

**STUDY OF CANDIDURIA IN CATHETERIZED ICU PATIENTS****NUZHAT FIRDOS*¹, DEEPALI.M.KULKARNI², SANDEEP.L.NILEKAR³ AND SWATI KANT⁴**

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ABSTRACT

Candiduria is an important nosocomial infection afflicting urinary tract. Candiduria in critically ill patients may be life threatening. The common risk factors for Candiduria are indwelling urinary catheter, antibiotic usage, diabetes mellitus, and prolonged hospitalization. *Candida albicans* has been reported as the most common causative organism for Candiduria in most of the observational studies, followed by *Candida glabrata* and *Candida tropicalis*. Species identification of the *Candida* causing nosocomial UTI should be an important routine procedure before initiating treatment as some are inherently resistant to fluconazole. The present study was thus envisaged with the aim to study the incidence of Candiduria in the ICU of a rural tertiary care hospital, Ambajogai and to identify *Candida* isolates upto species level by various phenotypic methods, and study their antifungal susceptibility pattern. Species identification was done by the germ tube test, cornmeal agar morphology, CHROMagar, sugar assimilation and fermentation test.. Antifungal susceptibility was done by disk diffusion method. From 76 urinary samples 35 (46.05%) *Candida* species were isolated. *Candida tropicalis* was most commonly isolated species followed by *Candida albicans*. Resistance to fluconazole, ketoconazole and itraconazole was high in non-*albicans* group.

KEY WORDS: Candiduria , catheterized , antifungal susceptibility, CHROMagar.

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INTRODUCTION

Candiduria is an important nosocomial infection afflicting the urinary tract.¹ It is defined as the presence of yeast cells in urine.² Candiduria in most of the patients is asymptomatic, but in critically ill patients it may be life threatening.^{3, 4} The clinicians face diagnostic dilemma in differentiating , colonisation from true infection and to decide whether Candiduria requires any therapeutic intervention.^{4,5} Contamination can be ruled out by obtaining second sterile urine sample, but there are no consistent diagnostic criteria to differentiate colonization of the urinary tract from true urinary tract infection with *Candida* species till date.^{1,4,6,7,8} The common risk factors for Candiduria are indwelling urinary catheter, prior surgical procedure, antibiotic usage, old age, diabetes mellitus, immunosuppressive therapy and prolonged hospitalization.¹ *Candida albicans* has been reported as the most common causative organism for Candiduria in most of the observational studies, followed by *Candida glabrata* and *Candida tropicalis*.¹ Since Candiduria in presence of risk factors predisposes the patients to disseminated candidiasis, awareness to validate Candiduria and the need to stratify treatment according to the patient's state is warranted.^{1,9,10,11} Species identification of the *Candida* causing nosocomial UTI should be an important routine procedure before initiating treatment as many non-*albicans* *Candida* species are inherently resistant to fluconazole.^{12,13,14} The present study was thus envisaged with the aim to study the incidence of Candiduria in the ICU of a rural tertiary care hospital, Ambajogai and to identify *Candida* isolates upto species level by various phenotypic methods, and study their antifungal susceptibility pattern.

MATERIALS AND METHODS

The study was done during Jan 2012 to June 2012. Out of 76 urine samples obtained from the catheterized ICU patients, 35 *Candida* spp. were isolated.

Inclusion criteria

- 1) Samples were taken from catheterized patients admitted in ICU for more than 72 hrs.
- 2) Urine samples showing pus cells on direct examination were included.
- 3) Yeast isolated as pure growth were further speciated.

Exclusion criteria

- 1) Samples of non catheterized patients, or whose duration of hospital stay less than 72 hrs.
- 2) Urine samples without pus cells.
- 3) Urine samples showing mixed growth.

Patients demographic details such as age, sex, duration of hospital stay, duration of catheterization, h/o antibiotic usage, diabetes mellitus and other clinical details were also obtained.

Sample processing

The samples were processed as per standard protocols. Direct microscopy was done to see for pus cells, RBC, cast, bacteria, or fungal elements. Gram staining was done to see for gram positive yeast cells. Culture was done on Sabouraud dextrose agar (SDA). Two sets of SDA slope were inoculated and incubated at 37°C and 30°C. The isolates were identified as *Candida* species by repeat gram staining. Repeat isolation was done to rule out contamination. Species identification was done by germ tube test, cornmeal agar morphology, sugar assimilation and fermentation test. Simultaneously, identification of *Candida* isolate was done by culture on CHROMagar. Antifungal susceptibility was done by disk diffusion method using commercially available antifungal discs procured from Hi media. ATCC 10231 *Candida albicans* was used as control strain.

Interpretative Criteria for Susceptibility of Antifungals

The interpretative criteria for fluconazole, voriconazole, amphotericin B, ketoconazole , itraconazole are indicated in table.1 .^{15,16}

Table 1
Interpretative criteria of susceptibility and resistance of used antifungal disks.

	Antifungals	Zone Diameters in mm		
		Sensitive	Dose dependent	Resistant
1	Fluconazole	≥19	15-18	≤14
2	Voriconazole	≥17	14-16	≤13
3	Ketoconazole	≥30	29-23	≤ 22
4	Itraconazole	>16	10-15	< 9
5	Amphotericin-B	>15	10-14	< 9

RESULTS

From 76 urinary samples 35 (46.05%) *Candida* species were isolated

Table 2
The following species were isolated

No.	Isolated species	No.
1.	<i>Candida tropicalis</i>	18 (51.42%)
2.	<i>Candida albicans</i>	12 (34.28%)
3.	<i>Candida parapsilosis</i>	2 (5.71%)
4.	<i>Candida glabrata</i>	2 (5.71%)
5.	<i>Candida dubliniensis</i>	1 (2.85%)
	Total	35 (100%)

Fluconazole resistance was seen in 16% of *Candida albicans*, and 30% of non-*Candida albicans* strains. Ketoconazole resistance was seen in 16% of *Candida albicans* whereas 21% of non-*albicans*. Itraconazole resistance in 18% of *Candida albicans* and 20% of non-*albicans* strains. Among non-*albicans*

Candida glabrata showed maximum resistance. It was 100% resistant to Fluconazole and Ketoconazole and 50% resistant to Itraconazole. All strains were 100% sensitive to Voriconazole and Amphotericin B.

Figures



Figure 1
Colony of Candida on SDA

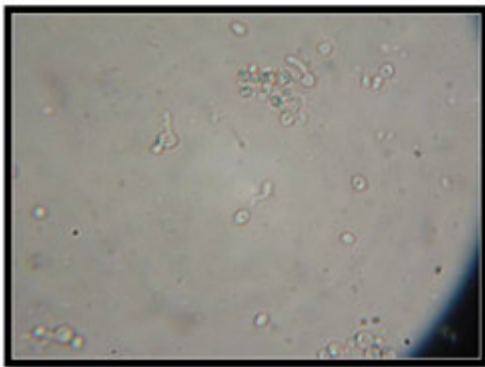


Figure 2
Germ tube

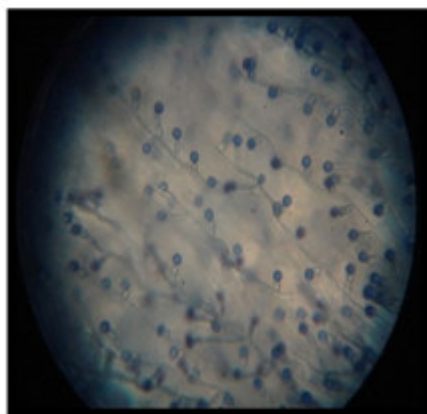


Figure3
Chlamydospores of Candida albicans

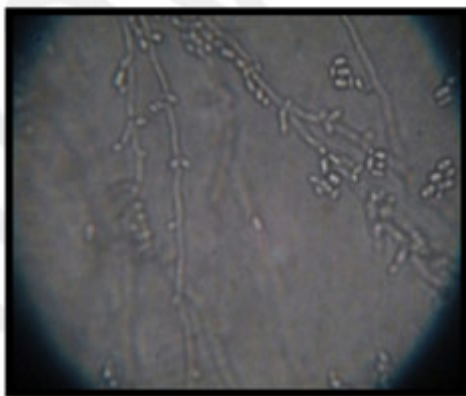


Figure 4
Cornmeal agar morphology of C.tropicalis

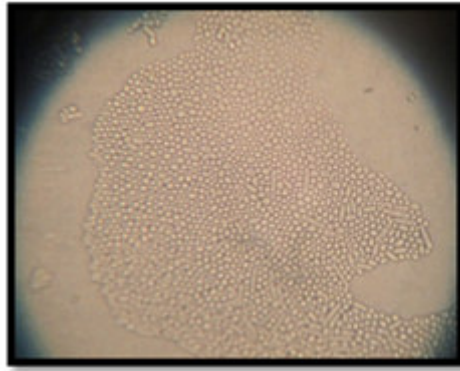


Figure 5
Cornmeal agar morphology of Candida glabrata

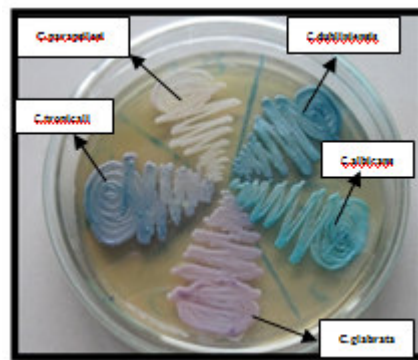


Figure 6
Different species of Candida on CHROM agar

DISCUSSION

Candida species account for almost 10-15% of nosocomial urinary tract infections. *Candida albicans* has been the most commonly isolated species from nosocomial UTI.⁵ But the microbiological trend is shifting, and non-*albicans* *Candida* are replacing *Candida albicans* as predominant pathogens for nosocomial UTI.⁵ In our study also out of 35 *Candida* isolates 23 (65.71%) were non-*albicans* *Candida*. *Candida tropicalis* 18 (51.4%) was the commonest non-*albicans* species isolated, followed by *Candida albicans* 12(34.28%). Other species isolated were *Candida parapsilosis* 2 (5.71%), *Candida glabrata* 2 (5.71%), *Candida dubliniensis* 1(2.85%). In a study done by Prasad *et.al* the isolation of non-*Candida albicans* species were higher (52.4%) as compared to *Candida albicans* (47.6%).¹⁷ Chakrabarthy A *et al* found *Candida tropicalis* as the commonest species isolated from urine (58.7%) followed by *Candida albicans*.¹⁸ Urinary catheter was

universal risk factor seen in all the patients followed by, prior antibiotic therapy with Cephalosporins and Imepenem 12 (34.28%), diabetes mellitus 8 (22.8%), and major surgery 4 (11.4%), prolonged hospital stay due to chronic disease 4 (11.4%), underlying renal pathology 2 (5.71%). Catheterization can lead to infection by the introduction of organism during catheterization process or through migration of the organism along the surface of catheter into the bladder.¹⁹ Candiduria was common in patients who were catheterized for more than 10 days. There is a direct relationship between the duration of catheterization and nosocomial Candiduria, thus as the duration of catheterization increases the risk of Candiduria also increases.⁵ Prolonged use of antibiotics suppresses the endogenous flora and increases the risk of colonization with *Candida* spp.²⁰ Females are at increased risk of developing Candiduria due to ascending

infection because of colonization of vulvovestibular area with *Candida* spp.^{1,6} But in our study males (68%) were commonly affected. Mirdha B.R *et al* and Chakrabarthy A *et al* also found increased percentage of Candiduria in males.¹⁸ Diabetes mellitus is a well-known risk factor for Candiduria.^{1,4,6,21} This is because diabetes reduces the host resistance to invasion by fungi and also promotes urinary stasis in neurogenic bladder, thus further increasing the chances of colonization of *Candida* spp.^{5, 21} Resistance to fluconazole, ketoconazole and itraconazole was high in non-*albicans* group. Among them *Candida glabrata*, followed by *Candida tropicalis*, showed maximum resistance. It has been reported that *Candida glabrata*, *Candida tropicalis*, *Candida parapsilosis*, have higher resistance rates than *Candida albicans* against fluconazole.²² No resistance was seen to voriconazole and amphotericin –B. CHROMagar is a differential medium which yield different coloured colonies, secondary to chromogenic substance that react with the enzyme secreted by them.^{23,24} It is very useful medium for the identification of mixed *Candidial* infection. Identification of *Candida*

spp. by conventional methods requires 3-5 days or even longer.²⁵ Use of CHROMagar reduces the time required for identification of species upto 24 - 48hrs.²⁶

CONCLUSION

Candiduria as nosocomial urinary tract infection in catheterized patients of ICU is an issue of concern. Along with *Candida albicans*, non-*albicans Candida* are increasingly found to be associated with these infections. Indwelling catheters, systemic antibiotic use, diabetes mellitus, previous surgery are commonly associated risk factors. CHROMagar can be used for presumptive identification as it gives excellent results within short time. The changing microbiological trend of *Candida* infections, highlights the need for close surveillance of *Candida* species distribution and susceptibility patterns, in order to optimise treatment and reduce the morbidity and mortality due to these infections.

CONFLICT OF INTEREST

None

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