

# Epidemiology, Characterization and Antifungal Susceptibility Profile of *Candida Species* Isolated From Suspected Cases of Urinary Tract Infections at Tertiary Care Centre of North Delhi

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## ABSTRACT

**Purpose:** Funguria is a condition characterized by the presence of fungus in urine. It is a common finding at tertiary care hospitals across the globe. There is limited literature on fungal profile in funguria cases especially from our country. This study was undertaken to know the fungal profile amongst candiduria cases and to know the antifungal susceptibility profile of different isolates at a tertiary care hospital in North Delhi.

**Methods:** Culture & sensitivity testing of two consecutive mid stream urine samples from suspected cases of urinary tract infection was done at the Department of Microbiology, North DMC Medical College & Hindu Rao Hospital. Yeast like isolates obtained were further speciated by conventional methods by Gram staining, germ tube test, growth on corn meal agar with Tween 80, colony colour on CHROM agar candida medium, and VITEK 2 System. Antifungal susceptibility testing of Candida isolates was performed using VITEK 2 System

**Results:** In this study, out of 4838 urine samples, 50 yeast like isolates were obtained. In these, 33 were from OPD clinics and 17 were from indoor wards. Of the 50 Candida isolates, 18 (36%) and 32 (64%) were from male and female patients respectively. The male to female ratio was 0.56. In our study, *Candida albicans* was the most common species isolated followed by *C.tropicalis*, *C.glabrata* and *C. parapsilosis*. In this study, 84% Candida species were sensitive to Fluconazole, 92% to Voriconazole, 88% to Caspofungin, 86% to Amphotericin B and 88% to Flucytosine.

**Conclusion:** Our study will help in identifying the common *candida spp.* and their antifungal sensitivity pattern in cases of fungal urinary tract infections.

**Keywords:** Fungal UTI, *Candida albicans*, Fluconazole resistance

## INTRODUCTION

Funguria is a condition characterized by the presence of fungus in urine. It is a common finding at tertiary care hospitals across the globe. Candiduria may range from 16-22 per cent in patients admitted in hospitals. [1,2] There are various risk factors for funguria namely female sex, elderly, children below 10 years of age, urinary catheterization, ICU admission, diabetes mellitus, and long term broad spectrum antibiotic therapy. [1-4]

Urinary tract mycosis may often be a result of *candida* urinary tract infection because of frequent isolation of *candida* in urine. [5,6] Most common isolate in urine is *Candida albicans* followed by *C. glabrata* and *C. tropicalis*. The strains of *Candida* show varying trends in pathogenicity and may be isolated in combination with other microorganisms. [6,7,8] Potential risk factors for *Candida* infection should be detected early in view of their clinical importance,

severities and for initiation of treatment. [9,10]

Limited literature is available on fungal profile in candiduria cases especially from our country. So, this study was undertaken to know the fungal profile amongst candiduria cases and to know the antifungal susceptibility profile of different isolates at a tertiary care hospital in North Delhi.

## MATERIAL & METHODS

In this study, culture and sensitivity testing of 2 consecutive mid stream urine samples from clinically suspected cases of urinary tract infection was done at the Department of Microbiology, North DMC Medical College & Hindu Rao Hospital between January-June 2019. The urine samples were inoculated on Blood agar and MacConkey agar and incubated at 37°C for 18-24 hours. Yeast like isolates obtained on blood agar were further identified by conventional methods by Gram staining, germ tube test, growth on corn meal agar with Tween 80, colony colour on CHROM agar candida medium and further confirmed by VITEK 2 System. Antifungal susceptibility testing of Candida isolates was performed using VITEK 2 System.

### Inclusion criteria [11]

1. Indoor and outdoor patients with signs and symptoms of urinary tract infection like bladder discomfort, frequency, painful or difficulty in micturition and fever were included in the study.
2. Pure growth of yeast isolates having significant colony count >10<sup>3</sup>CFU/ml

### Exclusion criteria [11]

1. Sample showing mixed growth of microorganisms on blood agar and MacConkey agar was excluded from the study.
2. A colony count less than 10<sup>3</sup> CFU/ml was excluded.

### Statistical Analysis

All the statistical calculations were done using MEDCALC software version 14.12.0 (Med Calc Software bvba, MedCalc Ostend, Belgium).

## RESULTS

Between January-June 2019, 4838 urine samples were received for urine culture and sensitivity testing from patients with suspected urinary tract infection. Gram staining of all the isolates obtained on blood agar was done. During this period, 50 (1.03%) yeast like isolates were obtained (Table 1).

Table 1: Total no. of samples received for testing and total no. yeast like isolates obtained

Total No. of urine samples	Total No. of Candida species(%)
4838	50 (1.03%)

These isolates were identified by germ tube test, growth on cornmeal agar with Tween 80 and colony color on CHROM agar candida medium as per manufacturer's instructions.

All Candida isolates were further confirmed by VITEK 2 system.

Out of 50 Candida isolates, Germ tube test was positive in 27 isolates (not shown in table).

Out of 50 Candida isolates, 33 were from OPD clinics and 17 were from Indoor wards (Table 2).

Table 2: OPD and IPD distribution of Candida species

OPD	IPD	Total
33	17	50

Of the total isolates, 18 (36%) and 32 (64%) were from male and female patients respectively (Table 3). The male to female ratio was 0.56.

Table 3: Gender-wise distribution of Candida species

Male	Female	Total
18	32	50

The cumulative mean age of the patients was 27.64±19.97 years whereas for male and female, the mean age was 26.5±23.17 years & 28.53±17.86 years respectively. An age-wise distribution of candiduria cases is shown in the Table 4. Maximum cases of candiduria (22;44%) were seen in 21-40 age group followed by 51-70 age group(16;32%).

**Table 4: Age-wise distribution of Candida species**

Age Group	Male	Female
0-10	01	01
11-20	01	01
21-30	01	12
31-40	02	07
41-50	05	03
51-60	07	08
61-70	01	00
Total	18	32

a. Mean age of patients = 27.64±19.97 years  
 b. Males; Females = 26.5±23.17 yrs;  
 28.53±17.86 yrs.  
 The antifungal sensitivity of various candida isolates is given in table 5.

**Table 5: Antifungal profile of Candida species**

Antifungal Drug	Candida albicans (28)			Candida tropicalis (15)			Candida glabrata (05)			Candida parapsilopsis (02)		
	S	I	R	S	I	R	S	I	R	S	I	R
Fluconazole	23	3	2	12	2	1	5	0	0	2	0	0
Voriconazole	25	2	1	14	0	1	5	0	0	2	0	0
Caspofungin	24	3	1	13	1	1	5	0	0	2	0	0
Amphotericin B	21	4	3	15	0	0	5	0	0	2	0	0
Flucytosine	22	5	1	15	0	0	5	0	0	2	0	0
Micafungin	-	-	-	-	-	-	5	0	0	-	-	-

In this study, 84% candida species were sensitive to Fluconazole, 92% to Voriconazole, 88% to Caspofungin, 86% to Amphotericin B and 88% to Flucytosine.

## DISCUSSION

Urinary tract infection caused by fungus or funguria have become an important nosocomial infection over the past few years. Around 15 per cent of urinary tract infections are caused by Candida species. [1,12,13]

Out of the total 50 Candida isolates, 33(66%) were from OPD clinics and 17(34%) were from indoor wards. In case of 17 indoor patients, 11(64.70%) were catheterized which also happens to be an important cause of urinary tract infection in admitted patients. Our findings are supported by study done by Mario Gajdacs *et al.* [14]

In our study, 18 (36%) and 32 (64%) Candida isolates were from male and female patients respectively (Table 3). The male to female ratio in our study was 0.56 showing female preponderance. Increased cases amongst women may be due to various factors like usage of birth control methods containing high doses of estrogen, douches or vaginal sprays, pregnancy, uncontrolled diabetes mellitus, antibiotic therapy etc. Similar results were seen in study done by Surumy P. Sulaiman *et al.* [15]

In our study, mean age for candiduria in case of male and female was 26.5±23.17 years and 28.53±17.86 whereas cumulative mean age for the group was 27.64±19.97 years.

In this study, 22 (44%) adults were between 21-40 yr of age and 16 (32%) out of 50 positive cases were between 51-70 years of age. The higher rate amongst elderly in our study may be due to decreased immunity in this age group. Similar findings were seen in studies done by Jain *et al* and Kauffman *et al.* [3,4]

Two cases (4%) of candiduria were below 10 years of age in our study. Fungal UTI in children may be attributed to compromised immune system, long-term therapy with broad-spectrum antibiotic or possible anomalies of the urinary tract. Our findings were supported by studies by Sheikh and Desai *et al.* [16, 17] A study by Zahra Seifi *et al* shows candiduria prevalence rate of 5.2 % among children below 14 years of age. [18]

There was only 1 (3.7%) out of 28 isolates of *C. albicans* in the present study which was germ tube test negative. Negative result was confirmed by examining at least 10 high power fields for the presence of germ tube. [19] The germ tube test negative species of *C. albicans* was identified by characteristic color on CHROM agar candida medium, growth on cornmeal agar with Tween 80 and VITEK 2

system. The negative germ tube test in *C. albicans* may be due to high concentration of yeast inoculum  $> 10^7$  cells /MI. [20]

In our study, *C. albicans* was the most common fungal isolate found in suspected fungal urinary tract infection, followed by *C. tropicalis*, *C. glabrata* and *C. parapsilosis* (28>15>5>2). Similar fungal profile has also been reported in other studies done by Jain et al and Paul N et al. [3,21,22] *C. albicans* was the most common isolate and was followed by *C. glabrata* from studies done outside India by Zarei-Mahmoudabadi et al, Kauffman et al, da Silva et al, Silva EH et al, Fraise T et al, Ozhak-Baysan B et al & Febré N et al. [1,4,23-26]

The overall rate of resistance to fluconazole was 6% (3 out of 50 isolates). Only 02(7.14%) out of 28 *C. albicans*, 01 (6.67%) out of 15 isolate of *C. tropicalis* were resistant to fluconazole while none of the isolates of *C. glabrata* and *C. parapsilosis* were resistant to fluconazole in our study. The resistance to fluconazole may be due to excessive use of fluconazole in suspected fungal infections. Reena Ray-Ghosh et al has reported high level of resistance (37%) to fluconazole. [27]

In our study, out of total 50 Candida isolates, 94% were sensitive to amphotericin B. The remaining 6% Candida isolates which were resistant to amphotericin B belonged to *C. albicans*. Study done by Reena Ray et al shows 91% sensitivity to amphotericin B.

There was a limitation of this study as this study was conducted only on 50 Candida isolates, a study involving more isolates would yield better conclusive results.

## CONCLUSION

Our study will help in identifying the common candida species and their antifungal sensitivity pattern prevalent in cases of candiduria.

## Conflict of Interest

There is no conflict of interest to declare.

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