

Review Article

<https://doi.org/10.20546/ijcmas.2019.811.251>

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

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### ABSTRACT

#### Keywords

*Candida*,  
Immunosuppressive  
agents, Diabetes  
mellitus, HIV

#### Article Info

Accepted:  
17 October 2019  
Available Online:  
10 November 2019

*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% Diabetes Mellitus, 16% Neutropenia, 8 % Tuberculosis and Treatment with Steroids, 6% Malignancy, 2% 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 systematically. 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<sup>2</sup>. The second event was increase in the prevalence of immunosuppressed patients as a result of chemotherapy or AIDS which led to

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 IFN $\alpha$ -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 burns. 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<sup>3</sup>

## **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 Diabetes 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

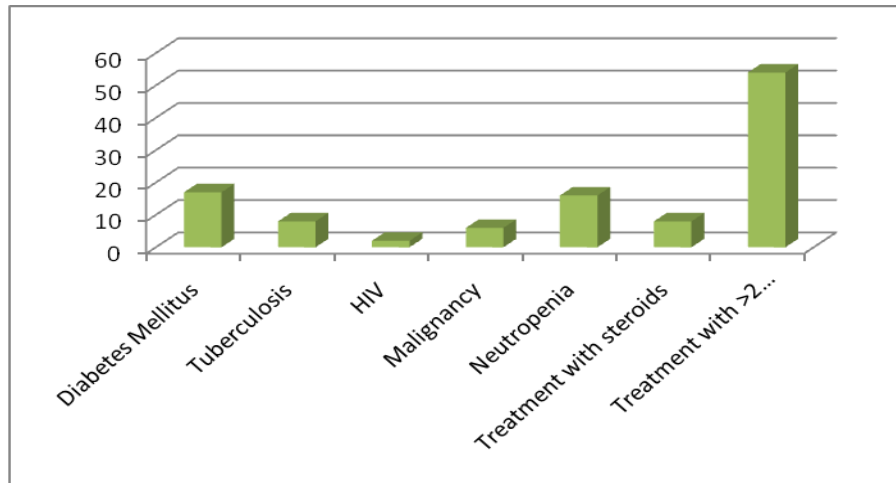
In a study conducted by Kao *et al.*, risk factors

associated were antibacterial therapy (68%), steroid therapy (40%), neutropenia (13%)<sup>10</sup> while a study conducted by Verma (2003) showed association with broad-spectrum antibiotics (42.8%) immunosuppressive therapy (23.8%), neutropenia (14.3%)<sup>11</sup> 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

**Fig.1** Risk factors associated with *Candida* infections



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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**How to cite this article:**

Natasha, M.V. and Nawaz, U. 2019. Association of Various Risk Factors in *Candida* Infection in a Tertiary Care Hospital. *Int.J.Curr.Microbiol.App.Sci.* 8(11): 2171-2174.  
doi: <https://doi.org/10.20546/ijcmas.2019.811.251>