

# Prevalence of *Candida* species infection among intensive care unit patients at tertiary care hospital, Kanpur, Uttar Pradesh

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## Abstract:

**Introduction:** The presence of *Candida* in urine, called Candiduria. Immunocompromised individuals are more susceptible to this infection and it can cause life-threatening complications. *Candida albicans* is most common isolate in Urinary Tract Infections (UTI) but in recent years this is shifting to non-*albicans* groups. Researchers found that azole is the drug of choice against *Candida* infections but due to excess use of these drugs resistance is developing more frequently for azole group drugs and drug resistant isolates are increasing gradually. A unique virulence factor i.e biofilm production, similarly like bacterial species is a crucial factor which contributes to the resistance against antifungal drugs.

**Objective:** To assess the prevalence of *Candida* species among intensive care unit patients (ICU).

**Material & Methods:** An institutional based cross-sectional study was conducted in Department of Microbiology, Rama Medical College Hospital & Research Centre, Kanpur, Uttar-Pradesh, India for a period of 6 months i.e, from January 2023 to June 2023. A total of 60 samples of foley's tip were collected for this study from Intensive care unit (ICU) and different wards of the hospital belonging to the age group 15 to 75 years of age. 60 foley's tip samples received. They were processed by standard microbiological procedures. Isolated organisms were speciated as per guidelines.

**Result:** Among these 60 foley's tip samples from various wards and ICUs were culture on Hichrome agar to isolate the *Candida* species. Out of 60 culture samples 45 samples showed positive growth for *Candida* species and remaining 15 samples was culture negative. In culture positive cases 32 (71.1%) were females and remaining 13(28.88%) were males. Diabetes mellitus was the main co-morbidity factor in Candiduria patients. The incidence rate was high in ICU patients than in non ICU patients. Most the samples were isolated from general medicine and Obstetrics and Gynaecology department followed by general surgery.

**Conclusion:** Present study found the high prevalence of candiduria and the isolates were biofilm producers with increasing resistance against most common drugs fluconazole which is a major concern for the treatment and management aspects. In immunocompromised patients, it is important to identify the species of *Candida* isolates as well as their antifungal susceptibility pattern to assist the clinicians in treating the patients with candiduria.

**Keywords:** *Candida* spp., Antifungal drugs, Candiduria, Biofilm, Prevalence.

## Introduction

Globally, among other *Candida* species, *Candida albicans* is mainly responsible for systemic candidiasis and fungal nosocomial UTIs. *Candida albicans* is a dimorphic fungus which has a unique virulence property so it can switch between yeast and filamentous forms. There are several other attributes pertaining to *C. albicans* that have absolutely been considered as pathogenic markers including adhesion, tissue invasion, secreting hydrolytic enzymes, stereotropism and biofilm production [1-3]. A common clinical finding in hospitalised patients is *Candida* species in their urine (candiduria). *Candida* species in urine may be asymptomatic (in healthy people or patients) or symptomatic. There are many clinical conditions in

Which patients are more prone to candiduria which includes interstitial cystitis, Epididymo-orchitis, prostatitis, pyelonephritis, and renal candidiasis. The immune status of ICU patients is always on the weaker side which is beneficial for the *Candida* species to cause infections in these patients resulting in the high mortality rate and the prevalence is also very high [4,5]. There are many factors which includes gender (female), age, prolonged antibiotic intake, sex activities, Acquired Immunodeficiency Syndrome(AIDS), pregnancy, cancer patients, multiple clinical procedures, hypertension, hospitalisation, indwelling catheter or prosthetics, malnutrition, social behaviour, these are the predisposing factors leading to UTI candidiasis in patients [6,7]. Among the *Candida* species causing infections in young and adult individual's three most common species include, *C. albicans*, *C. glabrata*, and *C. tropicalis*. Candidauria and UTIs by *Candida* spp have different prevalence rates depending on geographical location, therefore, regional data is essential for evaluating the shift and to determine the scenario at national level. Hence, this study was done to assess the *Candida* prevalence in UTI.

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## Material and Methods

This study was carried out in the Department of Microbiology, Rama Medical College Hospital & Research Centre Kanpur, Uttar Pradesh January 2023 to June 2023. All foley's tip samples from patients who were admitted (IPDs) in various wards and ICUs were included. A total of 60 foley's tip samples received in the lab from various wards and ICUs were processed. Inclusion criteria: Microbiology fungal culture records which were related to only urine samples from all wards and ICU were included in the study retrospectively. Pure growth of yeast isolates having significant colony count >103 CFU/mL.

### Exclusion criteria

The study excluded other clinical samples from all wards and ICU. A colony count less than 103 CFU/mL was excluded from the study.

### Data collection

The study was conducted on 60 foley's tip samples received from different clinical departments. Among 60 samples, there were of 45 culture positive samples. In culture positive cases 32 (71.1%) were females and remaining 13(28.88%) were males. Candiduria data were collected from Institute's microbiology records retrospectively. Only urine samples received from inpatient and outpatient during the given period were included in this data screening. The collection of patient data, which contained only demographic information and the indication for the submission of samples, was also conducted. The term candiduria in clinical microbiology is described as the isolation of Candida species from urine samples on at least one occasion with >103 CFU/mL. Candida isolate is considered to be separate if it occurred more than 30 days apart or if it contained different species of Candida.

### Isolate identification

A total of 10 µL of each uncentrifuged and homogenised urine sample was cultured with a calibrated loop on Cysteine Lactose Electrolyte Deficient (CLED) agar, (Himedia, Mumbai, India) incubated overnight at 37°C for 18 hours, aerobically. If the colony count was 105 or more CFU/ml and upon suspicion of Candida spp. a wet mount of an isolated colony was prepared and examined during microscopy and after confirmation of the Candida spp. the isolates were further processed as per standard protocol [5]. Fungal colony morphology was confirmed by using Sabouraud Chloramphenicol Agar (Himedia, Mumbai, India), germ tube production, and micro morphology on HiCrome Candida Differential Agar (Himedia, Mumbai, India). All clinical samples were processed according to standard microbiology protocol [5] with standard guidelines.

## Statistical analysis

Data recorded on the case report from and structural proforma were subsequently entered into a spreadsheet. Data management and analysis were performed using Microsoft excel.

## Ethical consideration

The ethical committee clearance certificate was taken before starting of study by institutional medical ethical committee.

## Results

Among these 60 foley's tip samples from various wards and ICUs were culture on Hichrome agar to isolate the Candida species. Out of 60 culture samples 45 samples showed positive growth for Candida species and remaining 15 samples were cultures negative. In culture positive cases 32 (71.1%) were females and remaining 13(28.88%) were males. Diabetes mellitus was the main co-morbidity factor in Candiduria patients.

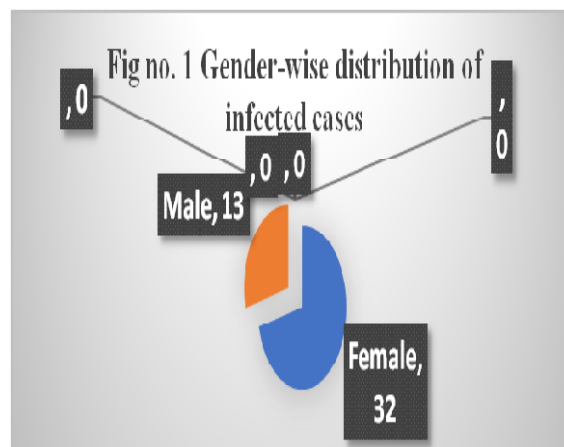


Figure no 1: shows the gender wise distribution of infected patients in which females are highly affected than males.

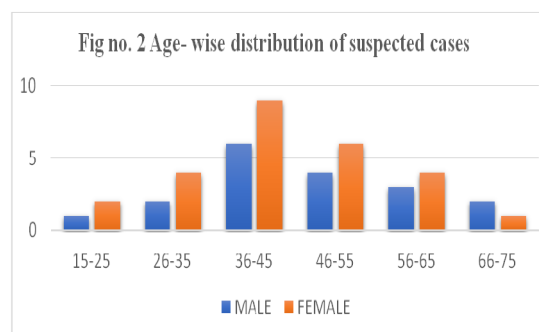


Figure no 2: shows the age wise distribution of male and female patients in which both the male and female patients which are belonging to the age group 36-45 years of age are highly affected.

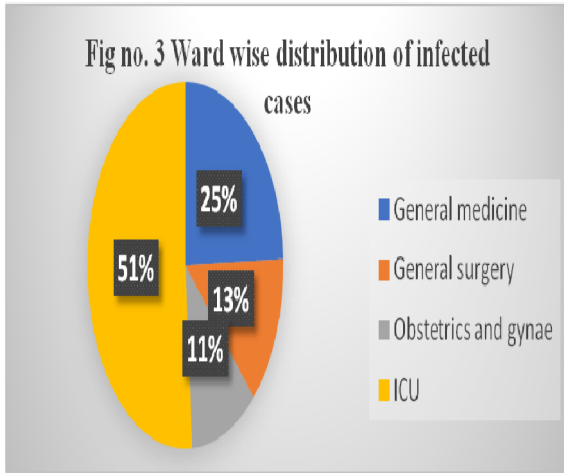


Figure no 3: shows the ward wise distribution of infected cases in which most of cases are from ICU wards followed by general medicine, general surgery and obstetrics & gynaecology.

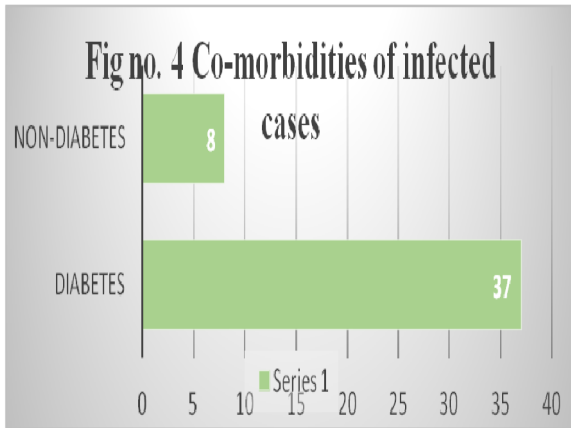


Figure no 4: describes the co-morbidities of infected patients in which infection is seen in mainly diabetic patients.

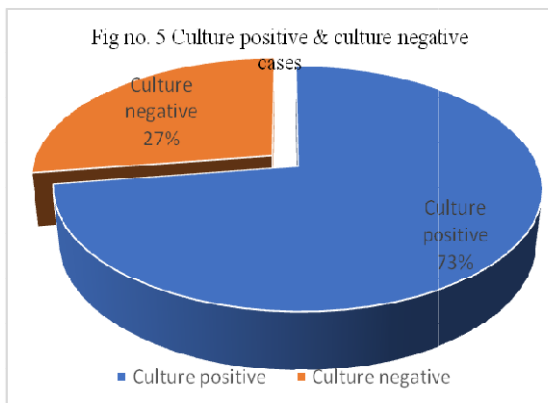


Figure no 5: shows the culture positive and culture negative cases.

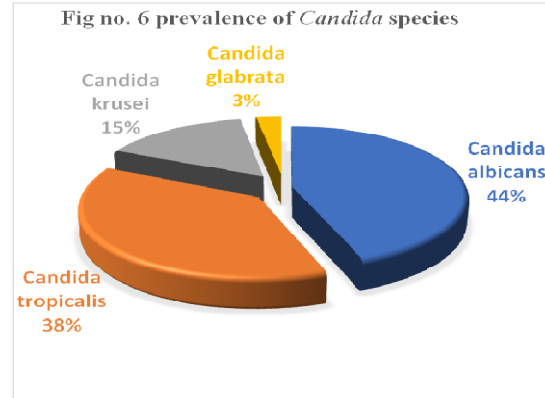


Figure no 6: shows the prevalence of Candida species in which Candida albicans is the most common species followed by Candida tropicalis, Candida krusei and Candida galbrata.

### Discussion

Presence of Candida in urine acts as a marker for haematogenous seeding to the kidneys. Candiduria reflects either colonisation or infection of the lower urinary tract or the kidneys [8]. Candida species ranks the fifth most common nosocomial urinary pathogen in India [9]. There has been a rapid shift in the distribution of Candida species, which is primarily responsible for nosocomial fungal UTI. Infectious Diseases Society of America (IDSA) suggests that use of indwelling catheters may be eliminated in asymptomatic candiduria patients with no risk factors and for the patients with high risk factor group oral fluconazole should be prescribed for the prevention of severe candidiasis [10]. There are certain factors that facilitate Candida infection, including immunocompromised status, immunosuppressive therapy, prolonged antibiotic treatment, catheterization, etc [11-13].

In the present study the percentage of female patients is higher than that of male patients and this is in accordance to the study done by Neeti Mishra et al. A Retrospective Study for Exploring the Prevalence of Candida Species was also performed.[14]. There was another study which was also similar to our study where the ratio of females was higher compared to males, where the candiduria was reported commonly in females (71.6%) as compared to males (28.4%)[15].

In the present study the age group of male and female patients which is highly affected to candiduria belongs to the 36-45 years of age and this is in accordance to the study done by Neeti Mishra et al. This study was in accordance with the study performed by the other research investigator [14].

In the present study the prevalence of Candida species is highly seen in *Candida albicans* followed by *Candida tropicalis* and *Candida krusei* and it is in accordance with study done by Neeti Mishra et al., [14]. Many healthy people shows microbial normal flora of *Candida albicans* and NAC in different anatomical sites like vagina, oral cavity, and alimentary canal.

Additionally, in premenopausal and healthy females, *Candida* can colonise the external side of the urethral opening. It can be an opportunistic pathogen leading to fungal in the host [16-19]. Clinicians are facing challenges to treat the *Candida* infection due to emergence of resistant strains. As a result of drug resistance, clinicians face challenges in treating *Candida* infections. Many new antifungal agents are under development which may have more advantages over current drugs when it comes to overcoming antifungal resistance and ensuring safety.

## Conclusion

Present study concluded that the high prevalence of candiduria and the isolates were biofilm producers with increasing resistance against most common drugs fluconazole which is a major concern for the treatment and management aspects. In immunocompromised patients, it is important to identify the species of *Candida* isolates as well as their antifungal susceptibility pattern to assist the clinicians in treating the patients with candiduria.

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