

## ORIGINAL ARTICLE

# Frequency of Urinary Tract Infections and Causative Agents in Different Age Groups in Both Genders in a Tertiary Care Hospital

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### ABSTRACT:

**Objective:** To determine the frequency of urinary tract infections and their causative agents in different age groups in both genders.

**Materials and Methods:** All urine samples received from February 2013 to October 2013 for culture and sensitivity in Baqai Laboratory (a subsidiary of Baqai University Hospital, Nazimabad, Karachi) were processed. Urine samples showing pyuria were inoculated on Cysteine Lactose Electrolyte Deficient (CLED) medium and blood agar and incubated at 37°C for 24 hours. Samples showing 10<sup>5</sup> organisms were considered to have significant bacteriuria. Organisms were identified by standard biochemical procedures.

**Results:** Out of 633 samples inoculated, 40% (253) showed significant bacteriuria. Incidence of isolated uropathogens was E.coli (70%), Enterobacter species (9%), Enterococcus species (7.5%), Pseudomonas species (5%), Klebsiella species (4%), Acinetobacter species (3.2%), Salmonella species (0.8%), Staph. aureus (less than 1%) and Candida (less than 1%). Gender-wise distribution of patients: Male 36%, Female 64%. Predominant number of female patients was in reproductive age group while greater frequency in males was seen in patients above 55 years of age.

**Conclusion:** There is higher frequency of urinary infections in females in reproductive age groups and more men with urinary infections were aged above 55. E.coli is the prominent causative organism.

**Keywords:** Urinary tract infection (UTI), Uropathogenic E.coli (UPEC), Midstream urine (MSU), Gram negative rods (GNR), Gram positive cocci (GPC), Pyelonephritis, Cystitis

### INTRODUCTION:

Urinary tract infections (UTIs) are common bacterial infections causing anxiety and morbidity in women with considerable financial implications.<sup>1,2</sup> Cystitis is infection of lower urinary tract with patient complaining of dysuria, urgency and suprapubic pain while pyelonephritis is infection of upper urinary tract with complaints of fever with rigors, flank pains, nausea and vomiting.<sup>3</sup>

UTIs are common in females with 15% of women suffering from this infection every year. 25% of women who have had an infection will experience a recurrence. UTIs are common during pregnancy. Infections and untreated symptomatic/asymptomatic bacteriuria have been associated with pyelonephritis, pre-mature delivery and fetal mortality. Most important risk factor for acute cystitis in young women is history of previous episode

of cystitis and recent sexual activity.<sup>4,5</sup> UTIs are common in females because of anatomical reasons of shorter female urethra,<sup>6</sup> proximity of urethral opening with vagina and anus facilitating colonization of periurethral area with fecal flora and absence of antibacterial prostatic secretions.<sup>7,8</sup> Increased incidence of these infections in reproductive age group is further contributed by sexual activity which transiently deforms sexual anatomy facilitating entry of uropathogens into bladder.

UTIs are less common in men because of longer male urethra and anti-bacterial prostatic secretions.<sup>9,10</sup> But this scenario changes after 50 years of age when prostatic hypertrophy sets in leading to obstruction of urinary flow facilitating infection.<sup>3</sup>

UTIs may be community acquired when 80% are caused by E.coli, 10% by Staph. saprophyticus, 8% by other GNRs (Klebsiella, Enterobacter, Serratia, Pseudomonas and Proteus) and 2% by GPC. Hospital acquired infections usually associated with catheterization/ instrumentation are caused 40% by E.coli 35% by other GNRs, 20% by GPC and remaining by Candida.<sup>11,12</sup>

Various virulence factors of UPEC are (i) P-frimbriae (ii) hemolysins (iii) siderophores (iv) K-antigens. P-frimbriae specifically bind to P blood group antigens present on uroepithelial cells of 99% of population. Frequency of these receptors determines susceptibility of an individual to UTI caused by E.coli. Hemolysins are cytotoxins. Siderophore help E.coli acquire iron during colonization. K-antigens are capsular antigen and are antiphagocytic.<sup>13,14</sup>

### MATERIALS AND METHODS:

633 patients were referred to Baqai Laboratory for urine culture and sensitivity from February 2013 to October 2013. Patients were provided sterilized wide mouthed bottles and advised to provide midstream urine specimen

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(MSU) samples.

**Urine Microscopy and Culture:** Urine specimens were centrifuged and sediments were examined microscopically for pus cells, red cells, casts and parasites. All samples showing many pus cells were inoculated on Cysteine Lactose Electrolyte Deficient (CLED) medium and blood agar with standard calibrated loop delivering 1µl of urine. Plates were incubated at 37C for 24 hours. All samples showing 10<sup>5</sup> CFU or more were considered to have significant bacteria. Organisms were identified by standard biochemical procedures.<sup>5</sup> Out of 633 samples inoculated, 253 samples showed significant bacteriuria. Data collection was done after formal written consent of patient and with the approval of institutional ethical committee. Data was analysed using program Excel 2007.

**RESULTS:**

Out of 633 clinical isolates inoculated, 253 (40%) showed significant bacteriuria while 380 (60%) isolates either showed no growth or insignificant growth (Table 1 & Figure 1). Age wise distribution of 253 positive samples is shown in Table 2 & Figure 2. Maximum number of isolates 92 (36%) were seen in age group 37-54 year followed by 70 (28%) persons above 55 years and 68 (27%) in age group 19-36. Lowest number of isolates 23 (09%) were seen in those below 18 years of age (Table 2 & Figure 2).

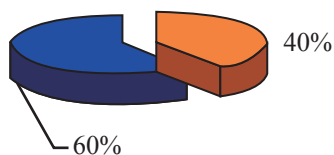
Gender wise distribution: 162 (64%) of isolates belonged to female gender while 91 (36%) isolates pertained to male population. Female population showed maximum positive isolated in reproductive age group with 68 (74%) samples in age group 37-54 and 49 (72%) samples in age group 19-36 years. Number of positive isolates dropped to 31 (44%) in females above 55 years of age and to 14 (61%) in patients below 18 years of age (Table 3& Figure 3)

In male population, maximum number of UTI patients 39 (56%) are above 55 years of age with numbers decreasing to 24 (26%), 19 (28%) and 9 (39%) in age groups 37-54, 19-36 and below 18 respectively (Table 3). Commonest pathogen isolated is E.coli in 176 (70%) of patients followed by Enterobacter species in 23 (9%), Enterococcus species 19 (7.5%), Pseudomonas species 13 (5%) and Klebsiella species 10 (4%) (Table 4).

Table: 1  
Specimens showing significant bacteriuria

Sample inoculated	Samples showing Significant bacteriuria	Samples showing Insignificant/no growth
633	253 (40%)	380 (60%)

Figure: 1

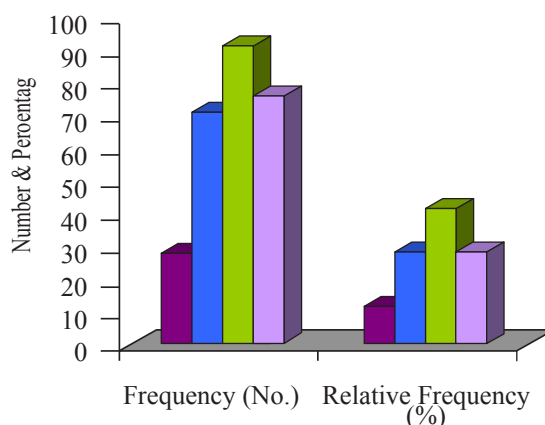


■ Significant bacteriuria ■ Insignificant bacteriuria

Table: 2  
Age-wise distribution of 253 samples

Age group (Years)	Frequency (No)	Relative frequency (%)
1-18	23	09
19-36	68	27
37-54	92	36
Above 55	70	28
Total	253	100

Figure: 2

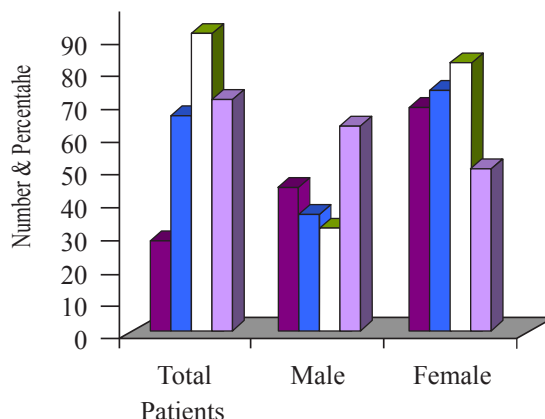


■ 1-18 Yrs ■ 19-36 Yrs ■ 37-54 Yrs ■ > 55 Yrs

Table: 3  
Gender wise distribution UTI patients in different age groups

Age group (Yrs)	Total Patients	Male	Female
1-18	23	09 (39%)	14 (61%)
19-36	68	19 (28%)	49 (72%)
37-54	92	24 (26%)	68 (74%)
Above 55	70	39 (56%)	31 (44%)
Total	253	91	162

Figure: 3



■ 1-18 Yrs ■ 19-36 Yrs ■ 37-54 Yrs ■ > 55 Yrs

Table: 4  
Frequency of various isolates

Organism	Frequency No. %	Male patients + for organisms	Female patients + for organisms
E.coli	176 70	52	124
Enterobacter spp.	23 09	12	11
Enterococcus spp.	19 07.5	13	05
Pseomonas spp.	13 05.0	05	08
Klebsiella spp.	10 04.0	03	07
Acinetobacter spp.	08 03.0	06	02
Salmonella spp.	02 0.7	00	02
Staph. aureus	01 0.4	00	01
Candida	01 0.4	00	01
Total	253	91	162

**DISCUSSION:**

633 samples were inoculated, 253 (40%) showed significant bacteriuria. Different studies have reported different figures for significant bacteriuria. Khan has reported its incidence as 23% similar to the one reported by Radar while Chaurasia has reported significant bacteriuria in his study as 48%. Our figure of 40% is similar to the one reported by Ahmed<sup>15,16,17,18</sup>

In our study, overall incidence of UTI in female subjects is 64% while figure for male subjects is 36%. Our results are almost similar to one reported by Farid, being 67.5% for female patients and 32.5% for male patients in a study conducted on 200 UTI patients<sup>19</sup> Our results are also in conformation with those reported by Mehr, being 62.6% and 37.4 in females and males respectively in 246 patients<sup>20</sup>.

Our study showed cumulative incidence of UTI in female subjects of reproductive age (19-36 and 37-54) being 73% which drops to 44% in subjects over the age of 55. This drop in incidence of UTI in females above 55 suggests important role of sexual activity in causation of UTI in females of reproductive age. Our study also showed cumulative incidence of UTI in males of age groups 19-36 and 37-54 being 27% (43/160) which is raised to 56% in males over 55 years. Increased incidence of UTI in men over 55 years correlates with prostatic hypertrophy, after 50 years of age, causing obstruction to urinary flow, thus facilitating development of infection. Commonest organism isolated in our study is E.coli (70%) followed by Enterobacter species (9%), Enterococcus species (7.5%), Pseudomonas species (5%), Klebsiella species (4%) and Acinetobacter species (3%).

Our results corroborate with results reported by Farid as E.coli (73%), Klebsiella (8%), Staph. aureus (7.5%) and Pseudomonas species (5%).<sup>19</sup> Another study has documented various organism in UTI patients as E.coli (80%), Staph. aureus (9%), Proteus species (5%) and Pseudomonas species (5%).<sup>21</sup> Studies have reported their results as E.coli (70%), Klebsiella species (14%), S. fecalis (5%) and Acinitobacter species (4.2%).<sup>22,23</sup> Another study conducted by Khan has reported their results as E.coli (56.8%), Klebsiella species (15.9%), Pseudomonas species (6.8%), S. aureus (6.8%), Enterococcus species (4.5%) and Candida (4.5%)<sup>24</sup>. In

this study, frequency of E.coli as causative agent of UTI is less which may be due to smaller size of sample. 70-80% of urinary infection are caused by E.coli contributed by GNR, GPC and Candida etc. depending on whether infection is hospital acquired or community acquired sample size and hygienic habits of patients.<sup>25</sup>

**CONCLUSION:**

There is higher frequency of urinary infections in females in reproductive age groups and more men with urinary infections were aged above 55. E.coli is the prominent causative organism.

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