

## Original Research Article

# Clinical profile of neonatal candidiasis in newborn nursery

Mary James<sup>1</sup>, Anuja J. S.<sup>1</sup>, Praveen Jacob Ninan<sup>2\*</sup>

<sup>1</sup>Department of Pediatrics, <sup>2</sup>Department of Radiotherapy, Government T. D. Medical College, Alappuzha, Kerala, India

**Received:** 01 January 2018

**Accepted:** 05 January 2018

**\*Correspondence:**

Dr. Praveen Jacob Ninan,

E-mail: [pjndr2000@gmail.com](mailto:pjndr2000@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. 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:** Candidiasis refers to infection with fungi of the genus candida. Candida infections are frequent and major causes of septicemia in neonatal intensive care units and are associated with high morbidity and mortality. Low birth weight preterm infants are especially vulnerable to these devastating infections. Candida infections are a major cause of septicemia in neonatal ICUs and may affect 1.6% to 12.9% of very low birth weight infants. The smaller the infant is, the greater is the likelihood for systemic fungal infection to develop.

**Methods:** 40 Newborns with culture proven candidiasis admitted in new-born nursery of Government T. D Medical College, Alappuzha, were selected for the study. The significance of different parameters such as gender, gestational age, birth weight, Apgar score, duration of hospital stays, central venous catheter and use of third generation cephalosporins were analysed. Clinical profile like apnoea, feed intolerance, requirement of ventilator support, temperature instability, thrombocytopenia, hyperglycemia etc. were analyzed.

**Results:** Out of 40 newborns 39 were preterms, 42% of study population were having a birth weight of 1-1.5 kg, 33% with a birth weight of 1.5-2 kg and 20% with a birth weight of <1 kg. 75% of the study population were hospitalized for >1 week. In the study group 58% had feed intolerance, 52.5% needed ventilator support, 52.5% had temperature instability, 70% had thrombocytopenia 50% had apnea and 4% had hyperglycemia. The overall survival was 60%.

**Conclusions:** Prematurity, low birth weight and prolonged hospital stay were associated with increased risk of candidiasis. Feed intolerance, increased need for ventilator support, apnea, temperature instability and thrombocytopenia were significant clinical parameters.

**Keywords:** Clinical profile, Neonatal candidiasis, Newborn nursery, Risk factors

### INTRODUCTION

Invasive candidiasis is a leading cause of infection-related morbidity and mortality in extremely low birth weight (<1000g) infants. Candidiasis refers to infection with fungi of the genus *Candida*. Candidemia is presence of candida fungi in the blood. Catheter-related candidemia refers to one that resolves rapidly after catheter removal and initiation of therapy. Candida infections are frequent and major causes of septicemia in neonatal ICUs, and they are associated with high

morbidity and mortality rates. The sources of candidiasis are mostly endogenous, and the frequency of the disease is influenced by the patient population and by various treatment regimens, antibiotics, and other supportive care procedures.<sup>1,2</sup>

With the recent emergence of candidemia as a significant cause of mortality in our health care system, clinicians must identify methods to minimize the sequelae of infection of this type in patients already burdened with serious underlying conditions. While well established as a

major cause of blood stream infection (BSI), candidemia has been shown to have some of the highest rates of inappropriate therapy when compared to infections from all other sources. Rates of inappropriate therapy may be even higher for some of the less common and antifungal resistant non-albicans candidemia. Identifying those patients at risk for the development of these types of infections will help improve clinical outcomes.<sup>2,3</sup>

Invasive candidiasis in neonates is a serious and common cause of late onset sepsis and has a high mortality (25 to 35%).<sup>4</sup> The incidence of such fungal infections has increased 11 fold over the past 15 years. Preterm infants are predisposed to *Candida* infections because of immaturity of their immune system and invasive interventions.<sup>5,6</sup> Transmission of *Candida* may be vertical (from maternal vaginal infection) or nosocomial. Colonization of health workers is as high as 30%. Initial site of colonization is usually the gastrointestinal tract.

Tinoco-Araujo JE et al has studied on invasive candidiasis.<sup>3</sup> The frequency of invasive candidiasis was low and correlated with low birth weight and prolonged hospital stay.

Oeser C et al: has studied on the epidemiology of neonatal and pediatric candidemia. *Candida* species was reported in 89.6% (1320/1473) cases of fungal sepsis, with *Candida albicans* and *Candida parapsilosis* accounting for most infections in all age groups.<sup>7</sup>

Lee JH et al: has studied on Risk factors for invasive candidiasis in infants >1500 g birth weight in the Department of Pediatrics, Duke University Medical Center, Durham, NC, USA. They concluded that Invasive candidiasis is uncommon in infants >1500 g birth weight. Infants at greatest risk are those exposed to broad-spectrum antibiotics and having central venous line.<sup>8</sup>

## METHODS

This descriptive study was conducted for a period of one year from July 2014 to June 2015 in the newborn ICU of government T. D. Medical College, Alappuzha, Kerala, India. The study was approved by the Institutional Research Committee and the Institutional Ethics Committee. All 40 newborns with culture proven candidiasis admitted in the newborn ICU during the study period were included in this study.

Names of the neonates with culture proven candida sepsis were collected from IP register of newborn nursery. Case records were obtained from records section. Case records were analysed for presence of risk factors for invasive candidiasis like gender, gestational age, birth weight, apgar score, duration of hospital stay, use of third generation cephalosporins and indwelling central venous catheters. The clinical features like feed intolerance, temperature instability, apnea, hyperglycemia and increased need for ventilator support, thrombocytopenia

were studied. Details were recorded in the proforma and analysed.

## Statistical analysis

Data were entered in Microsoft Excel and statistical analysis were conducted using software SPSS version 16. Quantitative data were analysed using mean, median and standard deviation. Qualitative data was analysed by percentages.

## RESULTS

There were 804 admissions in the newborn nursery during the one year study period. 40 out of 804 admissions in the newborn nursery developed neonatal candidiasis.

Out of 40 newborns selected for study, 55% were male babies. 18 (45%) of babies were having gestational age between 28 and 32 weeks. 42.5% (17) were in the gestational age group 32 to 36 weeks. 4 babies (10%) were in the gestational age group <28 weeks. Only one (2.5%) newborn belonged to gestational age group > 36 weeks

There were 8 babies with birth weight under 1 kg (20%). 17 (42.5%) belonged to 1-1.5kg group. 13 babies (32.5%) belonged to 1.5-2kg group. Only 2 babies (5%) belonged to 2-2.5 kg group. There were no babies weighing >2.5 kg.

Out of 40 babies, 9 babies had Apgar score below 5. 3<sup>rd</sup> generation cephalosporin was used in 6 babies. No babies in the study group had an indwelling central venous catheter.

**Table 1: Gender distribution in the study group.**

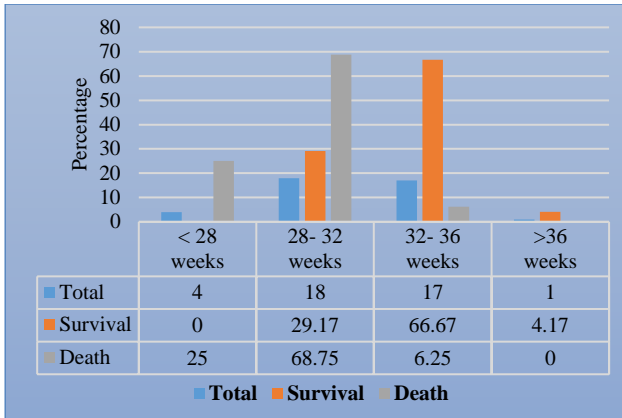
Gender	Number N=40
Male	22
Female	18
Ambiguous	0

Out of 40 culture positive newborns admitted in the newborn nursery during the study period, 22 were male babies and 18 were female babies. The gender distribution in the study group is almost equal.

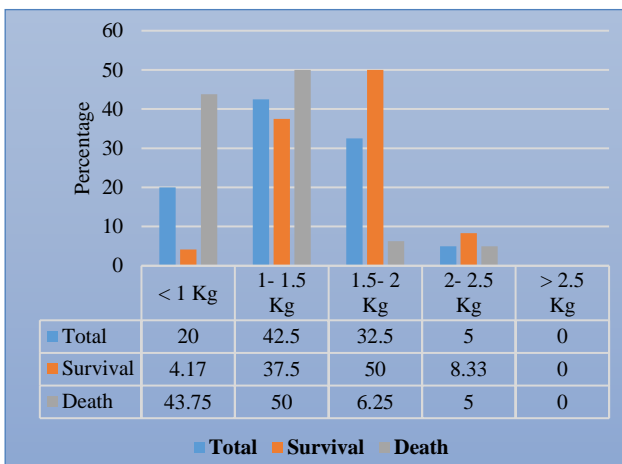
**Table 2: Duration of hospital stay.**

Duration of hospital stay	Number N=40
<1 week	10
>1 week	30

Out of 40 culture positive newborns admitted in the newborn nursery during the study period, majority of the babies had a hospital stay duration of more than one week. 30 out of 40 (75%) babies had a prolonged hospital stay before developing candidial sepsis.



**Figure 3: Gestational age distribution among the study population.**



**Figure 4: Birth weight distribution.**

20 out of 40 newborns (50%) had apnea during hospital stay. They had cessation of respiration for 20 seconds associated with bradycardia, cyanosis or both. Some had recurrent episodes of apnea. The remaining 20 babies did not have apnea during the hospital stay.

**Table 5: Presence of apnea.**

Presence of apnea	Number N=40
Yes	20
No	20

**Table 6: Feed intolerance.**

Feed intolerance	Number N=40
Yes	23
No	17

Feed intolerance was present in 23 out of 40 babies (58%). Most frequent features of feed intolerance were gastric residuals more than 50%, vomiting, abdomen distention or visible bowel loops disrupting the enteral nutrition plan. Abdominal distention was assessed by measuring the abdominal girth.

**Table 7: Temperature instability.**

Temperature instability	Number N=40
Yes	21
No	19

Temperature instability was present in 21 out of 40 (52.5%) newborns. Temperature of babies was monitored throughout the hospital stay. Babies with temperature less than 36.5°C and more than 37.5°C were included as having temperature instability.

**Table 8: Thrombocytopenia.**

Presence of thrombocytopenia	Number N=40
Yes	28
No	12

Thrombocytopenia was present in 28 out of 40 babies (70%). Thrombocytopenia was defined as platelet count less than 1.5 lakh. It was analyzed as a clinical parameter in babies with neonatal candidiasis.

21 babies (52.5%) required ventilator support either for recurrent apnea, hypoxemia or poor perfusion.

Hyperglycemia was observed in 4 babies (10%). An elevated plasma glucose level more than 150 mg/dl was taken as hyperglycemia.

Out of 40 newborns with culture proven candidiasis, 24 survived (60%). Overall survival was 60%.

**DISCUSSION**

All 40 culture proven fungal sepsis cases were due to candida albicans which is the commonest fungus causing neonatal sepsis.<sup>4,5,7</sup> A 4.9% candidemia incidence was documented in the neonatal intensive care unit. This was higher than in the study conducted by Celebi S et al and Jinjian Fu et al where the incidence documented was 1.1%.<sup>9,10</sup> 45% of the study population were in the gestational age group 28-32 weeks. 97.5% of the babies were below 36 weeks of gestational age. 38 out of 40 babies (95%) were born with birth weight below 2 Kg in the study group. 30 out of 40 babies (75%) who developed neonatal candidiasis had a hospital stay of more than 1 week. None of them had an indwelling central venous catheter. 9 neonates had an apgar score below 5 (23%). Only 6 out of 40 newborns (15%) were treated with third generation cephalosporins. Gender, low apgar and use of third generation cephalosporins were found to have not much significance as a risk factor for neonatal candidiasis in this study.

28 out of 40 babies (70%) had thrombocytopenia. 21 out of 40 babies (52.5%) had temperature instability. 21 out of 40 babies (52.5%) required ventilator support. Feed intolerance was present in 23 out of 40 babies (58%). 20 out of 40 neonates (50%) in the study group had apnea.

Hyperglycemia was present only in 4 out of the 40 babies (10%). 24 out of 40 babies (60%) survived.

## CONCLUSION

Low birth weight, prematurity and prolonged hospital stay were important risk factors associated with neonatal candidiasis in this study. Thrombocytopenia, feed intolerance, increased requirement for ventilator support, temperature instability and apnea were significant clinical parameters noted in babies with culture proven neonatal candidiasis. The overall survival was 60% in the study group.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Benjamin DK, Stoll BJ, Gantz MG, Walsh MC, Sánchez PJ, Das A et al. Neonatal candidiasis: epidemiology, risk factors, and clinical judgment. *Pediatrics.* 2010 Oct 1;126(4):e865-73.
2. Cetinkaya M. Neonatal candidiasis risk factors; UCLA SCC-TR-2010-0005 Technical Report University of California, Los Angeles;2010.
3. Tinoco-Araujo JE, Araújo DF, Barbosa PG, Santos PS, Medeiros AM. Invasive candidiasis and oral manifestations in premature newborns. *Einstein (Sao Paulo).* 2013 Mar;11(1):71-5.
4. de Haan TR, Beckers L, de Jonge RC, Spanjaard L, van Toledo L, Pajkrt D, van Wassenae-Leemhuis AG, van der Lee JH. Neonatal gram negative and *Candida* sepsis survival and neurodevelopmental outcome at the corrected age of 24 months. *PLoS One.* 2013 Mar 18;8(3):e59214.
5. Steinbach WJ, Roilides E, Berman D, Hoffman JA, Groll AH, Bin-Hussain I, Palazzi DL, Castagnola E, Halasa N, Velegraki A, Dvorak CC. Results from a prospective, international, epidemiologic study of invasive candidiasis in children and neonates. *Pediatric Infect Dis J.* 2012 Dec;31(12):1252-7.
6. Goudjil S, Kongolo G, Dusol L, Imestouren F, Cornu M, Leke A, Chouaki T. (1–3)- $\beta$ -D-glucan levels in candidiasis infections in the critically ill neonate. *J Maternal-Fetal Neonat Medicine.* 2013 Jan;26(1):44-8.
7. Oeser C, Lamagni T, Heath PT, Sharland M, Ladhani S. The epidemiology of neonatal and pediatric candidemia in England and Wales, 2000–2009. *Pediatr Infect Dis J.* 2013 Jan 1;32(1):23-6.
8. Lee JH, Hornik CP, Benjamin Jr DK, Herring AH, Clark RH, Cohen-Wolkowicz M et al. Risk factors for invasive candidiasis in infants > 1500 g birth weight. *Pediatr Infect Dis J.* 2013 Mar;32(3):222-6.
9. Celebi S, Hacimustafaoglu M, Koksall N, Ozkan H, Cetinkaya M, Ener B. Neonatal candidiasis: results of an 8 year study. *Pediatr Int.* 2012 Jun 1;54(3):341-9.
10. Fu J, Ding Y, Wei B, Wang L, Xu S, Qin P et al. Epidemiology of *Candida albicans* and non-*C. albicans* of neonatal candidemia at a tertiary care hospital in western China. *BMC Infect Dis.* 2017 May 6;17(1):329.

**Cite this article as:** James M, Anuja JS, Ninan PJ. Clinical profile of neonatal candidiasis in newborn nursery. *Int J Contemp Pediatr* 2018;5:334-7.