Original Research Article

Antifungal Susceptibility Pattern of *Candida* Isolates from a Tertiary Care Hospital of North India: A Five Year Study

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A B S T R A C T

Pathogenic yeast from the genus *Candida* can cause serious infections in humans and are now recognized as a major agent of hospital acquired (nosocomial) infections. The emergence of drug resistance further worsens the situation. The present study was done to know the distribution of various *Candida* spp. among clinical isolate and to find out the antifungal susceptibility pattern of *Candida* isolates from various clinical samples. Various clinical samples from the patients suspected of having fungal infection were cultured. Antifungal susceptibility testing of the isolated yeasts was done in by disk diffusion susceptibility methods based on the CLSI guidelines. A total of 256 isolate of *Candida* species were recovered from various clinical samples. C. albicans was the most common isolated species (169, 66%). Fluconazole resistance was detected in 32 *Candida* isolates followed by resistance to ketoconazole in 3, Amphotericin-B in 2, Clotrimazole in 12 isolates, while no resistance was detected against Itraconazole and Nystatin. The increased isolation rates of Antifungal resistant strains of *Candida* species underlines the need of early and accurate diagnosis of infecting *Candida* species along with antifungal susceptibility testing for selecting the most appropriate antifungal agent for therapy.

Introduction

Pathogenic yeast from the genus *Candida* can cause serious infections in humans and are now recognized as a major agent of hospital acquired (nosocomial) infections (Pfaller *et al.,* 2006). *Candida* infection can be superficial or invasive; the former often affects the skin or mucous membrane and can be treated successfully with topical fungal infections are often life threatening, probably due to inefficient diagnostic methods, inappropriate initial antifungal therapy and emergence of drug resistance, (Pappas, 2006; Pfaller *et al.,* 2007).

The growing problem of mucosal and systemic candidiasis reflects the enormous

increase in the number of patients at risk and the increased opportunity that exists for *Candida* species to invade tissues normally resistant to invasion (Guery *et al.,* 2009). *Candida* species are true opportunistic pathogens that exploit interventional therapeutic advances to gain access to the circulation and deep tissues. The treatments used to manage *Candida* infections vary substantially and are based on the anatomic location of the infection, the patients' underlying disease and immune status, the patients' risk factors for infection, the specific species of *Candida* responsible for infection, and, the susceptibility of the *Candida* species to specific antifungal drugs, (Kett *et al.,* 2009). So, it is of great importance to know the species of *Candida* responsible for the infection as well as its susceptibility patterns.

The present study was done to know the distribution of various *Candida* spp. among clinical isolate and to find out the antifungal susceptibility pattern of *Candida* isolates from various clinical samples.

Materials and Methods

Study design: the present study is the retrospective study in we analyzed the species of *Candida* isolates and their antifungal susceptibility patterns to various antifungal agents

Specimens: various clinical samples including blood, urine, sputum, pus, bronchoalveolar lavge (BAL), oral swab, Skin/Nail Scraping, cerebrospinal fluid (CSF) and Cervical/Virginal swab from the patients suspected of having fungal infection were cultured to isolate the infecting fungi.

Specimen processing: The culture of specimens was done on Sabourauds dextrose agar (SDA) in accordance with the standard

methods. Yeast isolates were identified on the basis colony characteristics and further by germ tube production, morphology on corn meal agar, HiCrome *Candida* agar (Hi Media), urease test, carbohydrate fermentation tests and assimilation tests using yeast nitrogen base agar and other tests as per standard recommended procedures (Forbes *et al.,* 2002; Koneman *et al.,* 1997; Moore el al, 1979).

Antifungal susceptibility testing of the isolated yeasts was done in accordance with the proposed guidelines for disk diffusion susceptibility methods based on the CLSI document M44-A and Broth microdilution method based on the CLSI document CM27A. Antifungal susceptibility testing was performed using fluconazole, clotrimazole, itraconazole, ketoconazole, amphoteracin B and nystatin.

Result and Discussion

A total of 256 isolate of *Candida* species were recovered from various clinical samples like blood, urine, sputum, pus, BAL, oral swab and others (Figure 1).

C. albicans was the most common isolated species (169, 66%) followed by *C. parapsilosis* (27, 10.5%), *C. krusei* (20, 7.8%), *C. tropicalis* (19, 7.4%), *C. guilliermondii* (9, 3.5%), *C. dubliniensis* (7, 2.7%) and *C. glabrata* (5, 1.9%) (Table 1).

Fluconazole resistance was detected in 32 *Candida* isolates followed by resistance to ketoconazole in 3, Amphotericin-B in 2, Clotrimazole in 12 isolates, while no resistance was detected against Itraconazole and Nystatin (Table 2).

Infection of both bacterial and fungal is a frequent complication among patients admitted to tertiary care hospitals. The

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incidence of fungal infections especially candidiasis has been increasing during the past few years. Infections with these yeasts also have a direct impact on the choice of antifungal therapy and clinical outcome. Prior knowledge of species distribution in clinical isolates and antifungal drug sensitivity patterns help to choose early and apt empirical therapy.

Our study elucidates the distribution of various *Candida* spp. among clinical isolate and there antifungal susceptibility pattern. In our study *Candida* albicans was the most common species isolated, historically *Candida* albicans is considered the most pathogenic member of the genus *Candida* and is the species most commonly isolated from clinical materials, although infections with other species of *Candida* have been described in recent times (Pfaller, 1996; Fadda *et al.,* 2008). In immune-compromised patients although *Candida* albicans remains the most common isolated species (Anwar Khan *et al.,* 2012) but the emergence of non albicans *Candida* species is on rise (Manchanda et al., 2011; Ragini et al, 2011). In our study non albicans *Candida* species comprised of 44% of all yeast isolate, also invasive *Candida* infection was mostly caused by non-*albicans Candida* while *C. albicans* was found mostly in skin and mucosal surfaces.

Resistance to Azoles and polyenes continues to increase and is a matter of concern as this is the most commonly used empirical therapy for suspected fungal infections (Mar Masiá Canuto and Félix Gutiérrez Rodero, 2002). In our study, the resistance of yeast isolates against antifungal drugs was most commonly seen against fluconazole.

Kothari and Sagar *et al.* (2008), from North India reported the susceptibility profile of *Candida* isolates as to FLU, 24% to ITR, whereas in another study from South India showed 75% sensitivity to FLU (Adhikary and Joshi, 2011). Most of our isolates were sensitive to amphotericin-B and all isolates were sensitive to nystatin and Itraconazole. Similar susceptibility of *Candida* isolates was also reported by Mokaddas *et al.,* 2007; Fadda *et al.,* 2008).

To conclude, the present study showed that *Candida* albicans was the most commonly isolated yeast from various clinical specimens, also the increase in the resistance especially to azoles is a major concern. Therefore the species level identification of *Candida* isolates and its sensitivity profile is a must, More importantly this capability will also enable clinicians to choose appropriate antifungal agents, thus decreasing patient's morbidity and mortality.

Table.1 Distribution of *Candida* species isolated

species	No. of isolates
Candida albicans	169 (66%)
Candida parapsilosis	27 (10.54%)
Candida krusei	20 (7.81%)
Candida tropicalis	19 (7.42%)
Candida guilliermondii	9 (3.51%)
Candida dubliniensis	7 (2.73%)
Candida glabrata	5 (1.95%)
Total	256

Table.2 Antifungal susceptibility profile of isolated *Candida* species

Antifungal	No. of Resistant isolates
Fluconazole	32
Clotrimazole	12
Ketoconazole	3
Amphoteracin B	2
Nystatin	0
Itraconazole	0
Total	49

Figure.1 Distribution of various clinical samples
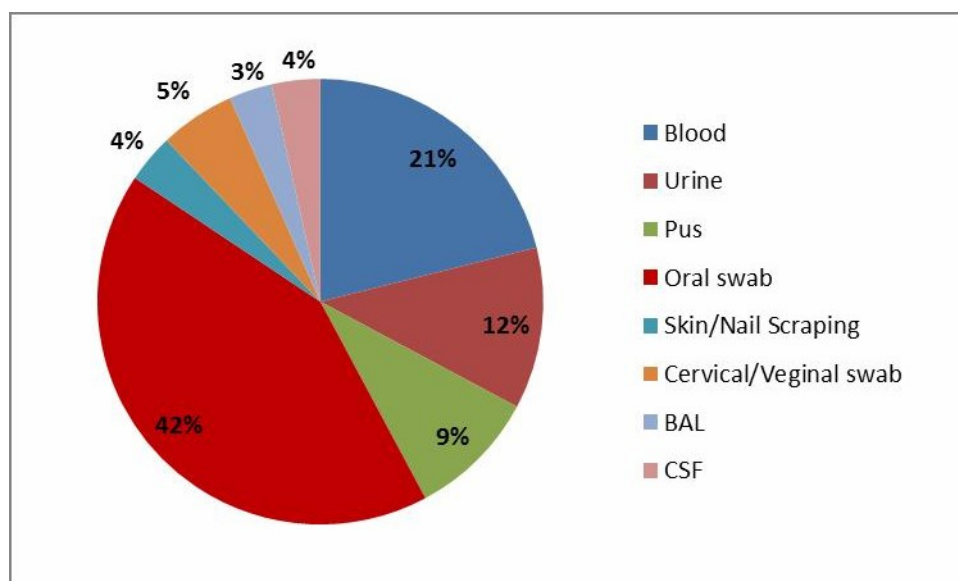
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