

## Catheter Associated Fungal Urinary Tract Infection

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### ABSTRACT:

#### BACKGROUND:

Fungal urinary tract infections are an increasing problem in hospitalized patients. There are specific criteria for evaluating urinary tract infections caused by bacteria. There are also specific guidelines for prevention of catheter associated bacteruria. No such criteria or recommendations are available for fungal urinary tract infections.

#### OBJECTIVE:

To evaluate the incidence of catheter associated fungal infection among all patients with catheter associated urinary tract infection and its risk factors.

#### MATERIALS AND METHODS:

From January 2009 to March 2011 (72) patients with indwelling urinary catheter for different indications with significant pyuria presented to urologic department at Al-Ramadi teaching hospital were included in this prospective study, all patients were subjected to urine culture for bacteria and fungi. The following information was obtained: age, sex, antibiotic therapy, immunosuppressive therapy, duration of catheterization and the presence of diabetes mellitus. The type of growth whether bacterial or fungal was noted. The age of patients ranges from 2 to 70 years.

#### RESULTS:

The age of patients ranged from 2 to 70 years (mean 34.6). Of 72 patients, 12 had diabetes mellitus, 18 patients were on long term antibiotic use and 15 patients on immunosuppressants. Bacterial infection accounted for 70.9% of catheter associated urinary infection with *E. coli* is the most commonly isolated organism (41.6%), fungal infection accounted for 16.6% and mixed fungal and bacterial infection account for 12.5%. Risk factors among patients with fungal infection were diabetes mellitus (47.6%), long term antibiotic use (42.8%), immunosuppressive therapy (9.5%), and prolonged duration of catheterization (85.7%).

#### CONCLUSION:

Fungal infection constitutes a significant proportion of all catheter associated urinary tract infection and diabetes mellitus, long term antibiotic use, immunosuppressive therapy, and prolonged duration of catheterization are the most common risk factors.

**KEY WORDS:** Catheter associated, Fungal infection, Urinary tract infection.

### INTRODUCTION:

Catheter-associated urinary tract infections are common. The overwhelming majority of nosocomial urinary tract infections, the most common infections diagnosed in the hospital or nursing home setting, are associated with the presence of a bladder catheter. The diagnosis of a catheter-associated UTI can be fraught with difficulties, since patients with indwelling catheters often have some degree of pyuria, almost always have bacteriuria, and often lack symptoms.<sup>(1,2)</sup>

Many patients with a long-term indwelling catheter will have colonization of their bladder

with *Candida* species or, rarely, other fungi.<sup>(3,4)</sup>

*Candida* infections of the urinary tract are strongly associated with the presence of a urinary catheter. The National nosocomial infections surveillance (NNIS) data indicated that *C. albicans* caused 21% of catheter-associated urinary tract infections, in contrast to 13% of non-catheter-associated infections.<sup>(5)</sup>

Risk factors for funguria include diabetes mellitus, urinary tract abnormalities, malignancy, and antibiotic use.<sup>(6,7)</sup>

In a multicenter study of 861 patients with a documented single episode of candiduria, the major associated illnesses included diabetes mellitus (39%), urinary tract disease (37.7%), malignancy (22.2%), and malnutrition (17%). Surgical procedures were associated with candiduria in 52.3% of patients. Indwelling

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urethral catheters were present in 77.6% of patients.<sup>(8)</sup>

Our study is to know the incidence of catheter associated fungal infection among all patients with catheter associated urinary tract infection and its risk factors.

### PATIENTS AND METHODS:

From January 2009 to March 2011 (72) patients with indwelling urinary catheter for different indications with significant pyuria presented to urologic department at Al-Ramadi teaching hospital were included in this prospective study, all patients were subjected to urine culture for bacteria and fungi. The following information was obtained: age, sex, antibiotic therapy,

immunosuppressive therapy, duration of catheterization and the presence of diabetes mellitus. The type of growth whether bacterial or fungal was noted. The age of patients ranges from 2 to 70 years (mean 34.6).

### RESULTS:

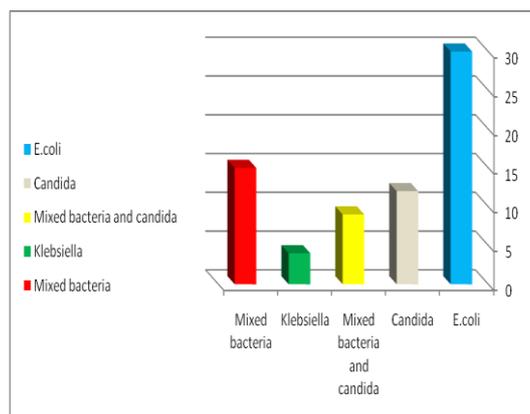
Of 72 patients, 12 had diabetes mellitus, 18 patients are on long term antibiotic use and 15 patients on immunosuppressants. Table (1) Bacterial infection account for 70.9% of catheter associated urinary infection with *E. coli* is the most commonly isolated organism (41.6%), *Klebsiella* in 5.5% and mixed bacteria in 20.8%. Fungal infection account for 16.6% and mixed fungal and bacterial infection account for 12.5. Figure (1), Table (2).

**Table 1: The demographic data of patients.**

Total No.	72
Age	2-70(38.25)
Male	63
Female	9
Diabetes mellitus	12
Long term antibiotic use	18
Immunosuppressive therapy	15

**Table 2: The results of urine culture**

Type of organism cultured	No.(%)
<i>E.coli</i>	30(41.6)
<i>Candida</i>	12(16.6)
Mixed bacteria and candida	9(12.5)
<i>Klebsiella</i>	4(5.5)
Mixed bacteria	15(20.8)



**Figure 1: The results of urine culture.**

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Catheter associated fungal infections account for 29.1% of all catheter associated urinary tract infections, of which 16.6% are isolated fungal infections and 12.5% are mixed fungal and bacterial infections. The risk factors for fungal

infection are diabetes mellitus (47.6%), long term antibiotic use more than two weeks (42.8%), Immunosuppressive therapy(9.5%) and prolonged duration of catheterization more than 10 days(85.7%). Table (3).

**Table 3: The percentage of catheter associated fungal infection from all catheter associated urinary infection and its risk factors.**

Fungal infection	21(29.1%)	Isolated	fungal
	12(16.6%)		
		Mixed fungal and bacterial	9(12.5%)
Risk factors			
Diabetes mellitus	10(47.6%)		
Long term antibiotic use	9(42.8%)		
Immunosuppressive therapy	2(9.5%)		
Duration of catheterization (more than 10 days)	18(85.7%)		

### DISCUSSION:

Most catheter associated urinary tract infections involve multiple organisms and resistant bacteria from catheter associated biofilms. Catheter are a good medium for bacterial growth because once they gain access to the urinary tract, bacteria produce various adhesions, including hairlike fimbriae that allow them to firmly attach to the catheter wall. These attached bacteria upregulate their expression of certain genes, resulting in altered phenotypes that ultimately lead to biofilms (living layers of organisms). Urine contains protein that adheres to and primes the catheter surface. Micro-organisms bind to this protein layer and thus attach to the surface. Such bacteria are different from free-living planktonic bacteria (bacteria that float in urine). Initially, indwelling urinary catheter (IUC) biofilms may be composed of single organisms, but can lead to multiorganism biofilms because the presence of the biofilm inhibits antibacterial activity. Biofilms provide a sustained reservoir for micro-organisms that, after detachment, can infect the patients.

These include Enterobacteriaceae other than *Escherichia coli* (eg, *Klebsiella*, *Enterobacter*, *Proteus*, and *Citrobacter*), *Pseudomonas aeruginosa*, enterococci and staphylococci and *Candida*.<sup>[9]</sup> Candiduria is especially common in individuals with prolonged indwelling urinary catheter use who are receiving broad spectrum systemic antimicrobial agents.<sup>[10]</sup>

*Candida* organisms are commensals, and to act as pathogens, interruption of normal host defenses is necessary. Therefore, general risk factors for *Candida* infections include

immunocompromised states, diabetes mellitus, and iatrogenic factors like antibiotic use, indwelling devices, intravenous drug use, and hyperalimentation fluids.<sup>[11]</sup>

In our study we concentrate on the catheter associated funguria and its risk factor but we also evaluate the all catheter associated infections and estimate the percentage of each organism causing catheter associated infection and percentage of candida from all microorganisms. Bacterial infection account for 70.9% of catheter associated urinary infections with *E. coli* is the most commonly isolated organism (41.6%), fungal infection account for 16.6% and mixed fungal and bacterial infection account for 12.5%. So the presence candida has been identified in 29.1% of all catheter associated urinary infection, similar incidence has been reported by Ema et al.<sup>[5]</sup>

Regarding catheter associated fungal infection, isolated fungal infection was seen in 16.6% and mixed fungal and bacterial infection was seen in 12.5% of cases. Fungal infection was more common in patients with diabetes mellitus (47.6%), patients on long term antibiotic use more than two weeks (42.8%), those on immunosuppressive therapy (9.5%). So diabetes mellitus is the most common risk factor for catheter associated fungal infection followed by long term antibiotic use. Diabetes mellitus has been reported as the most common risk factor for fungal infection by many investigators.<sup>[6,7]</sup>

The duration of catheterization is also an important risk factor as the duration increases the incidence of fungal infection is increased,<sup>[12]</sup>

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where in our study more than 10 days duration of catheterization was seen in 85.7% of patients with catheter associated fungal infection. So fungal infection should be kept in mind when dealing with patients with indwelling urinary catheter, especially with prolonged catheterization and those who are diabetic or on prolonged antibiotic therapy or immunosuppressive therapy.

### CONCLUSION:

Fungal infection constitutes a significant proportion of all catheter associated urinary tract infection and diabetes mellitus, long term antibiotic use, immunosuppressive therapy, and prolonged duration of catheterization are the most common risk factors.

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