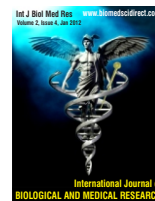


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Short report

Prevalence of uropathogens in diabetic patients and their resistance pattern at a tertiary care centre in south India.

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ABSTRACT

Urinary tract infection (UTI) is a common infection observed in diabetic patients. *Escherichia coli* are the most common bacterial pathogen causing urinary infection in diabetics, other organisms being *Klebsiella pneumoniae*, *Proteus mirabilis* and *Pseudomonas aeruginosa*. Among the 1200 diabetic patients, a total of 630 pathogens were isolated. Gram negative bacilli were found to be more sensitive than gram positive cocci to amikacin (65vs29%). Gram positive cocci (67%) were found to be more sensitive to cefotaxime than gram negative bacilli (55%), whereas gram negative bacilli (65%) were more sensitive than gram positive cocci (49%) to ceftizoxime. *Escherichia coli* was commonly isolated; the gram negative pathogens were highly sensitive to sulbactam / cefoperazone and piperacillin / tazobactam. Diabetic patients are at a high risk of development of UTIs, so continued surveillance of resistance rates among uropathogens is needed to ensure appropriate recommendations for the treatment of these infections.

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1. Introduction

Diabetes mellitus (DM) has a number of effects on genitourinary system. Patients with diabetes mellitus are at increased risk for urinary tract infection.[1] Urinary Tract Infection (UTI) is more common in diabetics because of a combination of host and local risk factors. Under some circumstances urine may be inhibitory or even bactericidal against uropathogens. Modification of chemical composition of urine in diabetes mellitus can alter the ability of urine and support the growth of microorganisms. Autonomic neuropathy in diabetes mellitus impairs bladder emptying and subsequent urological manipulation pre-dispose to UTI.

Escherichia coli are the most common bacterial pathogen causing urinary infection in patients with diabetes, other organisms being *Klebsiella pneumoniae* and *Proteus mirabilis*. *Pseudomonas aeruginosa* should be suspected if there is a history of recent instrumentation or hospitalization. Therefore, this study

has been undertaken to assess the prevalence of urinary tract infection, the causative pathogens, and their antimicrobial resistance pattern in diabetic patients.

2. Materials and Methods

A total of 1200 diabetic patients were studied for a period of one year from January 2010 to December 2010. Diagnosis of diabetes was made based on the WHO criteria.[2] Clean voided midstream urine samples were collected in sterile containers after giving proper instructions and samples were processed in the laboratory within 2 hours of collection. Urine cultures were done by inoculating urine samples on blood agar and MacConkey agar plates using a calibrated loop (0.001ml) and incubated at 37°C for 18-24 hours. Those culture reports were considered positive who had colony forming units more than 10⁵/ml of voided urine. A pure culture of *Staphylococcus aureus* was considered to be significant regardless of the number of CFUs. The presence of yeast in any number was also considered to be significant. The pathogens were isolated and biochemical tests were done for identifying the species of the pathogens. Antimicrobial sensitivity was done by Kirby-Bauer disc diffusion method. [3]

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3. Results

A total of 1200 urine samples were collected, out of which, females (760) and males (440) samples respectively. The overall prevalence of urinary tract infection was 45% and the prevalence rate was higher in females (46%) than males (43%) (Table-1).

Significant bacteriuria was seen in 540 (45%) patients, 360 (30%) patients had an insignificant colony count, no growth was seen in 300 (25%) specimens, and a total of 630 pathogens were isolated among all the patients with significant UTI.

Among the 630 isolates 480 were gram negative bacilli, 120 were gram positive cocci, and 30 were of the *Candida spp.* Among the 480 gram negative bacilli, 280 (58%) were *E.coli*, 95 (19%) were *Klebsiella*, 40 (8.3%) were *Pseudomonas* and 30(6%) were *Proteus spp.* *Enterobacter spp.* and *Citrobacter spp.* were present in only 3% of the patients, and Non fermenting gram negative bacilli were found only in 2% of the patients.

Among the gram positive cocci *Enterococci* (60%) were predominate followed by coagulase-negative *Staphylococcus* (22%), Beta-hemolytic *Streptococci* (6%), *Staphylococcus aureus* (4%), Non hemolytic *Streptococcus* in 8% of the patients.

Table 1: Sex wise prevalence of urinary tract infections

	Significant bacteriuria	Percentage (%)
Men (n=440)	190	43
Women (n=760)	350	46
Total (n=1200)	540	45

The antibiotic sensitivity patterns of the isolates to various antimicrobial agents are shown in Table-2. Gram negative bacilli were found to be highly sensitive to sulbactam / cefoperazone (90%) and piperacillin / tazobactam (82%). Gram positive cocci were 77% sensitive to sulbactam / cefoperazone and 64 % sensitive to piperacillin / tazobactam respectively.

Gram negative bacilli were found to be more sensitive than gram positive cocci to amikacin (65 vs 29%). Gram positive cocci (55%) were found to be more sensitive to ofloxacin than gram negative bacilli (25%) whereas gram negative bacilli (65%) were more sensitive than gram positive cocci (35%) to ciprofloxacin. Not much difference in sensitivity was observed between gram positive cocci (35%) and gram negative bacilli (33%) to cefoperazone. Gram positive cocci (67%) were found to be more sensitive to cefotaxime than gram negative bacilli (55%), whereas gram negative bacilli (65%) were more sensitive than gram positive cocci (49%) to ceftizoxime.

Table 2: Antimicrobial sensitivity pattern of gram negative bacilli and gram positive cocci.

Antimicrobials	Gram negative bacilli (n=480) values in percentages	Gram positive cocci (n=120) values in percentages
Amikacin	66	30
Cefoperazone /sulbactam	90	77
Piperacillin /tazobactam	82	64
Ciprofloxacin	65	35
Ofloxacin	25	55
Norfloxacin	23	17
Cefoperazone	35	37
Ceftozoxime	65	49
Cefotaxime	55	67

4. Discussion

The prevalence of UTI among the female diabetic patients was 46%, which was higher when compared to prevalence in male (43%). Our study showed similar with other reports stating high prevalence of UTI in females[4][5]. Bacteriological studies usually reveal the involvement of gram negative enteric organisms that commonly cause urinary tract infections, such as *E. coli*, *Klebsiella species*, and the *Proteus species*. [6] Similarly, the predominant number of pathogens isolated in our study were gram negative bacilli rather than gram positive pathogens.

In another study from India, it was found that *E. coli* was the most commonly grown organism (64.3%), followed by *Staphylococcus aureus* (21.4%), and *Klebsiella pneumoniae* (14.3%). [7] [8] Lloyds et al. have shown that *Enterococci spp.* accounted for 35% of urinary tract isolates. [9] In our study 60% of the isolates were *Enterococci spp.* among gram positive pathogens. Gram negative bacilli were found to be more sensitive than gram positive cocci to amikacin. Gram negative bacilli were found to be highly sensitive to *ciprofloxacin* (65%) than to ofloxacin (25%). *Ciprofloxacin* is thus clearly useful against poly resistant species such as *Pseudomonas aeruginosa*. [10] Gram positive cocci (67%) were found to be more sensitive to cefotaxime than gram negative bacilli (55%).

Conclusions

In summary, the prevalence of lower UTI was high in women with diabetes than in men. *Escherichia coli* was commonly isolated; the gram negative pathogens were highly sensitive to sulbactam / cefoperazone and piperacillin / tazobactam. Diabetic patients are at a high risk of development of UTIs, so it is recommended that continued surveillance of resistance rates among uropathogens is needed to ensure appropriate recommendations for the treatment of these infections.

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