

ANTIBIOGRAM OF EXTENDED SPECTRUM BETA-LACTAMASE (ESBL) PRODUCING UROPATHOGENS AT TERTIARY CARE HOSPITAL: A DESCRIPTIVE CROSS SECTIONAL STUDY

Ritu Pandey, Jytoshna Sapkota, Laxmi Kant Khanal, Ram Prasad Adhikari, Shusila Khadka

Department of Microbiology, Nepal Medical College Teaching Hospital, Attarkhel, Gokarneshwor-8, Kathmandu, Nepal.

ABSTRACT

Urinary tract infection (UTI) is one of the most common bacterial infections worldwide. The emergence of extended-spectrum β -lactamase (ESBL) producing uropathogens has become a major therapeutic concern due to their multidrug-resistant (MDR) nature and limited treatment options. This study aimed to determine the prevalence of ESBL-producing uropathogens and their antimicrobial susceptibility pattern in a tertiary care hospital. A descriptive cross-sectional study was conducted at the Clinical Microbiology Laboratory of Nepal Medical College Teaching Hospital, Kathmandu, Nepal, from January 2026 to June 2026. A total of 3,132 urine samples from patients with suspected UTIs were processed using standard microbiological methods. Antimicrobial susceptibility testing and ESBL detection were performed according to CLSI 2025 guidelines. Significant bacteriuria was detected in 396 (12.64%) samples, of which 385 (97.22%) were Gram-negative isolates. *Escherichia coli* was the predominant pathogen (80.05%), followed by *Klebsiella spp.* (12.63%). ESBL production was confirmed in 40 (10.40%) isolates, of which 36 (90.00%) were *E. coli*. ESBL-producing isolates were more common in females (62.50%) and in patients aged 41–60 years (40.00%). The highest number of isolates were susceptible to imipenem and meropenem (92.50%), followed by amikacin (77.00%), nitrofurantoin (70.00%), and piperacillin/tazobactam (70.00%). All ESBL-producing isolates were MDR. ESBL-producing *E. coli* remains an important cause of UTIs and exhibits universal MDR, limiting therapeutic options. Carbapenems a last resort drug remain the most effective treatment, while amikacin and nitrofurantoin retain good activity. Therefore, routine ESBL surveillance and antimicrobial stewardship are essential to limit the spread of antimicrobial resistance and guide empirical therapy.

KEYWORDS

Urinary tract infection, extended-spectrum β -lactamase, multidrug resistance, antibiogram, *Escherichia coli*, antimicrobial susceptibility

Received on: July 12, 2026

Accepted for publication: September 02, 2026

CORRESPONDING AUTHOR

Dr. Ritu Pandey
Lecturer,
Department of Microbiology,
Nepal Medical College Teaching Hospital,
Attarkhel, Gokarneshwor-8, Kathmandu, Nepal
Email: ritupandey0289@gmail.com
Orcid No: <https://orcid.org/0009-0009-7954-0387>
DOI: <https://doi.org/10.3126/nmcj.v28i3.101260>

Cite this paper as: Pandey R, Sapkota J, Khanal LK, Adhikari RP, Khadka S. Antibiogram of Extended Spectrum Beta-Lactamase (ESBL) Producing Uropathogens at Tertiary Care Hospital: A Descriptive Cross Sectional Study. *Nepal Med Coll J* 2026; 28: 240-6.

INTRODUCTION

Urinary tract infection (UTIs) are among the most common bacterial infections affecting individuals of all ages worldwide, representing a major cause of morbidity and significant healthcare burden.¹ They can occur in both community and hospital settings, with *Escherichia coli* being the predominant causative organism, followed by other Gram-negative bacilli (GNB) such as *Klebsiella pneumoniae*, *Proteus mirabilis*, *Enterobacter* spp., and *Pseudomonas aeruginosa*.² Although UTIs are generally treatable with conventional antibiotics, the emergence of multidrug-resistant organisms has posed a serious challenge to effective management.³

Extended spectrum β -lactamase (ESBL) production is one of the most concerning mechanisms of antimicrobial resistance among uropathogens.⁴ ESBLs are enzymes which hydrolyze and inactivate a wide range of β -lactam antibiotics including third generation cephalosporins and monobactams but are inhibited by β -lactamase inhibitors such as clavulanic acid.⁵ These enzymes are plasmid mediated which allows rapid spread of resistance genes among different species of bacteria.⁴ Plasmids carrying ESBL genes often harbor other resistance determinants, leading to resistance to multiple antibiotic classes, and thus significantly limiting therapeutic options⁶ and are associated with longer hospital stays, higher healthcare costs, increased rates of treatment failure, and elevated mortality, especially in vulnerable populations.⁷

Incidence of uropathogenic strains producing ESBLs has increased significantly all over the world.¹ UTI is still one of the leading infections and causes approximately 150 million cases each year across the globe.¹ The most common pathogens responsible for UTIs were *E. coli* (approximately 70-80%) followed *K. pneumoniae*, *P. mirabilis*, *P. aeruginosa*, *Enterobacter* species.⁸ The increasing antimicrobial resistance among the prominent uropathogens, largely driven by ESBL producer has become a major public health concern worldwide.⁹

Asia has one of the highest reported burdens of ESBL-producing uropathogens worldwide.¹⁰ *E. coli* and *K. pneumoniae* are the predominant ESBL-producing bacteria causing UTI in countries such as India, Bangladesh, Pakistan, China, and other Southeast Asian nations.^{1,10} The widespread misuse and overuse of antibiotics, inadequate infection prevention and control practices, and high population density have

contributed to the rapid emergence and spread of these resistant organisms.¹¹ Although carbapenems remain the most effective treatment for severe ESBL infections, the increasing emergence of carbapenem-resistant strains has become a major public health concern.⁵

In Nepal, UTI remain one of the most common bacterial infections encountered in both community and hospital settings, with *E. coli* consistently reported as the predominant uropathogen, followed by *Klebsiella* spp., *Proteus* spp., *Pseudomonas* spp., and other GNB.¹² Several other studies conducted in Nepal have also documented a rising trend in ESBL production among uropathogens.^{13,14,15} A recent systematic review and meta-analysis reported that the pooled prevalence of ESBL-producing Enterobacteriaceae in Nepal was approximately (29.00%), with an increasing trend over the past decade.¹⁴ The increasing prevalence of ESBL-producing uropathogens has become a significant public health concern due to the limited therapeutic options available and the increasing burden of multidrug resistance.¹⁶

Previous studies from different regions of Nepal have consistently identified *E. coli* as the predominant uropathogen and the principal ESBL-producing organism.¹⁵ Guragain *et al*¹⁷ reported ESBL production in (31.25%) of *E. coli*, (30.00%) of *Klebsiella* spp., (33.30%) of *Acinetobacter* spp., and (16.70%) of *P. aeruginosa* isolates, while Shakya *et al*.¹³ found that *E. coli* accounted for (91.70%) of all ESBL-producing isolates. These studies also demonstrated a high prevalence of multidrug resistance among ESBL-producing organisms, making empirical treatment increasingly difficult. However, antimicrobial resistance patterns vary over time and between healthcare institutions.¹⁸

Earlier, in 2022 Khanal *et al*.¹⁹ reported the prevalence of (14.90%) as ESBL producing uropathogens from Nepal Medical College Teaching Hospital. As the antimicrobial resistance patterns vary over time at the same institutions, we became interested to find out the current prevalence of ESBL producing uropathogens from the same hospital setting and the findings of the study has been reported in this paper.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted at Nepal Medical College Teaching Hospital (NMCTH) from January 2026 to June

2026 after obtaining an ethical approval from Nepal Medical College Research and Ethical Committee, Ref. No: 41-082/083. Total of 3,132 urine samples were received for aerobic bacterial culture and sensitivity in Clinical Microbiology Laboratory, NMCTH. Significant bacteriuria were identified by using standard microbiological technique. Gram negative uropathogen from all positive urine cultures with significant bacteriuria were further identified by their colony characteristics, Gram-stain and pattern of biochemical profiles using standard procedures.²⁰

Screening and confirmation of ESBL-producing isolate: The initial screening for production of ESBL were performed by using ceftazidime (CAZ) (30µg) and cefotaxime (CTX) (30µg) disk. When the zone of inhibition <22mm for CAZ and <27mm for CTX, the isolate were presumed to be ESBL producer as recommended by CLSI.²² Confirmation of ESBL production were done by the Combination Disk method in which CAZ and CTX alone and in combination with clavulanic acid (CA) (10 µg) were used. When the zone diameter of either CAZ or CTX (or both) in the presence of CA is >5mm larger than the zone diameter of respective agent alone, the isolate were considered as ESBL producer.²¹

Antibiotic sensitivity test of ESBL producing uropathogens: Antimicrobial susceptibility of ESBL producers was done on Mueller-Hinton agar by modified Kirby-Bauer disc diffusion

method and interpretation were performed as per the Clinical and Laboratory Standard Institute (CLSI) 2025 guideline.²¹ Briefly, three to five well-isolated, morphologically similar colonies were suspended in 5 mL of nutrient broth. The turbidity of the suspension was adjusted to 0.5 McFarland standard.²¹ Then, the bacterial suspensions was uniformly carpeted on the surface of MHA. Commercially prepared antimicrobial discs (procured from Himedia Laboratories, India), were placed on the inoculated MHA surface and plates were incubated 37° c for 24 hour. The antimicrobial discs used were amikacin (30 µg), ceftriaxone (30 µg), cefotaxime (30 µg), ampicillin (10 µg), piperacillin (100 µg), piperacillin+tazobactam (100 µg/10 µg), trimethoprim/sulfamethoxazole (1.25 µg / 23.75 µg), nitrofurantoin (300 µg), ciprofloxacin (5 µg), ofloxacin (5 µg), ceftazidime (30 µg), imipenem (10 µg), meropenem (10 µg).²¹ The isolates that were resistant to at least one agent of three different classes of commonly used antimicrobial agents, were regarded as MDR.²²

Quality control: Reference strains- *E. coli* ATCC 25922, *S. aureus* ATCC 25923, *P. aeruginosa* ATCC 27853 used as quality control for antimicrobial susceptibility test.

RESULTS

A total of 3,132 urine samples from patients clinically suspected of UTI were processed

Table 1: ESBL producing uropathogens among total Gram-negative isolates (n = 385)

Organism	Total n	%	ESBL producer n	% of ESBL producer
<i>Escherichia coli</i>	317	80.05	36	9.35
<i>Klebsiella</i> spp.	50	12.63	2	0.52
<i>Pseudomonas</i> spp.	11	2.78	1	0.26
<i>Proteus mirabilis</i>	5	1.26	0	0.00
<i>Citrobacter freundii</i>	1	0.25	0	0.00
<i>Acinetobacter</i> spp.	1	0.25	1	0.26
Total	385	100.00	40	10.40

Table 2: Distribution of ESBL produing uropathogens according to age group (n=40)

Age group (Year)	ESBL producer n	% ESBL producer
<20	1	2.50
21-40	13	32.50
41-60	16	40.00
61-80	8	20.00
>80	2	5.00
Total	40	100.0

Table 3: Antimicrobial susceptibility pattern of ESBL producers (n=40)

Antibiotics	Sensitive n (%)	Resistant n (%)
Ampicillin (AMP)	0 (0.00)	40 (100.00)
Piperacillin (PI)	27 (67.50)	13 (32.50)
Piperacillin/Tazobactam (PIT)	28 (70.00)	12 (30.00)
Ceftriaxone (CTR)	4 (10.00)	36 (90.00)
Ciprofloxacin (CIP)	10 (25.00)	30 (75.00)
Ofloxacin (OF)	10 (25.00)	30 (75.00)
Amikacin (AK)	30 (77.00)	9 (23.00)
Trimethoprim/sulfamethoxazole(TMP-SMX)	23 (60.00)	16 (40.00)
Nitrofurantoin (NIT)	28 (70.00)	12 (30.00)
Imipenem (IPM)	37 (92.50)	3 (7.50)
Meropenem (MRP)	37 (92.50)	3 (7.50)

during the study period. Significant bacteriuria were detected in 396 (12.64%) samples. Of these, 385 (97.22%) isolates were GNB. Among the 385 GNB isolates, *E. coli* was the predominant uropathogen, accounting for 317 (80.05%) isolates, followed by *Klebsiella* spp. 50 (12.63%), *Pseudomonas* spp. 11 (2.78%), *P. mirabilis* 5 (1.26%), *C. freundii* 1 (0.25%), and *Acinetobacter* spp. 1 (0.25%). Of the 385 GNB isolates, 40 (10.40%) were confirmed as ESBL producers, while 345 (89.60%) were non-ESBL producers. Among the 40 ESBL-producing isolates, *E. coli* was predominant, accounting for 36 (9.35%) isolates, followed by *Klebsiella* spp. 2 (0.52%), *Pseudomonas* spp. 1 (0.26%) and *Acinetobacter* spp. 1 (0.26%) (Table-1).

Among the 40 ESBL-producing isolates, 25 (62.50%) were recovered from females and 15 (37.50%) from males. The highest proportion of ESBL-producing isolates was observed among patients aged 41–60 years (40.00%), followed by 21–40 years, 61–80 years, and <20 years (Table-2).

Antimicrobial susceptibility testing showed that 37 (92.50%) of ESBL-producing isolates were susceptible to imipenem and meropenem, making them the most effective antibiotics. 30 (77.00%) of the isolates were susceptible to amikacin, while 28 (70.00%) were susceptible to nitrofurantoin and piperacillin/tazobactam. In contrast, 30 (75.00%) of the isolates were resistant to ciprofloxacin and ofloxacin. All ESBL-producing isolates were resistant to cefotaxime, ceftazidime, ampicillin, and cefixime. All ESBL-producing isolates were MDR (Table-3).

DISCUSSION

UTI remains one of the most common bacterial infections encountered in clinical practice worldwide.¹ The emergence of ESBL-producing uropathogens and MDR strains has become a major public health concern because of limited therapeutic options, prolonged hospitalization, increased healthcare costs and poor clinical outcomes.³

The prevalence of culture-confirmed UTI in the present study was (12.64%), which is comparable to Sedhain *et al*²³ (13.50%). However, this finding was lower than those reported by Shrestha *et al*²⁴ from Nobel medical college (22.30%), Khadka *et al*²⁵ from western regional hospital reported (23.20%). On the other hand, lower prevalence has also been reported by Subedi *et al*²⁶ from Bhaktapur hospital (9.60%) and Amatya *et al*²⁷ from Nepal Police Hospital (8.84%). These differences may be explained by variations in study populations, healthcare settings, specimen collection, laboratory methods and antimicrobial prescribing practices.^{15,28}

E. coli was the predominant uropathogen, in the present study, accounting for (82.34%) followed by *Klebsiella* spp. (12.99%) and *Pseudomonas* spp. (2.86%). Several reports of uropathogens among UTI-suspected cases in Nepal had similar trends of isolated bacteria consistent with our findings consistent with previous studies from Nepal.¹²⁻¹⁷ Studies from India have similarly identified *E. coli* as the leading cause of UTI.^{4,29} The predominance of *E. coli* reflects its ability to colonize the periurethral region and ascend the urinary tract, aided by virulence factors

such as adhesins, pili, fimbriae, and biofilm formation.^{23,30}

The prevalence of ESBL-producing isolates was (10.40%), marginally lower than that reported by Khanal *et al*¹⁹ from the same hospital setting (14.90%). And this differences may be as the ESBL prevalence can fluctuate over time because of changes in antimicrobial use and infection-control practices. Therefore, even studies conducted in the same hospital may obtain different prevalence estimates. However, this finding was lower than those reported by Nayaju *et al*¹⁶ from Chitwan, Shrestha *et al*²⁴ from Kathmandu, where as similar studies done from India,³¹ and Bangladesh.³² These differences may relate to study populations, prescribing practices, infection prevention measures, and geographical variation.²⁶ Among ESBL-producing isolates, 36 (90.00%) of 40 were *E. coli*, followed by *Klebsiella* spp. 2 (5.00%), *Pseudomonas* spp. 1 (2.50%), and *Acinetobacter* spp. 1 (2.50%), confirming *E. coli* as the principal ESBL-producing uropathogen.

Antimicrobial susceptibility testing demonstrated that imipenem and meropenem were the most effective antimicrobial agents against ESBL-producing isolates, with susceptibility rates of (92.50%). However, the emergence of carbapenem resistance in a small proportion (7.50%) of isolates suggests the possible emergence of additional resistance mechanisms, warranting continuous surveillance. Amikacin (77.00%) and nitrofurantoin (70.00%) retained good activity. Amikacin remains effective against many ESBL-producing isolates because it is less susceptible to aminoglycoside-modifying enzymes, while nitrofurantoin achieves high urinary concentrations and acts through multiple bacterial targets, making it a valuable oral option for uncomplicated lower UTI.²

A high level of resistance was observed against the fluoroquinolones, with (75.00%)

of ESBL-producing isolates resistant to both ciprofloxacin and ofloxacin. Comparable findings have been reported from India³¹ and Bangladesh,³² where carbapenems remained the most active agents while resistance to third-generation cephalosporins and fluoroquinolones was widespread.

The findings of the present study highlight the growing burden of antimicrobial resistance among uropathogens. Routine surveillance of antimicrobial susceptibility patterns, early detection of ESBL-producing organisms, implementation of antimicrobial stewardship programs, and rational antibiotic use are essential to prevent further emergence and spread of resistant strains.¹²

The present study has certain limitations. It was conducted at a single tertiary care hospital and therefore may not fully represent antimicrobial resistance patterns in other healthcare settings or regions of Nepal. In addition, molecular characterization of ESBL genes was not performed, which could have provided further insight into the epidemiology of resistance mechanisms. Nevertheless, the study provides valuable baseline data regarding the prevalence of ESBL-producing uropathogens and their antimicrobial susceptibility patterns. These findings may assist clinicians in selecting appropriate empirical therapy and support the development of local antibiotic stewardship policies and treatment guidelines.

This study showed ESBL producing organism in our region is MDR. Carbapenems remains the most effective treatment options. These findings emphasize the need for routine ESBL detection, antimicrobial susceptibility testing, and ongoing surveillance to guide empirical antibiotic therapy and strengthen antimicrobial stewardship programs.

Conflict of interest: None

Source of research fund: None

REFERENCES

1. Mancuso G, Midiri A, Gerace E, Marra M, Zummo S, Biondo C. Urinary tract infections: The current scenario and future prospects. *Pathogens* 2023; 12: 623. DOI: <https://doi.org/10.3390/pathogens12040623>.
2. Zhou Y, Zhou Z, Zheng L *et al*. Urinary tract infections caused by uropathogenic *Escherichia coli*: mechanisms of infection and treatment options. *Int J Molecular Sci* 2023; 24: 10537. DOI: <https://doi.org/10.3390/ijms241310537>.
3. Khawcharoenporn T, Vasoo S, Singh K. Urinary tract infections due to multidrug-resistant Enterobacteriaceae: prevalence and risk factors in a Chicago emergency department. *Emerg Med Int* 2013; 13: 258517. DOI: 10.1155/2013/258517.
4. Ain R, Pal N, Hooja S. Prevalence of β -lactamase production and multi-drug resistance among uropathogenic *Escherichia coli* isolates at a tertiary care hospital of North-Western India. *Asian J Med Sci* 2021; 12: 27–32.

5. Husna A, Md MM, Badruzzaman *et al.* Extended-spectrum β -lactamases (ESBL): challenges and opportunities. *Biomedicines* 2023; 11: 2937. DOI: <https://doi.org/10.3390/biomedicines11112937>.
6. Ibekwe A, Durso L, Ducey *et al.* Diversity of plasmids and genes encoding resistance to extended-spectrum β -lactamase in *Escherichia coli* from different animal sources. *Microorganisms* 2021; 9: 1057. DOI: <https://doi.org/10.3390/microorganisms9051057>.
7. Maslikowska JA, Walker SAN, Elligsen M *et al.* Impact of infection with extended-spectrum β -lactamase-producing *Escherichia coli* or *Klebsiella* species on outcome and hospitalization costs. *J Hospital Infect* 2016; 92: 33–41. DOI: <https://doi.org/10.1016/j.jhin.2015.10.001>.
8. Flores-Mireles AL, Walker J, Caparon M, Hultgren SJ. Urinary tract infections: Epidemiology, mechanisms of infection and treatment options. *Nat Rev Microbiol* 2015; 13: 269–84. DOI: <https://doi.org/10.1038/nrmicro3432>.
9. Ziolkowski G, Pawłowska I, Stasiowski M *et al.* Multidrug-resistant micro-organisms associated with urinary tract infections in orthopedic patients: a retrospective laboratory-based study. *Antibiotics* 2020; 10: 7. DOI: <https://doi.org/10.3390/antibiotics10010007>.
10. Mostaghimi T, Shirafkan H, Nasrollahian S *et al.* Worldwide prevalence of extended spectrum β -lactamases-producing uropathogenic *Escherichia coli* isolates among kidney transplant patients: A systematic review and meta-analysis. *Infez Med* 2023; 31. DOI: <https://doi.org/10.53854/liim-3104-5>.
11. Endale H, Mathewos M, Abdeta D. Potential causes of spread of antimicrobial resistance and preventive measures in one health perspective-A review. *Infect Drug Res* 2023; 7515–45. DOI: <https://doi.org/10.2147/IDR.S428837>.
12. Thapa RB, Shrestha S, Adhikari P, Shrestha R. Antibiotic resistance patterns in uropathogens: Insights from a Nepalese tertiary care setting. *Therapeutic Adv Infect* 2025; 12: 20499361251339383. DOI: <https://doi.org/10.1177/20499361251339383>.
13. Shakya P, Shrestha D, Maharjan E, Sharma VK, Paudyal R. ESBL production among *Escherichia coli* and *Klebsiella* spp. causing urinary tract infection: a hospital based study. *Open Microbiol J* 2017; 11: 23–30. DOI: <https://doi.org/10.2174/1874285801711010023>.
14. Khadka C, Shyaula M, Syangtan G *et al.* Extended-spectrum β -lactamases producing Enterobacteriaceae (ESBL-PE) prevalence in Nepal: a systematic review and meta-analysis. *Sci Total Environ* 2023; 901: 166164. DOI: <https://doi.org/10.1016/j.scitotenv.2023.166164>.
15. Kayastha K, Dhungel B, Karki S *et al.* Extended-spectrum β -lactamase-producing *Escherichia coli* and *Klebsiella* spp. in pediatric patients visiting International Friendship Children's Hospital, Kathmandu, Nepal. *Infect Dis (Auckl)* 2020; 13: 1178633720909798. DOI: <https://doi.org/10.1177/1178633720909798>.
16. Nayaju T, Upreti MK, Ghimire A *et al.* Higher prevalence of ESBL producing uropathogenic *Escherichia coli* among diabetic patients from a tertiary care hospital of Kathmandu. DOI: <https://doi.org/10.21203/rs.3.rs-31876/v1>.
17. Guragain N, Pradhan A, Dhungel B. Extended spectrum β -lactamase producing gram negative bacterial isolates from urine of patients visiting everest hospital, Kathmandu, Nepal. *Tribhuvan Univ J Microbiol* 2019; 6: 26–31. DOI: <https://doi.org/10.3126/tujm.v6i0.26575>.
18. Shrestha RK, Karmacharya S, Alle Magar K *et al.* Prevalence of ESBL and MBL producing *Escherichia coli* among urinary tract infection patients at Star Hospital. *Nepal J Health Sci* 2026; 5: 30-5. DOI: <https://doi.org/10.3126/njhs.v5i2.90614>.
19. Khanal LK, Amatya R, Sah AK *et al.* Prevalence of extended spectrum β -lactamase producing *Escherichia coli* and *Klebsiella* spp. from urinary specimen in a tertiary care hospital. *Nepal Med Coll J* 2022; 24: 75–80. DOI: <https://doi.org/10.3126/nmcj.v24i1.44145>.
20. Teferi S, Sahlemariam Z, Mekonnen M *et al.* Uropathogenic bacterial profile and antibiotic susceptibility pattern of isolates among gynecological cases admitted to Jimma medical center, South West Ethiopia. *Sci Rep* 2023; 13: 7078. DOI: <https://doi.org/10.1038/s41598-023-34048-4>.
21. Clinical Laboratory Standards Institute 2025. Performance standards for antimicrobial disk susceptibility tests; approved standard—35th Ed. CLSI document M100. 26:1. Clinical Laboratory Standards Institute, Wayne, PA.
22. Poulou A, Grivakou E, Vrioni G *et al.* Modified CLSI extended-spectrum β -lactamase confirmatory test for phenotypic detection of ESBLs among *Enterobacteriaceae* producing various β -Lactamases. *J Clin Microbiol* 2014; 52: 1483–89. DOI: <https://doi.org/10.1128/JCM.03361-13>.
23. Sedhain A, Sapkota A, Shrestha B. Antibiotic sensitivity pattern in urinary tract infection among adults in central part of Nepal. *J Chitwan Med Coll* 2019; 9: 18–23. DOI: <https://doi.org/10.3126/jcmc.v9i4.26894>.
24. Shrestha K, Singh PK, Yadav KR, Singh GK. Prevalence and antibiogram of bacterial uropathogens from a tertiary care hospital of eastern Nepal. *J Nobel Med Coll* 2023; 12: 39-44. DOI: [10.3126/jonmc.v12i1.56340](https://doi.org/10.3126/jonmc.v12i1.56340).
25. Khadka KS, Khadka J, Lekhak B, Shrestha P, Tiwari BR. Incidence of urinary tract infection among the patients visiting Western Regional Hospital, Pokhara, Nepal. *J Health Allied Sci* 2019; 2: 35-7. DOI: [10.37107/jhas.73](https://doi.org/10.37107/jhas.73).
26. Subedi BK, Subedi S, Khadka S *et al.* Antimicrobial sensitivity and resistance pattern in urinary isolates in Bhaktapur Hospital. *J Gen Pract Emerg Med Nepal* 2025; 12: 34-8.
27. Amatya NM, Shrestha S, Tamang NS *et al.* Unraveling biofilm-forming uropathogens: isolation and antimicrobial resistance patterns at Nepal Police Hospital, Kathmandu. *Can J Infect Dis Med Microbiol* 2026; 4: 6625304. DOI: [10.1155/cjid/6625304](https://doi.org/10.1155/cjid/6625304).
28. Pradhan B and Pradhan S. Prevalence of urinary tract infection and antibiotic susceptibility

- pattern to urinary pathogens in Kathmandu Medical College and Teaching Hospital, Duwakot. *Birat J Health Sci* 2017; 2: 134–7. DOI: <https://doi.org/10.3126/bjhs.v2i1.17290>.
29. Pardeshi P. Prevalence of urinary tract infections and current scenario of antibiotic susceptibility pattern of bacteria causing UTI. *Ind J Microbiol Res* 2020; 5: 334–8. DOI: <https://doi.org/10.18231/2394-5478.2018.0070>.
 30. Hossain G, Hossain E, Ahammed F *et al*. Bacteriological profile and sensitivity pattern of urinary tract infection patients in north east part of Bangladesh. *Int J Adv Med* 2020; 7: 1614. DOI: <https://doi.org/10.18203/2349-3933.ijam20204510>.
 31. Behera B, Debbarma M, Rout B *et al*. Prevalence of ESBL producing bacteria in community-acquired UTI from eastern part of India. *J Pure Appl Microbiol* 2022; 16: 1682–88. DOI: <https://doi.org/10.22207/JPAM.16.3.07>.
 32. Munny NN, Khatun S, Johora FT, Md CZ. Prevalence and antibiotic resistance pattern of extended spectrum β -lactamase producing *Escherichia coli* isolated from patients of urinary tract infection in a tertiary care hospital, Dhaka. *East West Med Coll J* 2026; 14: 170–8. DOI: <https://doi.org/10.3329/ewmcj.v14i2.86253>.

ERRATA

In the article entitled "Effect of premenstrual stress on reaction time among medical and dental student of medical college in Kathmandu Nepal" authored by of Manandhar SA published in NMCJ 24(4): 283-88 (December 2022). The Visual reaction time (VRT) measured should be in seconds (s) instead of millisecond (ms).