Association of Various Risk Factors in Candida Infection in a Tertiary Care Hospital

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ABSTRACT

Candida is a part of the normal flora in healthy individuals, and is usually confined to the skin and mucosal surfaces of the oral cavity, gastrointestinal and urogenital tracts, and vagina. However, it can cause a wide variety of infections in immunosuppressed patients of long term broad spectrum antibiotics, steroids or other immunosuppressive agents, diabetes mellitus, AIDS, Malignancy, Neutropenia. Although the majority of infections are caused by Candida albicans, Non-C. albicans Candida (NCAC) species are emerging as important pathogen in humans. The present study included 130 clinical isolates which showed gram positive budding yeasts cells with or without pseudohyphae. We correlated Candida isolation with various risk factors and found that 54 % of the patients from whom candida was isolated had been treated with >2 antibiotics, 15% treated with >3 antibiotics, 17% Diabetis Mellitus, 16% Neutropenia, 8 % Tuberculosis and Treatment with Steroids, 6% Malignancy, 2% HIV.

Keywords
Candida, Immunosuppressive agents, Diabetes mellitus, HIV

Introduction

Several Candida species most notably C.albicans are ubiquitous human commensals. They become pathogenic in situations where the hosts resistance to infection is lowered locally or systemically. Two major medical events revived in candida infections were introduction of antibacterial drugs during the second half of twentieth century, broad spectrum antibiotics acts as predisposing factors for mycotic infections by causing imbalance of hosts microflora in favour of fungi upon which they have no inhibitory activity. The second event was increase in incidence of Candida infections.

Host defenses

The oral cavity possesses physical barriers such as epithelial cells, saliva and salivary immunoglobulin (IgA), lysozyme, histidine-rich polypeptide, lactoferrin and lactoperoxidase for antagonistic action against Candida overgrowth. Epidermal keratinocytes play an important role in the cutaneous immune response through the production of cytokines and chemokines, including interferon (IFN) Inducible protein 10 (IP-10), prostaglandin E2 may be a major predisposing factor for diminishing IFNc-induced IP-10.
In mucosal (chronic mucocutaneous and gastrointestinal) candidiasis, T-cell (CD4+ and CD8+) and cell-mediated immunity is the predominant host defence mechanism. Vaginal candidiasis is affected by T-cell response.

Poor cellular transportation of antifungal agents and inadequate immune response are the major factors that allow yeasts to colonize in immunocompromised patients such as AIDS.

The role of neutrophil activity as a main defense against systemic Candida infection has been supported by the significant incidence of disseminated infection during chemotherapy-induced granulocytopenia in patients with hematologic malignancies. T cell in the prevention of mucocutaneous candidiasis has been shown by the development of chronic infections in children with altered cell-mediated immunity and in patients with acquired immunodeficiency syndrome. Alterations in cutaneous or mucosal barriers, provide a portal of entry, also increased the incidence of infections like candida endocarditis and endophthalmitis in intravenous drug abusers and in patients with indwelling catheters or extensive destruction of the skin by deep bums. An increased incidence of disseminated candidiasis is associated with altered gastrointestinal (GI) mucosa resulting from drug-induced or tumor-induced GI damage in patients with hematologic malignancies.\(^3\)

**Materials and Methods**

A total of 130 *Candida* species isolated from clinical samples like urine, pus, sputum, blood, oral swabs, vaginal swabs, endotracheal aspirates, endotracheal tips, were included in this study. The Study was conducted from Jan 2017 to Dec 2017. Data of patients regarding the use of long term broad – spectrum antibiotics, steroids or other immunosuppressive agents, diabetes mellitus, AIDS, Malignancy, Neutropenia, radiotherapy, organ transplant, new diagnostic and therapeutic procedures to patients, such as urinary indwelling catheters, nephrostomy tubes, hemodialysis, previous surgery were collected at enrolment.

Direct Examination of the clinical specimen using 10% and 20 % KOH was done by Wet mount preparation. The fungal elements ie budding yeasts cells pseudohyphae and hyphae were appreciated. Gram staining was done for all isolates which showed creamy pasty white growth to look for gram positive budding yeasts cells.

Samples showing Gram positive yeast like budding cells were inoculated using standard loops on Sabouraud's Dextrose Agar (SDA) containing chloramphenicol, incubated at 37°C and examined at the end of 24 and 48 hours of incubation. SDA slants were incubated at 37°C and examined twice a week to look for the growth of cream coloured pasty colonies suggestive of *Candida* species.

**Inclusion criteria**

Clinical samples like urine, pus, sputum, blood, oral swabs, vaginal swabs, endotracheal aspirates, endotracheal tips, which showed gram positive budding yeasts cells were included in this study.

**Exclusion criteria:** Contamination, Normal commensals

**Results and discussion**

Out of 130 *Candida* species isolated 54 % of the patients from whom candida was isolated had been treated with >2 antibiotics, 15% had been treated with >3 antibiotics, 17% had Diabetis Mellitus, 16% had Neutropenia, 8 % had Tuberculosis and 8% in those treated with
steroids, 6% had malignancy, 2% had HIV. Isolation of C. albicans was 16% among HIV patients. C. tropicalis (32%) and C. glabrata (32%) most commonly isolated Candida spp in HIV infected individuals.

In a study conducted by Kao et al., risk factors associated were antibacterial therapy (68%), steroid therapy (40%), neutropenia (13%) while a study conducted by Verma (2003) showed association with broad-spectrum antibiotics (42.8%) immunosuppressive therapy (23.8%), neutropenia (14.3%) which was similar to our present study.

Table 1 Risk factors associated with Candida infections

| Risk factor              | Number | Percentage % |
|-------------------------|--------|--------------|
| Diabetes Mellitus       | 23     | 17           |
| Tuberculosis            | 11     | 8            |
| HIV                     | 3      | 2            |
| Malignancy              | 9      | 6            |
| Neutropenia             | 22     | 16           |
| Treatment with steroids | 11     | 8            |
| Treatment with >2 antibiotics | 70 | 54       |

In conclusion, Candida spp. is one of the most frequent pathogens isolated in bloodstream infections, associated with significant morbidity and mortality in hospitalized patients. Candida species is more common in patients on multiple broad spectrum antibiotics, patients with Diabetes mellitus.

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