

## Candida Species Isolated From Blood Culture in Neonatal Septicemia Patients Admitted at RIMS, Ranchi

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### ABSTRACT

**Introduction:** Candida species are a common cause of neonatal nosocomial bloodstream infections in premature baby, low birth weight baby and baby on prolonged antibiotic therapy, and are a leading cause of infectious-related mortality in the neonatal intensive care unit (NICU). The clinical manifestations are respiratory distress, feeding intolerance, bradycardia and abdominal distension. Blood cultures are the gold standard for detecting candidemia. Blood culture sensitivity is likely worse in premature infants, where blood culture volumes are less than 1 ml.

**Aims and Objective:** Identification and speciation of the various candida species isolate.

**Materials and Methods:** 455 (four hundred fifty five) neonate blood sample are collected in microbiology department RIMS Ranchi, over a period of 12 month July16 to June17). About 1-3 ml of blood was collected from peripheral vein of the infants under aseptic precaution and inoculated and processed by automated BD BACTEC FX system blood culture bottle. Identification of Candida species was done by using germ tube test, growth on corn meal agar, sugar fermentation test and sugar assimilation test.

**Results:** Out of the 455 blood samples, 65 showed growth of candida species (prevalence 14.3%) Among 65 candida species, NAC (nonalbicans candida) species were responsible

for 83.1% (54) cases with *C. tropicalis* 55.5% (30), *C. parapsilosis* 12.3% (8), *C. glabrata* 10.8% (7) and *C. krusei* 7.6% (5) as the most predominant species, whereas as 16.9% (11) of cases were caused by *C. albicans*.

**Conclusion:** Low birth weight, premature and baby on broad spectrum antibiotic therapy are at higher risk of developing candidemia. In this study, prevalence of nonalbicans candida species were more common than candida albicans and among them *C. tropicalis* was most common.

**Keywords:** Candida Spp., Blood Culture, Septicaemia, BD BACTEC FX System.


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### INTRODUCTION

Candida species are a common cause of neonatal nosocomial bloodstream infections in premature baby, low birth weight baby and baby on prolonged antibiotic therapy. They are a leading cause of infection-related mortality in the neonatal intensive care unit (NICU). The clinical manifestations are respiratory distress, feeding intolerance, bradycardia and abdominal distension. Blood cultures are the gold standard for detecting candidemia. Blood culture sensitivity is likely to be worse in premature infants, where blood culture volumes are less than 1 ml. Infection with Candida species is associated with significant morbidity and mortality in infants. Extremely low birth weight (ELBW; <1000 g) infants carry the highest burden of disease. The incidence of candidiasis in ELBW infants is approximately 10%, although it varies as much as 20-fold between centers.<sup>1,2</sup> Neonatal candidiasis is associated with 20% mortality, and 50% of survivors have severe neurodevelopmental impairment.<sup>3</sup> End-organ damage in the

central nervous system, heart, and genitourinary tract is also common.<sup>4</sup>

Invasive candidiasis is a common complication of neonates of low birth weight requiring long intensive care.<sup>5</sup> Candida species are third most common organism (after coagulase negative staphylococcus and staphylococcus aureus) isolated in late onset sepsis and low birth weight infants.<sup>7</sup>

Preterm infants are predisposed to candida infections because of immaturity of their immune system and invasive interventions.<sup>6-8</sup> Transmission of candida may be vertical or nosocomial.<sup>6,7</sup> The risk factors for candidemia include low birth weight, prematurity, use of broad spectrum and/ or multiple antibiotics, central venous catheters, prolonged urinary catheterization, parenteral alimentation and intervenous fat embolism, colonization with Candida and/or previous episode of mucocutaneous candidiasis and immunosuppressive therapy.<sup>5-11</sup>

Systemic Candidiasis in neonates is increasing in frequency especially since the survival of babies with low birth weight has increased.<sup>8</sup> This prompted us to carry out a study to isolate and identify the various species of candida causing neonatal candidemia in NICU of Rajendra institute of Medical science Ranchi, assess the risk factors and clinical manifestations associated with neonatal candidemia and also to evaluate if candiduria, can be consider as a reliable indicator of candidemia.

**AIMS AND OBJECTIVES**

- To study the incidence of neonatal candidemia in a tertiary care hospital.
- To identify and separate various candida spp isolated obtained from blood culture in cases of neonatal candidemia and clinical manifestations associated with it and to identify the species other than candida albicans from cases of neonatal candidemia and clinical manifestations associated with them.

**MATERIAL AND METHODS**

The prospective study period was from July 2016 to June 2017 and the study was conducted in the Department of Microbiology, RIMS, Ranchi. 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. Candidemia was attributed to the mortality of the neonate expired within 3 days of a positive blood culture. Blood sample is taken from peripheral vein under aseptic

conditions. The local site is cleansed with 70% alcohol and providine iodine (1%) followed by 70% alcohol again. Approximately, 1-3ml of venous blood is collected and is inoculated into BD BACTEC peds plus culture vial and processed by automated BD BACTEC FX system. If Bactec shows positive result then subculture was done on sheep blood agar, mac conkey agar and Sabraud Dextrose Agar slant. Candida species identification was based on cultural characteristics, Gram stain and assessment by Germ tube test. Speciation of all isolates was done by plating on corn meal agar plate. Confirmation was done by sugar assimilation test and sugar fermentation test.

**Inclusion Criteria**

- All neonates admitted in neonatal intensive care Unit (NICU) with clinical presentation of septicaemia.
- Growth of candida spp isolates on blood culture.

**Exclusion Criteria**

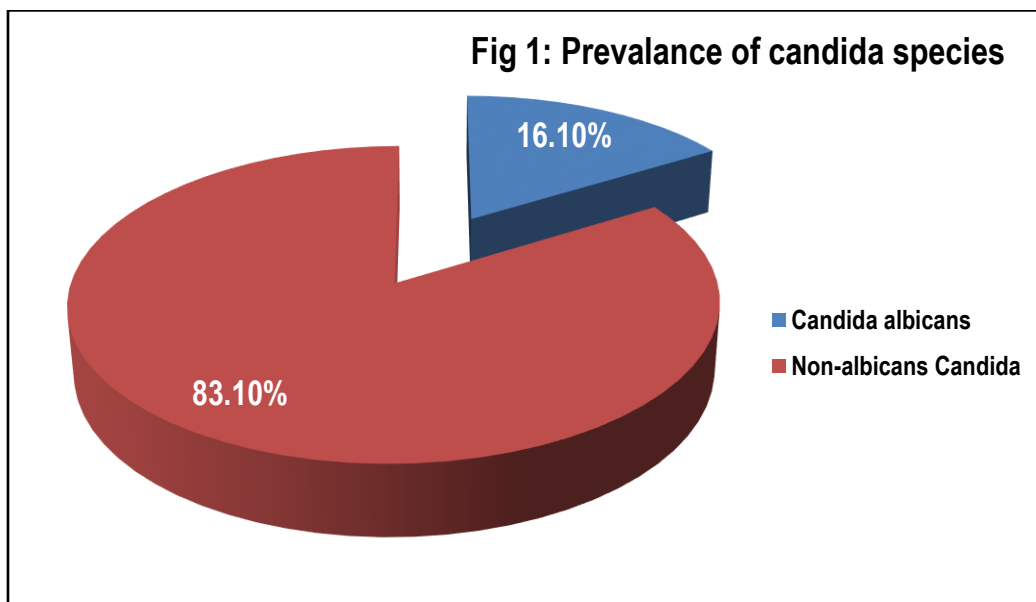
- All culture negative neonates.
- Neonates with blood culture positive for bacterial isolates.
- Any neonate with any other associated clinical condition which is not a part of our study.

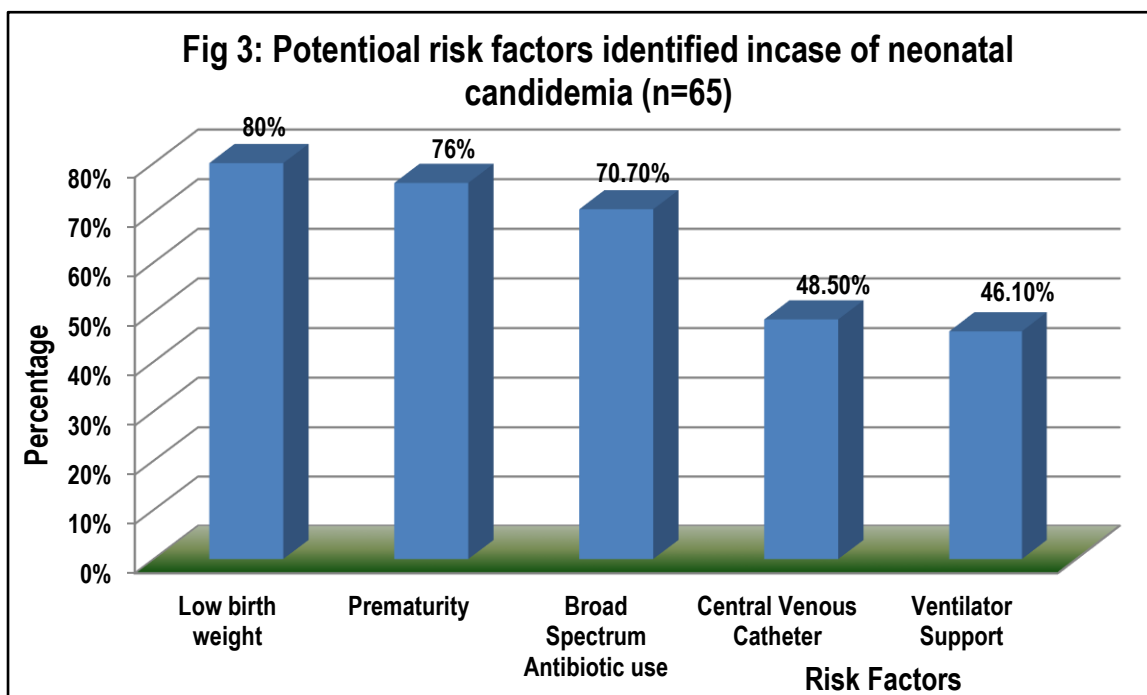
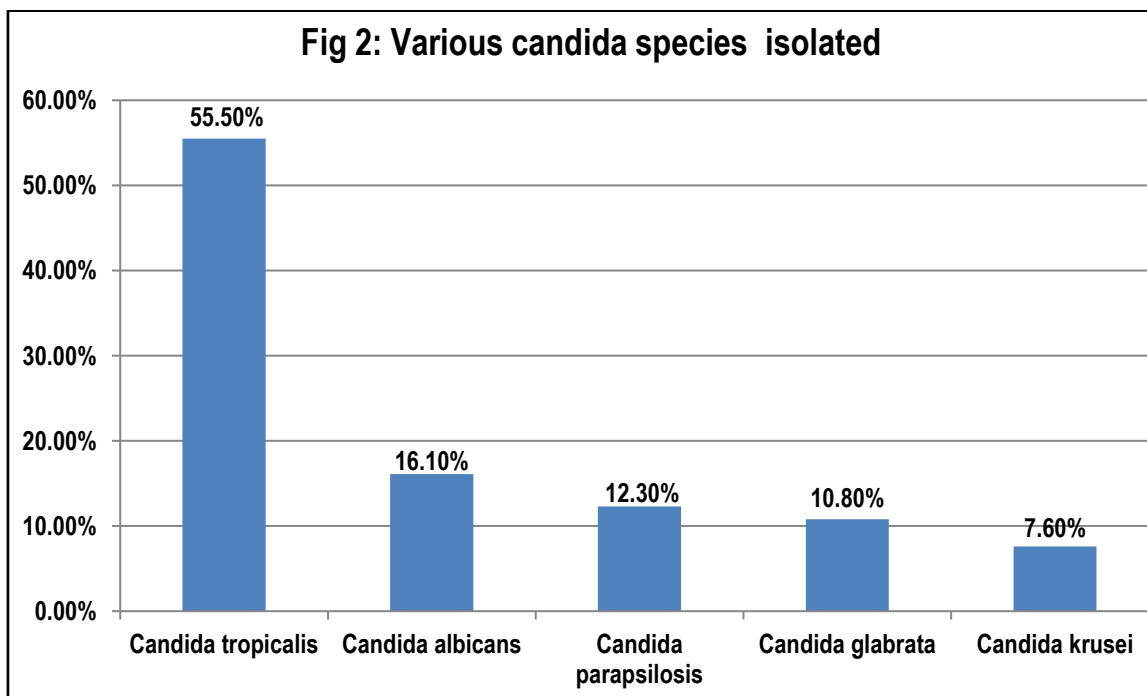
**Table 1: Differentiation of candida spp on the basis of Germ tube test**

Sl. No.	Candida spp.	GTT
1.	Non Albicans Candida (83.1%)	Negative
2.	Candida Albicans (16.9%)	Positive

**Table 2: Candida spp identification by chlamydospore formation, carbohydrate assimilation & carbohydrate fermentation.**

Fungus Isolated	Chlamydospore formation	Carbohydrate Assimilation test				Carbohydrate fermentation test			
		Glucose	Sucrose	Maltose	Lactose	Glucose	Sucrose	Maltose	Lactose
C.tropicalis	Absent	+	+	+					
C.parapsilosis	Absent								
C.glabrata	Absent								
C.krusei	Absent								
C.albicans	Present								





**RESULTS**

Out of the 455 blood samples, 65 showed growth of candida species (prevalence 14.3%), Among 65 candida species, NAC (nonalbicans candida) species were responsible for 83.1.% (54) cases with *C. tropicalis* 55.5% (30) ,*C. parapsilosis* 12.3% (8), *C. glabrata* 10.8% (7) and *C. krusei* 7.6% (5) as the most predominant species, whereas as 16.9% (11) of cases were caused by *C. albicans*.

Among the various risk factors observed for candidemia, increased low birth weight deliveries (80%) was the commonest followed by prematurity (76%), prolonged use of broad spectrum IV antibiotics (70.7%), central venous catheters (48.5%) ,ventilator support (46%). This finding in our study correlated with the study of V. Sardana et al & Asif Nazir et al.

**DISCUSSION**

Fungal blood stream infection is an important cause of morbidity and mortality in sick newborn infants. In the present study isolation rate of candida spp. was 14.3%. This was comparable with study conducted by Neerula Pandit et al showing isolation rate 13.8% and another study conducted by Asifa Nazir where isolation rat was 10%.

In this study non albicans candida spp. (83.1%) were more commonly isolated than candida albicans. This finding was also consistent with other studies done by Asifa Nazir et al (82.9%) and Vaibhav Misra et al (82.4%) where non albicans candida spp. predominant.

In India candida tropicalis is now the most common cause of nosocomial candidemia. Epidemiological studies have implicated

candida tropicalis in as many as 67-90% cases of candidemia. The increased use of fluconazole has been determined to be the major cause of predominance of candida tropicalis over candida albicans. Candida tropicalis as a cause of fungemia in neonatal intensive care units have been linked to the presence of the fungus on the hands of the hospital personnel. Candida tropicalis may be more virulent than candida albicans and proceeds from colonisation to invasion more easily. In the present study candida tropicalis was found to be most prevalent spp. of candida isolated from cases of candidemia (55.5%) followed by candida albicans (16.9%), Candida parapsilosis (12.3%), candida glabrata (10.7%), this finding correlates with the study done by V. Misra et al & V. Sardana et al.

## CONCLUSION

Candida remains the most common cause of invasive fungal infections, but non-albicans candida species have more predominance in causing neonatal candidemia. The present study emphasises the clinical importance and various candida spp. isolated in neonatal candidemia. In our study, candida tropicalis (55.5%) was found to be the most common isolated fungal species from cases of neonatal septicaemia, exceeding the candida albicans infection rate. Blood culture although not a sensitive test, remains the only reliable method for diagnosis.

Preventive measures such as use of filters for parenteral nutrition, prophylactic antifungal use, and restrictive policy of antibiotics use to decrease candida infection rates should be implemented to reduce the morbidity and mortality associated with these infections.

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