Journal of Applied Pharmaceutical Science Vol. 6 (03), pp. 048-050, March, 2016
Available online at http://www.japsonline.com
DOI: 10.7324/JAPS.2016.60308
ISSN 2231-3354 

# Non-Albicans Candiduria: An Emerging Threat

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**ARTICLE INFO**

*Article history:*
Received on: 04/01/2016
Revised on: 08/02/2016
Accepted on: 22/02/2016
Available online: 30/03/2016

***Key words:***
*Non Albicans Candida*, UTI, Candiduria.

**ABSTRACT**

**Objective:** The incidence of *Candida* has been on rise worldwide. Clinicians face dilemma in differentiating colonization from true candiduria. The species identification of *Candida* is important, as *non albicans Candida* species are increasing in number and more resistant to antifungal drugs.
**Material and method**s: The present study was conducted at a tertiary care teaching hospital of North India with an aim of investigating prevalence of NAC spp. among *Candida* isolates from urinary tract specimens.
**Results:** A total of 7627 urine samples were analysed in a tertiary care hospital. The *Candida* isolates (180) were further speciated by Gram stain, culture on sabouraud's dextrose agar, germ tube test, sugar fermentation test. A total of 180 (2.36%) *Candida* species were isolated from 7627 urine samples. Among them *non albicans Candida* species were predominant (66.7%), compared to *Candida albicans*(33.3%).The rate of isolates of *Candida* species were more in females, 101 (56.1%) than in males 79 (43.9%). The highest isolation rates of *Candida* among uropathogens were found in age group above 60 years.The emergence of *non-albicans Candida* similar to the trends in the western countries should be a cause of concern in our country.
**Conclusions:** NAC spp. have emerged as an important cause of urinary tract infections. Its isolation from clinical specimens can no longer be ignored as nonpathogenic isolate nor can it be dismissed as a contaminant. Proper surveillance of these fungal pathogens is important to improve quality of care in tertiary care setting.

## INTRODUCTION

Urinary tract infections (UTIs) are amongst the most common infections in both outpatients as well as hospitalised patients (Rashedmarandi *et al.*, 2008). The frequency of urinary tract infections (UTIs) due to *Candida* species is increasing and these infections are now being the most common clinical finding, particularly in hospitalised patients (Manisha *et al.*, 2011). *Candida* species account for almost 10-15% nosocomial UTIs (Lundstrom *et al.*, 2001; Kauffman *et al.*, 2000). The presence of *Candida* species in the urine is known as candiduria. Candiduria if not properly diagnosed and treated has been source of morbidity and mortality (Manjunath *et al.*, 2011). *Non albicans Candida* (NAC) species have replaced *Candida albicans* as the predominant pathogen. *Non albicans Candida* species appear better adopted to the urinary tract environment and are more resistant to antifungal drugs compared to *C. albicans*. The clinical manifestations of infections caused by different members of NAC spp. are usually indistinguishable but several NAC species are inherently resistant or acquire resistance or both to commonly used antifungal drugs (Manjunath *et al.*, 2011).

The shift of *Candida* spp. from commensal to potent pathogen is facilitated by a number of virulence factors such as adherence to host tissues and medical devices, biofilm formation, and secretion of extracellular hydrolytic enzymes (Sardi *et al.*, 2013). Although there has been extensive research to identify these pathogenic attributes *in C. albicans*, relatively less is known about NAC spp (Sachin *et al.*, 2012).

The present study was conducted at a tertiary care teaching hospital of North India with an aim of investigating prevalence of NAC spp. among *Candida* isolates from urinary tract specimens.

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## MATERIALS AND METHODS

A total of 7627 urine samples were collected from patients attending to outpatient department and admitted in the hospital at SRMSIMS, Bareilly from June 2014 to June 2015. Permission from the institutional ethical committee was taken.

### Inclusion criteria

Male and female patients of all age groups were considered for our study. Both outpatients and inpatients who presented with signs and symptoms of urinary tract infections were included. Pure growth of yeast isolates with significant colony count was included in the study.

### Exclusion criteria

The urine samples where *Candida* species was isolated in the absence of pyuria, *Candida* with colony count ≤ 1000 CFU/ml and mixed growth (polymicrobial growth) were excluded from analysis.

The urine samples were collected in a sterile leak proof container with screw capped lids and transported immediately to microbiology laboratory. Urine wet mount examination was done to look for the presence of pus cells, red blood cells, casts, crystals or any bacterial or fungal elements. The urine samples were inoculated on Cysteine Lactose Electrolyte Deficient (CLED) by calibrated wire loop technique delivering 0.001ml of urine as per standard protocol for urine culture. The culture plates were incubated aerobically at 37°C for 24 to 48 hours. *Candida* species isolated on culture plates with colony count >10000 CFU/ml were considered significant (Ang *et al.*, 1993; Chakrabarthi *et al.*, 2002).

The *Candida* isolates (180) were further speciated by culture on Sabourauds dextrose agar (SDA) in accordance with the standard methods. They were further speciated on the basis of colony characteristics, 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 *et al*., 1979).

### Germ tube test (GTT)

This was done according to the method of Baker (1967) (Baker *et al.*, 1967). Yeast isolates suspected to be *C. albicans* were inoculated into human serum, incubated for about 30 min at 37°C and examined microscopically for the production of germ tubes.

## RESULTS AND DISCUSSION

A total of 180 (2.36%) samples showed the growth of *Candida* species out of 7627 urine samples. Among them Non albicans *Candida* species 120 (66.7 %), were predominant compared to *C. albicans* 60 (33.3%). *Non albicans Candida* species included *C. tropicalis* (20.6%), *C. gullermondi* (15.5%), C. intermedia (15%), C. krusei (11.1), *C. pseudotropicalis* (3.9) and *C. stelloidia* (0.5) [Table 1]. The rate of isolates of *Candida* species were more in females, 101 (56.1%) than in males 79 (43.9%). The highest isolation rates of *Candida* among uropathogens were found in age group above 60 years [Table 2].

**Table 1:** Distribution of *Candida* species in urine samples.

| *Candida* species | Total number = 180 | Percentage (%) |
|---|---|---|
| *C. albicans* | 60 | 33.3 |
| *C. tropicalis* | 37 | 20.6 |
| *C. krusei* | 20 | 11.1 |
| *C. gullermondi* | 28 | 15.5 |
| *C. intermedia* | 27 | 15 |
| *C. pseudotropicalis* | 7 | 3.9 |
| *C. stelloidia* | 1 | 0.5 |

**Table 2:** Age and Gender wise distribution of *Candida* isolates.

| Age group | Male | Female | Total |
|---|---|---|---|
| 1-15 | 3 | 4 | **7** |
| 16-30 | 13 | 31 | **44** |
| 31-45 | 10 | 19 | **29** |
| 46-60 | 17 | 13 | **30** |
| >60 | 36 | 34 | **70** |

The prevalence of candiduria caused by the species other than *C. albicans* was surprisingly high in the given study. Changing trends in the aetiopathogenesis of urinary tract infections and considerable increase in number of *non albicans Candida* species is a matter of concern (Ochipinti *et al*., 1994). In the present study, isolation rate of *Candida* species from urine samples were 2.36%, which is comparable to the observation of Yashavanth *et al*., (2.27%) (Yashavanth *et al*., 2013) and slightly higher than the observation of Ragini *et al*., (1.37%) (Ragini *et al*., 2012). Studies have shown that there is considerable increase in non albicans *Candida* species among candiduria. Similar to the finding of Iman *et al*., (Iman *et al*., 2012) and Yashavanth *et al*., (Yashavanth *et al.*, 2013), we found the isolation rate of non albicans *Candida* was 66.7%, which is higher than *C. albicans* 33.3%. This is also consistent with emergence of predominance of *nonalbicans Candida* species all over the world (Pfaller *et al.*, 1999). Identification of *Candida* species is important as *non albicans Candida* are more resistant to azoles compared to that of *C. albicans*. *C. krusei* is intrinsically resistant to fluconazole.

The present study had a female preponderance, with an overall male: female ratio being 1:1.28, indicating that female sex is a risk factor for developing candiduria. Since colonization of vulvo vestibular area with *Candida* spp. is frequent in females, they are more at risk of developing candiduria due to ascending infection (Lundstrom *et al.*, 2001; Bukhary *et al.*, 2008). Though candidiasis can occur at all ages, we found the highest incidence of candiduria in the age group above 60 yrs which is similar to as stated by Yashavanth *et al*. (Yashavanth *et al.*, 2013). This could be due to lowered host defenses at extremes of age. This finding is supported by many other researchers. (Passos *et al.*, 2005; Fisher *et al.*, 1995; Kobayashi *et al.*, 2004).

Among the *Non albicans candida*, *C. tropicalis* (20.6%) was the most common followed by *C. gullermondi* (15.5%). Our observation is similar to that of Álvarez-Lerma *et al*. (2003) and

Kauffmann *et al.* (2005), where >50% of urinary *Candida* isolates belonged to the above written species. NAC spp. are not only well adapted to the urinary tract but also more difficult to eradicate than *C. albicans*. Presence of indwelling urinary catheters, advanced age, diabetes mellitus, and pregnancy are major risk factors associated with candiduria. Incidence of candiduria was high among patients admitted to the ICU and among those who had a previous history of treatment with antibiotics (Sachin *et al.*, 2014).

## CONCLUSION

The emergence of non-albicans *Candida* similar to the trends in the western countries should be a cause of concern in our country. In our study, NAC spp. were the predominant pathogens associated with candiduria. Therefore, it can be concluded that NAC spp. have emerged as an important cause of urinary tract infections. Its isolation from clinical specimens can no longer be ignored as nonpathogenic isolate nor can it be dismissed as a contaminant. Proper surveillance of these fungal pathogens is important to improve quality of care in tertiary care setting.

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**How to cite this article:**

Goyal RK, Sami H, Mishra V, Bareja R, Behara RN. Non-Albicans Candiduria: An Emerging Threat. J App Pharm Sci, 2016; 6 (03): 048-050.