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Antimicrobial susceptibility of bacteria isolated from urine cultures in Southern Turkey

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Abstract

Background: Pathogen spectrum and antibiotic susceptibility patterns vary in different regions and should consider the empirical treatment of urinary tract infections (UTIs). Information on susceptibility is the basis for providing reliable treatment. This study aimed to determine the antibiotic susceptibility of bacteria isolated from urine cultures at Çukurova State Hospital, which is located south of Turkey and east of the Mediterranean region.

Materials and methods: Urine culture results were retrospectively evaluated between April 2018 and January 2021. Variables, such as age, sex, and medical department, were also recorded. Inclusion criteria were patients aged at least 18 years with pathogenic bacterial growth in their urine cultures. Antibiotic susceptibility testing and bacterial identification were performed using the VITEK 2 automated system.

Results: Of 12,288 urine samples, 2033 (16.5%) had pathogenic growth. The rates of bacterial and yeast growth were 93.3% and 6.7%, respectively. Gram-negative pathogens constituted 91.6% of the cohort. The most prevalent bacteria were *Escherichia coli* with a 66% rate, followed by *Klebsiella* (14.2%). According to our results, ciprofloxacin, trimethoprim-sulfamethoxazole, and ampicillin are not suitable for empirical treatment of UTIs, whereas nitrofurantoin and fosfomycin are rational options.

Conclusions: Uropathogens exhibit an increased resistance rate against ampicillin, trimethoprim-sulfamethoxazole, and ciprofloxacin. Nitrofurantoin, fosfomycin, and ceftazidime have better efficacy than other investigated antibiotics in urine culture against common uropathogens and are suitable for empirical treatment of UTI.

Keywords: Antibiotics; Antimicrobial susceptibility; *Escherichia coli*; Urinary tract infections

1. Introduction

Urinary tract infections (UTIs) are one of the most common bacterial infections, with approximately 150 million to 250 million cases reported globally per year.[1] The annual cost of UTI-related hospitalization has reached US $9.7 billion by 2011 in the United States.[2] The presentation of UTIs can vary from simple cystitis to serious urosepsis, whereas the pathogen spectrum fluctuates, especially with geographical location.[3] Appropriate antibiotics with reliable efficacy are crucial for treating UTIs.[4]

Epidemiological information about uropathogens and their susceptibility rates is essential for determining empirical antibiotic treatment.[5] The primary obstacle to delivering a successful empirical treatment for UTI is the antibiotic resistance (AR) of the bacteria. Antibiotic resistance is the ability of bacteria to parry the effect of antibiotic agents and can differ from natural to acquired or clinical resistance.[6] Other factors contributing to AR include misdiagnosis, improper prescription or use of antibiotics, and poor patient compliance.[7] Resistance surveillance programs should be implemented to select a suitable regimen.[8]

Data published on the prevalence and susceptibility of uropathogens in Turkey are limited. In addition, local and updated data are not available for the Adana region. Therefore, this study aimed to retrospectively evaluate the spectrum and antibiotic susceptibility patterns of pathogens isolated from urine cultures at Çukurova State Hospital, which is located in southern Turkey and east of the Mediterranean region.

2. Materials and methods

We retrospectively reviewed the urine culture results obtained from the Microbiology Department between April 2018 and January 2021. The demographic characteristics of the patients were collected from hospital records.

A standard loopful of each urine sample (10 μL) was dispensed onto blood agar and eosin methylene blue agar medium and incubated at 37 °C for 24 hours. A significant bacterial growth of $\geq 10^5$ colony-forming units/mL was considered. The clinical microbiologist evaluated the plates and categorized them according to Gram staining findings or as yeast. Bacterial identification and susceptibility tests were performed using the VITEK 2 automated system (bioMerieux, Marcy-l'Étoile, France).

The inclusion criteria of the study were as follows: age at least 18 years, with urine cultures performed at our laboratory, and pathogenic growth on culture results. The exclusion criteria were as follows: fungal infections, anaerobic bacterial infections, polymicrobial growth, growth of nonpathogenic microorganisms, and no growth

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in urine culture. Common uropathogens and antibiotic susceptibility were studied according to patient sex, age group, outpatient/inpatient or intensive care unit (ICU) settings, Gram staining, and extended-spectrum β-lactamase (ESBL) status of the detected pathogens.

The distributions are summarized using frequencies. Independent-sample *t* test, analysis of variance, Mann-Whitney *U* test, and χ^2 test were used to investigate the association between continuous and categorical variables, as appropriate. Statistical significance was set at $p < 0.05$. Data analysis was performed using SPSS version 21.0 (IBM Corp, Armonk, NY).

This study was performed in accordance with the principles of the Declaration of Helsinki and was approved by the Adana City Hospital Institutional Review Board (approval date: October 3, 2021, no. 1319).

3. Results

A total of 12,288 urine cultures were performed at our hospital between April 2018 and January 2021, since our center started providing health services in April 2018. It is one of the four state hospitals in Adana city and is located in the southern part of Turkey. Adana city is located in the northeastern coast of the Mediterranean Sea and has a population of more than 1.5 million. According to our results, over 3 years, there were 2033, 1896 (93.3%), and 137 (6.7%) pathogenic, bacterial, and yeast growths, respectively. Cultures that yielded yeast growth were excluded from the analysis. In addition, we excluded 198 results from the analysis owing to patients aged <18 years. The final cohort consisted of 1698 urine culture results.

The mean age of the entire cohort was 55.6±19.2 years. There was female predominance (77.8%) in the entire cohort; however, the gap between the female and male patients rate was narrowing from outpatient to ICU settings. In outpatient, inpatient, and ICU settings, 81.7%, 68.4%, and 60.1% of the patients were women, respectively. In addition, females were significantly younger than males, and the mean age increased in both sexes from outpatient to ICU settings ($p < 0.001$) (Table 1). Most of the specimens were collected from the outpatient clinics (80%). Intensive care unit patients were older than those in the other departments (Table 1).

Statistical analysis revealed that Gram-negative pathogens constituted 91.6% of the cohort, and the most prevalent bacteria were *Escherichia coli* (with a rate of 66%), followed by *Klebsiella* (14.2%). The ESBL (+) *E. coli* and *Klebsiella* strain rates were 42.2% and 50%, respectively. The distributions of the pathogens according to sex, age, ESBL status, and clinic are presented in Tables 2, 3, and 4.

Table 5 summarizes the resistance rates of the bacteria to common antibiotics. Ampicillin had the highest overall resistance rate (64.6%), whereas imipenem (8.2%) had the lowest. The usual suspect of urine cultures, *E. coli*, was resistant to ampicillin, colistin, tigecycline, netilmicin, and trimethoprim-sulfamethoxazole (TMP-SMX) at rates of 60.6%, 46.4%, 42.4%, 38.5%, and 37.6% respectively, starting from the highest.

Table 1

Comparison of patients according to demographic variables.

	n = 1698	Mean (SD) age, yr	*p*
Sex			<0.001*
Female	1321 (77.8%)	53.5 (19.1)	
Male	377 (22.2%)	62.9 (17.9)	
Department			<0.001†
Outpatient	1359 (80.0%)	51.2 (17.7)	
Inpatient	95 (5.6%)	66.5 (15.3)	
Intensive care unit	244 (14.4%)	75.4 (19.2)	

Statistically significant differences are observed between sexes and departments in terms of age.
*t test.
†Analysis of variance.

Table 2

Rate of uropathogens in different department settings.

Pathogen	Outpatient, %	Inpatient, %	ICU, %	Total, %
Escherichia coli	57.8	3.1	5.1	66
ESBL (–)	62.7	25	31.3	
ESBL (+)	37.3	75	68.7	
Klebsiella species	10	0.7	3.5	14.2
ESBL (–)	48.1	59	42.9	
ESBL (+)	51.9	41	57.1	
Enterococcus species	2.1	0.5	1.9	4.5
Proteus species	2.9	0.2	0.4	3.6
Pseudomonas species	1.2	0.6	1.3	3.1
Staphylococcus species	2.0	0.0	0.3	2.3
Enterobacter species	1.6	0.1	0.3	2.1
Streptococcus species	1.5	0.0	0.0	1.5
Acinetobacter species	0.5	0.2	0.4	1.1
Providencia species	0.1	0.1	0.9	1.1
Others	0.3	0.0	0.2	0.5
Gram staining				
Gram (–)	74.4	5.1	12.2	91.6
Gram (+)	5.6	0.5	2.2	8.4
Total	80	5.6	14.4	100

ESBL = extended-spectrum β-lactamase; ICU = intensive care unit.
Escherichia coli is the most prevalent bacteria in all department settings.

4. Discussion

This retrospective analysis of urine cultures revealed that there were 2033 (16.5%) positive growth in urine cultures, whereas 137 (6.7%) of them were yeast. According to our inclusion criteria, 1698 cultures performed at our secondary center showed varied resistance rates. *Escherichia coli* was the most common pathogen in all departments. Female patients who presented to the outpatient clinic between 18 and 65 years of age constituted the majority of the cohort.

A similar positive urine culture rate (16.7%) was reported by Al-Naqshbandi et al.[9] in Erbil, Iraq. The authors stated that *E. coli* was the most common pathogen in their cohort. The distribution of pathogens according to Gram staining was comparable to our

Table 3

Rate of uropathogens in different age groups.

Pathogen	18–65 yr, %	>65 yr, %	Total, %
Escherichia coli	47.6	18.4	66
Klebsiella species	7.7	6.5	14.2
Enterococcus species	2.0	2.5	4.5
Proteus species	2.2	1.4	3.6
Pseudomonas species	1.2	1.9	3.1
Staphylococcus species	1.9	0.4	2.3
Enterobacter species	1.4	0.6	2.1
Streptococcus species	1.3	0.2	1.5
Acinetobacter species	0.5	0.6	1.1
Providencia species	0.3	0.8	1.1
Others	0.1	0.6	0.7
Total	66.1	33.9	100

Escherichia coli is the most prevalent bacteria in all age groups.

Table 4

Rate of uropathogens in both sexes.

Pathogen	Female, %	Male, %	Total, %
Escherichia coli	55.1	10.9	66
Klebsiella species	10.1	4.1	14.2
Enterococcus species	2.2	2.4	4.5
Proteus species	2.7	0.9	3.6
Pseudomonas species	1.5	1.6	3.1
Staphylococcus species	1.7	0.6	2.3
Enterobacter species	1.3	0.8	2.1
Streptococcus species	1.5	0.0	1.5
Acinetobacter species	0.8	0.4	1.1
Providencia species	0.6	0.4	1.1
Others	0.3	0.2	0.5
Total	77.8	22.2	100

Escherichia coli is the most prevalent bacteria in female patients; however, *Enterococcus* and *Pseudomonas* species are more common in males than in females.

results. Their center is geographically close to our region, which can explain why we obtained similar results in terms of isolated pathogens. However, their results showed only the microbiological outcomes without any demographic data, such as age, sex, or the medical department of the patient. In this study, we presented the distribution of pathogens in terms of these demographic variables as well.

Studies in the literature have repeatedly confirmed that female sex is a risk factor for UTI.[1,10,11] It has been shown that the incidence of UTIs between female and male patients decreases with increasing age.[12] Seifu and Gebissa[13] reported a 71.7% female predominance in their study and concluded that female sex increased the risk of UTI by almost fourfold. Our results were compatible with the literature findings that 77.8% of the positive urine cultures belonged to female patients.[13]

According to our results, the three most common bacteria in women were *E. coli, Klebsiella* species, and *Proteus* species. The order of common pathogens in males was *E. coli, Klebsiella* species, and *Enterococcus* species (Table 4). Caskurlu et al.[14] from our country reported comparable results with the present study findings, in that the first and second common pathogens were the same for both sexes. However, they stated that the third most common pathogens in urine cultures were *Enterococcus* species in females and *Pseudomonas* in males. In addition, various authors have reported similar results that the common pathogens for urine cultures were *E. coli, Klebsiella* species, *Proteus* species, and *Enterobacter* species.[15,16] Identifying the most common pathogens in urine cultures will increase the likelihood of success of empirical treatment. According to our results, which are in agreement with the literature findings, *E. coli* and *Klebsiella* species were the most commonly isolated pathogens in both sexes in urine cultures.

The European Association of Urology Urological Infections Guidelines cited that *E. coli* is the most common cause of UTIs.[17] In the empirical treatment of UTI, guidelines suggest that considering local susceptibility rates is of paramount importance.[17] In addition, 20% to 50% of prescribed antibiotics in acute care hospitals are either unnecessary or inappropriate.[18] During UTI treatment, significant geographical variations in the susceptibility of uropathogens should also be considered. There is no exact rate of resistance to antibiotics to be used for empirical treatment. If the local resistance rates for TMP-SMX and ciprofloxacin are >20% and >10%, respectively, choosing an alternative antibiotic is recommended according to expert opinion in the literature.[19] All factors that could affect the success of UTI treatment should be considered by clinicians.

In this study, evaluation of the antibiotic susceptibility of *E. coli* showed that the highest resistance was against ampicillin (60.6%), whereas the lowest was against imipenem (3.5%). The resistance rates of *E. coli* against commonly prescribed drugs, such as ciprofloxacin, TMP-SMX, cefuroxime axetil, and ceftriaxone, were high. Cefoxitin, fosfomycin, and nitrofurantoin seemed to have a better effect on *E. coli* than commonly prescribed drugs. According to our cohort, ertapenem, imipenem, meropenem, piperacillin, and vancomycin were robust alternative options (Table 5). Yılmaz et al.[20] reported a similar resistance pattern for *E. coli* against various antibiotics, such as ampicillin (66.9%), cefazolin (42%), cefuroxime (36.9%), ceftazidime (14.9%), ceftriaxone (28%), cefepime (12%), and amoxicillin-clavulanic acid (36.9%). In another study from our country, Caskurlu et al.[14] suggested fosfomycin as an empirical treatment for outpatients with early-stage UTIs and the use of cefepime in parenteral treatment. Although our data support the use of fosfomycin in the empirical treatment of UTI, there was a high resistance rate to cefepime (33.1%), contrary to the findings of both Yılmaz et al.[20] and Caskurlu et al.[14] Our data showed that cefoxitin had a lower resistance rate (3.9%) and is a better choice for the treatment of UTI caused by *E. coli*.

Klebsiella species is the second most common pathogen in urine culture results. The resistance rates of *Klebsiella* species against the commonly prescribed antibiotics, such as ampicillin (94.6%), ciprofloxacin (41.3%), TMP-SMX (62.7%), nitrofurantoin (35.9%), cefepime (41%), and ceftriaxone (41.4%), are high. Further, our data revealed that the rate of *Klebsiella* species is relatively high in patients older than 65 years and in ICU patients (Tables 2 and 3). Similar resistance rates were highlighted by Hrbacek et al.,[21] reflecting Central Europe results in a 9-year period. According to our results, amoxicillin, cefoxitin, gentamicin, and carbapenems are effective in the treatment of UTI caused by *Klebsiella* species.

The rate of ESBL is another issue to consider in the treatment of UTIs. A recent study from our country reported that the ESBL (+) *E. coli* rates were 50.5% and 38.2% in hospital- and community-acquired UTIs.[22] Another multicenter study from China reported 37.2% ESBL (+) rates, with a comparable uropathogen distribution to our results.[23] The rate of ESBL is a growing concern that should be considered during UTI treatment.

Enterococcus species, *Proteus* species, and *Pseudomonas* species are other common pathogens found in urine cultures. Our data showed that *Enterococcus* species were susceptible to ampicillin, cefoxitin, and ceftazidime. However, resistance rates for ciprofloxacin, fosfomycin, amikacin, and gentamicin were high. *Proteus* species, known as typical nosocomial pathogens, are intrinsically resistant to nitrofurantoin and colistin and have decreased susceptibility to imipenem.[24] The high resistance rates of *Proteus* species against the antibiotics used in the empirical treatment of UTI suggest that obtaining a urine culture and antibiogram is the main step in the treatment of UTI caused by *Proteus* species. For the treatment of UTI caused by *Pseudomonas* species, our data suggest the use of aminoglycosides or carbapenems.

Another emerging problem is the effect of the COVID-19 pandemic on the increase in antimicrobial resistance due to broad-spectrum antibiotic use.[25] Well-designed studies are needed to compare the spectrum and susceptibility of uropathogens during the pandemic and prepandemic eras.

Our data showed that the resistance rates of uropathogens to commonly prescribed antibiotics were remarkably high. Similar high resistance rates, especially for *E. coli*, have been reported by other studies in our country.[14,20,26] These results emphasize the importance of antibiotic stewardship programs. Since the national surveillance and infection control programs started in Turkey in

Table 5

Antibiotic resistance rates of isolated uropathogens (%).

Antibiotic Pathogens	*Escherichia coli*, % (n)	*Klebsiella* species, % (n)	*Enterococcus* species, % (n)	*Proteus* species, % (n)	*Pseudomonas* species, % (n)	*Staphylococcus* species, % (n)	*Enterobacter* species, % (n)	*Streptococcus* species, % (n)	*Acinetobacter* species, % (n)	*Providencia* species, % (n)	Others, % (n)	Ovarall resistance rate, % (n)	Times studied in susceptibility tests
Amikacin	27.8 (308)	39.8 (96)	59.6 (31)	47.5 (29)	26.9 (7)	7.4 (2)	11.4 (4)	0	57.9 (11)	83.3 (15)	50 (4)	31.4 (507)	1617
Amoxicillin	19.4 (108)	20 (25)	N/A	46.9 (15)	52.2 (12)	37.5 (3)	30 (6)	50 (1)	85.7 (6)	100 (10)	0	23.6 (186)	788
Ampicillin	60.6 (416)	94.6 (123)	15.2 (5)	57.1 (16)	71.4 (10)	55 (11)	94.1 (16)	N/A	100 (3)	100 (4)	100 (1)	64.6 (605)	937
Aztreonam	11.6 (89)	23.6 (41)	0	24.4 (10)	33.3 (3)	22.2 (2)	25.9 (7)	66.7 (2)	100 (3)	88.9 (8)	60 (3)	16 (168)	1048
Cefepime	33.1 (167)	41 (43)	0	28 (7)	38.5 (5)	25 (1)	27.8 (5)	0	N/A	87.5 (7)	75 (3)	34.2 (238)	696
Cefixime	20.8 (133)	30.1 (37)	N/A	21.4 (6)	0	5.3 (1)	47.4 (9)	0	66.7 (2)	100 (3)	0	22.4 (191)	853
Cefoxitin	3.9 (18)	20 (18)	19.5 (8)	12.5 (3)	21.4 (3)	5.3 (1)	30 (3)	0	66.7 (4)	80 (4)	0	9 (62)	692
Ceftazidime	17.1 (125)	26.5 (39)	8.9 (4)	7.9 (3)	31.3 (10)	14.8 (4)	9.5 (2)	84.2 (16)	62.5 (5)	72.7 (8)	40 (2)	20.1 (218)	1082
Ceftriaxone	37.1 (174)	41.3 (38)	0	31.3 (5)	100 (11)	75 (3)	33.3 (6)	0	100 (3)	100 (2)	0	38.8 (242)	624
Cefuroxime axetil	34.4 (308)	38.4 (76)	33.3 (1)	26 (13)	34.8 (8)	22.7 (5)	23.1 (6)	N/A	66.7 (4)	93.3 (14)	28.6 (2)	35.1 (437)	1246
Ciprofloxacin	36.2 (394)	41.3 (95)	54.2 (26)	38.6 (22)	38.9 (14)	33.3 (9)	20 (7)	N/A	58.3 (7)	84.4 (14)	57.1 (4)	38 (592)	1556
Colistin	46.4 (180)	62.6 (62)	0	46.7 (14)	80 (4)	57.1 (4)	50 (7)	33.3 (1)	N/A	100 (7)	100 (3)	50.3 (282)	561
Ertapenem	10.4 (75)	14.8 (21)	0	27.8 (10)	68.2 (15)	14.3 (4)	12 (3)	5.9 (1)	72.7 (8)	71.4 (5)	100 (3)	13.9 (145)	1040
Fosfomycin	14.6 (140)	24.8 (50)	43.8 (14)	32.1 (17)	56.3 (9)	42.9 (15)	22.2 (6)	0	100 (9)	92.3 (12)	80 (4)	20.4 (276)	1350
Gentamicin	17 (93)	13.2 (14)	30.8 (4)	56.5 (13)	6.7 (1)	60 (21)	5.6 (1)	0	33.3 (3)	100 (7)	50 (1)	20.4 (158)	775
Imipenem	3.5 (17)	12.1 (11)	N/A	47.4 (9)	18.2 (4)	63.6 (7)	0	N/A	22.2 (2)	80 (4)	N/A	8.2 (54)	657
Levofloxacin	25.4 (112)	45.1 (51)	12.5 (2)	41.4 (12)	66.7 (2)	50 (5)	80 (12)	50 (2)	100 (1)	92.3 (12)	50 (2)	32.8 (213)	649
Linezolid	33.6 (116)	57.3 (51)	0	28 (7)	0	12.5 (2)	80 (8)	20 (1)	N/A	100 (10)	25 (1)	37.9 (196)	517
Meropenem	10.5 (71)	20.5 (26)	N/A	4.3 (1)	20 (4)	9.1 (2)	31.6 (6)	N/A	28.6 (2)	75 (3)	0	12.8 (115)	897
Netilmicin	38.5 (177)	59.1 (68)	0	40 (12)	38.1 (8)	25 (1)	18.8 (3)	0	100 (7)	92.9 (13)	50 (3)	42.5 (292	687
Nitrofurantoin	12.5 (129)	35.9 (66)	0	66.7 (34)	50 (13)	53.6 (15)	15 (3)	38.1 (8)	87.5 (7)	91.7 (11)	85.7 (6)	20.9 (292)	1400
Piperacillin	7.2 (42)	23.9 (34)	0	33.3 (12)	25 (5)	42.9 (3)	0	33.3 (1)	62.5 (5)	84.6 (11)	33.3 (2)	13.5 (115)	849
Piperacillin-tazobactam	22.7 (141)	37 (44)	N/A	21.4 (6)	20 (3)	21.1 (4)	21.1 (4	N/A	N/A	60 (3)	0	24.8 (205)	828
Teicoplanin	14.6 (58)	33.3 (34)	0	19.2 (5)	44.4 (8)	37.5 (6)	6.3 (1)	16.7 (1)	100 (6)	100 (8)	16.7 (1)	20.9 (128)	611
Tigecycline	42.4 (181)	63.4 (71)	0	41.4 (12)	66.7 (2)	18.2 (2)	20 (3)	20 (1)	100 (1)	100 (13)	75 (3)	45.8 (289)	631
Tobramycin	34.6 (176)	54 (67)	40 (4)	35.5 (11)	22.2 (2)	27.3 (3)	50 (8)	0	100 (1)	100 (8)	33.3 (1)	38.8 (282)	727
TMP-SMX	37.6 (368)	62.7 (133)	37.5 (12)	36.5 (19)	53.8 (7)	20 (2)	50 (16)	0	50 (6)	83.3 (10)	60 (3)	42.3 (576)	1363
Vancomycin	8.9 (39)	21.6 (24)	0	24.1 (7)	29.4 (5)	35.3 (6)	6.3 (1)	0	33.3 (2)	91.7 (11)	33.3 (2)	14.5 (97)	667

N/A = not assessed; TMP-SMX = trimethoprim-sulfamethoxazole.

All evaluated pathogens and their antibiotic resistance rates.

Percentages represent the resistance rate of the pathogen to related antibiotic. Provided numbers in the parenthesis shows resisted case numbers to related antibiotic. The resistance rate calculated with the formula of [Resisted pathogen cases to related antibiotic / Total pathogen cases that susceptibility test includes related antibiotic].

2005, health care-associated infection rates have declined over the past 10 years.[27] However, individual reports have shown variations in the regional antibiotic susceptibility rates. Clinicians should consider international guidelines and local AR rates, especially in the empirical treatment of UTI. According to our cohort, ciprofloxacin, TMP-SMX, and ampicillin are not suitable for empirical treatment of UTIs, whereas nitrofurantoin and fosfomycin are rational options.

This study has some limitations. The retrospective design, single-center results, and limited serving area of the center, which may have caused restricted geographic sampling, were drawbacks. In addition, limited clinical information about the patients, lack of better categorization of the bacterial spectrum in clinical settings, and inability to compare with other hospitals were other limitations. Our results reflect a restricted part of the population and are applicable only to these studies. However, the number of evaluated samples was high, reflecting the current spectrum and susceptibility of uropathogens in our region.

In conclusion, there was an increased rate of resistance in uropathogens against ampicillin, TMP-SMX, and ciprofloxacin. Nitrofurantoin, ceftazidime, and fosfomycin still have effective susceptibility rates against common uropathogens and are applicable in the empirical treatment of UTI. Further studies are needed to stratify antibiotic susceptibility across different geographical regions.

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Statement of ethics

This study was performed in accordance with the principles of the Declaration of Helsinki and was approved by the Adana City Hospital Institutional Review Board (approval date: October 3, 2021, no. 1319). All participants provided consent to the publication of this study. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Conflict of interest statement

No conflict of interest has been declared by the author.

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Author contributions

CB and AK: Conception and design of the study, material preparation, data collection, analysis, commented on the previous versions of the manuscript, read and approved the final manuscript;
CB: Writing of the first draft of the manuscript.

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