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Candida Species in Neonatal Sepsis : A Retrospective Study in MIMS, Mandya

KEYWORDS: Neonatal sepsis, candida albicans, non albicans candida, early onset sepsis, late onset sepsis

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ABSTRACT *Neonatal sepsis although has classically been attributed to bacterial organisms, prevalence of fungal sepsis among the neonates is on a rise in the present era of antibiotics. Most fungal infections in neonates are due to Candida species; a much smaller number may be attributed to Malassezia, Zygomycetes or Aspergillus.A total of 128 blood samples with clinical suspicion of neonatal sepsis were processed in the Microbiology laboratory from Jan 2014 till Dec 2014(1 year).Among 128 blood samples processed, Candida species was isolated in 17 blood samples. The isolation rate was 13.3%. Among 17 candida isolates, 7(41.2%) were isolated from early onset septicaemia(EOS) and 10 (58.8%) from late onset septicaemia(LOS).Only 3(17.6%) isolates were from female babies.3(42.8%) from EOS and 4(40%) from LOS were non albicans candida.We found that Candidaalbicans was more isolated than Non albicans Candida both in early and late onset septicaemia*

INTRODUCTION

Neonatal mortality rate is one of the indicators measuring the health status of a nation. There could be various reasons for neonatal mortality but septicemia continues to be a major cause of neonatal mortality and morbidity worldwide [1]

Septicemia in neonates refers to the presence of microbes or their toxins in blood.[2] It is documented by positive blood culture in the first four weeks of life and is one of the leading causes of neonatal mortality in India.[3]

Neonatal sepsis although has classically been attributed to bacterial organisms, prevalence of fungal sepsis among the neonates is on a rise in the present era of antibiotics. Most fungal infections in neonates are due to Candida species; a much smaller number may be attributed to Malassezia, Zygomycetes or Aspergillus[4]

Importance of Candida species in nursery and intensive care units (ICUs) is increasingly being recognized. Candida species account for 9-13% of all blood isolates in neonatal intensive care units (NICUs).[5]

Probably infections due to Candida species are endogenous. It has been studied that about 10% babies in NICU get colonized in the first week of life and 64% babies get colonized by 4 weeks of hospital stay. The gastrointestinal tract is the first to become colonized though multiple sites may be involved [6] . There is some evidence showing correlation between fungal colonization and invasive disease in very low birth weight, premature babies. [7]

Preterm, low birth weight babies are more vulnerable to acute fungal sepsis, primarily because of an immature immune system, invasive interventions, and prolonged use of antimicrobials that serve as risk factors for fungal colonization [8]

Most commonly reported causative microorganisms in NCS are Candida albicans and Candida parapsilosis [9]

This study was conducted to know the profile of Candida species in neonatal sepsis.

MATERIAL AND METHODS

This retrospective study was conducted in the Dept. of Microbiology, MIMS, Mandya. A total of 128 blood samples with clinical suspicion of neonatal sepsis were processed in the Microbiology laboratory from Jan 2014 till Dec 2014(1 year). The blood inoculated into Brain Heart Infusion broth was, incubated at 37^{0}C and subcultured routinely onto Mac Conkey's agar & Blood agar at 24 hours. If there was no growth, subsequent cultures were done on 3rd, 5th and 7th day. Whenever growth of white opaque colony on Blood agar was noticed, Gram's stain was performed to study the morphology, yeast like budding cells were further speciated by using germ-tube production and cornmeal agar.[10]

RESULTS

Among 128 blood samples processed, Candida species was isolated in 17 blood samples. The isolation rate was 13.3%. Among 17 candida isolates, 7(41.2%) were isolated from early onset septicaemia(EOS) and 10 (58.8%) from late onset septicaemia(LOS). Only 3(17.6%) isolates were from female babies. So male preponderance 14(82.4%) was noted. 3(42.8%) from EOS and 4(40%) from LOS were non albicans candida. The predisposing factors noted were perinatal asphyxia(6, 35.3 %), hypoglycaemia(5, 29.4 %), preterm (4, 23.5 %) and pneumonia(2, 11.8 %).

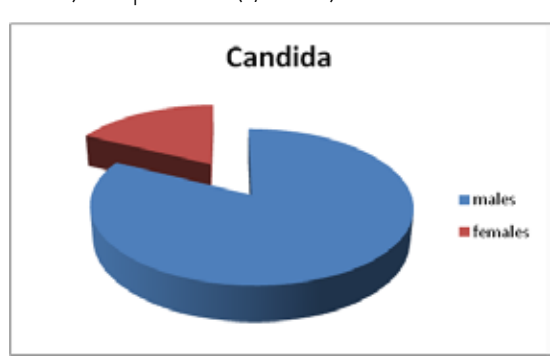

Fig 1: Percentage distribution of Candida species in males and females.

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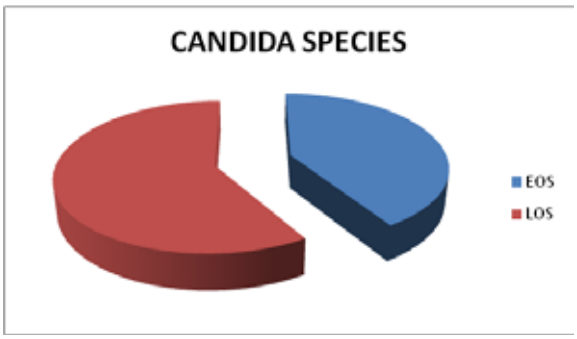

Fig 2: Percentage distribution of Candida species in Early onset and Late onset septicaemia

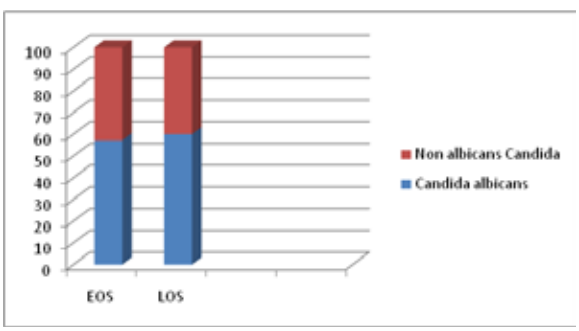

Fig 3: Percentage distribution of Candida albicans and non albicans candida in EOS and LOS

DISCUSSION

Clinical diagnosis of sepsis is not easy, because, symptoms and signs are not specific and dramatic deterioration of clinical conditions can supervene rapidly long before blood cultures results are available even in asymptomatic newborn infants [11].

Cahanand Deville [12] reported in a study that lasted for four years that neonatal candidiasis has risen with a mortality rate of 35%. The mortality rate in developing countries among neonates was 23-52% [13].

Reporting of fungal blood-stream infection and the spectrum of species involved are essential measures in any intensive care unit in order to implement appropriate preventive and therapeutic strategies [14].

In our study, isolation rate of Candida species was 13.3%. This is comparable with study conducted by Agarwal et al.15 showing isolation rate 13.6% and another study conducted by Rani et al. , [16] where isolation rate was 11%.

Among 17 candida isolates, only 3(17.6%) isolates were from female babies. So male preponderance 14(82.4%) was noted. This male predominance is apparent in almost all studies of sepsis in newborn infants [17,18]. Klein and Marcy[19] stated that this might be due to a gene located on the X-chromosome and involved with the function of the thymus, or with synthesis of immunoglobulins.

We noted that Candida species were isolated more in late onset septicaemia(58.8%) compared to early onset septicaemia(41.2%).Early-onset fungal sepsis is an infrequent cause of neonatal sepsis, and risk factors include maternal fungal colonization and vaginal route of delivery. In the NICU setting, fungal infections, most commonly involving Candida spp., are more frequently associated with late-onset sepsis, with an incidence inversely proportional to the estimated gestational age (EGA) and birth weight[20].

Candida species are the fourth most common cause of late-onset infections in the neonatal intensive care unit (NICU) and are responsible for considerable morbidity and mortality.21

In our study, we noted predominance of Candida albicans 10(58,8 %) closely followed by non albicans Candida 7(41.2%).3(42.8%) from EOS and 4(40%) from LOS were non albicans candida.Ariffetal also noted candida albicans as major isolate(55%) in their study22.

The findings of Candida albicans as predominant pathogen in neonatal sepsis was noted in the year 2003 from Mumbai in which Candida albicans was isolated in 16 out of 30 isolates (53.3%).[23]

In recent years, there is marked shift in isolation rates of non-albicans Candida species compared to Candida albicans in cases of neonatal sepsis. Kossoff et al.24 showed significant shift from Candida albicans to non-albicans, i.e. Candida parapsilosis over 15 years. Rani et al.[16] observed Candida tropicalis as predominant pathogen (92%), followed by Candida albicans and Candida kefyr (4% each).

Agarwal et al[15] showed marked increase in non-albicans isolate, showing Candida parapsilosis being most prevalent isolate. Narang et al[25] showed Candida tropicalis as commonest isolate followed by Candida albicans and Candida guillermondii.

We found that perinatal asphyxia(35.3%) was the most common predisposing factor followed by hypoglycaemia(5, 29.4 %), preterm (4, 23.5 %) and pneumonia(2, 11.8 %). Previous studies have suggested that possible risk factors such as common use of broad-spectrum antibiotics, low birth weight (LBW), prematurity, asphyxia neonatorum, hyperalimentation, presence of intravascular catheters, surgery, total parenteral nutrition and intensive care unit stay have made neonates prone to candidemia.[26,15]Various fungal agents colonize hospitalized infants, healthcare workers and visitors. Pathogenic agents can be transmitted by direct contact or indirectly via contaminated instruments and intravenous fluids.[27].

Our study is limited by a single institution's experience, lack of follow-up and antifungal susceptibility testing not performed.

CONCLUSION

We found that Candida albicans was more isolated than Non albicans Candida both in early and late onset septicaemia. This study provides baseline data in order to carry out a future study to find out the changing pattern of fungemia in cases of neonatal sepsis.

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