



Original Article

## Prevalence of Urinary Tract Infection among Patients with Diabetes Melitus in Tirana District

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### ABSTRACT

**Background: & Objectives:** Urinary tract infection is one of the most commonly occurring infections among the patients with diabetes mellitus.

**Methods** This investigation was based to evaluate the incidence of UTI in patients with DM. Between January, 2013 to November, 1000 diabetic urine samples were collected. All urine samples were processed in the lab following standard laboratory protocol.

**Results:** A total of 25 UTI organisms were isolated from 361 urine samples collected from the diabetic patients attending the Department of Emergency, University Hospital Center "Mother Theresa" (QSUT) from. The incidence of UTI was recorded to 36.1%. *Escherichia coli* (54%) was found to be the major cause of UTI. About 5 different types of organisms isolated from the UTI samples were randomly chosen to test against the UTI antibiotics.

**Interpretation & Conclusion:** The antibiotic susceptibility pattern revealed that ciprofloxacin and nitrofurantoin were most effective to *e.coli* 79.6%, and 89.4%. These data may be used to determine trends in antimicrobial susceptibilities, to formulate local antibiotic policies and to assist clinicians in the choice of antibiotic therapy to prevent misuse, or overuse of antibiotics.

**Key Words:** Diabetes mellitus (DM), Urinary Tract Infection (UTI), Bacteria, antimicrobial resistance

### 1 Introduction

Urinary tract infections (UTIs) are estimated to account for around 30 000 visits to emergency units and 500 hospitalizations annually in Tirana, Albania. [1] Frequent infections are observed in clinical practice and have high medical costs for the Albanian Healthcare program. The propensity of the

infection in patients with Diabetes Melitus can vary in different individuals especially when there is underreporting from the patients having a risk of acquiring infections. [2-3] DM can alter the genitourinary system where UTI can be a cause of severe complications ranging from dysuria

organ damage and sometimes even death due to complicated UTI (pyelonephritis).[4]

Urine analysis (U/A) is one of the most important tests in clinical laboratories for diagnosis, screening and prevention of UTI and nowadays is used as a guide for empirical treatment in UTI.[5-9]

UTI is more widespread in women with DM than in non diabetic women as a consequence of debilitated immune system. The risk factors for UTI involve colonization with a different uropathogen in cases of recurrent UTI, glucosuria and impaired granulocyte function. Diabetic patients are at a higher risk developing acute pyelonephritis, renal abscess, abnormalities of bladder scarring and pyelitis.

People with diabetes have dysfunctional bladders which contract poorly. Women are prone to UTIs for reasons which are not well understood. Every one woman develops UTI among five women. UTI is uncommon in men and contributes to have larger complications after initial infection. Ninety five percent of UTIs are caused by uropathogens which multiply at the notch of the urethra and migrate towards the bladder. UTI is a result of various factors which may trigger Infection. Recurrent UTI is a nasty infection in sexually active young women and patients with DM.[12-17]

Cystitis or bladder infection is commonly prevalent in women and

young adolescent girls. The infection can be brief and acute (Cystitis) with classical symptoms of dysuria. In cases of continuous infection deeper layers of the bladder may be damaged (pyelonephritis). The risk of UTI increases with harmful changes in the immune system which also leads to the easier invasion and colonization in the lining of the bladder by Uropathogens. DM is also a leading a cause of overactive bladder or neurogenic bladder.

## 2. Methods

This was a longitudinal study conducted on 1000 urine samples that were collected from laboratory of University Hospital Center "Mother Theresa"(QSUT), Tirana, Albania. Samples of DM patients were collected with systematic randomized sampling method. A total of 1000 diabetic patients from various out-patient departments and admitted in wards at QSUT Hospital, were taken for the study. Known diagnosed diabetics who were already started on antibiotics and who took antibiotic within last 2 weeks were excluded.

The presence of at least  $10^5$  CFU/ml in 1 culture of clean-voided mid-stream urine specimen or obtained by urethral catheterization was the criterion used for defining asymptomatic bacteriuria.

In order to exclude possible diabetic patients from non diabetic group, was assured to have a negative

diabetic history and absence of glycosuria and fasting blood sugar less than 126 mg/dl.

It is a serious clinical problem for people with DM. Hospitalization for pyelonephritis occurs 15 times more frequently in diabetic patients. Symptomatic UTI may be present as a severe illness including higher frequency of bacteremia and bilateral renal involvement with pyelonephritis or unusual clinical presentations of emphysematous cystitis. (8) Diabetic patients encounter urinary urgency and incontinence during night. This condition is often manifested by the shape of painful urination and retention of urine in the bladder. DM also results in abnormalities of the host defense system that may result in a higher risk of developing infection. Immunologic impairments such as defective migration, and phagocytic alterations of chemotaxis in polymorphonuclear leukocytes is well marked in diabetic patients.

Statistical analyses were performed using IBM SPSS version 20 statistical software for windows.

### 3. Results

Among the 1000 urine samples analyzed, 57.7% were female patients and 42.3% were male patients. Among the 361 urine

samples that gave growth in culture, 83% (90/108) yielded more than  $10^5$  CFU per mL of urine.

The prevalence of microorganisms in female patients was: *Escherichia coli* (62.1%; 124/232), *Enterococcus* spp. (13.4%; 38/232), *Klebsiella* spp. (7.4%; 12/232), *Proteus mirabilis* (5.3%; 11/232), *Staphylococci* spp (3.4%; 22/232). In male patients, the prevalence was: *E. coli* ( 53.49%; 69/129), *Enterococcus* spp. (16.3%; 21/129), *Klebsiella* spp. (6.2%; 8/129), *Proteus mirabilis* (5.43%; 8/129), *Staphylococci* spp (4.65%; 6/129).

**Table 1 Isolation rate of uropathogens in male and female patients**

	Diabetic males		Diabetic females	
	N <sup>o</sup>	%	N <sup>o</sup>	%
<i>E. coli</i>	69	53.49	124	62.1
<i>Enterococcus</i> spp	21	16.28	38	13.4
<i>Klebsiella</i> spp	8	6.20	12	7.4
<i>Proteus</i> spp	7	5.43	11	5.3
<i>Pseudomonas</i> spp	5	3.88	13	4.9
<i>Staphylococci</i> spp	6	4.65	12	3.4
Other	13	10.08	22	3.5
<b>Total</b>	<b>129</b>	<b>100</b>	<b>232</b>	<b>100</b>

The sensitivity and specificity for the parameters analyzed as predictors of UTI are shown in [Table 1]

**Table 2 Antimicrobial resistance of urinary *E. coli* in patients with diabetes.**

Antimicrobial agent	Tested strains n°	Resistant strains n°	%
ampicillin	92	35	38.1
cotrimoxazole	75	22	29.9
ciprofloxacin	112	24	21.4
nitrofurantoin	82	9	10.6
<b>Total</b>	<b>361</b>	<b>90</b>	

The rates of antibiotic resistance of *E. coli* in diabetic patients were : ampicillin 38.1%; cotrimoxazole 29.9%; ciprofloxacin 21.4%; nitrofurantoin 10.6% [Table 2]. The *Pseudomonas* strains isolated in diabetic patients had similar patterns of resistance: ciprofloxacin 33%; ceftazidime 39.6%; imipenem 15.2%; amikacin 18.9%.

#### 4. Conclusion

This study confirms that diabetes predisposes patients to the risk of urinary tract infections due to the changes in bladder function and in circulation. UTIs are more frequent and are likely to have a more complicated course in patients with (DM). The most frequent uropathogen is *E. coli*. Imipenem was most effective against GNB and vancomycin and Linezolid was most effective against GPC. These data may be used to determine trends in antimicrobial susceptibilities, to formulate local antibiotic policies and to assist

clinicians in the choice of antibiotic therapy to prevent misuse or overuse of antibiotics. The mechanisms, which potentially contribute to the greater incidence of UTI in these patients, are malfunctioning in the local urinary cytokine secretions and an increased adherence

of bacteria to the cells of the Uroepithelial cells. No confirmation is available on the best possible treatment of acute cystitis and pyelonephritis in patients with DM. Thus we suggest screening of UTI in diabetic patients is imperative.

Varieties of factors were found responsible for UTI in diabetic patients, probably the most important is the damaged immune response, but also genetic susceptibility can be possible cause. The purpose of this study was to evaluate the prevalence of UTI among the diabetic patients and compare these data with other previous studies.

Regarding the antimicrobial resistance profile of the uropathogens, we observed that the isolated *E. coli* strains were resistant at similar rates to ampicillin, cotrimoxazole, ciprofloxacin and nitrofurantoin in diabetic patients. In a similar study performed in emergency departments, an association was found between the

presence of cotrimoxazole resistance and diabetes. [21-25]

### Competing interests

The author declare that they have no competing interests.

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