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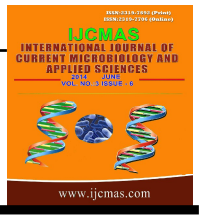

Original Research Article

Nosocomial Candidemia in intensive care units of a tertiary care hospital, New Delhi, India

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A B S T R A C T

The occurrence of candidemia is on the rise worldwide. Candidemia is the 4th most common cause of nosocomial blood stream infections and accounts for around 10% of ICU blood stream infections. Non-albicans candida species have emerged as major cause of candidemia in many countries. Method: This study was undertaken in the Department of Microbiology, Dr. R.M.L Hospital from September 2013 to February 2014 with the aim to find the prevalence of candidemia in ICU patients. Findings: Prevalence of candidemia was found to be 2.68% with the predominant specie being Non-albicans candida. Candida tropicalis (58.8%) was the most common isolate followed by Candida parapsilosis (29.4%), Candida krusei (17.7%) and Candida albicans (5.9%). Discussion: Identification of specific species responsible for candidemia is important, as there is a difference in antifungal susceptibility among different candida species. Knowing the prevalence of various Candida spp in the hospital setting; helps the clinician to guide empirical antifungal therapy in suspected cases where antifungal susceptibility is not available.

Keywords

Candida spp, intensive care units, blood stream infections

Introduction

Candidemia is ranked 4th as the cause of bloodstream infection, occuring more frequently in ICU than in hospital wards. Candidemia accounts for around 10% of ICU blood stream infections. Approximately 200 Candida species are known, of which about 10 % are recognized to cause infections in human. Traditionally, Candida albicans was most common isolate causing nosocomial blood stream infections. But recently, non-albicans candida species have emerged as a major cause of Candidemia. As the early signs and symptoms suggestive of invasive fungal infections are easily missed due to the associated co-morbid conditions, thus underscoring the need to rapidly isolate and identify the causative organism. The increase in incidence may be contributed to various factors including long hospital stay, use of antibacterial agents, indwelling devices etc (Poikonen, E., et al 2010). The present study was planned to determine the prevalence of Candidemia in

ICU patients and also to identify the various species of Candida in these patients.

Materials and Methods

A retrospective study was done in the Department of Microbiology, Dr. Ram Manohar Lohia Hospital from September 2013 to February 2014. Patients admitted in intensive care units for more than 48 hours with suspected sepsis were included in the study while patients already having candidemia, patients on prophylactic antifungal therapy or patients with <48 hours of stay in hospital were excluded. A total of 1270 blood samples were collected from patients in ICU. A volume of 1-2 ml blood for children and 5 ~ 10 ml blood for adults was collected aseptically by skin veni-puncture taken from two different sites of each patient. The blood was inoculated into BacT/AlerT 3D aerobic vials (Becton Dickinson). All positive blood cultures were Gram-stained for preliminary identification of the microorganism and inoculated on Hi-CHROM agar (Hi-Media, Mumbai) to ensure viability and purity. Germ tube test was done to differentiate Candida albicans from other Candida spp. Colonies were further confirmed by the morphology on corn meal agar.

Results and Discussion

A total of 1270 blood samples were collected from patients between the age group of 1 month to 85 years with suspected sepsis. Among all patients screened for candidemia, 34 patients had candidemia, prevalence of candidemia being 2.68%. Overall, Candida tropicalis (58.8%) was the most common isolate followed by Candida parapsilosis (29.4%), Candida krusei (17.7%) and Candida albicans (5.9%). In adult patients, Candida tropicalis was the predominant isolate while in pediatric patients; Candida tropicalis and Candida krusei were seen in equal proportion followed by Candida parapsilosis.

Candida has emerged as an important cause of nosocomial blood stream infection. But, the actual prevalence of candidemia in India is lacking; due to unavailability of data from various parts of the country. However, a study from Lucknow reported an incidence rate of 1.61 per 1000 hospital admissions for candidemia (Verma, A.K., et al 2003]. A New Delhi based study gave a prevalence rate of 18% while a study in South India reported an incidence rate of 5.7% for candidemia among children (Kothari, A., et al 2008 and Kumar, C.P., et al 2005). Xess et al. from AIIMS, New Delhi, found a prevalence rate of 6% for Candida species in a 5-year study (2001-2005) (Xes,s I., et al 2007). A study by Sahni et al. from Maulana Azad Medical College, New Delhi, found an incidence rate of 6.9% for Candida species in BSI (Sahni, V., I et al 2005). Another study from Rohtak, North India, reported an isolation rate of 8.1% for Candida species from cases of neonatal septicaemia (Goel, N., et al 2009).

This is consistent with the finding of our study; where prevalence was found to be 2.68%. Among Candida spp., Candida albicans was the most common cause of candidemia worldwide. However, in recent years, some studies have reported an increase of candidemia due to non-albicans Candida species, with the threat of increased mortality and antifungal drug resistance (Oberoi, J.K., et al 2012 and Magill, S.S., et al 2006). The intrinsic and emerging resistance to azoles actually represents a major challenge for empirical, therapeutic and prophylactic strategies

(Leroy, O., et al 2009). The various factors which determine the development of candidemia are prolonged hospital stay, central or peripheral venous lines, parentral nutrition; prolonged antibiotic therapy etc. (Table-1) All the patients included in the study had these risk factors as patients who were hospitalized for more than 48 hours were included in the study. These patients were empirically treated with broad spectrum antibiotics and had either peripheral or central line.

Over the past 20 years, a shift towards non-albicans Candida species has been reported previously from the USA, Europe and Australia; although the precise pattern of causative species varies across countries (Poikonen, E., et al 2010). Non-albican Candida (NAC) infections have characteristics like high mortality and virulence traits like biofilm formations, presence of adhesions and drug resistance. In a study, retrospective analysis of 51 cases showed that a mortality of 23.5% was seen in-spite of susceptiblity to micafungin and fluconazole. [Hirai, Y., 2014] In addition to resistance profile, there are other factors like presence of various virulence factors and host factors are also responsible for morbidity and mortality. However, a study from Taiwan showed C. albicans as the most common species followed by C.tropicalis , C. glabrata and C. parapsilosis (Chen, P., et al 2014).

Currently, C. tropicalis is more prevalent, even compared with C. albicans or other NAC species. Although prophylactic treatments with fluconazole causes a decrease in the frequency of candidiasis caused by C. tropicalis but it is increasingly showing a moderate level of fluconazole resistance. The propensity of C. tropicalis for dissemination and the high mortality associated with its infections might be strongly related to the potential of virulence factors exhibited by this species, such as adhesion to different host surfaces, biofilm formation, infection and dissemination, and enzymes secretion (Negri, M., et al 2012).

In the present study, Candida tropicalis (58.8%) was the most common isolate followed by Candida parapsilosis (29.4%), Candida krusei (17.7%) and Candida albicans (5.9%). Candida tropicalis was the predominant species isolated in adult age group where as Candida tropicalis and Candida krusei were equally found in the pediatric age group followed by Candida parapsilosis.

Another aspect of Candidemia is the economic impact on the patient as well as on the hospital. The economic impact of these infections has been associated with increased costs of care including anti-fungal agents and prolonged hospitalization (Olaechea P., et al 2004). This study demonstrates that candidemia is an important problem in Indian hospitals. Diagnostic delays could be shortened by more active screening for candidemia especially in the Intensive care settings. The rising incidence of non-albicans candidemia worldwide probably is true here as well. However, in the present study, catheter associated with blood stream infection could not be differentiated from true candidemia. There should be a concerted effort on the part of all treating physicians to restrict risk factors like use of antibiotics, central venous lines, total parenteral nutrition, mechanical ventilation, and long stay in the hospital especially in intensive care units and diagnostic laboratories to give timely diagnosis up to species level which may help in appropriate antifungal therapy thus, improving patient care.

Table.1 Risk factors for systemic candidiasis (Bross J., et al 1989).

Risk factors
Age
Azotemia
Central venous catheters
Colonization
Damaged mucosal barriers
Graft versus host disease
Haemodialysis
Hyperglycemia
Long term broad spectrum antibiotic use
Neutropenia
Parenteral nutrition
Steroids
Surgery (multiple, extended, abdominal

Candidemia is emerging as a significant problem in hospitalized patients especially in ICU setup. Now, prevalence of non-albicans candida species is also increasing. These Non-albicans Candida spp are resistant to antifungal agents as compared to Candid albicans and also have different resistance profiles. Thus, prevalence of different Candida species in pediatric and adult age group helps the clinician to guide empirical antifungal therapy in suspected cases of sepsis where antifungal susceptibility is not available.

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