

# Prevalence Of Uropathogens In Diabetic Patients And Their Antimicrobial Susceptibility Pattern

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## ABSTRACT

**Introduction:** Diabetes mellitus has adverse effect on genitourinary system and patients suffering from diabetes mellitus are more prone to have urinary tract infection with risk of potentially harmful extension of infection to kidneys.

**Aim:** The study was carried out to find the prevalence of uropathogens in diabetic patients and to study their antibiotic susceptibility pattern.

**Material and methods:** Urine samples were collected from 270 diabetic patients (inpatients and outpatients) of our hospital. The specimens were processed and examined for the various uropathogens using the standard microbiological procedures. Antibiotic susceptibility testing was performed for various antibiotics by Kirby Bauer disc diffusion method and the results were interpreted as per CLSI guidelines. The

data was tabulated and analyzed.

**Results:** Uropathogens were isolated in 118 patients with females out numbering males (1.8:1). *Escherichia coli* was the most frequent isolate (41.5%), followed by *Klebsiella species* (14.4%), *Proteus species* (10.1%), *Enterococci* (8.4%), *Pseudomonas aeruginosa* (6.7%), *Staphylococcus species* (10.1%) and *Candida albicans* (8.4%). The isolates showed moderate to high level of resistance to various antibiotics tested.

**Conclusions:** Continuous surveillance of antibiotic susceptibility patterns of uropathogens in diabetic patient should be done to ensure rational use of antibiotics for empirical and definitive treatment of urinary tract infections in this vulnerable group.

**Key Words:** Diabetes Mellitus, Genitourinary, Uropathogens

## INTRODUCTION

Urinary Tract Infections (UTI) are one of the frequent infections that are encountered in clinical practice and also one of the most common cause of both community acquired and nosocomial infections [1]. Individuals with diabetes mellitus are reported to have increased risk of UTI both in frequency and severity [2,3]. Many studies have shown that diabetes mellitus has a long term deleterious effect on genitourinary system that causes significant morbidity and mortality. Various complications that may occur are renal parenchymal damage, abscesses, emphysematous pyelonephritis and emphysematous cystitis [3,4,5]. A characteristic feature observed in UTI in diabetic patients in presence of asymptomatic bacteruria (bacteria in urine), more in female patients than in male patients. The exact reasons for these is not clear but may be attributed to a number of factors. These include impairment of granulocyte function, increased adherence of uropathogens to uroepithelial cells, dysfunctional bladder and increased in sugar content of urine [2,4,6]. Treatment options for UTI in diabetes may be similar to as in non diabetics but have to be initiated timely and may take a longer time for cure.

This prospective study was therefore carried out to find the prevalence of uropathogens in diabetic patients and study their antibiotic susceptibility patterns.

## MATERIALS AND METHODS

The present study was conducted in Government Medical College Amritsar from August 2009 to July 2010 on 270 patients (both inpatients and out patients) with diagnosed diabetes mellitus. Informed written consent was taken from all the patients included in this study. Clean voided midstream urine specimens were collected in sterile universal container in 254 patients after proper patient education and by sterile needle aspiration of urine from tube of indwelling urinary catheter in 16 patients. The specimens were processed in the department of microbiology and were cultured onto appropriate media by standard loop method. Those growths were considered positive where colony forming units (CFU) were  $\geq 10^5$  CFU/ml. In case of *Staphylococcus aureus*, pure growth was considered significant regardless of the CFU's. The growth obtained were gram stained and were characterized as per the standard microbiological procedures. Antibiotic

susceptibility for bacterial isolates was performed by Kirby Baur disc diffusion method. The antibiotics used were:- Amikacin (30µg), Gentamicin (10µg), Ciprofloxacin (5µg), Norfloxacin (10µg), Nitrofurantoin (300µg), Amoxicillin (30µg), Imipenem (10µg), Linezolid (30µg) and Cefotaxime (30µg). Cefoxitin (30µg) was used for detection of methicillin resistance in staphylococcal isolates. The results were interpreted as per Clinical laboratory and standards Institute (CLSI) guidelines [3,7,8]. The data was tabulated and analyzed.

## RESULTS

Of the 270 urine specimens from diabetic patients, growth was obtained in 118 (43%) cases, with females (77) outnumbering males (41) in isolation of uropathogens. Among these 50.84% (60/118) had asymptomatic bacteruria while symptomatic infection occurred in 49.15 % (58/118) patients. The female patients in our study population were between the age group of 20–70 years while males were in age group of 40-60 years. Various Uropathogens isolated and their distribution is shown in [Table/Fig-1]. The resistance to various antibiotics has been shown in [Table/Fig-2].

AK= Amikacin, G= gentamicin, CF= Ciprofloxacin, NR= Norfloxacin, NFT= Nitrofurantoin, A= Amoxicillin, CT= Cefotaxime, CN= Cefoxitin, I= Imipenem, LZ= Linezolid,

\*= not used in these isolates

## DISCUSSION

In our study, isolation of Uropathogens was more in females diabetic patients as compared to male diabetic patients which is in accordance with findings of other authors [3,4,9,10,11,12]. *E.coli* was the most frequent uropathogen isolated in our study. Many other studies have also reported similar findings [3,11,12]. The other organisms isolated in our study were *Klebsiella*, *Proteus*, *Staphylococcus*, *Pseudomonas* and *Candida*. This corroborates the findings of other authors who have reported frequent isolation of these organisms in urine specimens of diabetic patients [2,3,4,9,12]. In our study, of the 16 patients with indwelling urinary catheter, *Candida* was isolated in 8, *Pseudomonas* in 5 and *Staphylococcus haemolyticus* in 3 patients. Analysis of the findings with respect to the frequency of isolation of uropathogens showed that 80% (8/10) of candida isolates, 62.5% (5/8)

Uropathogens isolated	Prevalence of isolates in males	Prevalence of isolates in females	Total
<i>Escherichia coli</i>	18	31	49 (41.5%)
<i>Klebsiella species</i>	6	11	17 (14.4%)
<i>Proteus species</i>	5	7	12 (10.1%)
<i>Enterococci</i>	3	7	10 (8.4%)
<i>Pseudomonas aeruginosa</i>	4	4	8 (6.7%)
<i>Staphylococcus aureus</i>	1	2	3 (2.5%)
<i>Staphylococcus saprophyticus</i>	1	4	5 (4.2%)
<i>Staphylococcus haemolyticus</i>	2	2	4 (3.3%)
<i>Candida albicans</i>	1	9	10 (8.4%)
Total	41	77	118

[Table/Fig-1]: Frequency of isolation of uropathogens

Antibiotics	<i>E.coli</i>	<i>Klebsiella</i>	<i>Proteus</i>	<i>Enterococci</i>	<i>Pseudo</i>	<i>S.aureus</i>	<i>S.saprophyticus</i>	<i>S.haemolyticus</i>
AK	8.1%	17.6%	25%	20%	12.5%	0%	20%	25%
G	36.7%	41.1%	41.6%	30%	50%	33.3%	20%	50%
CF	71.4%	52.9%	66.6%	50%	62.5%	66.6%	60%	75%
NR	40.8%	47%	33.3%	20%	37.5%	33.3%	40%	25%
NFT	30.6%	64%	16.6%	50%	25%	66.6%	20%	50%
A	89.7%	82%	75%	70%	100%	100%	100%	100%
CT	59.1%	47%	25%	*	50%	33.35	20%	25%
CN	*	*	*	*	*	50%	40%	50%
I	*	*	*	*	0%	*	*	*
Lz	*	*	*	*	*	0%	0%	0%

[Table/Fig-2]: Percentage resistance to various antibiotics

of *Pseudomonas aeruginosa* isolates and 75% (3/4) of the *Staphylococcus haemolyticus* isolates were isolated in the patients with urinary catheter. This suggests importance of these species in nosocomial setting, which is in accordance with other studies [1,13]. Also, these organisms are known to form biofilms which usually result in treatment failures as the antibiotic fail to eradicate the organisms completely.

In our study asymptomatic bacteruria was noted in 50.84% (60/118) patients, more in females (47) as compared to males (13). Presence of asymptomatic bacteruria in diabetic patients with higher frequency in females as compared to males has been documented in various studies [1,2]. It calls for special concern as such patients are at risk of potentially harmful extension of infection to kidneys that may speeds up interstitial damage.

The antibiotic susceptibility testing of our study isolates showed moderate to high level of resistance to various antibiotics tested which is similar to those reported in other studies [4]. Overall the isolates showed highest resistance against amoxicillin and ciprofloxacin, moderate resistance against norfloxacin, nitrofurantoin, gentamicin and cefotaxime while resistance against amikacin was low. This resistance pattern against these commonly used agents is a worrisome problem. This calls for early diagnosis and institution of definitive therapy after sensitivity reports are obtained which would not only help in eradication of infection but also prevent emergence/spread of resistance.

## CONCLUSIONS

Urinary tract infection is a significant problem in diabetics. Early diagnosis and treatment is essential to prevent any complication. Continuous surveillance of antibiotic susceptibility patterns of uropathogens in diabetic patient should be done to ensure rational use of antibiotics for empirical and definitive treatment of urinary tract infections in this vulnerable group.

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