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AN OBSERVATIONAL STUDY, PREVALENCE OF CANDIDA SPECIES IN CATHETER ASSOCIATED URINARY TRACT INFECTION IN ICU PATIENTS AT A TERTIARY CARE HOSPITAL AT INDORE MADHYA PRADESH, INDIA

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ABSTRACT

Introduction: Catheter associated urinary tract infection (CAUTI) is most common nosocomial infection which constitutes ~80% of nosocomial urinary tract infections (UTIs). candida species have emerged as an increasingly important of cause of infection This observational study, aimed to investigate the prevalence and species distribution of candida infections in catheter associated urinary tract infection among ICU patients at a tertiary care hospital at Indore Madhya Pradesh, India. **Material and Methods:** A cross-sectional prospective observational study carried out over a period of 18 month from Jan 2018 to June 2019. Total 350 urine sample were collected during our study and were analyzed on the basis of inclusion and exclusion criteria. Before starting the study, ethical approval was obtained from the Institutional Ethics Committee. **Results:** In this study 350 urine sample were collected and analyzed. Out of these 350 urine samples; Yeast growth (*Candida species*) was obtained in 71(20.28%) urine samples. Over all 71 Candida isolates, among them 39 (54.92%) were female and 32 (45.07%) were male. The maximum number of patients were found to be 41-60 years of age group. Out of 71 Candida isolates; *Non albicans Candida (NAC)* were 45(63.38%) and *Candida albicans* were 26 (36.61%). (Shown in figure 4) The prevalence of *non- albicans Candida spp.* was much higher than the *Candida albicans species.* **Conclusion:** Our study, we conclude that the increasing burden of Candida associated CAUTI is causing large burden to both the healthcare system. It also Changing pattern of Candida species causing UTIs around the world points towards continuous need for surveillance, thus helping us in providing appropriate therapy.

KEYWORD:- Candida Albicans, Non albicans Candida (NAC) , Urinary Tract Infections (UTIs). Intensive Care Unit (ICU).

INTRODUCTION

Urinary Tract Infection (UTIs) are one of the most common health care associated Infections (HAIs) in critically ill patients, with catheter Associated urinary tract infection (CAUTIs) being a significant contributor to morbidity and mortality in intensive care units (ICUs). Among all the bacterial & fungal agents causative of UTI, incidence of fungal UTIs have been increasing in recent years and more so in the ICU settings.[1,2]

Among the various pathogens responsible for CAUTIs, candida species have emerged as an increasingly important of cause of infection. *Candida albicans* has been most commonly isolated opportunistic pathogenic fungi from cases of UTI in the past.[1,3] In recent years non-albicans candida has emerged as more common agent causing UTI in ICU settings. *Candida* species constitute almost 10- 15% of nosocomial UTIs.[4]

Candida species, a type of opportunistic fungal pathogen, are typically found as part of the normal flora of the gastro intestinal and urogenital tracts. However, under certain conditions, such as various Predisposing factors being instrumentation of urinary tract, prolonged antimicrobial therapy antibiotic usage, diabetes mellitus, immunosuppressive drugs, extremes of age, AIDS, surgeries, and female gender. Indwelling medical devices/ catheters are of significance because in hospitalized patients they are very commonly associated with biofilm formation which is inherently resistant to antifungals drugs.[5]

This observational study, aimed to investigate the prevalence and species distribution of candida infections in catheter associated urinary tract infection among ICU patients at a tertiary care hospital at Indore Madhya Pradesh, India.

MATERIAL AND METHODS

The present study was conducted in the department of Microbiology, at the Tertiary Care Hospital of Index Medical College, Indore, and Madhya Pradesh, India. It was a cross sectional prospective study carried out over a period of 18 months from Jan 2018 to June 2019. Before starting the study, ethical approval was obtained from the Institutional Ethics Committee.

During this study, 350 urine samples were collected from cases of symptomatic CAUTI in ICU patients on the basis of inclusion and exclusion criteria. Male and female patients of age ≥18 years were considered for this study. Those who had UTI after 72 hours of hospitalization & were put on Foley's catheter were included in the study. Urine samples showing concomitant pyuria on microscopic examination were included to rule out contamination. Patient's initial urine samples showed presence of candida species as a pure growth with significant colony count of more than $10^{[5]}$ cfu/ml. Only those yeast isolates which showed pure growth with significant colony count were included in the study.

Patients who were catheterised before being admitted in ICU, whose Foley's catheter was removed or who were discharged before 72 hours of being catheterised were not included in this study. Urine samples where Candida species was isolated without any pyuria, colony count was $<10^3$ CFU/ml and poly microbial growth were also excluded from the study.

Urine samples were collected from Foley's catheter using aseptic technique, and a minimum of 3ml of urine was taken in a screw capped, sterile, leak proof container. The sample was transported immediately to microbiology laboratory for processing. 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. Gram staining was done to see the presence of gram positive yeast cells. Culture was performed by semi quantitative method as per standard protocol. Species identification was done by germ tube test, corn meal agar morphology, sugar assimilation and fermentation test. Simultaneously, identification of *Candida* isolate was done by culture on CHROM agar. Antifungal susceptibility was done by disk diffusion method (CLSI M44-A2guidelines, Aug 2009) using commercially available antifungal discs procured from Himedia.

The urine samples were inoculated on Cysteine Lactose Electrolyte Deficient (CLED) and MacConkey agar 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.

Statistical analysis

Statistical analyses were performed with SPSS software version 24 (IBM SPSS Statistics for Windows 24.0, Armonk, NY, IBM Corp.). Categorical variables were expressed as frequencies and percentages. The descriptive statistics was used to characterise the study group.

RESULTS

In the present study a total of 350 urine samples were collected from catheterized patients (for more than 72 hours) who were admitted in the ICU of Index Medical College and Hospital, Indore Madhya Pradesh. A total of 350 urine sample were processed from catheterized ICU patients, Out of these 350 urine samples; Yeast growth (*Candida species*) was obtained in 71(20.28%) urine samples.(shown in Figure 1) These 71candida isolates were included in the present study for final analysis. Over all 71 Candida isolates, among them 39 (54.92%) were female and 32 (45.07%) were male. (Shown in Figure 2) The maximum number of patients were found to be 41-60 years of age group; followed by 20 patients in 21-40 years age group and minimum patients were in ≥80 year's age group. (Shown in Figure 3) Out of 71 Candida isolates; *Non albicans Candida (NAC)* were 45(63.38%) and *Candida albicans* were 26 (36.61%). (Shown in figure 4) The prevalence of *non- albicans Candida spp.* was much higher than the *Candida albicans spp.* Distribution of *Non albicans Candida species* isolated from urine samples of catheterized ICU patients was as follows: *C. tropicalis* was 20(44.44%) followed by *C. krusei* 14 (31.11%) and *C. Parapsilosis* 11(24.44%). (Shown in Table 1)

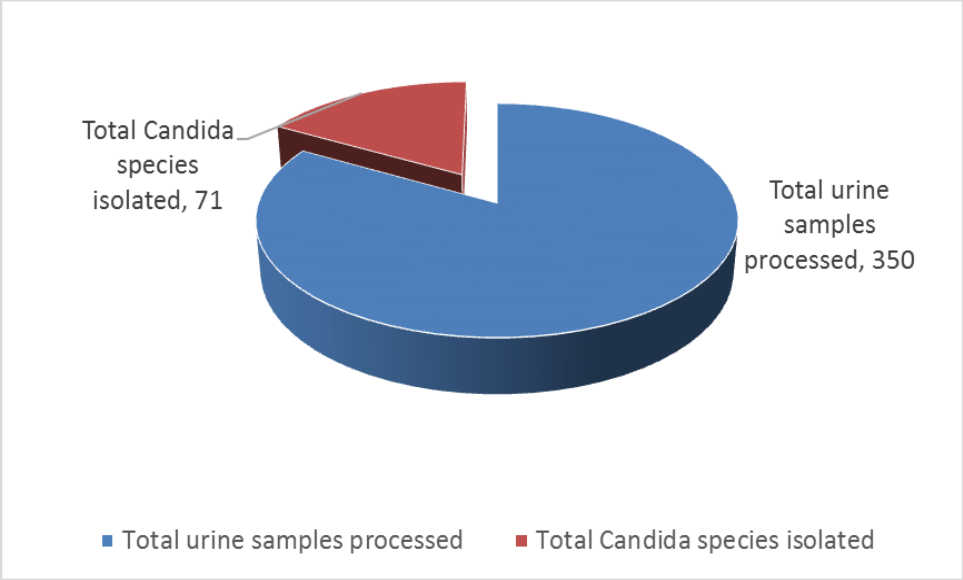

Figure 1: Total Candida species isolates from urine specimens of catheterized ICU patients.

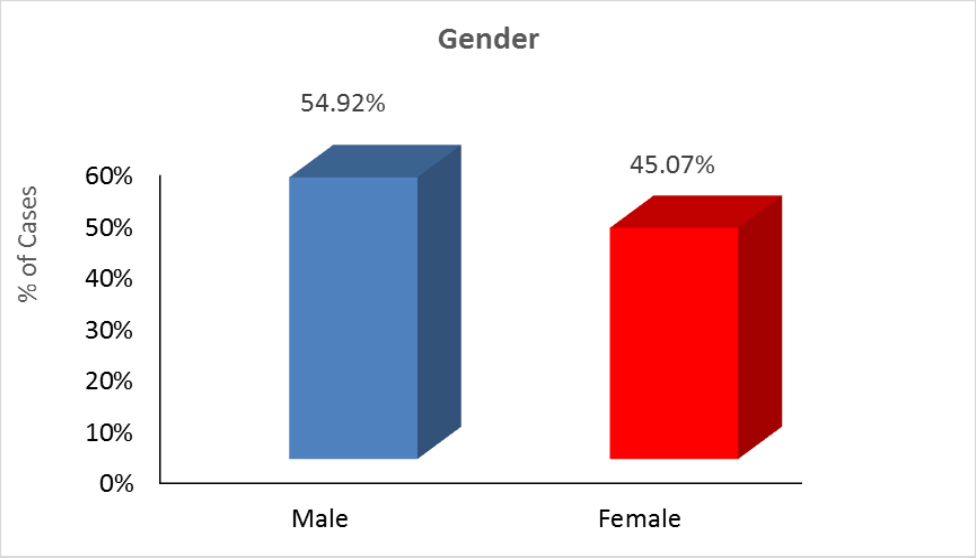

Figure 2: Distribution of Candida species isolates according to gender of patients

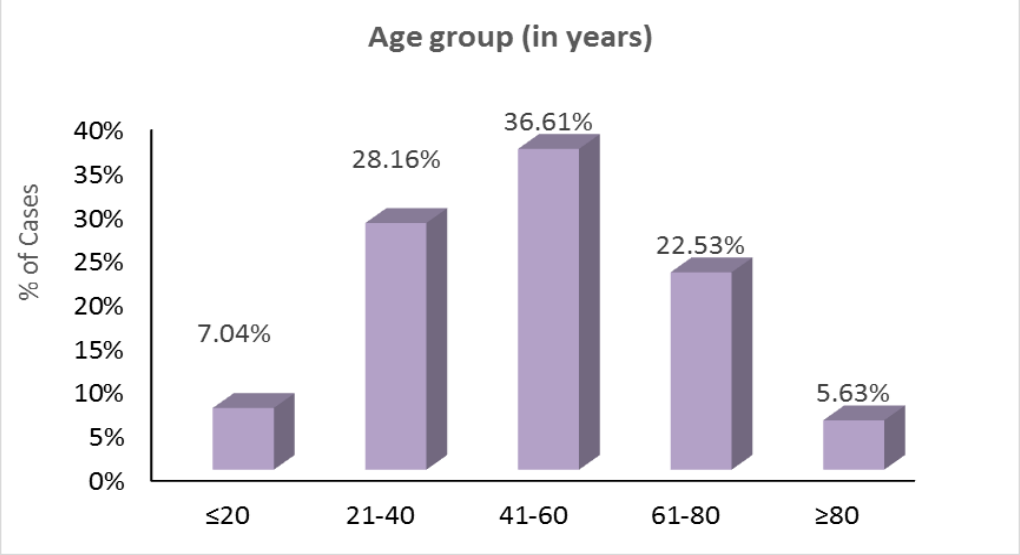

Figure 3: Distribution of candida species isolates according to age group.

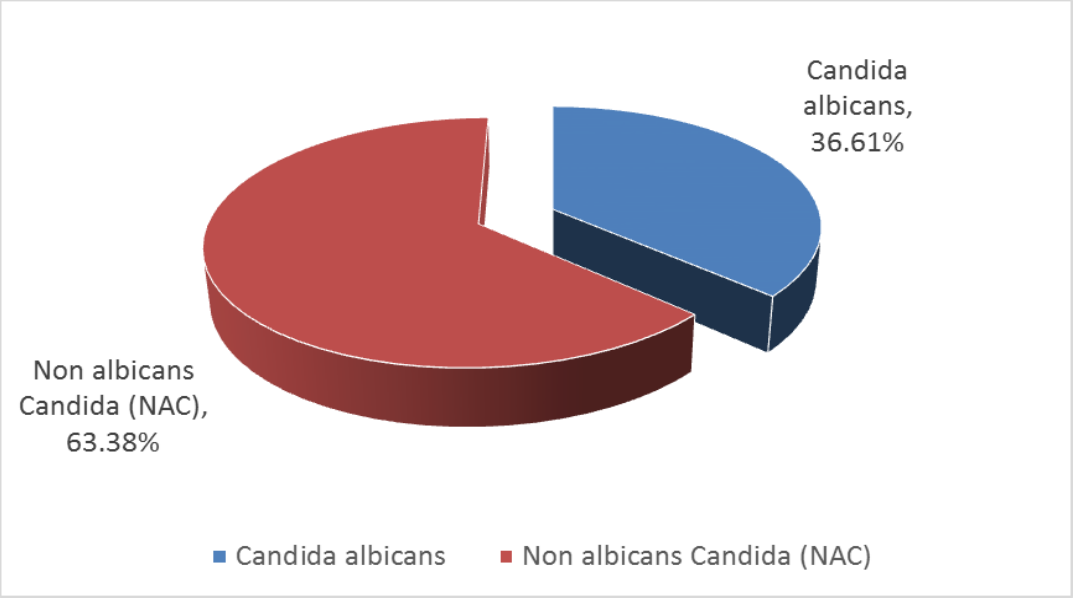

Figure 4: Candida species (Candida albicans vsnon albicans candida) isolated from icu patients urine.

Table 1: Various non albicans candida species isolates in the study(N=45)

Candida species	No.of Isolates (n=71)	Percentage
Candida tropicalis	20	44.44%
Candida krusei	14	31.11%
Candida parapsilosis	11	24.44%

DISSCUSSION

Catheter associated UTI is considered to be the most common UTI worldwide, accounting for up to 40% of nosocomial infections.[6] Presence of a urinary catheter is single most important risk factor for developing UTI. This is because of the lateral urethral pressure exerted by catheter which causes decreased mucosal blood flow, urothelial mucosal disruption & impaired mucin secretion. Also, in catheterised patients bladder is often incompletely emptied which serves as a nidus for infection. All these factors predispose to infection.

The frequency of UTIs due to *Candida species* is becoming increasingly common, especially in hospitalized ICU patients. Candida species have been reported as being the cause of up to 20% of UTIs episodes in ICUs.[7,8]

In this study identified Candida species as the main pathogen in catheterized ICU patients representing 71(20.28%) out of 350 urine samples collected from catheterized ICU patients whose admitted in ICU for more than 72 hours. This finding is similar with earlier studies Nuzhat firdos et al., (2015) and Kruthika P et al; (2014):- in which Candida species is consistently appeared as the predominant pathogen in urinary tract infections (UTIs).[9.10]

In present study, on the basis of gender UTI incidence reveals that females generally show a higher prevalence of infections than males. Our findings indicate that females were significantly more impacted, exhibiting an incidence rate of 54.92% in females and 45.07% in males respectively. Similar findings were observed in Rahul Kumar Goyal et al;(2016) The rate of isolates of Candida species were more in females, 101(56.1%) than in males 79 (43.9%). One other study Almahdy Mohamed Alatrounyet al;[7](2014) **,** also support that candida species infection predominantly found in female patients.[11,12]

In our study, maximum Candida isolates i.e. 26(36.61%) were obtained from the patients of the age group 41-60 years; followed by 20 (28.16) candida isolates from patients in the age group 21-40 years and 16(22.53%) of the candida isolates from age groupof 61-80 years. These findings are also support by Zarei-Mahmoud abadi et al;(2012): in his study maximum patients were included in age group 36-65years (44.7%) followed by; 41.5% >35 year, and 13.8% <66 year. One other study Esha Singhal et al; (2024): in this study Maximum numbers of Candida isolates were found in above 60 years age group. This is because of physiological alterations and some underlying medical conditions and weaning of immune system.[13,14]

In current study, total 350 urine samples were processed Out of these 71 were Candida isolates; among these candida isolates *NAC* were 45(63.38%) and *C. albicans* were 26(36.61%).The isolation rate of *NAC* strains were 45(63.38%) which is higher than *C. albicans which is* 26(36.61%) this is aligning with the findings from Esha Singhal et al; (2024): that out of total positive urine isolates 27

(79.41%) were due to non-albicans Candida spp. and 7 (20.58%) were due to Candida albicans.[14]

In present study, various NAC species identified which are C. tropicalis, C. krusei ,C. parapsilosis. Distribution of Non albicans Candida species isolated from urine samples of catheterized ICU patients was as follows: C. tropicalis was 20(44.44%) followed by C. krusei14(31.11%) and C. parapsilosis 11(24.44%). Among them, NAC species identified highest number of isolates were of C. tropicalis then C.krusei and C.parapsilosis. similar studies in favor of our findings are Tirath Singh et al;(2009) : In this study non-albicans Candida spp. Candida tropicalis was the most common isolate observed in both fungal infection (85.3%).h6

CONCLUSION

Our study, we conclude that the increasing burden of Candida associated CAUTI is causing large burden to both the healthcare system and patients. Catheterized patients admitted in the ICU with associated risk factors like Prolong used of antimicrobial therapy, Prolong catheterization, diabetes mellitus, history of previous surgery, mechanical ventilation and history of trauma are at risk of developing candiduria. Infection control measures should be considered with emphasis on antibiotic policy, removal of urinary catheter as soon as possible in ICU patients. Also changing pattern of Candida species causing UTIs around the world points towards continuous need for surveillance, thus helping us in providing appropriate therapy.

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Conflict of interest

None declared

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