

## Urinary tract infection among males and females- a comparative study

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### ABSTRACT

Urinary tract infection (UTI) is a common global health problem. Although both genders suffer from this ailment, there are some differences between the two due to different anatomy and risk factors. We tried to study the differences between UTI in male and female patients. A total of 3123 patients whose urine sample was cultured for bacterial isolation were studied during the year 2014-2015. Freshly voided clean catch midstream urine samples were processed to look for bacterial isolation and significant bacteriuria. Antibiotic susceptibility test (AST) for the bacterial isolates were performed according to clinical laboratory standard institute (CLSI) guidelines. Prevalence of UTI was found to be 15.9% among males and 64.9% among females. The most common causative agent found were *Escherichia coli* followed by *Klebsiella pneumoniae* for UTI in this study population. The most affected age in males was 61-80 year's among males while it was found highest among 21-40 year's age group in females. Among various antibiotics tested, almost all gram positive bacterial isolates were sensitive to vancomycin, ofloxacin, amoxicillin and almost of the total isolates were sensitive to nitrofurantoin, ceftriaxone, and aminoglycosides among gram negative bacteria for both males and females.

**Keywords:** UTI, Comparative study, Males, Females, Nepal

### INTRODUCTION

Urinary tract infection (UTI) is characterized by burning sensation during micturition and frequent urination.<sup>1,2</sup> UTI is also defined by significant bacteriuria which is defined as colony count  $> 10^3$  CFU/ml of urine specimen among males and  $> 10^5$  CFU/ml of urine specimen among females.<sup>1,2</sup> UTI in female is common mostly during the sexually active reproductive age group, whereas it is mostly seen in the elderly men with benign prostatic hyperplasia.<sup>3,4,5,6</sup> We tried to find the differences in the etiological agents and their antibiogram between the two group of patients as it has not been studied separately.<sup>7,8,9</sup> This knowledge can be useful in the empiric treatment of male and female patients with UTI.

### MATERIAL AND METHODS

The study was conducted after obtaining ethical approval from NMC research and ethical sub-committee. All urine specimens submitted to clinical Microbiology laboratory of Nepal Medical College Teaching Hospital from May 1<sup>st</sup> 2014 to April 30<sup>th</sup> 2015 (1 year duration) were included in the study. Urine specimens were inoculated on cysteine lactose electrolyte deficient (CLED) media by semi-quantitative technique. Significant bacteriuria were noted. Causative bacteria were identified based on colony characters, gram staining, and relevant

biochemical tests according to standard microbiological technique.<sup>10</sup> AST was performed by Kirby- Bauer's disc diffusion method and reported. The data were analyzed using SPSS version-16.

### RESULTS

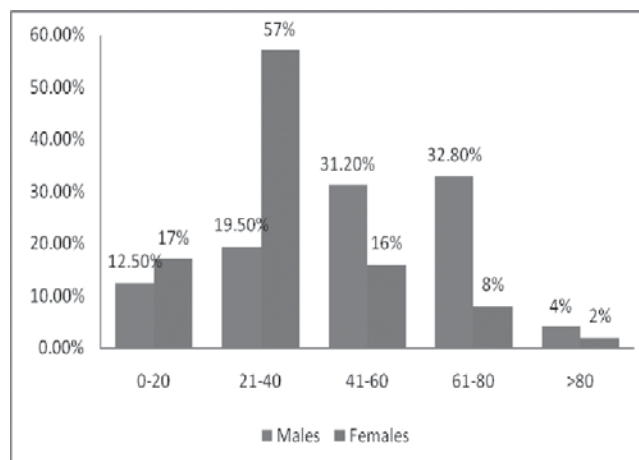
Out of the total 3123 patients included in the study, 804 were males and 2319 were females. Among 804 male patients, 128 (15.9 %) were found culture positive and similarly, out of 2319 female patients, 1506 (64.9%) were culture positive. Various bacterial pathogens isolated were; the most common agent was *E. coli* (74/128=57.8%) followed by *K. pneumoniae* (17/128=13.2%) among males and *E. coli* (1059/2319=70.0%) followed by *K. pneumoniae* (144/2319=9.6%) among females. **Table-1** shows the bacterial pathogens isolated from male and female patients.

Among various antibiotic discs applied for antibiotic sensitivity test, most of the bacterial isolates were sensitive to vancomycin, ofloxacin and amoxicillin for gram positive bacteria among males and most isolates were resistant to aminoglycosides. Similarly, the GPC from females were sensitive to vancomycin, cefotaxime, ceftriaxone, and nitrofurantoin. For gram negative bacilli, isolates were sensitive to nitrofurantoin, aminoglycosides and ceftriaxone. Similar anti biograms were noted for isolates from male and female.

**Table 1.** Showing distribution of organisms causing UTI among males and females

Organisms	Males	Females
	Number (%)	Number (%)
<i>E. coli</i>	74 (57.8)	1059 (70.0)
<i>Klebsiella pneumoniae</i>	17 (13.3)	144 (9.6)
<i>Pseudomonas aeruginosa</i>	5 (3.9)	15 (1.0)
<i>Enterococcus spp.</i>	8 (6.2)	48 (3.2)
<i>Staphylococcus aureus</i>	6 (4.6)	66 (4.4)
<i>Proteus vulgaris</i>	3 (2.3)	12 (0.8)
<i>Proteus mirabilis</i>	2 (1.6)	27 (1.8)
<i>Klebsiella oxytoca</i>	1 (0.78)	30 (2.0)
<i>Enterobacter spp.</i>	1 (0.78)	6 (0.4)
<i>Citrobacter freundii</i>	1 (0.78)	30 (2.0)
<i>Acinetobacter spp.</i>	1 (0.78)	21 (1.4)
<i>Morganella spp.</i>	1 (0.78)	
Coagulase negative <i>Staphylococci</i>	1 (0.78)	54 (3.6)
<b>Total</b>	<b>128 (100)</b>	<b>1506 (100)</b>

UTI was most frequent among males of 61 – 80 year’s age followed by 41 – 60 year’s while it was most frequent among 21-40 year old females.



**Fig. 1** Age wise distribution of UTI among males and females

**Table 2.** Showing resistance pattern (in %) of gram positive cocci and gram negative bacilli among males and females

Antibiotics	Gram positive cocci		Overall	Gram negative bacilli		
	Male	Female		Male	Female	Overall
Nitrofurantoin	43.7	35.1	29.4	21.4	15.1	18.2
Cotrimoxazole	25.0	21.0	23.0	59.8	68.5	64.1
Amikacin	27.1	31.3	29.2	34.8	26.0	30.4
Ciprofloxacin	50.0	37.8	43.9	58.6	41.2	49.9
Gentamicin	50.0	43.3	46.6	24.5	18.2	21.3
Cefotaxime	12.5	9.5	11.0	42.4	31.9	37.1
Cefixime	25.0	14.7	19.8	51.8	38.3	45.0
Ceftriaxone	19.1	25	22.0	28.9	31.8	30.3
Ofloxacin	21.5	27.5	24.5	36.5	29.4	32.9
Vancomycin	0.00	0.00	0.00			
Amoxicillin	25.0	19.0	22.0	22.9	17.9	20.4
Tobramycin	25.0	13.6	19.3	16.2	13.9	15.0
Cloxacillin	0.00	0.00	0.00	-	-	-
Norfloracin	6.4	9.9	8.1	29.2	38.3	33.7
Ceftazidime	-	-	-	35.4	26.8	31.1
Imipenem	-	-	-	0.00	0.00	0.00
Meropenem	-	-	-	21.6	17.7	19.6

**DISCUSSION**

The prevalence of UTI among females (64.9%) is higher than among males (15.9%). The overall prevalence of UTI in our study is 40.4%. The difference in prevalence in different places may be due to cultural dissimilarities.<sup>3,6,14,15</sup> It is generally low among Muslims since the practice of circumcision reduces the risk of acquisition of infection.<sup>12</sup> Another confounding factor is the age group of the patients included in the study. As our study revealed, it is the disease mostly of the sexually active age group in females and in the elderly

males. *E. coli* was the most commonly isolated pathogen from cases of UTI for both the genders. Though the frequency of infection is different in males and females due to anatomical and behavioral practices, the source of infection is the gastrointestinal tract flora. Urogenic *E. coli* equipped with its K fimbriae which can adhere to uroepithelial cells are therefore the most frequent and most successful pathogen to cause lower UTI. In our set-up *E. coli* comprised (63.9%) of the total uropathogens. Similar findings are reported in studies from elsewhere in the world.<sup>3-6,14,15</sup> Another gastrointestinal tract resident

*K. pneumoniae* was the second most common isolate (11.4%). *K. pneumoniae* follow *E. coli* as uropathogen in many other studies too. Amongst the GPCs, Coagulase negative Staphylococci (CoNS) were more in females than in males. Since most of the female patients with UTI were from reproductive age group, *S. saprophyticus* could be the CoNS responsible for the condition. From the total, 64.1% of the total GNB were resistant to cotrimoxazole, 50% to ciprofloxacin, 45% to cefixime and 18% to nitrofurantoin. This is similar to findings of Jha BK *et al* (2009), Baral P *et al* (2012), Raza S *et al* (2011), Jha N *et al* (2005). This similarity in findings might be due to similar study set up of the bacterial isolates in similar geographic area.<sup>3,6,13-15</sup> However, it contrasts with the findings of other studies done in other geographic areas.<sup>12,16,17</sup> A lower percent of Gram positive isolates are seen to be resistant to these commonly prescribed drugs. 44% of GPC were resistant to ciprofloxacin. A lower percentage of Gram positive isolates were resistant to cotrimoxazole (23%) and nitrofurantoin (29.4%), 19.8% to cefixime and only 8.1% to norfloxacin. This finding is also similar to findings of other studies conducted in Nepal and India, however, these results are contrasting with that of other various studies in different set-up. Similarity could be due to similar study set up in similar geographic area again and dissimilarity in findings might be due to different geographic set up.<sup>3,6,13-24</sup> It can thus be concluded from this study that *E. coli* is the predominant pathogen causing UTI in both the genders although the age mostly affected in females was 21-40 years and in males was 61-80 years. The Gram negative isolates showed a higher rate of resistance to the commonly used antibiotics than the Gram positive isolates. This emphasizes the need to perform urine culture and antibiotics sensitivity test for all suspected cases of urinary tract infection.

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