

A study among Catheter Associated Urinary Tract infection by *Candida albicans* and non *albicans*

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INTRODUCTION

Indwelling intravascular and urinary catheters are essential components of modern medical care. Unfortunately, indwelling devices significantly increase the risk of iatrogenic infection, particularly in an already fragile patient population. Most nosocomial infections in severely ill patients are associated with the very medical devices that provide life-sustaining care.¹ Indwelling urinary catheterization is the most common risk factor for complicated UTI; such catheter-associated UTI (CAUTI) accounts for 40.0% of all nosocomial infections worldwide and often leads to secondary bloodstream infections.² Though recognition of this risk has led to reductions in insertion or duration of use of indwelling urinary catheters, a sizable number of hospitalized patients still undergo urinary catheterization during their stay. In the United States, the 30 million Foley catheters used annually confer substantial risk for CAUTI.³

Urinary tract infections are the most common type of healthcare-associated infection; accounting for more than 30.0% of infections reported by acute care hospitals and 23.0% of hospital-acquired infections (HAI) in intensive care units (ICU) (4). Virtually all healthcare-associated UTIs are caused by instrumentation of the urinary tract. Catheter associated urinary tract infection (CAUTI) has been associated with increased morbidity, mortality, hospital cost and length of stay. In addition, hospital acquired CAUTIs are often due to multidrug resistant strains which require higher antibiotics and these strains may spread to other patients (5).

Candida is increasing as a causative agent of CAUTI, accounting for 17.8% of cases; however, its pathogenic mechanisms during CAUTI are not well described. *Candida* species have been found associated with latex and silicone urinary catheters, with preference for latex material. *Candida* biofilms are readily detected on indwelling catheters by scanning electron microscopy. *C. albicans* adheres poorly to the bladder mucosa, and risk for *Candida* UTI increases sharply in the presence of an indwelling catheter. A recent ex vivo study showed that a *C. albicans* CAUTI isolate binds to urinary catheters via fibrinogen. *C. albicans* encodes a fibrinogen-binding protein, Mp58, which is expressed during candidiasis. In total, the wide distribution of diverse fibrinogen-binding adhesins among common uropathogens suggests that fibrinogen binding is a common theme in CAUTI pathogenesis (6).

The present investigation was aimed to study the incidence of dermatophytic infections and their clinical variants. CAUTIs constitute a huge reservoir of antimicrobial resistance and inadvertent use of antibiotics increases the risk of cross-infections among catheterized patients this results in prolonged hospital stay and increased cost of healthcare, not only to the patients but also to the hospital.

MATERIALS AND METHODS

COLLECTION OF DATA

The research was carried out in the Department of Microbiology, Index Medical College, Hospital & Research Centre, Indore, MP, India,

A systematic questionnaire was used to collect data from the 600 patients who took part in the trial. Name, age, sex, address, IP number, date of admission, clinical data such as presenting complaints, personal history, past medical history, high risk factors, immunocompromised status, physical examination findings, and clinical diagnosis details were all gathered. The need for a Foley's catheter was noted. The patients were examined every day for signs of a urinary tract infection, such as fever, suprapubic pain, and costovertebral angle tenderness. Catheter care will be closely managed, including daily meatal care with betadine or soap water and the maintenance of closed drainage. Patients were monitored until they developed bacteriuria, were released, expired, or had their catheter removed. It will be noted when the catheter was removed and how long it had been in place. Patients who will be transferred to a different ward will be monitored for the development of CAUTI symptoms for up to 48 hours.

Following process were assessed from the urine specimen collected.

1. Direct Gram's stain of Uncentrifuged urine.
2. Culter the specimen's culture by semi quantitative method using SDA, CLAD Chrome agar culture medium
3. Germ tube test

Table: Descriptive analysis of Risk factors in study group (N=600)

Parameter	Frequency	Percent
I. Age 50yrs and above		
Yes	165	27.5
No	435	72.5
II. Duration of catheterisation ≥ 10days		
Yes	267	44.5
No	333	55.5

III. Diabetes mellitus		
Yes	114	19
No	486	81
IV. Neurological causes		
Yes	117	19.5
No	483	80.5
V. Respiratory causes		
Yes	75	12.5
No	525	87.5
VI. Urological Nephrological causes		
Yes	36	6
No	564	94
VII. Steroid		
Yes	36	6
No	564	94
VIII. Other immunocompromised conditions		
Yes	36	6
No	564	94
IX. Faulty catheter care		
Yes	30	5
No	570	95

The descriptive analysis of all relevant risk variables for symptomatic CAUTI development. A total of 27.5 percent of the participants were over the age of 50. 44.5 percent of the participants had catheterization for more than 10 days, and 19 percent of the participants had diabetes mellitus. The percentage of individuals who had neurological or respiratory problems was 19.5 percent and 12.5 percent, respectively. Only 6% of the subjects had urological or nephrological

problems, and 6% of the patients had steroid use or other immunocompromised conditions. Each of the 5% of patients had a catheter that was not properly cared for.

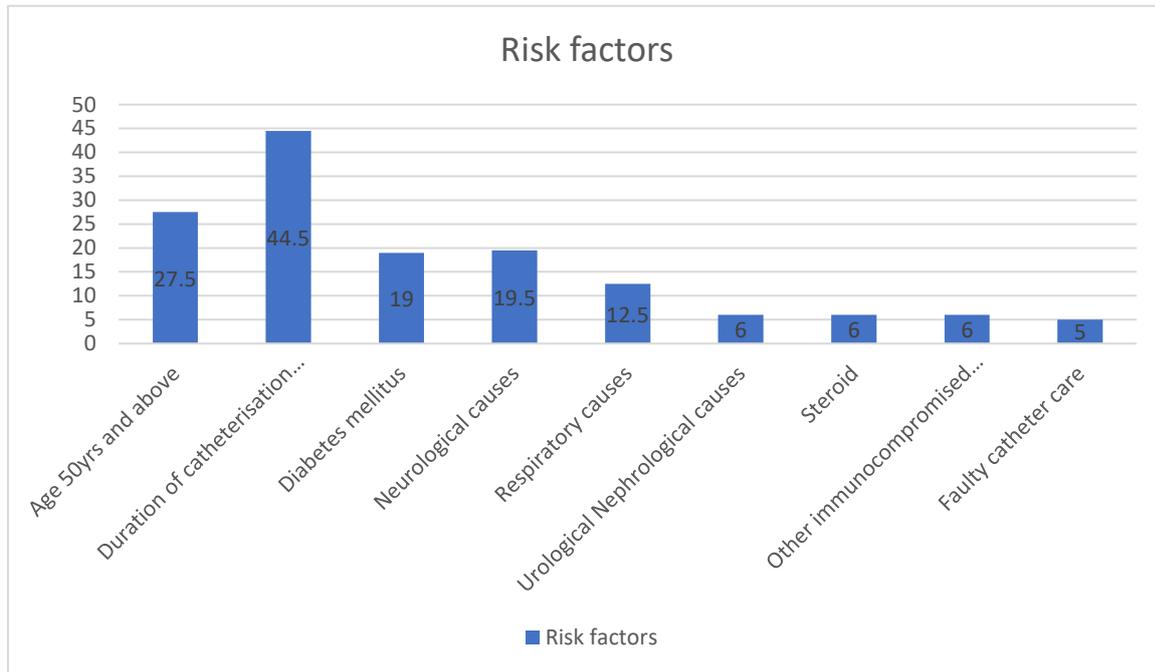


Figure: Distribution of Risk factors distribution in study group

Table: Descriptive analysis of Organism isolated in study group (N=600)

S. No.	Organism Isolated	Frequency	Percentage
1	<i>Candida albicans</i>	210	35
2	<i>Candida glabrata</i>	195	32.5
3	<i>Candida parapsilosis</i>	93	15.5
4	<i>Candida tropicalis</i>	42	7
5	<i>Candida dubliniensis</i>	60	10

Among the candida species, non-albicans *Candida* spp. contributed to 65 % of the isolates and only 35 % of isolates were *Candida albicans*.

Candida albicans was found to be present in 35 percent and 32.5 percent of urinary catheters, respectively, for *Candida glabrata*, 15.5 percent for *Candida parapsilosis*, 7% for *Candida tropicalis*, and 10% for *Candida dubliniensis* in this investigation. On the basis of identification, 5 different *Candida* species were confirmed. *Candida albicans* and *Candida glabrata*, in particular, exhibited a higher prevalence rate than other species.

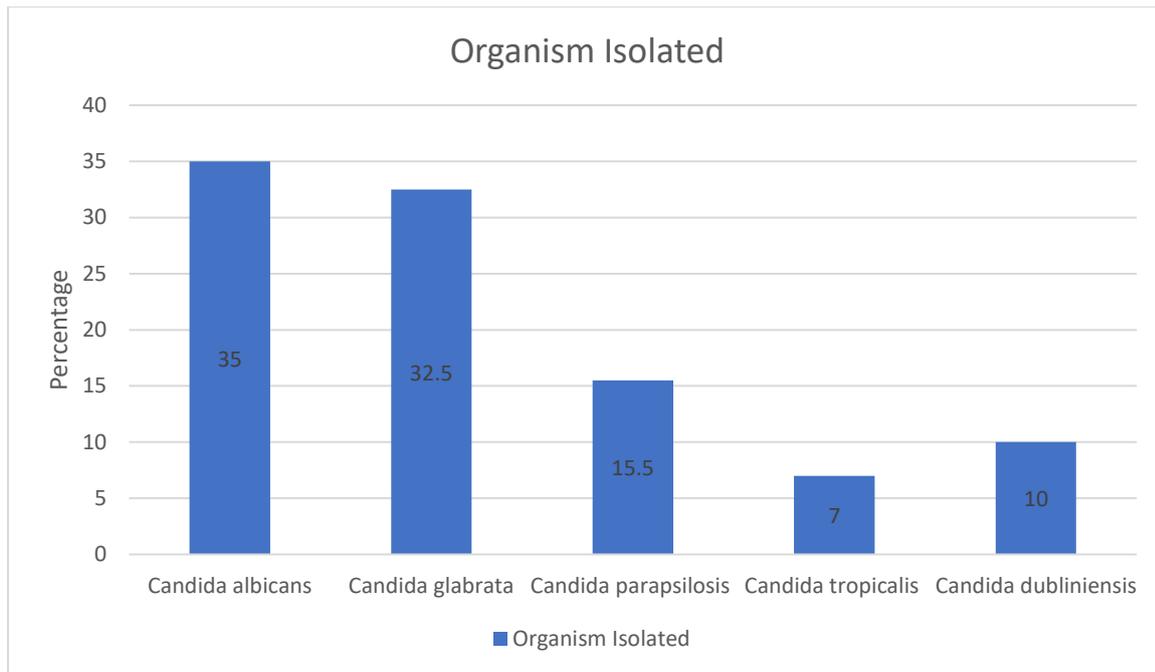


Figure: Descriptive analysis of Organism isolated in study group

DISCUSSION

The most prevalent device-associated nosocomial infection is catheter-associated urinary tract infection. The study included 600 patients who were admitted to the medical ICU and were monitored for the development of CAUTI. Only symptomatic CAUTI cases were included in this investigation.

In this investigation, 165 individuals out of 600 were found to have had symptomatic CAUTI during their stay in the hospital. As a result, the CAUTI rate was computed as 25.06 per 1000 catheter days, and the incidence was 27.5 percent.

The age distribution of the participants revealed that the majority of the individuals (34.5%) were between the ages of 18 and 30. The majority of patients (81.5%) had total catheter days in the range of 8 to 14 days, 12.5 percent had total catheter days in the range of 1 to 7 days, and just 6% had total catheter days in the range of 15 to 21 days. In all cases, the indication for catheterization was found to be genuine. On day 14, 36 of the 55 individuals who developed symptomatic CAUTI did so.

A variety of risk variables that have been linked to the development of symptomatic CAUTI have been investigated. The Chi square test was used to determine the statistical significance ($p < 0.05$) and strength of connection of these risk factors by calculating the p value and odd's ratio. The descriptive analysis of all relevant risk variables for symptomatic CAUTI development. A total of 27.5 percent of the participants were over the age of 50. 44.5 percent of the participants had catheterization for more than 10 days, and 19 percent of the participants had diabetes mellitus. The percentage of individuals who had neurological or respiratory problems was 19.5 percent and 12.5 percent, respectively. Only 6% of the subjects had

urological or nephrological problems, and 6% of the patients had steroid use or other immunocompromised conditions. Another risk factor is poor catheter care; 5% of patients had faulty catheter care, although it was not shown to be statistically significant in this study. Similar results were seen in studies conducted by Priya et al., (2014)⁷, Meric et al., (2006)⁸ and Agrawal et al., (2005)⁹.

In this investigation, 200 urinary catheters were collected, with *Candida albicans* showing up in 35% of them and *Candida* spp. (83.3%) emerging as the most common isolate. *Candida glabrata* accounted for 32.5 percent, *Candida parapsilosis* for 15.5 percent, *Candida tropicalis* for 7%, and *Candida dubliniensis* for 10%. On the basis of identification, 5 different *Candida* species were confirmed. *Candida albicans* and *Candida glabrata*, in particular, exhibited a higher prevalence rate than other species. These findings were comparable to those of Manisha Jain et al., (2011)¹⁰, who found that non-*albicans* *Candida* spp. (71.4%) was the most common infection causing CAUTI. A study by Chanda R. Vyawahare et al (2015)¹¹ found similar results. As a result, non-*albicans* *Candida* spp. are displacing *Candida albicans* as the most common cause of nosocomial UTI.

CONCLUSION

Candida albicans and non-*Candida albicans* were found to predominate in distinct clinical samples in this investigation. The goal of this cross-sectional study, which took place at the Index Medical College Hospital and Research Centre, Indore, was to determine the burden of catheter associated urinary tract infection by *Candida albicans* and non *albicans* with emphasis on biofilm formation. CAUTI is a prevalent complication in critically ill individuals. In order to reduce the incidence of catheter-related UTI, the focus should be on appropriate catheter maintenance and lowering catheterization length rather than prophylactic. In the treatment of CAUTI, culture and susceptibility testing are crucial.

The risk of catheterization and the need for it should be assessed. Only if there is a valid indication should an indwelling catheter be utilised in the patient. When it is no longer needed, it should be removed. If the catheter is needed for longer than 14 days, it should be replaced or other catheterization options, such as a condom catheter, should be investigated. Proper catheter bundle care should be followed in catheterized patients.

Candida albicans produced a larger percentage of biofilms than non-*Candida albicans*. This finding shows that biofilm creation is more significant for *Candida albicans* strains, and that non-*Candida albicans* strains have mechanisms for establishing infections other than biofilm production.

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