 mg/kg/day in two divided doses. Babies with persistent culture positivity in spite of the sensitivity were considered to be clinically resistant to Amphotericin and treated with

a combination of Amphotericin B and Voriconazole. Ethical committee approval was obtained from institutional ethical board.

RESULTS

The prevalence of Candida sepsis was found to be 7.1% (n = 94) of the 1,317 NICU admissions during the study period. The incidence of fungal sepsis was 4.1% (39 of 930 admissions) in pre term babies and 14.2% (55 out of 387) in term babies, with an inverse relation of fungal sepsis to the gestational age (p=0.0002). Table 1 depicts the characteristics of the study subjects with culture positive candida infection of the candida sub-species, C.Albicans, C.Tropicalis, C.Gullerimondi and C.Geotrichum were found to be sensitive to all anti-fungal medication. 46.5% of

C.Krusei were found to be resistant to fluconazole and Amphotericin B and were treated with Voriconazole. 6.3% study subjects (n = 6) had end organ involvement as a complication of fungal sepsis, which were renal fungal ball in 4 babies, meningitis (CSF culture positive for C.Krusei) in 1 baby and a cranial fungal abscess (CSF culture positive for C.Geotrichum) in 1 baby. Of the 10.4% (11 of 106) preterm babies (<34 wks/ 2000gm) screened for ROP during the study period, 7 (63.6%) had Candida sepsis. They were treated appropriately with laser therapy as required. Among the patients who succumbed to candida sepsis (n=22), 15 (68.1%) were treated with fluconazole alone, 2 (9%) with amphotericin alone and 5 (22.9%) with Voriconazole alone.

Table 1: Study characteristics of babies with culture proven candida infection (n = 94)

	Candida positive cases	Percentage
Gestation age		
< 28 weeks	10	10.7%
28 - 34 weeks	29	30.9%
34 - 37 weeks	16	17%
> 37 weeks	39	41.4%
Gender		
Male	39	41%
Female	55	59%
Candida sub-species distribution		
C. Krusei	88	94%
C. Albicans	2	2%
C. Tropicalis	2	2%
C. Gullerimondi	1	1%
C. Geotrichum	1	1%
Outcome		
Survival	72	76.6%
Mortality	22	23.4%

DISCUSSION

This study throws light on the emerging non-albicans fungal infections in NICUs [5]. NICU patients are prone to hospital acquired infections at some point during their prolonged hospitalisation [6]. Although candida infections have been reported commonly in NICUs, there is inadequate data on C. Krusei as a sub-species.

In one multi centric study on fungal infections in children, C. parapsilosis was the most prevalent, followed by C. albicans and C. Tropicalis [7]. Wingard [8] found that only 4% were caused by C krusei in his study as compared to 10% reported by Jalal *et al.* [9]. The possibility of a Candida outbreak during the study period was considered due to a higher incidence of reported culture proven candida infection. C. Krusei is known to be resistant to fluconazole and less susceptible to Amphotericin B in comparison to C

albicans. It however is found to be highly sensitive to Voriconazole with good outcome. A higher incidence of complications such as fungal ball and meningitis were seen in C.Krusei patients in our study. This study thus demonstrates the rising prevalence of C.Krusei infections in NICUs, its drug susceptibility and associated complications.

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