

Clinical and Bacteriological Profile of UTI Patients in Medicine Department in a Teaching Hospital of Bangladesh

F AHAMMED^a, ME HOSSAIN^b, MG HOSSAIN^c, G KARMAKER^d, MR KABIR^e, IA CHOWDHURY^f, MC PAUL^g, HS PAL^h

Abstract:

Introduction: Urinary tract infections (UTIs) encompass a wide array of infections, accounting for a vast number of community as well as hospital acquired infections. This study was undertaken to evaluate the clinical presentations and bacteriological profile of UTI patients in indoor setting.

Methods: This 6 months cross-sectional study enrolled 100 patients admitted in Medicine department of Sylhet MAG Osmani Medical College Hospital with symptoms and signs of UTI subsequently confirmed by compatible investigations including urine culture.

Results: Among 100 patients of UTI, maximum were females (67%) and the male female ratio was 0.49: 1. The most common age group was 46–60 years (34%). Majority (68%) of the patients had upper UTI while lower UTI constitutes 32%. 66% of the patients had complicated while 34% have

uncomplicated UTI. 18% of the patients had recurrent UTI. Most of the patients had fever (55%), followed by loin pain (37%) as their presenting symptoms. The most common risk factor was loss of host defense 38% (diabetes mellitus/ use of immunosuppressive drugs). Out of 100, 60 urine samples were positive for pathogenic organisms. *Escherichia coli* was isolated in 41 (68.3%) of the positive samples, followed by *Klebsiella sp* 13 (21.6%), *Pseudomonas sp* 3 (5%) *Proteus sp* 2 (3.3%) *Staph. Aureus* 1 (1.66%).

Conclusion: The most common clinical presentations of UTI in admitted UTI patients are fever and loin pain. Diabetes mellitus is the most important risk factor. Mainly Gram negative bacilli were found to be responsible for UTI and most frequent isolated bacteria was *E-coli*.

(*J Bangladesh Coll Phys Surg* 2021; 39: 106-113)

DOI: <https://doi.org/10.3329/jbeps.v39i2.52391>

Introduction:

Urinary tract infection (UTI) may be defined as inflammatory disorders of the urinary tract caused by abnormal growth of pathogens¹. UTI is one of the

most common bacterial infections among male and female affecting 150 million people worldwide^{2,3}. In Bangladesh it is also one of the most important causes of morbidity at both outdoor and indoor setting. Lack of proper research, faulty diagnostic procedures, abuse of chemotherapeutic agents and little or no preventive measures are all common attributing factors⁴.

Clinically, UTI is uncomplicated and complicated. When the infection occurs in otherwise healthy and has no structural or neurological urinary tract abnormalities, it is an uncomplicated UTI⁵. Complicated UTIs are defined as UTIs associated with factors that compromise the urinary tract or host defense, including urinary obstruction, urinary retention caused by neurological disease, immunosuppression, renal failure, renal transplantation, pregnancy, and the presence of foreign bodies such as calculi, indwelling catheters, or other drainage devices^{6,7}.

- Dr. Ferdaus Ahammed, Concepts, Design, Literature Search, Manuscript review
- Dr. Md. Enayet Hossain, Concepts, Design, Literature Search, Manuscript review
- Dr. Md. Guljar Hossain, Data Analysis, Literature Search, Manuscript review
- Dr. Gobinda Karmaker, Concepts, Manuscript editing, Manuscript review
- Mohammed Ruhul Kabir, Data Analysis, Manuscript review
- Iqbal Ahmed Chowdhury, Manuscript editing, Manuscript review
- Dr. Mukul Chandra Paul, Data Analysis, Manuscript review
- Dr. Hitangshu Shekhar Pal, Data Analysis, Manuscript review

Address of Correspondence: Dr. Ferdaus Ahammed, Assistant Professor, Dept. of Medicine, Sylhet MAG Osmani Medical College, 113/1, 2nd Floor, Kajalshah, Sylhet 3100. Cell: 01717518609, E-mail: ferdauscom7@gmail.com

Received: 29 September, 2020

Accepted: 15 February, 2021

It is reported that 70–80% of complicated UTIs are attributable to indwelling catheters, accounting for 1 million cases per year in the United States⁸. Risk factors for developing a catheter associated UTI include prolonged catheterization, female gender, older age, and diabetes⁹.

The symptoms associated with the bladder and kidney infections are contrasting. Painful and frequent urination in case of cystitis as a result of bladder infection whereas high fever and flank pain in case of kidney infection are the common phenomena¹⁰.

The infection encompasses a diverse group of clinical syndromes and diseases that differ in epidemiology, etiology, and location severity of the condition¹¹. In addition to the above factors, it also varies in symptoms, frequency of recurrence, extent of damage caused, and presence of complicating factors¹². The occurrence of bladder infection is usually followed by kidney infection, and results in blood-borne infection and in severe circumstances can lead to severe consequences including death. Therefore, UTI is capable of claiming lives under severe circumstances and proper treatment results in quick recovery from the contagion¹³.

In the presence of risk factors such as female sex, diabetes, obstructive uropathy, previous instrumentation, and chronic kidney disease (CKD), the treatment becomes even more challenging. Various studies done worldwide have shown changing pattern in etiology of UTIs³. The present trends of the uropathogens and their susceptibility to various antibiotics are essential to formulate guidelines for the empirical treatment of UTIs while awaiting the culture sensitivity¹².

The major pathogens causing UTI are *E. coli* and *Pseudomonas sp*, *Proteus sp*, *Klebsiella sp* etc⁶. Increasing antibiotic resistance among urinary pathogens, especially *E. coli*, to commonly prescribed drugs like Cotrimoxazole has become a global reality⁷.

Hence, the present study was an attempt to evaluate the current clinical and bacteriological profile of UTI patients in our hospital.

Methods:

This 6-month cross-sectional study was undertaken in the Department of Medicine, Sylhet MAG Osmani Medical College, Sylhet from January 2019 to June

2019 by convenient sampling. Total of 100 patients admitted Medicine indoor Department with symptoms (Urgency, frequency, dysuria, lower abdominal pain, loin pain, fever, vomiting, incontinence, confusional state) and signs (Increased temperature, loin and/or pelvic tenderness tenderness) of UTI confirmed by pertinent investigations (CBC, Urine R/E and C/S, USG of KUB in necessary cases, S Creatinine, RBS) including urinary culture either positive or negative were selected for the study. Patients aged <13 years were excluded from the study.

UTI involving Kidney and ureter is taken as upper UTI, whereas involving urinary bladder and urethra is taken as lower UTI. When the infection occurs in otherwise healthy and has no structural or neurological urinary tract abnormalities, it is an uncomplicated UTI. Complicated UTIs are defined as UTIs associated with factors that compromise the urinary tract or host defense, including urinary obstruction, urinary retention caused by neurological disease, immunosuppression, renal failure, renal transplantation, pregnancy, and the presence of foreign bodies such as calculi, indwelling catheters, or other drainage devices. Reinfection in urinary tract with any organism after an interval is taken as recurrent UTI. Bladder outflow obstruction, anatomical abnormality, neurological problems, foreign body, loss of host defense is taken as risk factors of UTI.

Detailed history was taken from patient and patient attendants regarding clinical presentation (including diagnosis, complication, risk factor and recurrence) of UTI.

Data were processed manually and analyzed with the help of SPSS version 22. Quantitative data were expressed as mean and standard deviation, qualitative data were expressed as frequency and percentage.

Results:

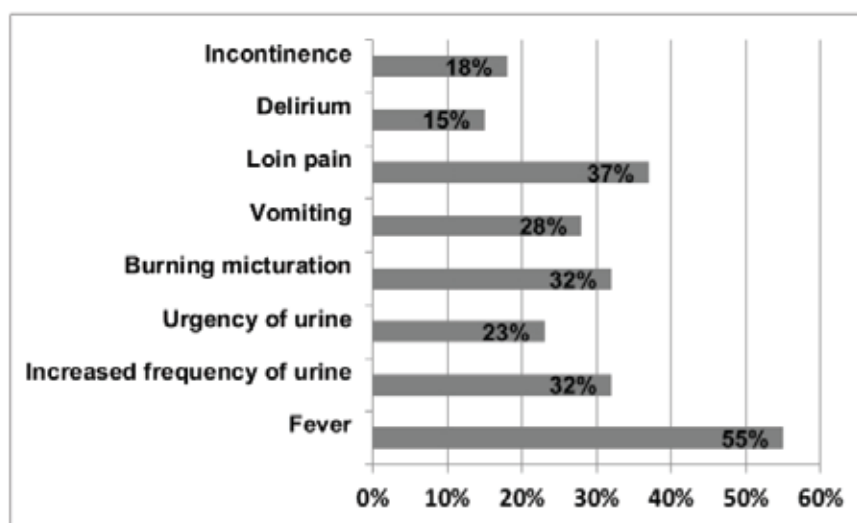
Among 100 patients of UTI, maximum were females (67%) and the male to female ratio was 0.49:1. The most common age group was 46–60 years (34%). The mean age was 54.19±3.94 years. The median age was 55 years and ranged between 17 to 100 years. Most of the patients completed primary education (52%). 21% did not receive any institutional education. Most (54%) of the patients belong to income range of 10,000 to 20,000 taka per month. (Table 1)

Table 1

Demographic profile of study patients (n=100)		
Traits	Frequency	Percentage
Age		
Mean	54.19	
Minimum	17	
Maximum	100	
15-30	10	10
31-45	23	23
46-60	34	34
61-75	24	24
76-90	8	8
91-105	1	1
Gender		
Male	33	33
Female	67	67
Educational status		
None	21	21
Primary	52	52
Secondary	24	24
Tertiary	3	3
Socioeconomic status(Income range -Taka/month)		
<10,000	32	32
10,000-20,000	54	54
>20,000	14	14
Marrital status		
Married	95	95
Unmarried	5	5

Most of the patients had fever (55%), followed by loin pain (37%), burning and increased frequency of micturition (32%), vomiting (28%), urgency of urine (23%), delirium (15%) incontinence 18(%). (Figure 1)

Figure 1: Symptoms of UTI



Majority (68%) of the patients had upper UTI while lower UTI constitutes 32%. 66% of the patients had complicated UTI, while 34 % have uncomplicated UTI. 18% of the patients had recurrent UTI. (Table 2)

Table 2

Pattern of UTI in study patients		
Traits	Frequency	Percentage
Diagnosis		
Upper UTI	68	68
Lower UTI	32	32
Complication Status		
Complicated	66	66
Uncomplicated	34	34
Recurrence		
Recurrent	18	18
Not recurrent	82	82

The most common risk factor was loss of host defense 38% (diabetes mellitus/ use of immunosuppressive drugs) followed foreign body (17%) like urethral catheter or stone anywhere in urinary pathway, 9% have bladder outflow obstruction like BEP or urethral stricture, 4% have neurological problem like Stroke, and 4% have anatomical abnormality like uterine prolapse. (Figure 2)

Figure 2: Risk factors of UTI patients

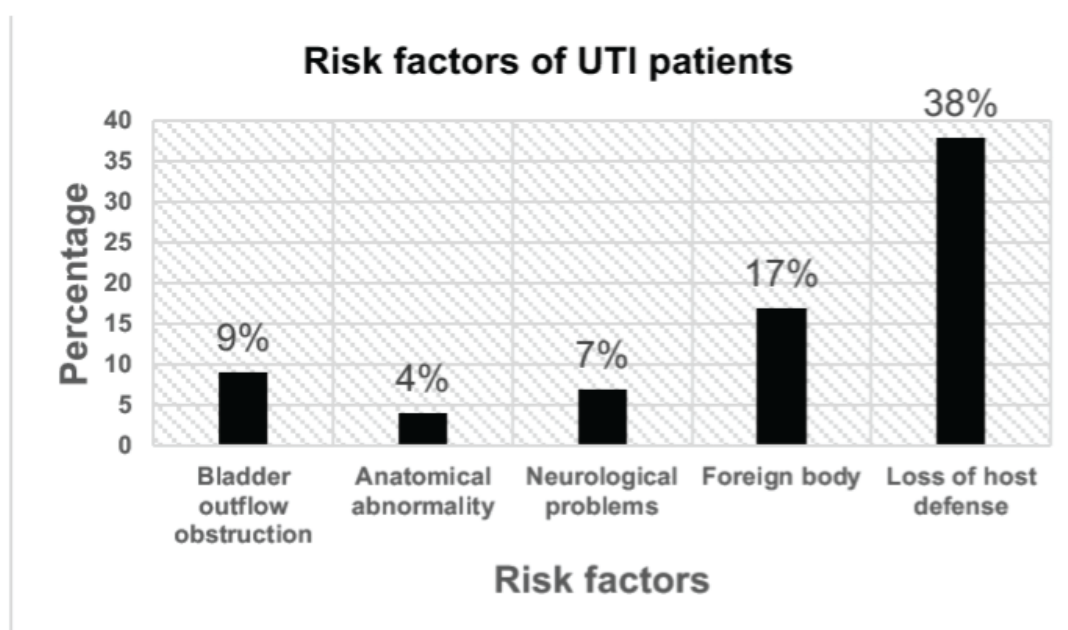


Table 3

Risk factors of UTI among study patients (n=100)		
Traits	Frequency	Percentage
Present	60	60
Absent	40	40

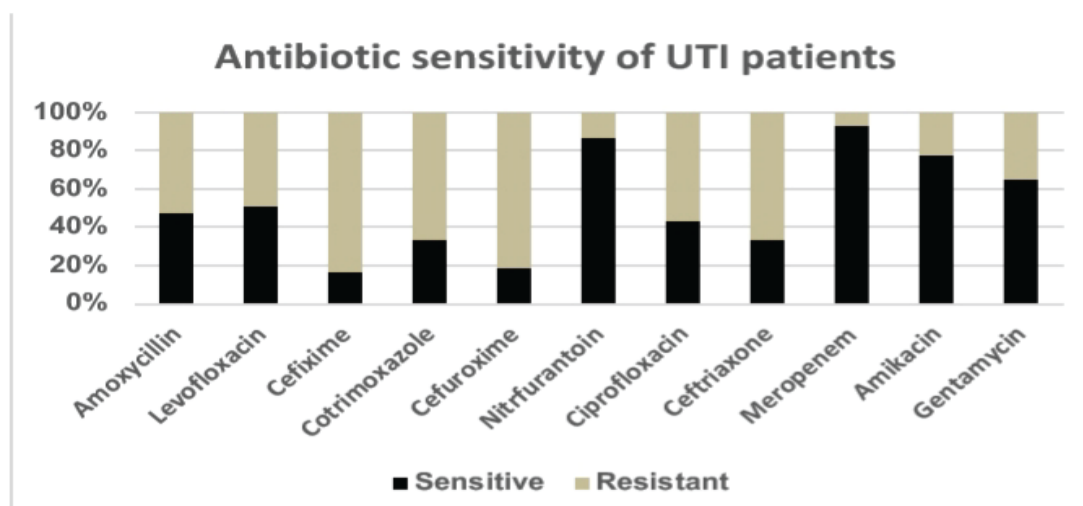
Out of 100 urine samples 60 were positive for pathogenic organisms. *Escherichia coli* was isolated in 41 (68.3%) of the positive samples. This was followed by *Klebsiella sp* 13 (21.6%), *Pseudomonas sp* 3 (5%) *Proteus sp* 2 (3.3%) *Staph. Aureus* 1 (1.66%). (Table 4)

Table 4

Microbiological pattern in study patients(n=100)		
Traits	Frequency	Percentage
Organism		
Present	60	60
Absent	39	39
Gram Stain		
Gram + ve	1	1.7
Gram -ve	59	98.3
Individual Bacteria		
E Coli	41	68.3
Klebsiella	13	21.6
Pseudomonas	3	5
Proteus	2	3.3
Staph aureus	1	1.6

As a whole all organisms are mostly sensitive to Nitrofurantoin (86.2%), Meropenem (93.1%), Amikacin (77.2%), and Gentamycin (64.9%) and mostly resistant to Cefixime (83.3%), Cefuroxime (81.4%), and Ceftriaxone (66.9%). (Figure 3)

Figure 3: Antibiotic sensitivity of UTI patients



Discussion:

UTI is a common clinical problem in both the community and health care associated settings. Epidemiologically urinary tract infections account for seven million office visits and one million emergency department visits, resulting in 100,000 hospitalizations yearly, making them the most common bacterial infections in outpatient and emergency department setting. Financially, the estimated annual cost of UTI is significant, at approximately \$1.6 billion¹⁴.

In the present study, 67% of the patients were females and 33% of the patients were males with male female ratio of 0.49: 1. Similar finding had been observed by another study by Kibret et al in Ethiopia which reported UTIs in 66 % of the females and 34 % of males¹⁵. The reason behind this high prevalence of UTI in females is due to proximity of the urethral meatus to the anus, shorter and wider urethra, sexual intercourse, incontinence, and less acidic pH of vaginal surface and poor hygienic conditions¹¹⁻¹³.

The incidence of UTI increases with age¹⁶. In the present study, age ranged between 17 and 100 years. The most common age group was 46–60 years comprised of 34 % of the patients and the mean age

was 54.19 (± 3.94 SD) years. A study from Vadodara, India showed maximum UTI patients in the age group of 50 to 69 (41.25%)¹⁷.

UTI usually develops in the lower urinary tract (urethra and bladder), and if not properly treated, they ascend to the upper urinary tract (ureters and kidneys) and cause severe damage to the kidneys¹⁶. In the present study, 66% of the patients had complicated type of UTI (Remaining 6 UTI patients had been labeled as complicated UTI upon their pregnancy as because pregnancy with UTI is complicated. Pregnancy was not encountered as risk

factor for UTI in Data collection tool but history of pregnancy is documented in data). while 34% of the patients had uncomplicated UTI. These findings were consistent with a study by Stefaniuk E et al. in Poland reported 37.8% of patients with uncomplicated UTI and 62.2% had a complicated infection¹⁸.

In the present study, the most common clinical presentation was fever noted in 55% of the patients followed by loin pain which was present in 37% of the patients. The other presentations were increased frequency of urine and burning during micturition

32%, vomiting 28%, urgency of urine 23%, incontinence 18%, and delirium 15%. A study from north Indian tertiary care center reported that most of the patients with symptomatic UTI complained of mild fever, increased frequency, and burning during micturition along with urgency¹¹, while another study by Eshwarappa M et al. demonstrated fever and dysuria being the most common clinical presentation¹⁹. Our study only included admitted patients which may explain the dominance of fever in the clinical presentation.

60% of the patients have at least one risk factors, while 40% having no risk factors to develop UTI. The most common risk factor was loss of host defense 38% (diabetes mellitus/ use of immunosuppressive drugs) followed foreign body (17%) like urethral catheter or stone anywhere in urinary pathway, 9% have bladder outflow obstruction like BEP or urethral stricture, 4% have neurological problem like Stroke, and 4% have anatomical abnormality like uterine prolapse. Similar study from South India reported that diabetes was the most common factor associated with complicated UTI which is consistent with the present study¹⁹. Nicolle LE et al. also demonstrated that the risk of developing UTI in diabetic patients is higher and urinary tracts the most common site for infection²⁰.

Raval R et al. in his bacteriological study revealed the involvement of gram negative enteric organisms as commonly causing urinary tract infections, such as *E. coli*, the *Klebsiella* species, and the *Proteus* species.¹⁷ Findings in our study also coincide with the previous studies, gram negative bacilli was more common and *Escherichia coli* constituted the largest group with a prevalence of 68.3 %, followed by *Klebsiella* sp 21.6%, *Pseudomonas* sp 5%, *Proteus* sp 3.3% and *Staph Aureus* sp 1.6%. Similar finding is also reported in a recent study in Dhaka city of

Bangladesh where *E coli* was most frequent (69%).²¹ Other investigators also reported higher association of *E. coli* (66.67% and 77.8% cases respectively) in UTI patients^{19,20}.

Overall antimicrobial sensitivity and resistance of isolated uropathogens in this study showed relatively high resistance to Amoxicillin (52%), Cotrimoxazole (66.90%) Cefixime (83.30%), Cefuroxime (81.40%) and Ceftriaxone (68.90%) which correlates with a previous study done by Haque et al in Bangladesh.²²

Meropenem 93.1%, Nitrofurantoin 86.20%, Amikacin 77.20 %, and Gentamycin 64.90% were found to be sensitive to identified uropathogens. These findings are quite consistent to the findings of another study done in King Fahad Hospital Saudi Arabia²³.

Limitations of our study were small sample size, inclusion of only admitted patients which is not representative of total community. As we enrolled the patients of indoor setting of a Govt. Hospital, so poor educational status as well as low socioeconomic status were in background information.

Conclusion:

Based on the findings of this study, it may be concluded that, the most of the UTI patients present with fever, Loin pain, burning micturition and increased frequency of micturition. Vomiting, urgency of micturition, incontinence and delirium are less common as clinical presentation. Diabetes mellitus is the most important risk factor of UTI. Most frequent isolated bacteria was *E-coli*.

Acknowledgement: UTI patients of Sylhet MAG Osmani Medical College Hospital

References:

1. Prakash D, Saxena RS. Distribution and antimicrobial susceptibility pattern of bacterial pathogens causing urinary tract infection in urban community of Meerut city, India. ISRN Microbiol. 2013 Oct 29;2013:749629. doi: 10.1155/2013/749629. PMID: 24288649; PMCID: PMC3830820. <https://doi.org/10.1155/2013/749629>, PMID: 24288649 PMCID: PMC3830820
2. Stamm WE, Norrby SR. Urinary tract infections: Disease panorama and challenges. J Infect Dis 2001;183 Suppl 1:S1-4. <https://doi.org/10.1086/318850>, PMID:11171002
3. Flores-Mireles AL, Walker JN, Caparon M, Hultgren SJ. Urinary tract infections: Epidemiology, mechanisms of infection and treatment options. Nat Rev Microbiol 2015;13:269-84. <https://doi.org/10.1038/nrmicro3432> PMID:25853778 PMCID:PMC4457377
4. Hamida K, Fahmida M, Shafiullah A. Z. M., Farhana M. Prevalence and comparative likelihood of urinary tract infection among female out patients in BSMMU. Bangladesh J. Zool. 2012 40(2): 231-39. <https://doi.org/10.3329/bjz.v40i2.14317>

5. Hooton TM. Clinical practice. Uncomplicated urinary tract infection. *N Engl J Med* 2012;366:1028-37. <https://doi.org/10.1056/NEJMc1104429> PMID:22417256
6. Lichtenberger P, Hooton TM. Complicated urinary tract infections. *Curr Infect Dis Rep* 2008;10:499-504. <https://doi.org/10.1007/s11908-008-0081-0> PMID:18945392
7. Levison ME, Kaye D. Treatment of complicated urinary tract infections with an emphasis on drug resistant gram negative uropathogens. *Curr Infect Dis Rep* 2013;15:109-15. <https://doi.org/10.1007/s11908-013-0315-7>, PMID:23378123
8. Lo E, Nicolle LE, Coffin SE, Gould C, Maragakis LL, Meddings J, et al. Strategies to prevent catheter associated urinary tract infections in acute care hospitals: 2014 update. *Infect Control Hosp Epidemiol* 2014;35:464-79. <https://doi.org/10.1086/675718>, PMID:24709715
9. Chenoweth CE, Gould CV, Saint S. Diagnosis, management, and prevention of catheter associated urinary tract infections. *Infect Dis Clin North Am* 2014;28:105-19. <https://doi.org/10.1016/j.idc.2013.09.002> PMID:24484578
10. Vasudevan R. Urinary tract infection: An overview of the infection and the associated risk factors. *Microbiol Exp* 2014;1:1-15. <https://doi.org/10.15406/jmen.2014.01.00008>
11. Khan R, Saif Q, Fatima K, Meher R, Shahzad HF, Anwar KS. Clinical and bacteriological profile of UTI patients attending a North Indian tertiary care center. *J Integr Nephrol Androl* 2015;2:29-34. <https://doi.org/10.4103/2225-1243.150009>
12. Ochei J, Kolhatkar A. Diagnosis of infection by specific anatomic sites/antimicrobial susceptibility tests. In: *Medical Laboratory Science Theory and Practice Reprint*. 6th ed. New Delhi, India: McGraw-Hill; 2007. p. 615-43,788-98.
13. Ghadage DP, Muley VA, Sharma J, Bhoire AV. Bacteriological profile and antibiogram of urinary tract infections at a tertiary care hospital. *Natl J Lab Med* 2016;5:MO20-24.
14. Aiyegoro OA, Igbinsola OO, Ogunmwonyi IN, Odjajaro E, Igbinsola OE, Okoh AI. Incidence of urinary tract infections (UTI) among children and adolescents in Ile-Ife, Nigeria. *Afr J Microbiol Res* 2007;1:13-9.
15. Kibret, Mulugeta, and Bayeh Abera. "Prevalence and antibiogram of bacterial isolates from urinary tract infections at Dessie Health Research Laboratory, Ethiopia." *Asian Pacific journal of tropical biomedicine* vol. 4,2 (2014): 164-8. doi:10.1016/S2221-1691(14)60226-4, [https://doi.org/10.1016/S2221-1691\(14\)60226-4](https://doi.org/10.1016/S2221-1691(14)60226-4)
16. John AS, Mboto CI, Agbo B. A review on the prevalence and predisposing factors responsible for urinary tract infection among adults. *Eur J Exp Biol* 2016;6:7-11.
17. Raval R, Verma RJ, Kareliya H. Clinico-pathological features of urinary tract infection in rural India. *Adv Infect Dis* 2015;5:132-9. <https://doi.org/10.4236/aid.2015.54016>
18. Stefaniuk E, Suchocka U, Bosacka K, Hryniewicz W. Etiology and antibiotic susceptibility of bacterial pathogens responsible for community-acquired urinary tract infections in Poland. *Eur J Clin Microbiol Infect Dis* 2016;35:1363-9. <https://doi.org/10.1007/s10096-016-2673-1>, PMID:27189078 PMID:PMC4947106
19. Eshwarappa M, Dosegowda R, Aprameya IV, Khan MW, Kumar PS, Kempegowda P, et al. Clinico-microbiological profile of urinary tract infection in South India. *Indian J Nephrol* 2011;21:30-6. <https://doi.org/10.4103/0971-4065.75226>, PMID:21655167 PMID:PMC3109780
20. Nicolle LE. Asymptomatic bacteriuria in diabetic women. *DiabetesCare* 2000;23:722-3. <https://doi.org/10.2337/diacare.23.6.722>, PMID:10840984
21. Rahman SR, Ahmed MF, Begum A. Occurrence of urinary tract infection in adolescent and adult women of shanty town in Dhaka City, Bangladesh. *Ethiop J Health Sci.* 2014 Apr;24(2):145-52. doi: 10.4314/ejhs.v24i2.7. PMID: 24795516; PMID: PMC4006209. <https://doi.org/10.4314/ejhs.v24i2.7> PMID:24795516 PMID:PMC4006209
22. Haque R, Akhtar ML, Salam MA Prevalence and susceptibility of uropathogens: A recent report from a teaching hospital in Bangladesh. *BMC Research Notes* 2015; 8:416. <https://doi.org/10.1186/s13104-015-1408-1>, PMID:26342570 PMID:PMC4560919
23. Al-Zahrani AJ, Akhtar N. Susceptibility patterns of extended spectrum beta-lactamase (ESBL)-producing *Escherichia coli* and *Klebsiella pneumoniae* isolated in a teaching hospital. *Pak J Med Res* 2005;44:64-7.