

Original Research Article

Prevalence and Risk Factors of Nosocomial Candiduria – A One Year Prospective Study from a Tertiary Care Centre of Haryana, India

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A B S T R A C T

Candiduria is an endogenous type of infection emerging as the most common finding in hospitalized patients. *Candida* species are unusual cause of urinary tract infection (UTI) in healthy individuals, but common in the hospital setting or among patients with predisposing factors. As there was scarcity of studies done on candiduria from this part of the country, so this one year study was undertaken from Jan 2012 to Dec 2012 on urinary catheterized patients to find out the prevalence and risk factors of nosocomial candiduria in a tertiary care hospital of Haryana. Samples were collected at the time of admission and after 72hrs of admission. Then in case of positivity, samples were repeated. Standard protocol was followed for species identification. Out of 500 urine samples from catheterized patients, the prevalence of *Candida spp.* was 12% with 60 isolates. The species wise distribution among *Candida* isolates was *Candida albicans* 40(66.7%), *C. tropicalis* 12 (20%) and *C. glabrata* 8 (13.3%). Rate of pyuria and fungiuria was documented with the prolonged days of catheterization in the present study. Extremes of age, diabetes and post surgical procedures were the predisposing factors. The present study reveals the emergence of nosocomial Candiduria in which *non-albicans* are replacing the *albicans*. Therefore clinicians need to be aware of factors causing urinary tract infection and its management.

Keywords

Candiduria,
Candida albicans,
Non-*Candida albicans*,
Risk factors

Introduction

Candiduria is an endogenous type of infection emerging as the most common finding in hospitalized patients. The natural history of Candiduria is not clearly established (Weber *et al*, 1992). Candiduria is detection of yeast in urine which could be due to contamination during collection,

colonization or in patients who have upper urinary tract infection (Kauffman, 2005). Despite asymptomatic, the patients are usually very sick. The incidence of Candiduria has increased dramatically due to the increased use of indwelling catheters and it increases with the days of

catheterization (Bose *et al.*, 2011). Urinary catheters are a crucial attribute to virulence as they allow the yeast to attach to body sites and commence proliferation. *Candida* on its first interaction with the host cause subsequent colonization of surrounding tissue and dissemination throughout the body. *Candida* species are unusual cause of urinary tract infection in healthy individuals, but common in the hospital setting or among patients with predisposing factors (Fisher *et al.*, 2011). Until recently, *Candida albicans* was the species that received major clinical attention. However, in parallel with the overall increase of fungal infections, it has been observed that infections caused by non-*Candida albicans* species are also emerging these days (Negri *et al.*, 2012). *C.krusei* and *C.glabrata* are known for their innate resistance to fluconazole (Kashid *et al.*, 2011). Therefore clinicians need to be aware of these factors before taking decision on treatment of candiduria after repeating second sample of urine which is confirmatory especially in case of asymptomatic patients and also identification of candida yeast to the species level is now required. As there was no report on candiduria from this part of the country, so this one year study was undertaken to find out the prevalence and risk factors of nosocomial candiduria in a tertiary care hospital at Mullana, Haryana.

Material and Methods

The present study was carried on Urinary catheterized patients from all clinical wards of Maharishi Markandeshwar Institute of Medical Sciences and Research (Mullana, Haryana) irrespective of age and sex from a period of January 2012 to December 2012 in the Department of Microbiology.

Sample collection

Urine aspiration was done with 5ml sterile

syringe after disinfecting the catheter area to be punctured (above the bifurcation of soft rubber connection between catheter and tubing) with betadine. Then, urine sample was emptied into wide mouthed container. First sample was collected at the time of admission and then, after 72 hrs of admission. In case of positive findings of first sample, two more samples were repeated on consecutive days (specifically on 5th and 7th day.)

Processing of sample

The urine sample was subjected to:

Wet mount examination:

10-12 WBCs / HPF were considered significant and in addition, presence of red cells, Casts, crystals, yeast cells were noted.

Culture:

Sabouraud's dextrose agar (SDA) without antibiotics

Sabouraud's with antibiotics and Cycloheximide

SDA slants were incubated at 37°C for 7 days to 4 weeks as per standard guidelines.

Identification of cultures were achieved by microscopic characteristics of colonies by Gram staining to observe Gram positive budding yeast cells and examination of macroscopic characteristics on Sabouraud's dextrose agar. Standard protocol was followed for species identification by germ tube test, corn meal morphology and sugar assimilation test (Chander, 2009).

Data management and statistical analysis

The data entry was carried using Microsoft Office Excel worksheet and then exported to

statistical software and analyzed using appropriate statistical tests by using Statistical Package for Social Services (SPSS vs. 21 for Mac.IBM Inc. Chicago).

Results and Discussion

A total number of 500 urine samples were collected from catheterized patients during the study period. Out of these 169(33.8%) were culture positive and 331(66.2%) were culture negative. Of the 169 culture positive samples only 69(40.8%) yielded fungal isolates whereas rest 100(59.1%) yielded bacterial isolates. Amongst the bacterial isolates *Escherichia coli* (50%) constituted majority followed by *Staphylococcus spp.* (20%), *Enterococcus spp.* (10%), *Pseudomonas spp.* (5%) and *Klebsiella spp.* (15%) in catheterized patients. *Candida spp.* with 60 (86.9%) isolates was in majority amongst the 69 fungal isolates, followed by non *Candida* Species 9 (13.04%). So, out of 500 catheterized patients, *Candida species* accounted for 12% of Nosocomial urinary tract infection. *Candida albicans* (66.7%) emerged as the predominant fungal pathogen as compared to non-albicans *Candida* (33.3%) in catheterized patients (Figure 1). Further amongst the *Candida* non-albicans the number of isolates of *C. tropicalis* were 12 and of *C. glabrata* were 8 with a prevalence rate of 20 and 13.3 respectively (Figure 1).

The microscopic findings of catheterized patients revealed that on 4th day, 33.3% were with presence of pus cells and yeast cells, 16.6% with RBC's. On 5th day, there was an increase in no. of patients with the finding of RBC'S and yeast cells i.e. 50% and 83.3%. On 7th day, there was 100% presence of pus cells and yeast cells and 66.6% with RBC's. This observation is highly significant with a p value 0.031 (Table 1). The male to female ratio amongst

the patients with candiduria was 0.5:1 with clear cut female preponderance. The maximum percentage of culture positive patients (56.7%) was in the age group > 60years and minimum (6.7%) were in the age group of less than 15 years (Table 2). Further among the risk factors for nosocomial Candiduria, diabetes accounted for 33.3% followed by post surgical cases (16.6%) showing significant p-value < 0.001 (Figure 2).

Various studies across the world have concluded that nosocomial infections are one of the major causes of mortality and morbidity. Especially urinary tract infections are creating a menace all over and amongst which around 80% are caused by indwelling bladder catheter. The current study on 500 urinary catheterized patients during hospitalization showed strong association between catheterization and culture positivity in which 33.8% of patients were culture positive which is in accordance with that reported by Hazelett *et al.* (2006) and Kamat *et al.* (2009). In the present study, 40.8% samples yielded fungus. Thus, the positivity of bacterial cultures was more in comparison to fungal cultures, but fungal pathogens are also emerging these days. In the current study, bacteria were the most common etiology with highest prevalence of *Escherichia coli* as reported earlier (Stamm *et al.*, 1998; Pramodhini *et al.*, 2012). Although *Escherichia coli* was predominant among bacterial isolates, *Candida spp.* had the highest overall prevalence and also in comparison with other fungal spp. had a prevalence rate of 86.9% as supported by Jain *et al.* (2011), Passos *et al.* (2005) and Kobayashi *et al.* (2006). This is because of the fact that *Candida* otherwise a commensal in the genitourinary tract of humans can turn pathogenic as and when the ecological niche gets imbalanced, it becomes virulent due to its adherence

because of ALS proteins and this study also signifies that patients in this region mostly were farmers and were prone to fungal infections. *Candida* being the most prevalent in causing UTI constituted about 12% of

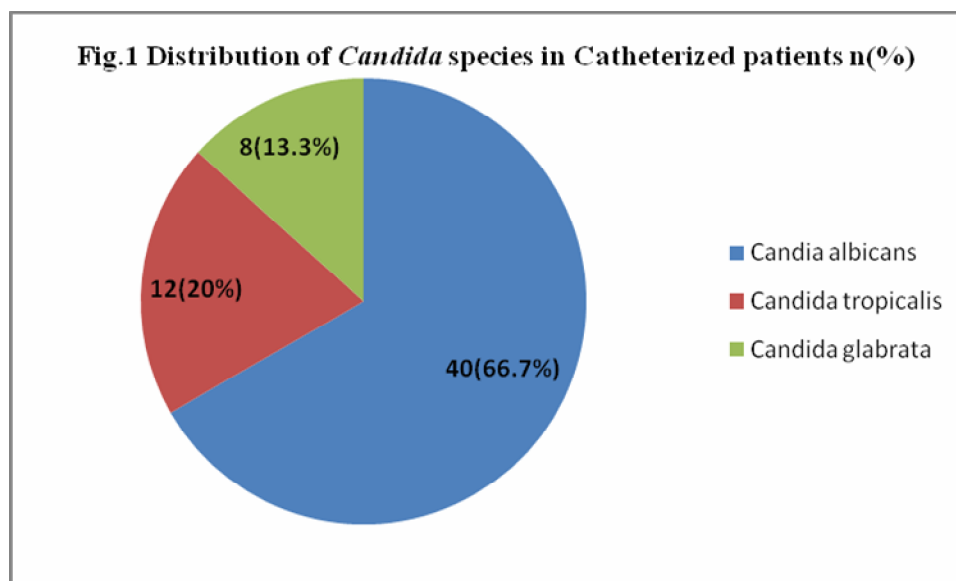
Catheter associated nosocomial UTI which was in concordance with the studies done by Jain *et al.* (2011) and Kauffman (2005) who reported *Candida* species being responsible for almost 10–15% of nosocomial UTI.

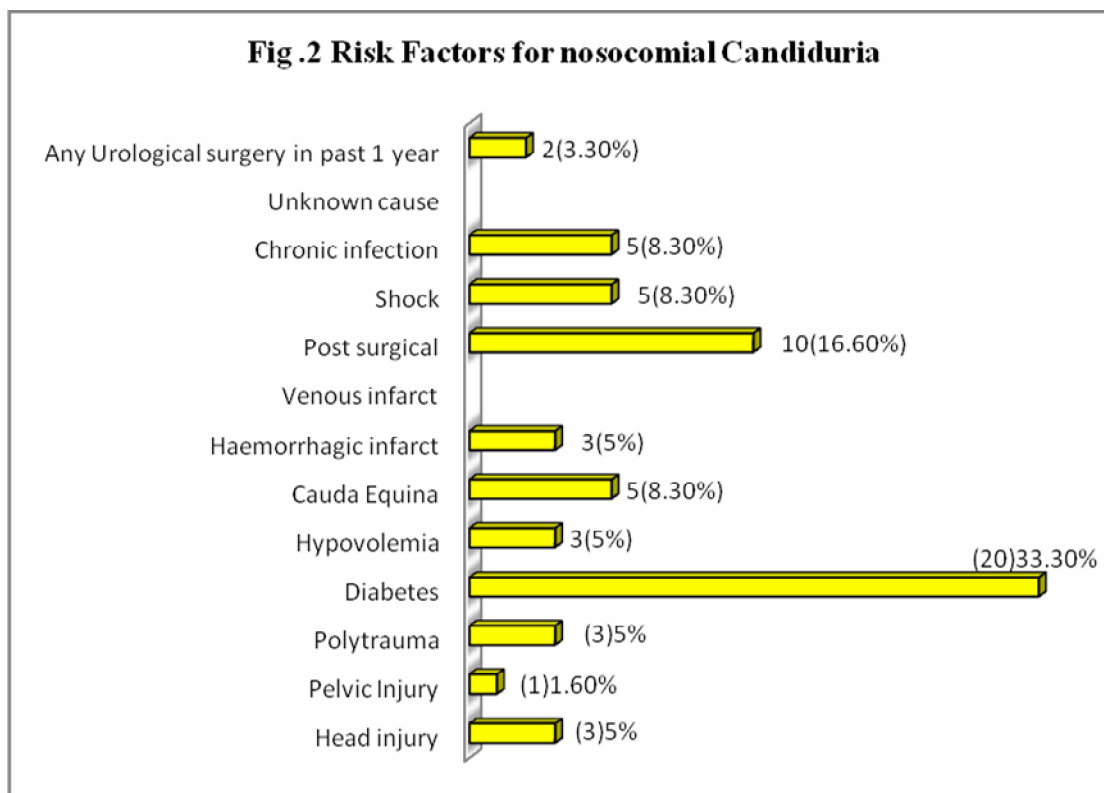
Table.1 Microscopic findings of nosocomial candiduria patients

| Microscopy finding of urine from catheterized patients | 4th day No. of patients | 5 th day | 7 th day |
|--|-------------------------|---------------------|---------------------|
| Pus cells | 20(33.3%) | 20(33.3%) | 60(100%) |
| RBCs | 10(16.6%) | 30(50%) | 40(66.6%) |
| Yeast cells | 20(33.3%) | 50(83.3%) | 60(100%) |
| $\chi^2 = 10.7$ df =4 p value=0.031 | | | |

Table.2 Distribution of *Candida* spp. isolates (n=60) according to age of patients

| Age in years | <i>Candida</i> spp. isolates | |
|--------------|------------------------------|------------|
| | No. of isolates | Percentage |
| 0-15 | 4 | 6.7 |
| 15-45 | 12 | 20 |
| 45-60 | 10 | 16.6 |
| >60 | 34 | 56.7 |





In this study, rate of *C. albicans* (66.6%) was higher than *non-albicans* (36.6%) as reported by Bukhary *et al.* (2008) because infection caused by *C. albicans* does not depend upon the immunogenic status of the patient whereas the infections with non albicans species occurs in the patients with impaired immunity. In the present study, most common species of non-albicans isolated were *C. tropicalis* followed by *C. glabrata*, duly supported by Jain *et al.* (2011), Weinberger *et al.* (2003) and Chaudhary *et al.* (2009).

Candiduria was usually accompanied by pyuria. The rate of microscopic findings revealed that catheterization for more than 2 days was a significant risk factor and also increase in rate of pyuria and fungiuria was documented with the prolonged days of catheterization in the present study. This fact was supported by Ksycki *et al.* (2009), Tambyah *et al.* (2011), Bose *et al.* (2011) and Chaudhary *et al.* (2009).

The demographic profile of the study showed that the rate of Candiduria is highest in elderly patients i.e. >60 yrs of age. The indwelling urinary catheter use is thought to be most significant risk factor for developing nosocomial UTI because of low immunity and immunosuppression due to the other underlying illness like diabetes, enlarged prostate gland, cerebrovascular disease etc. and certain medications. This is in accordance with Hazelett *et al.* (2006), Choudhary *et al.* (2009), Bukhary *et al.* (2008) and Kashid *et al.* (2011). Females are more prone to develop catheter associated Candiduria as ascending infection because of shorter urethra and frequent vulvovestibular colonization with *Candida*.

Among risk factors for nosocomial Candiduria, diabetes is the most common followed by post surgical and others. Diabetes predisposes to Candiduria by enhancing fungal growth in the presence of glycosuria in the vulvovaginal area in

females and in periurethral area in men. Thus the host resistance to invasion by *Candida* species is impaired as a consequence of impaired phagocytic activity, presence of urine in neurogenic bladder, and in case of surgery due to contaminated instrumentation. Kauffman (2005) and Bukhary *et al.* (2008) have related the above mentioned factors causing Candiduria.

Finally, the serious consequences of hospital acquired infections have made clinicians to go to the root cause and it is usually presumed that bacteriuria is inevitably associated with catheter associated UTI's. This in turn leads to the prescription of anti-bacterial drugs by most of the physicians. However, the fact that each and every time, it cannot be bacteria is often ignored and the parallel micro-organisms viz fungi are not even considered bringing the onus on the microbiologist to identify the species as early as possible and help in instituting specific and appropriate treatment.

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