

ORIGINAL ARTICLE

Clinical Profile and Associated Risk Factors of Urinary Tract Infections in Patients at a Tertiary Care Hospital

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ABSTRACT

Background: Urinary tract infections (UTIs) are a very common bacterial infection worldwide, and they are significant contributors to morbidity, healthcare costs, and antimicrobial resistance. The presentation, pathogens, and risk factors vary across populations, which necessitates the availability of local epidemiological information for guiding effective management programs. **Objective:** The aim of this study was to assess the clinical profile and associated risk factors of UTI. **Methods & Materials:** This cross-sectional observational study was conducted in the Department of Medicine, Comilla Medical College Hospital (CoMCH), Comilla, Bangladesh from 1st January 2018 to 30th June 2018. Total 100 patients aged more than 12 years fulfilling the clinical criteria of UTI, urine R/M/E shows pus cell >10/HPF, urine culture shows number of colony is ≥ 105 CFU/ml were included in this study. **Results:** The mean age of patients was 55 ± 18.2 years, and females represented 62% of the cases. The affected age group most frequently was 61–70 years (28%). The most common symptoms were urgency (88%). Common comorbidities included diabetes mellitus (34%) and hypertension (23%). The most common pathogen was *Escherichia coli* (*E. coli*) (86%), with a significant association between gender and type of pathogen ($P < 0.05$). Sexually active (72%), female gender (62%), and advanced age (>60 years) (48%) were the primary risk factors. **Conclusion:** UTIs among this group were most prevalent among sexually active older women, and the most frequent pathogen was *E. coli*. The findings emphasize the need for prevention and empirical treatment in light of regional data.

Keywords: Clinical Profile, Associated Risk Factors, Urinary Tract Infections, and Tertiary Care Hospital.

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INTRODUCTION

Urinary tract infections (UTIs) are among the most common bacterial infections globally, affecting millions of individuals every year and inflicting significant costs on healthcare systems. They can occur at any age but are most common among women and older adults, with female-to-male ratios in some populations reaching 8:1 because of anatomical and hormonal factors.^[1] The global burden of UTIs is widespread. The Global Burden of Disease (GBD) report approximated that UTIs had resulted in millions of outpatient visits and a

significant proportion of hospitalizations worldwide, contributing significantly to disability-adjusted life years (DALYs) lost, mainly among elderly individuals.^[2] In addition to direct health costs, UTIs have indirect consequences like work absenteeism and chronic complications among vulnerable populations such as pregnant women, diabetics, and individuals with chronic kidney disease.^[3] The clinical presentation of UTIs is characteristically well known, generally consisting of dysuria, urinary frequency and urgency, and suprapubic pain, and in more serious or

ascending infections, flank pain, fever, and systemic findings.^[4] Diagnosis is usually corroborated by laboratory evidence in the form of urinalysis, showing pyuria and/or nitrite test positivity, and by urine culture, which is still considered the "gold standard" for pathogen identification and antimicrobial susceptibility testing. Globally, *Escherichia coli* is the prevalent isolate of uropathogen responsible for 70–90% of community-acquired UTI cases, followed by *Klebsiella pneumoniae*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, and *Enterococcus faecalis*.^[4,5] However, there has been the concerning rise of antimicrobial resistance (AMR) among these pathogens, particularly with the emergence of extended-spectrum β -lactamase (ESBL) producing *E. Escherichia coli* and *Klebsiella*, and carbapenemase-producing strains, that highly limit treatment.^[6]

Some risk factors for UTI have been reported in the community as well as in healthcare settings. Female sex, advancing age, diabetes mellitus, chronic kidney disease, immunosuppression, urinary catheterization, past history of antibiotic use, and recent hospital admission are all predictors of enhanced vulnerability.^[7,8] Catheter-associated urinary tract infection (CAUTI) is the most common health care-associated infection but is still highly preventable with evidence-based practices of catheter care.^[3] Epidemiology and resistance patterns also differ greatly for community-acquired and health care-associated UTIs, the latter often caused by MDR strains.^[9] MDR uropathogens are associated with increased lengths of stay, increased morbidity and mortality, and increased expenditure on treatment, especially in tertiary-care facilities where patient turnover is high and there is exposure to antimicrobials.^[10] These findings emphasize the need for access to up-to-date, locally applicable antimicrobial susceptibility data to guide empiric therapy and underpin antimicrobial stewardship programs.^[11]

Whereas UTI epidemiology and AMR trends are more easily obtained from international and national databases, local trends will differ noticeably due to variations in patient population, referral patterns, healthcare, and infection control. Studies in Nepal, Saudi Arabia, Bangladesh, and Vietnam have shown that pathogen distributions and resistance profiles are institution or region-specific.^[5,6,10,12] Despite this, there remains a paucity of comprehensive, integrated studies in the majority of tertiary-care centers, particularly in low- and middle-income countries, integrating clinical presentation, microbiological trends, AMR patterns, and patient-level risk factor analysis all under the same roof. Such data are needed for individualized optimization of empiric antibiotic regimens, improved sensitivity of diagnosis, identification of high-risk groups, and planning focused preventive interventions such as CAUTI reduction initiatives.^[13]

The present study was intended to document the clinical, laboratory, and microbiological profile and association of patients diagnosed with UTI in the tertiary care center.

OBJECTIVE

To assess the clinical profile and associated risk factors of urinary tract infections (UTI).

METHODS & MATERIALS

This cross-sectional observational study was conducted among the indoor and outdoor patient in the Department of Medicine, Comilla Medical College Hospital (CoMCH), Comilla, Bangladesh from 1st January 2018 to 30th June 2018. Total 100 patients aged more than 12 years fulfilling the clinical criteria of UTI (fever, frequency of micturation, dysuria, suprapubic pain), urine R/M/E shows pus cell >10/HPF, urine culture shows number of colony is ≥ 105 CFU/ml were included in this study. Patients aged below 12 years who refuse to take part in this study, presented with active menstruation, PID, tubo-ovarian disease, appendicitis, colitis, severe other infections e.g. sepsis and were on antibiotic advised to were excluded from this study. Patients Data were collected through a structured proforma, capturing socio-demographic characteristics (age, sex, residence), relevant clinical history (comorbidities, previous UTI episodes, hospitalization, catheterization, and prior antibiotic use), presenting symptoms (dysuria, frequency, urgency, suprapubic pain, fever, flank pain), and laboratory findings. Midstream urine samples were obtained aseptically and subjected to urinalysis followed by culture and sensitivity testing, with significant bacteriuria defined as growth of $\geq 10^5$ colony-forming units/mL. Identification of uropathogens and antimicrobial susceptibility testing was performed using standard microbiological procedures in accordance with Clinical and Laboratory Standards Institute (CLSI) guidelines. Data were entered into and analyzed using SPSS version 25. Descriptive statistics were computed for continuous variables as mean $\pm$ standard deviation (SD) and categorical variables as frequencies and percentages. Associations between categorical variables were tested using the Chi-square test, while logistic regression analysis was applied to determine independent predictors of UTI and MDR infection, with a p-value <0.05 considered statistically significant. Ethical approval for the study was obtained from the institutional review board prior to commencement, and informed consent was obtained from all participants.

RESULTS

In the present study, Table I outlines the baseline characteristics of the 100 patients included. The mean age of participants was 55 ± 18.2 years, with ages ranging from 12 to 90 years. The largest age group was 61–70 years (28%), followed by equal proportions in the 20–30 and 71–80-year ranges (16% each). Younger age groups, such as 31–40 years (8%) and 81–90 years (4%), had lower representation. The majority of patients were married (82%) and reported being sexually active (72%), both of which were statistically significant ($P < 0.05$). Education status showed that 68% were educated compared to 32% without formal education, also significant ($P < 0.05$). In terms of gender distribution (Figure 1), females constituted a larger proportion (62%) than males (38%).

Table II summarizes the clinical presentations and co-morbid conditions. Urgency was the most common presenting symptom (88%), followed by abdominal pain (77%), dysuria (68%), and fever (67%). Among co-morbidities, diabetes

mellitus was most frequent (34%), followed by hypertension (23%) and ischemic heart disease (14%), with other conditions reported in 2% of patients.

Table III presents the distribution of bacterial pathogens isolated from patients. *Escherichia coli* (*E. coli*) was the predominant organism, identified in 86% of cases, with a higher prevalence among females (51%) compared to males (35%), a difference that was statistically significant ($P < 0.05$). *Klebsiella* species accounted for 9% of infections (7% in

females, 2% in males), while *Enterococcus* was detected in 5% (4% in females, 1% in males).

Table IV highlights associated risk factors for urinary tract infection in this cohort. Female sex was the most common risk factor (62%), followed by being sexually active (72%) and advanced age (>60 years, 48%). Comorbidities such as diabetes mellitus (34%), hypertension (23%), and ischemic heart disease (14%) were also notable contributors. Prior antibiotic use was reported by 10% of patients.

Table - I: Baseline characteristics of the study patients (n=100)

Characteristics	Frequency	Percentage (%)	P-value
Age group (in years)			
20-30	16	16	P <0.05*
31-40	8	8	
41-50	12	12	
51-60	12	12	
61-70	28	28	
71-80	16	16	
81-90	4	4	
Mean ± SD	55 ± 18.2		
Range (min-max)	12-90		
Marital status			
Married	82	82	P <0.05*
Unmarried	18	18	
Sexual activity			
Active	72	72	P <0.05*
Not active	28	28	
Education status			
Educated	68	68	P <0.05*
Not educated	32	32	

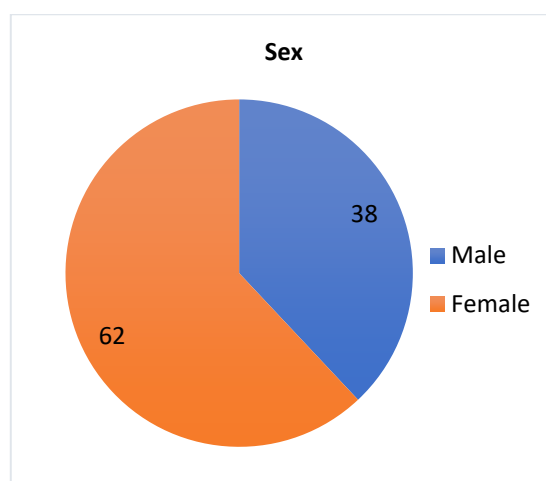


Figure - 1: Sex distribution of the study patients (n=100)

Table - II: Clinical presentation of UTI and co-morbid condition of the study patients (n=100)

Parameter	Frequency	Percentage (%)
Clinical presentation		
Urgency	88	88
Abdominal pain	77	77
Dysuria	68	68
Fever	67	67
Co-morbid condition		

Diabetes mellitus	34	34
Hypertension	23	23
Ischemic Heart Disease	14	14
Others	2	2

Table – III: Distribution of bacterial pathogen among the study patients (n=100)

Pathogen	Male (%)	Female (%)	Total	P-value
Escherichia coli	35	51	86	P <0.05*
Klebsiella	2	7	9	
Enterococcus	1	4	5	
Total	38*	62*	100	

Table – IV: Associated risk factors among the study patients (n=100)

Risk Factors	Frequency	Percentage (%)
Female sex	62	62
Advanced age (>60 years)	48	48
Sexually active	72	72
Diabetes mellitus	34	34
Hypertension	23	23
Ischemic Heart Disease	14	14
Prior antibiotic use	10	10

DISCUSSION

The present study is an in-depth analysis of demographic profile, clinical presentation, microbiological profiles, and risk factors of patients reporting with urinary tract infection (UTI) in a tertiary care center. The age group of the participants was 55 years with a significant proportion being above 60 years, supporting the known fact that the prevalence of UTI increases with increasing age.^[14] Women comprised 62% of cases, which is consistent with the global epidemiologic patterns attributing the higher incidence among women to anatomical and physiological causes.^[15] The majority of patients were married (82%) and sexually active (72%) being consistent with previous studies indicating sexual activity to be a significant risk factor, particularly in women, since sexual activity provides a potential for urogenital bacterial transfer.^[15] In clinical presentation, the most frequent symptom was urgency (88%), followed by abdominal pain (77%), dysuria (68%), and fever (67%).

The symptom pattern is consistent with that described by Mody and Juthani-Mehta^[16], who noted frequency and urgency as common complaints in older adults with UTIs, whose relative proportions vary within populations. The prevalent rate of abdominal pain in this research could be explained by variations in patient perception, reporting style, or geographical variation in disease severity and health-seeking attitude. In terms of comorbidities, the most common (34%) was diabetes mellitus, followed by hypertension (23%) and ischemic heart disease (14%). Similar patterns have also been observed in population-based epidemiological studies, for example, that of Grandy et al.^[17], which documented elevated UTI prevalence and recurrence rates among type 2 diabetic patients due to impaired immune function and bacterial growth promoted by glycosuria. Hypertension and ischemic heart disease, although less directly implicated in UTI pathogenesis, may possibly contribute indirectly through

vascular changes affecting renal function and host defense capacity.^[16] Microbiological analysis revealed *Escherichia coli* (*E. coli*) as the most prevalent uropathogen, taking 86% of the isolates.

This finding agrees with a number of studies worldwide where *E. coli* is the leading causative agent in community- and hospital-acquired UTIs.^[18] The strong association between the pathogen type and gender in this study, where *E. coli* more frequently recovered from females, supports the pathogen's uniformly reported predominance in females due to urethral proximity to the rectum and comparative urethral shortness.^[15] *Klebsiella* (9%) and *Enterococcus* (5%) came next as the most frequent isolates, as in local surveillance reports implicating these organisms as emerging uropathogens, especially in health care-associated infections.^[19] Concurrent risk factor analysis confirmed the multifactorial etiology of susceptibility to UTI.

Sex (72%) was the predominant factor, in agreement with earlier studies documenting recent sexual exposure as the single best predictor of UTI onset.^[15] Female sex (62%) and advanced age (>60 years) in 48% of patients also represent validated risk strata.^[14] Diabetes mellitus, in 34% of patients, was again a major factor, in agreement with data that diabetic patients are more susceptible to complicated UTIs as well as infection with drug-resistant organisms.^[20] Pre-exposure to antibiotics (10%), although less common, has been recognized as a driver of antimicrobial resistance, and thus the importance of stewardship programs.^[17] Comparison with other studies of similar design supports the results of the present research in both strengthening and augmenting current evidence.

A higher proportion of urgency and pain patients, and the relatively low rates of prior antibiotic consumption, may reflect regional epidemiological heterogeneity. The dominance of *E. coli* is in stable concordance with worldwide trends, but high incidences of *Klebsiella* and *Enterococcus* species suggest continued local surveillance because of their implication for multidrug resistance. Further, the strong association of sexual behavior, female sex, and very old age with the status of UTI reaffirms the need for gender- and age-specific targeted prevention.

CONCLUSION

This study concludes that urinary tract infection predominantly affected middle-aged and elderly women, with pain in the abdomen and urgency being the predominant symptoms. *Escherichia coli* remained the most prevalent pathogen, and there were strong associations with risk factors such as sex, female, and diabetes mellitus. The resistance pattern described here underscores the need for focused empirical treatment and effective infection prevention and control. These findings highlight the importance of local epidemiological data in guiding antimicrobial stewardship and clinical decision.

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