

# FREQUENCY OF UROPATHOGENS IN DIFFERENT GENDER AND AGE GROUPS

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## ABSTRACT

**Background:** Urinary tract infections (UTIs) are most common infectious diseases worldwide. The objective of this study was to determine the frequency of uropathogens in relation to gender and age in District D.I. Khan.

**Material & Methods:** This cross sectional study was conducted at the Department of Urology, DHQ Teaching Hospital, D.I. Khan from February 2012 to January 2013. All patients whose routine urine examination revealed numerous pus cells on microscopy were included in the study. The midstream urine specimens were collected in sterile containers and were processed for culture. With standard calibrated loop, 1µl of urine was inoculated on Cysteine Lactose Electrolyte Deficient agar and blood agar and incubated aerobically at 37°C for 18-24 hrs. After the incubation, if the CFU was more than 10<sup>5</sup>, it was considered significant bacteriuria. Age in years was analyzed as mean and range. Gender, age grouping and culture were analyzed as frequency (number) and relative frequency (%).

**Results:** A total number of 44 UTI cases diagnosed on urine culture were included in this study. Out of these cases 10 (22.8%) were males and 34 (77.2%) were females. The mean age was 39 (1-80) years. *E. coli* was the leading uropathogen 56.82% followed by *Klebsella* spp. 15.90%, *Pseudomonas* spp. 6.82%, *Staphylococcus aureus* 6.82%, *Enterococcus* spp. 4.55% *Candida* spp 4.55%, *Enterobacter* spp 2.27% & *Streptococcus* spp. 2.27% respectively.

**Conclusion:** The most common uropathogen was *E. coli*. Higher prevalence of UTIs was observed in female population. The prevalence of UTI was highest for age group 21 to 40 years.

**KEY WORDS:** Urinary tract infection, *E. coli*, urine Culture.

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## INTRODUCTION

Among the most common infectious diseases, urinary tract infections (UTIs) are commonly encountered diseases by clinicians in developing countries with an estimated annual global incidence of at least 250 million.<sup>1,2</sup> It has been estimated that globally symptomatic UTIs result in as many as 7 million visits to outpatient clinics, 1 million visits to emergency departments, and 100,000 hospitalizations annually.<sup>3</sup> In fact, UTIs are associated with a high risk of morbidity and mortality especially in the elderly.<sup>4</sup>

Urine in the human bladder is normally sterile. UTIs refer to the presence of microbial pathogens within the urinary tract and it is usually classified by the infection site: bladder (cystitis), kidney (pyelonephritis), or urine (bacteriuria). Bacteriuria

may be asymptomatic or show apparent symptoms of urinary tract infection<sup>5,6</sup> like dysurea, suprapubic pain and fever. The common uropathogens identified in adult patients with UTIs include enteric gram-negative bacteria, with *E. coli* being the most common. The remainders of infections are caused by coagulase-negative *Staphylococcus saprophyticus* (10-20%), while *Proteus mirabilis*, *Klebsiella*, and *Enterococcus* account for less than 5%.<sup>7,8</sup> Other aerobic gram-negative bacteria of the Enterobacteriaceae family include *Citrobacter*, *Enterobacter*, *Serratia*, and *Salmonella*.<sup>9,10</sup> In complicated urinary tract infections and hospitalized patients, organisms such as *Enterococcus faecalis* and highly resistant Gram-negative rods including *Pseudomonas* spp. are comparatively more common.

UTI is one of the most common infections occurring in all the age groups from neonates to old age. It is more common in females as compared to males, especially females of reproductive age group (from 15-50 years).<sup>9</sup> This is due to anatomical pre-

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disposition, close approximation of urethra and vagina and sexually active life during these years.<sup>11</sup> UTI is also an important complication of pregnancy. The relative frequency of the pathogens varies depending upon age, sex, catheterization, and hospitalization.<sup>12</sup> This study was conducted to determine the frequency of uropathogens in relation to age and gender in District D.I. Khan.

**MATERIAL AND METHODS**

This cross sectional study was conducted at the Department of Urology DHQ Teaching Hospital, D.I. Khan from February 2012 to January 2013. All patients whose routine urine examination revealed numerous pus cells on microscopy were included in this study. The midstream urine specimens were collected in sterile containers and were processed for culture within 30 minutes of collection. With standard calibrated loop, 1µl of urine was inoculated on Cysteine Lactose Electrolyte Deficient (CLED) agar and blood agar and incubated aerobically at 37°C for 18-24 hrs. Inoculation from well-mixed specimen was performed first, followed by other procedures. After the incubation, if the CFU was more than 10<sup>5</sup>, it was considered significant bacteriuria.

Gender and age in years and age grouping

**Table 1: Age group distribution of patients with Urinary Tract Infections (n=44).**

S. No.	Age groups in years	Frequency (number)	Relative frequency (%)
1	1-20	09	20.45
2	21-40	17	38.63
3	41-60	10	22.72
4	> 60	08	18.20
Total		44	100 %

**Table 2: Frequency of Uropathogens in patients with Urinary Tract Infections (n=44).**

S. No.	Uropathogens	Frequency (number)	Relative frequency (%)
1	<i>E.coli</i>	25	56.82
2	<i>Klebsella spp.</i>	07	15.90
3	<i>Pseudomonas spp.</i>	03	6.82
4	<i>Staphylococcus aureus</i>	03	6.82
5	<i>Enterococcus spp.</i>	02	4.55
6	<i>Candida spp.</i>	02	4.55
7	<i>Enterobacter spp.</i>	01	2.27
8	<i>Streptococcus spp.</i>	01	2.27
Total		44	100 %

were demographic variables. Culture of microorganisms was a research variable. Age grouping was done as follows: 1-20 years, 21-40 years, 41-60 years and more than 60 years. Age in years was analyzed as mean and range. Gender, age grouping and culture were analyzed as frequency (number) and relative frequency (%).

**RESULTS**

A total number of 44 UTI cases diagnosed on urine culture were included in this study. Out of these cases 10 (22.8%) were male and 34 (77.2%) were females. The mean age was 39 (1-80) years. Majority of UTI cases were found in age group 21-40 years (38.63%). (Table 1)

The culture reports revealed *E. coli* as the leading uropathogen in 56.82% cases, followed by *klebsella spp.* 15.90%, *Pseudomonas spp.* and *Staphylococcus aureus* were 6.82% while *Enterococcus spp.* and *Candida spp.* were 4.55%. *Enterobacter spp.* and *Streptococcus spp.* were 2.27% respectively. (Table 2)

**DISCUSSION**

Urinary tract infection is one of the most common types of infectious diseases encountered in the practice of medicine these days. A total of 44 urine specimens of patients aged 1-80 years, suspected for urinary tract infection were processed for culture. According to our study the UTI was more common in females (77.20%) than males (22.80%). This is similar with studies conducted by Mohammad Tariq Mehr, where gender distribution was 62.6% for females as compared to 37.31% for males. Another study conducted by Anisur Rehman revealed 9.6% males and 90.4% females.<sup>13,14</sup> It is more common in females due to anatomical predisposition, close approximation of urethra and vagina and sexually

active life during these years. Women may be more susceptible to UTIs because their urethral opening is near the source of bacteria (e.g., anus, vagina) and their urethra is shorter, providing bacteria easier access to the bladder. 50-80% women experience urinary tract infection at least once or twice in their lives. UTI is also an important complication of pregnancy due to the pressure of gravid uterus on the ureters resulting in the stasis of urine flow and due to the humoral and immunological changes during normal pregnancy.

In our study the prevalence of UTIs was highest for age group of 21 to 40 years (38.63%) followed by 41 -60 years (22.72%). It was less common in age group below 21 (20.45%) and above 60 years (18.20%). According to analysis of a random digit dialing survey of 2000 women in the United States by Foxman B et al,<sup>15</sup> one-third of women will have at least one physician-diagnosed UTI treated with prescription medication by age 24 and above. Overall, an estimated 11.3 million women in the United States had at least one presumed UTI treated with antibiotics with annual cost of UTI cases \$1.6 billion in 1995 which will exceed to \$25.5 billion in next 20 years.

In our study *E. coli* was the commonest cause of urinary tract infection (56.82%) followed by *Klebsiella pneumoniae* (15.90%), *Staphylococcus aureus* (6.82%), *Pseudomonas spp.* (6.82%) *Enterococcus spp.* (4.55%) *Candida spp.* (4.55%), *Enterobacter spp.* (2.27%) and *Streptococcus spp.* (2.27%) respectively. This is similar to other studies where *E. coli* was the most frequent pathogen causing UTI, as in a study conducted by Mohammad MT, where 62.6% cultures grew *E. coli* and in a study by Naeem et al, he found 66% *E. coli* cases while Tabish reported 70% *E. coli* positive culture cases.<sup>13,16,17</sup> These results were also similar with a study conducted by Dilnawaz S et al,<sup>18</sup> which reflects that first two common organisms were *E. coli* and *Klebsiella pneumoniae*. Third prevalent organism in our study was *Pseudomonas* while in the above mentioned study it was also *Pseudomonas*.

In two other studies in Pakistan, Khan, reported an uropathogens prevalence of 45.6% for *E. coli*. This was followed by *Candida spp.* (10.5%), *Enterococcus spp.* (10.2%) while Farooqi revealed a prevalence of 42% for *E. coli*, 16% *Pseudomonas aeruginosa*, 11% *Klebsiella aerogenes*, 5.0%, *Enterobacter spp.*, 13% *Proteus spp.*, 4.0% *Serratia liquifaciens*, 1.0%, *Acinetobacter spp.*, 3.0% *Citrobacter spp.*, 4.0% *Enterococci* and 0.5% *Staphylococcus aureus*.<sup>8,19</sup> Prevalence of different pathogens is dependent on several population attributes, sample

size and hygienic conditions of the patients. Therefore, a stable pattern in this regard cannot be predicted. This is why data vary when different studies are compared. For example, Hsueh et al,<sup>20</sup> have reported that the most frequent isolates from UTIs at a university hospital in Taiwan during the period 1993 - 1998 were *Candida spp.* (23.6%), *E. Coli* (18.6%) and *Paeruginosa* (11.0%). However later on *E. Coli* (18.4%) replaced *Candida spp.* (14.3%) as the top ranking pathogen causing UTIs.

## CONCLUSION

The most common uropathogen was *E. coli*. Higher prevalence of UTIs was observed in female population. The prevalence of UTIs was highest for age group of 21 to 40 years.

## REFERENCES

1. Ronald AR, Nicolle LE, Stamm E, Krieger J, Warren J, Schaeffer A, et al. Urinary tract infection in adults: research priorities and strategies. *Int J Antimicrob Agents* 2001; 17: 343-8.
2. Barisiic´ Z, Babić -Erceg A, Borzić´ El. Urinary tract infections in South Croatia: aetiology and antimicrobial. *Intl J Antimicrob Agents* 2003; 22: S61-S64.
3. Wilson ML, Gaido L. Laboratory diagnosis of urinary tract infections in adult patients. *Clin Infect Dis* 2004; 38: 1150-8.
4. Orenstein R, Wong ES. Urinary tract infections in adults. *Am Fam Physician* 1999; 59: 1225-34.
5. Beyene G, Tsegaye W. Bacterial uropathogens in urinary tract infection and antibiotic susceptibility pattern in Jimma University Specialized Hospital, Southwest Ethiopia. *Ethiop J Health Sci* 2011; 21:141-6.
6. Saint S, Chenoweth CE. Biofilms and catheter-associated urinary tract infections. *Infect Dis Clin North Am.* 2003; 17:411-32.
7. Baerheiy A, Digranes A, Hunskar S. Are resistance patterns published by microbiological laboratories valid for general practice? *APMIS.* 1999; 107: 676-80.
8. Khan SW, Ahmed A. Uropathogens and their susceptibility pattern: a retrospective analysis. *J Pak Med Assoc* 2001; 51: 98-100.
9. Warren JW, Abrutyn E, Hebel JR, Johnson JR, Schaeffer AJ, Stamm WE. Guidelines for antimicrobial treatment of uncomplicated acute bacterial cystitis and acute pyelonephritis in women. *Clin Infect Dis* 1999; 29: 745-58.
10. Steele RW. The epidemiology and clinical presentation of urinary tract infections in children 2 years of age through adolescence. *Pediatr Ann* 1999; 28: 653-8.

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11. Newell A, Riley P, Rogers M. Resistance patterns of urinary tract infections diagnosed in a genitourinary medicine clinic. *Int J STD AIDS*. 2000; 11: 499-500.
12. Sefton AM. The impact of resistance on the management of urinary tract infections. *Int J Antimicrob Agents* 2000; 16: 489-491.
13. Mehr MT, Khan H, Khan TM, Iman N, Iqbal S, Adnan S. E coli urine super bug and its antibiotic sensitivity: a prospective study. *J Med Sci* 2010; 18:110-3.
14. Rehman A, Jahanzeb M, Siddiqui TS, Idris M. Frequency and clinical presentation of UTI among children of Hazara division, Pakistan. *J Ayub Med Coll Abbottabad* 2008; 20:63-5.
15. Foxman B, Barlow R, D'Arcy H, Gillespie B, Sobel JD. Urinary tract infection: self-reported incidence and associated costs. *Ann Epidemiol*. 2000; 10: 509-15.
16. Naeem M, Khan M, Qazi S M. Antibiotic susceptibility pattern of bacterial pathogens causing urinary tract infection in a tertiary care hospital. *Ann Pak Inst Med Sci* 2010; 6: 214-8.
17. Humayun T, Iqbal A. The culture and sensitivity pattern of urinary tract infections in females of reproductive age group. *Ann Pak Inst Med Sci* 2012; 8:19-22.
18. Sheikh D, Ashfaq S, Sheikh K, Sheikh M. Studies on resistance/ sensitivity pattern of bacteria related with urinary tract infections. *Med J Isl World Acad Sci* 2005; 15; 129-33.
19. Farooqui BJ, Khurshid M, Alam M. Urinary tract infection. *J Pak Med Assoc* 1989; 39: 129-31.
20. Hsueh P, Chen M, Sun C, Chen W, Pan H, Yang L, et al. Antimicrobial drug resistance in pathogens causing nosocomial infections at a university hospital in Taiwan: *Emerg Infec Dis* 2002; 8: 63-8.

### CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared