

Candiduria in Intensive Care Unit Patients

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Abstract: Nosocomial urinary tract infection (UTI) is the most common health care associated infections. Candiduria is often observed in hospitalized patients. It represents a therapeutic challenge for the physicians as it is often asymptomatic. In the present study, 300 ICU patient urine specimens were investigated for presence of Candida Spp. Candiduria was found in urine samples of 22.3% of patients. The predominant species was *C. albicans* (83.58 %), followed by *C. tropicalis* (8.96%), *C. glabrata* (5.97 %), and *C. parapsilosis* (1.49 %). Antibiotic therapy, urinary catheterization and Prolonged hospital stay, were found as a significant risk factors. The high frequency of candiduria and the possible predisposing factors in the ICU patients showing that candiduria surveillance should be performed to help in reducing nosocomial infections.

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1. Introduction

Nosocomial candidal infections has emerged as an increasing problem in the last years (Ghiasian *et al.*, 2014). Presence of Candida spp. In urine is rarely encountered in healthy people with structurally normal urinary tract (Bukhary, 2008).

In the Intensive Care Units (ICU), there are many risk factors that can leads to increasing Candiduria, such as use of indwelling urinary devices, frequent use of antibiotics, diabetes mellitus, immunosuppressive therapy, severity of the underlying illness, extreme of age, female sex, and prolonged hospitalization (Jain *et al.*, 2011).

The presence of Candida in urine may represent contamination of the clinical sample, actual colonization of the lower urinary tract, or may be a true indicator of invasive infection of the urinary tract.

Unfortunately, there are no established diagnostic test that reliably distinguish infection from colonization (Singla *et al.*, 2012). Lundstorm and Sobel (2001) and Bukhary (2008) reported that presence of pyuria usually supports the diagnosis of candidal infection. On the other hand, Kauffman (2005) found that pyuria has proved to be of little use in separating infection from colonization. However, it may be a result of coexistent bacteruria or mechanical injury of the bladder mucosa by the presence of an indwelling catheter. In patients with indwelling catheters, pyuria loses both sensitivity and specificity. Most patients with urinary catheters have white blood cells in the urine as a non specific finding (Nicolle, 2001). Unfortunately, the question of whether

candiduria represents an infection or colonization arises most often in patients who have indwelling bladder catheters, thus, the presence of pyuria is not a useful diagnostic test in most instances (Kauffman *et al.*, 2011).

C. albicans is the most frequently isolated Spp. in the urine cultures (Nucci, 2000). However, there has been a significant trend in the emergence of species other than *C. albicans* such as *C. krusi*, *C. tropicalis*, *C. glabrata*, and *C. parapsilosis* (DeOliveria *et al.*, 2001 and Paul *et al.*, 2004).

It is important to know candida Spp. causing the UTI before initiating the treatment as many non-albicans candida Spp. are inherently resistant to treatment with fluconazole (Febre *et al.*, 1999).

The aim of this work was to study the incidence of candiduria among the ICU patients, identify candida Spp. isolated from their urine, and to study the possible predisposing factors for candiduria in those patients.

2. Patients and Methods

The study was conducted at Misr University for Science and Technology Hospital in the period between Aug. 2013 and Jul. 2014. A total of 300 ICU patients were included in the study, they were 166 males and 134 females. Their ages were ranged between 18 and 74 years. They were admitted in the ICU for more than 72 hours.

Full history was taken including duration of hospitalization, catheterization, antibiotic and immunosuppressive therapy, underlying diseases, and

symptoms of UTI like dysuria, frequency of micturation, or had cloudy or smelly urine.

Mid-Stream urine specimens were obtained by sterile bladder catheters to eliminate contamination, and plated on Sabouraud dextrose agar plates, supplemented with 100ug/ml of chloramphenicol, using calibrated loop (0.01ml), and incubated at 37°C for 3 days. Macroscopic (creamy moist colonies) and microscopic (yeast cells and pseudohyphae) examination of the growth verified the diagnosis of candidiasis.

Candidal isolates were included in the study if they were isolated in a pure growth in a significant colony unite ($> 10^3$ colony forming unit/ml) (Jain *et al.*, 2011) of urine sample.

Identification of candida strains was performed by germ tube formation, sugar fermentation and carbohydrate assimilation reactions (Kurtzman and Fell, 1998). Confirmation was done by using API 20c Aux yeast identification system (bioMerieux, France) which analyze the carbohydrate assimilation profile of each spp. Each spp. was identified by referring to the analytical profile index provided by the manufacturer.

Statistical analysis was done using SPSS software 12.0 version. Differences between frequencies were analyzed by the Chi Square test (X²). *P* value of < 0.05 was considered statistically significant.

3. Results

Of the 300 ICU patients studied, 166 were males and 134 were females. Their ages ranged between 18 and 74 years with a mean age 51 ± 11 .

Candida spp. were isolated from urine of 67 (22.3%) patients, of whom 32 (47.76%) were males and 35 (52.24%) were females.

Candiduria was more frequent in patients above 50 years (54 patients, 80.59%). A history of antibiotic therapy was found in all patients. The majority of patients (56 patients, 83.58%) had indwelling urinary catheters. Diabetes mellitus was reported in 11 (16.41%) patients. Symptoms of UTI were reported in 12 (17.91%) patients. The duration of ICU stay ranged from 3 to 18 days, with a mean duration 11 ± 6 days. Fourty six (68.66%) patients had a history of ICU stay > 10 days (table 1).

Table (1): Distribution and risk factors in ICU patients with Candiduria.

	No	%
Age		
17-50 years	13	19.40
Above 50 years	54	80.60
Sex		
Males	32	47.76
Females	35	52.24
Duration of ICU stay		
3-10 days	21	31.34
above 10 days	46	68.66
Antibiotic therapy	67	100
Catheterization	56	83.58
Diabetes mellitus	11	16.41

Of the 67 ICU patients with Candiduria, the predominant spp. was *C. albicans* (56 isolates, 83.58%), followed by *C. tropicalis* (6 isolates, 8.96%), *C.*

glabrata (4 isolates, 5.97%), and *C. parapsilosis* (one isolate, 1.49%) (Table 2).

Table (2): Candida spp. isolated from ICU patients urine.

Candida Spp.	No.	%
<i>C. albicans</i>	56	83.58
<i>C. tropicalis</i>	6	8.96
<i>C. glabrata</i>	4	5.97
<i>C. parapsilosis</i>	1	1.49

4. Discussion:

Candida Spp. are increasingly becoming an important causative agent of Nosocomial UTI. The prevalence of Candiduria varies in the hospital

settings and is most prevalent among patients in ICUs (Kauffman *et al.* 2011).

In the present study, Candiduria was detected in 22.3% of the ICU patients. In a similar studies, the mean incidence of candiduria was 22% (Bochiccio *et*

al., 2003), 44.4% (Passos *et al.*, 2005), and 32.26 % (Ghiasian *et al.*, 2014).

A common clinical problem is to deciding whether Candiduria represents UTI or merely bladder colonization. However, Nassoura *et al.* (1993) reported that presence of Candiduria in these patients might be indicative of urinary tract or systemic infection.

The specific identification of *Candida* helps the clinician for proper management of Candiduria. In the present study, *C. albicans* had been the most frequent species isolated from urine of ICU patients (83.58%), followed by *C. tropicalis* (8.96%), *C. glabrata* (5.97%) and *C. parapsilosis* (1.49 %). This finding was supported by many studies (Storfer *et al.*, 1994, Ayeni *et al.*, 1999, and Kauffman *et al.*, 2000). On the other hand, Paul *et al.* (2004) and Jain *et al.* (2011) reported a shift to the non-*albicans* Spp..

In the present study, significant increase in Candiduria was present in patients above 50 years (80.60%) ($p < 0.05$). This finding was in agree with that obtained by Kauffman *et al.* (2000), Passos *et al.* (2005) and Jain *et al.* (2011). This could be due to lowered host defenses in these patients.

As regard sex, Lundstorm and Sobel (2001), Bukhary (2008) reported that Candiduria was more frequent in females because they are more liable to develop ascending infection. On the other hand, Jain *et al.* (2011) found that Candiduria was more common in males (61.4 %). However, in the present study we did not found a significant difference. Our finding was observed also by Guler *et al.* (2006). This could be due to predominance of other associated risk factors in the study group.

Symptoms of UTI were reported only in 12 (17.91%) patients. This was supported by many studies claimed that most patients with Candiduria are asymptomatic, only 14% (Storfer *et al.* 1994) and 4% (Kauffman *et al.*, 2000) had a symptoms of UTI.

Frequently, patients with Candiduria are unable to vocalize symptoms and many have a long term indwelling urethral catheters, and thus cannot perceive frequency or dysuria (Kauffman, 2005).

In the present study, significant increase in Candiduria was found in patients under treatment with antibiotics (100%). This finding was in agree with many studies (Blumberg *et al.*, 2001, Simpson *et al.*, 2004 and Passos *et al.*, 2005). Antibiotic therapy suppressing susceptible endogenous flora that favors epithelial surface fungal colonization, especially in the presence of catheter (Sobel and Vazquez, 1999).

In this study, significant increase of Candiduria was present in patients had urinary catheters (83.58 %) ($p < 0.05$). This finding was supported by Kauffman *et al.* (2000). It could be due to adherence of the yeasts to the catheter, allowing colonization.

In the present study, we found a relationship between duration of ICU stay and candidal colonization. Significant increase of candidal colonization was found in patients with ICU stay >10 days ($p < 0.05$). The same finding was reported by Alvarez *et al.* (2003), and Jain *et al.* (2011).

Diabetes mellitus was the most common underlying disease seen in the ICU patients with Candiduria in this study. Diabetes mellitus was found in 16.41% of those patients. Lundstorm and Sobel (2001) reported this finding in their study. This may be due to diabetes lowers host resistance to invasion by candida, and also promotes stasis of urine in neurogenic bladder, thus further increasing the chance of colonization of candida Spp.

Nassoura *et al.* (1993) reported that for critically ill patients, candiduria, whether symptomatic or not, should initially be regarded as a potential marker for the presence of invasive candidiasis. Sobel and Vazquez (1999) reported that Candiduria should be never ignored, since this condition may be the only indication of systemic or invasive candidiasis.

In conclusion, Nosocomial Candiduria is an important finding in ICU patients. It is significantly increased in patients with antibiotic therapy, patients with indwelling catheters, and those with long ICU stay. Therefore, candida surveillance should be performed to help reducing Nosocomial infections. Infection control measures should be considered with emphasis on antibiotic policy, and removal of urinary catheters as soon as possible in ICU patients.

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