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ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF PATHOGENIC BACTERIA CAUSING URINARY TRACT INFECTION IN TERTIARY CARE HOSPITAL IN KATHMANDU, NEPAL

Bipindra Pandey [1], Manoj Pandit [* 5], Suresh Jaiswal [1], Ashok Kumar Sah [2], Rashmi Shahi Chand [3] and Renu Shrestha [4]

School of Health and Allied Sciences [1], Pokhara University, Kaski, Nepal.
Amity Medical School [2], Amity University Haryana, Gurgaon - 122413, Haryana, India.
All Nepal College of Health Science [3], CTEVT, Nepal.
Asian College for Advance Studies [4], Purbanchal University, Nepal.
Universal College of Medical Sciences [5], Tribhuvan University, Bhairahawa, Nepal.

Keywords:

Tertiary care hospital, Uropathogens, Urinary tract infection, Antibiotic sensitivity, Antibiotic resistance, Multidrug resistance

Correspondence to Author:
Manoj Pandit

Lecturer,
Department of Pharmacology,
Universal College of Medical Sciences, Tribhuvan University,
Bhairahawa, Nepal.

E-mail: panditmanoj645@gmail.com

ABSTRACT: Urinary tract infection (UTI) is one of the common clinical conditions in patients presenting to the tertiary care hospital. In general, most of the case of UTI was being treated by empirical antimicrobial therapy before the laboratory results of urine culture; since the antimicrobial susceptibility test of uropathogenic bacteria and antibiotic resistance for enhanced management of UTI with a commonly used antibiotic. A prospective observational study was conducted on significant bacteria isolated from the urine samples submitted in microbiology unit from April 2017 to September 2017 at tertiary care hospital in Kathmandu, Nepal. *E. coli* (52.5%); the predominant etiological organism of UTI in our study showed high sensitivity to nitrofurantoin (93.3%), meropenem (92.9%), and colistin (82.3%). The most effective antimicrobial agent against Gram-positive *Enterococcus species* were linezolid (100%), vancomycin (100%) and nitrofurantoin (100%). A very high rate of resistance was seen against amikacin (75%), nalidixic acid (68.7%), and cotrimoxazole (63.9%) in Gram-negative bacilli isolates of *E. coli*. *Escherichia coli*, the most common uropathogens isolated more commonly from the female (66%) patients compared to the male (34%) patients and isolation of *E. coli* among female patients is statistically significant ($p<0.05$), whereas isolation of *Pseudomonas aeruginosa* (83.3%), *Acinetobacter spp.* (100%) and *Enterococcus spp.* (80%) among male patients is statistically significant ($p<0.05$). This study justifies the necessity to treat patients with UTI based on antimicrobial susceptibility test results in order to prevent the evolution of resistant pathogens. Since UTI has a large impact on the socio-economy & emergence of bacterial resistance, periodic surveillance of antibiotic susceptibility is strongly recommended.

INTRODUCTION: Urinary tract infection, the most common infection, is caused by the presence and growth of pathogenic microorganism within the human urinary system into lower and upper genitourinary tract [1].

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The urinary tract infection is ascertained to exist when a significant number of microorganism, usually greater than 10^5 cells per milliliter of urine or a single strain of bacterium per milliliter in two consecutive mid-stream samples of urine [2].

Urinary tract infection is said to be an asymptomatic infection if the urinary tract has significant bacteriuria associated with bladder and mucosal inflammation or invasion of the renal parenchyma, calices, and pelvis cell; otherwise, it is termed as an asymptomatic urinary tract infection [1, 3, 4].

Uncomplicated urinary tract infection may be symptomatic or asymptomatic, which is diagnosed in the normal anatomy of the urinary tract, while complicated urinary tract infection is mainly asymptomatic and diagnosed in structural or functional abnormalities in urinary tract [5].

In hospital and community-acquired infection, urinary tract infection is the major cause of morbidity, and serious health problem affecting all age groups but females bear the higher burden of UTI than males [6-8]. Worldwide, UTI is the second common infection after respiratory infection & about 150 million people are diagnosed with it each year, costing approximately 6 billion dollars of the global economy [9, 10]. Due to the anatomical differences of female urethra and vagina, hormonal effects, behavioral pattern, and other factors, the incidence and prevalence of UTI is higher in women than in males, but above 50 years, the incidence is similar [11-14]. 50% of all women will develop at least one UTI during their lifetime [6]. Most UTIs are caused by *E. coli*, *Pseudomonas spp., Staphylococcus spp., Neisseria gonorrhea, Chlamydia trachomatis, Candida spp., Mycoplasma* and *E. coli* is responsible for > 80% of all UTI cases [15-18]. Extremes of age, female gender, pregnancy, infants, urinary tract abnormalities and dysfunction, catheterized patients with spinal cord injury, renal disease, diabetes mellitus, and immune suppressant patients are predisposing factor increased risk of UTI [19, 20].

Antibiotic resistance is a major global problem develops when a microorganism has the ability to withstand the effect of antibiotics [21, 22]. Irrational and improper antimicrobial drugs use contribute significantly to antimicrobial resistance and nearly 15% of all prescribed antibiotics are for the management of UTI [23, 24]. Commonly prescribed oral antibiotics used for UTI are amoxicillin-clavulanate, nitrofurantoin, cephalosporins, fluoroquinolones and trimethoprim-sulfamethoxazole [25].

UTI is a common infectious disease among the Nepalese population and major health problems in Nepal [15, 16]. According to the health service report (Annual report of Nepal: the fiscal year 2010/2011), the morbidity of UTI among out patients was 265,143. The emerging antimicrobial resistance has been a burden for the treatment of infectious diseases such as UTI. Changing the spectrum of etiology of UTI and their antimicrobial sensitivity pattern varies from time to time and various geographic regions and climatic conditions [26-28]. One of the most important factors to be considered while selecting the suitable antibiotic therapy depends on the knowledge of the organism causing UTI and their antimicrobial susceptibility pattern in local scenarios [29, 30]. The regular monitoring of antimicrobial susceptibility pattern of uropathogenic bacteria could identify the antibiotic sensitivity and resistance pattern for enhanced management of UTI with the commonly used antibiotics [31]. Therefore, this study aims for the antimicrobial susceptibility pattern of pathogenic bacteria causing UTI in tertiary care hospitals.

MATERIALS AND METHODS:

Study Design: A hospital-based cross-sectional study of urinary tract infected patient's profile or records were conducted. In cross-sectional study design, it was a descriptive study. The study was carried out in patient visiting at Tribhuvan University Teaching Hospital (TUTH), Nepal. The study was carried out for six months, from April 2017 to September 2017. Independent variables like Age, Gender, Ethnic group, Uropathogens, Antibiotic pattern, multiple drug resistance, and Dependent variables like Antimicrobial susceptibility status were taken. The patients visiting at tertiary care hospital during the study period and whose urine culture was positive were tested for antimicrobial susceptibility during the study period and were taken as study population.

Ethical Consideration: The official letter from the college was submitted to related authority of the Tribhuvan University Teaching Hospital (TUTH), Kathmandu prior to the conductance of the research. Ethical approval for this study was obtained from the Institutional Review Board of Institute of Medicine (IOM) (Reference number 332/73/074) before the commencement of the study.

Data Sources: The urinary tract infected patient's laboratory report sheets of urine culture results and antibiograms carried from microbiology lab of tertiary care hospital was taken.

Data Collection Tools and Technique: The secondary data were collected from the hospital record, which includes patient's laboratory report of urine culture results and antibiograms. The patients whose urine culture had been performed in the microbiology lab of tertiary care hospital and were found culture positive were taken for the study. A checklist was used as a tool for the collection of patient's demographic information and laboratory result. The checklist was filled by the investigator. The data needed about the routine urine test and sensitivity report were collected by the investigator from the microbiology wards.

The patient profiles or records visiting a tertiary care hospital of both sex and every age group who were diagnosed with urinary tract infection with urine culture positive and had antibiotic sensitivity test for urine were included in our study while the insufficient information of the patient history including antibiotic usage was excluded. 209 sample was taken for the study.

Data entry was done in MS Excel 2007 and analysis was done by SPSS version 16 for calculating frequencies and percentage, while Chi-square test was applied to evaluate the incidence of disease with gender, to observe the correlation between the prevalence of organism and gender, to observe the correlation between the multiple drugs resistant among age groups. Significance of result was calculated at a 95% confidence level ($p \leq 0.05$).

RESULTS AND DISCUSSION: Classification of antimicrobial agent used in the study:

TABLE 1: CLASSIFICATION OF ANTIMICROBIAL AGENT USED IN THE STUDY

Name of the group	Name of antimicrobials
Aminiglycoside	Amikacin, Gentamicin
Penicillin	Amoxicillin + Clavulanic acid and
Nitrofuran	Piperacillin + Tazobactam
Fluoroquinolones	Nitrofurantoin
Cephalosporin	Norfloxacin, Ciprofloxacin
Monobactam	Cefixime, Cefotaxime
Carbapenem	Aztreonam
Sulfonamide	Meropenem, Imipenem
Oxazolidinones	Cotrimoxazole
Glycopeptides	Linezolid
Other	Vancomycin, Colistin

Table 1 depicts the assessed susceptibility test in our study and a total number of 16 antimicrobials and their classification.

Types of uropathogens isolate with sex:

TABLE 2: TYPES OF UROPATHOGENS ISOLATE WITH SEX

Types of Bacteria Isolate	Sex of Patient		Total
	Male no. (%)	Female no. (%)	
Gram Negative Bacteria	90(47.1%)	101(54%)	191
Gram Positive Bacteria	10(55.6%)	8(44.4%)	18
Total	100(47.8%)	109(52.2%)	209(100%)

A total of 209 urine sample examined report which showed significant bacteriuria were included in our study. Of the sample analyzed, 191(91.40%) were gram-negative bacteria, and 18(8.60%) were gram-positive bacteria isolated. Out of 209 which showed significant bacterial growth consisting of 100 (47.8%) from males and 109(52.2%) from females as detailed in **Table 2**. However, this was in agreement with the study conducted by Rangari A. A., *i.e.,* 45.66% were male, and 54.34% were female [10]. The incidence of UTI is high among the female than male due to the several anatomical differences such as the short urethra and its closeness to the anus as well as sexual activity have been reported to influence the higher prevalence of UTI in females [14, 32].

UTI in male and female patients of various age groups:

TABLE 3: UTI IN MALE AND FEMALE PATIENTS OF VARIOUS AGE GROUPS

Age Groups (Years)	Male no. (%)	Female no. (%)
<10	7(3.34%)	4(1.91%)
10-19	6(2.87%)	4(1.91%)
20-29	15(7.17%)	20(9.56%)
30-39	11(5.26%)	21(10.04%)
40-49	5(2.39%)	23(11.00%)
50-59	12(5.74%)	20(9.56%)
60-69	22(10.5%)	10(4.78%)
≥70	22(10.5%)	7(3.34%)
Total UTI Case = 209	100(47.8%)	109(52.2%)

In the study, UTI was more prevalent in the age group of 30-49 years in females and above 60 years in the case of a male. However, this was in agreement with other studies conducted by Nwanze P.I, *i.e.*, age groups 31-56 in the female is 22.55% whereas age groups above 57 in male is 17.45% [33]. The prevalence of UTI was more in the age group of 30-49 years in females due to known risk factors in menopausal women include sexual intercourse, reproductive stage, and pregnancy [19].

The prevalent of UTI was more in the age group above 60 years due to increasing risk factor in extremes of age, neurologic dysfunction, renal dysfunction, renal disease are predisposing factors for the development of UTIs [11].

UTI in male and female patients of various ethnic groups:

In the study prevalence of UTI was seen in high frequency in upper caste group in both male and female.

TABLE 4: UTI IN MALE AND FEMALE PATIENTS OF VARIOUS ETHNIC GROUPS

Ethnic Groups	Male No. (%)	Female No. (%)
Dalit	0(0%)	1(0.47%)
Disadvantaged Janajatis	23(11.00%)	26(12.4%)
Disadvantaged Non-Dalit Terai Caste	16(7.65%)	4(1.91%)
Religious Minorities	1(0.47%)	0(0%)
Relatively Advantaged Janajatis	9(4.30%)	22(10.52%)
Upper Caste Group	51(24.40%)	56(26.72%)
Total UTI Case = 209	100(47.8%)	109(52.2%)

Gender wise distribution of multi drug resistance:

TABLE 5: GENDER WISE DISTRIBUTION OF MULTIPLE DRUG RESISTANCE

Sex	Resistant to antibiotic				Total
	0drug (%)	1drug (%)	2 drug (%)	>2 drug (%)	
Male	8(8%)	9(9%)	7(7%)	76(76%)	100
Female	17(15.6%)	17(15.6%)	17(15.6%)	58(53.2%)	109
Total	25(12%)	26(12.4%)	24(11.5%)	134(64.1%)	209(100%)

O drug=All drug sensitive 1 drug=One class of antibiotic resistance 2 drug=Two class of antibiotic resistance >2drug=Multi drug resistance

Table 5 depicts the gender-wise distribution of multiple drug resistance. Out of 209 patients, 76(36.45%) of males and 58(27.75%) of females had a high frequency for multiple drug resistance. However, this was in agreement with a study conducted by Thakur P; among total isolates, the multiple drug resistance was higher in males (59.1%) than in females (31.01%) [34].

Multidrug resistance among different age groups:

TABLE 6: MULTIPLE DRUG RESISTANCE AMONG DIFFERENT AGE GROUPS

Age Groups (Years)	Resistant to antibiotic				Total	P-value
	0 drug (%)	1 drug (%)	2 drug (%)	>2 drug (%)		
<10	1(9.1%)	0(0%)	1(9.1%)	9(81.8%)	11	0.189
10-19	1(10%)	2(20%)	2(20%)	5(50%)	10	
20-29	9(25.7%)	1(2.9%)	5(14.3%)	20(57.1%)	35	
30-39	1(3.1%)	6(18.1%)	5(15.6%)	20(62.5%)	32	
40-49	6(21.4%)	6(21.4%)	1(3.6%)	15(53.6%)	28	
50-59	3(9.4%)	3(9.4%)	4(12.5%)	22(68.8%)	32	
60-69	2(6.2%)	4(12.5%)	5(15.6%)	21(63.6%)	32	
≥70	2(6.9%)	4(13.8%)	1(3.4%)	22(75.9%)	29	
Total	25(11.96)%	26(12.44)%	24(11.5)%	134(64.10%)	209(100%)	

O drug=All drug-sensitive 1 drug=One class of antibiotic resistance 2 drug=Two class of antibiotic resistance >2drug=Multi drug resistance

This table shows that Out of 134 multi-drug-resistant strains age group above 50 years was more resistant to multiple drugs (48.5%). Since multiple drug resistance among different age group is statistically insignificant (p>0.05). According to the literature Thakur P; multiple drug resistance belong to age group >60 had the highest percentage [34].

Multidrug resistance pattern of uropathogens:

TABLE 7: MULTIPLE DRUG RESISTANCE PATTERN OF UROPATHOGENS

Bacteria Isolates	Resistant to antibiotic				Total
	0 drug (%)	1 drug (%)	2 drug (%)	>2 drug (%)	
Gram-Negative Bacteria					
Escherichia coli	15(13.8%)	16(14.7%)	15(13.8%)	63(57.8%)	109
Klebsiella spp.	7(13.7%)	6(11.8%)	3(5.9%)	35(68.6%)	51
Pseudomonas aeruginosa	0(0%)	0(0%)	0(0%)	12(100%)	12
Acinetobacter spp.	0(0%)	0(0%)	0(0%)	4(100%)	4

Enterobacter spp.	0(0%)	0(0%)	1(33.3%)	2(67.7%)	3
Citrobacter spp.	1(16%)	0(0%)	0(0%)	5(83.3%)	6
Proteus spp.	0(0%)	1(25%)	1(25%)	2(50%)	4
Gram-Positive Bacteria					
Coagulase Negative Staphylococcus	1(4%)	3(11.5%)	2(8.3%)	3(2.2%)	9
Enterococcus spp.	2(20%)	0(0%)	2(20%)	6(60%)	10
Streptococcus spp.	0(0%)	0(0%)	0(0%)	1(100%)	1
Total	26(12.45%)	26(12.45%)	24(11.5%)	134(63.60%)	209(100%)
O drug=All drug-sensitive 1 drug=One class of antibiotic resistance 2 drug=Two class of antibiotic resistance >2drug=Multi drug resistance					

Out of 134 multiple drug resistance strains, 63(47.01%) of the gram-negative strain of *the Escherichia coli isolated urine sample were more resistant to multiple drugs, and 6(4.47%) of gram positive strain Enterococcus spp*. were resistant to multiple drugs. Multiple antibiotic resistance was seen in the following order: *E. coli* > *Klebsiella species* > *Pseudomonas aeruginosa* > and others organism, which was in agreement with literature [35].

TABLE 8: DISTRIBUTION OF UROPATHOGENS IN MALE AND FEMALE PATIENTS

Isolate Bacteria	Male No (%)	Female No (%)	Total Bacteria Isolate No (%)	P-value = <0.01
Gram Negative Bacteria				
Escherichia coli	37(34%)	72(66%)	109(52.2%)	0.000
Klebsiella spp.	30(58.8%)	21(41.2%)	51(24.4%)	0.071
Pseudomonas aeruginosa	10(83.3%)	2(16.7%)	12(5.7%)	0.011
Acinetobacter spp.	4(100%)	0(0%)	4(1.9%)	0.035
Enterobacter spp.	1(33.3%)	2(67.7%)	3(1.4%)	0.612
Citrobacter spp.	5(83.3%)	1(16.7%)	6(2.9%)	0.077
Proteus spp.	2(50%)	2(50%)	4(1.9%)	0.931
Gram Positive Bacteria				
Coagulase Negative Staphylococcus	3(33.3%)	6(67.7%)	9(4.3%)	0.373
Enterococcus spp.	8(80%)	2(20%)	10(4.8%)	0.037
Streptococcus spp.	1(100%)	0(0%)	1(0.5%)	0.295
Total	100(47.8%)	109(52.2%)	209(100%)	

Distribution of Uropathogens in Male and Female Patients: Out of the 209 isolates obtained, Gram-negative bacteria had a higher frequency of occurrence than Gram-positive. The most common isolated uropathogens in Gram-negative bacilli and Gram-positive cocci were *E. coli* (52.2%) and *Enterococcus* (4.8%), respectively **Table 8**.

Escherichia coli, the most common uropathogens isolated more commonly from the female (66%) patients compared to the male (34%) patients and isolation of *E. coli* among female patients is statistically significant ($p<0.05$), whereas isolation of *Pseudomonas aeruginosa* (83.3%), *Acinetobacter spp.* (100%) and *Enterococcus spp.* (80%) among male patients is statistically significant ($p<0.05$) **Table 8**. According to the literature, Rangari A.A; of the total uropathogenic isolate gram-negative bacteria had a higher frequency of occurrence than gram-positive *i.e., E. coli* (60%) and *Enterococcus* (20%) [10].

Antimicrobial Susceptibility Status in Isolated Gram-negative Uropathogens: *Escherichia coli*, the predominant etiological organism of UTI in study showed moderately susceptibility to imipenem (53.6%), piperacillin + tazobactam (68.2%), gentamicin (80%) and colistin (82.3%); highly susceptibility to meropenem (92.9%) and nitrofurantoin (93.3%). However, rest of other antibiotics tested were moderately resistant except meropenem and nitrofurantoin, which are poorly resistant. *Klebsiella species*, the second isolated causative agent of UTI in the study, showed absolutely resistance to aztreonam (100%); highly resistance to amikacin (94.1%), imipenem (95.5%); poorly resistance to colistin (8%); rest of others were moderately resistance. In *Pseudomonas aeruginosa* isolates: amoxicillin + clavulanic acid (100%), cefixime (100%), cotrimoxazole (100%), and nitrofurantoin (100%) were fully resistant; remaining antibiotic tested in this organism were moderately resistant.

However, ciprofloxacin was not tested in this organism. In the case of *Proteous species*: cotrimoxazole (25%) and nitrofurantoin (25%) were mildly sensitive; norfloxacin (50%) and gentamicin (75%) were moderately sensitive; the rest of other antibiotics were absolutely sensitive. However, colistin (100%) was fully resistant, whereas amikacin, amoxicillin + clavulanic acid, and ciprofloxacin were not tested in this organism.

TABLE 9: *IN-VITRO* ANTIBIOTIC SENSITIVITY IN ISOLATED GRAM NEGATIVE UROPATHOGENS

ANTIBIOTICS	GRAM NEGATIVE ORGANISM ISOLATED (n = 18)													
	E. coli		*Klebsiella spp.*		*Pseudomonas aeruginosa*		*Proteous spp.*		*Citrobacter spp.*		*Acinetobacter spp.*		*Enterobacter spp.*	
	S%	R%	S%	R%	S%	R%	S%	R%	S%	R%	S%	R%	S%	R%
Amikacin	25	75	5.9	94.1	40	60	NT	NT	-	100	66.6	33.4	100	-
AMC	43.7	56.3	29.2	70.8	-	100	NT	NT	NT	NT	NT	NT	-	100
Aztreonam	50	50	-	100	50	50	100	-	100	-	NT	NT	NT	NT
Cefixime	36.6	63.4	50	50	-	100	100	-	100	-	-	100	100	-
Ciprofloxacin	40	60	75	25	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Colistin	82.3	17.7	92	8	70	30	-	100	33.4	66.6	100	-	-	100
Cotrimoxazole	36.1	63.9	28	72	8.4	91.6	25	75	20	80	-	100	100	-
Cefotaxime	46	54	38	62	-	100	100	-	16.7	83.3	-	100	66.6	33.4
Gentamicin	80	20	44.5	55.5	28.6	71.4	75	25	75	25	-	100	100	-
Imipenem	56.3	43.7	4.4	95.6	30	70	100	-	66.6	33.4	50	50	100	-
Meropenem	92.9	7.1	72.2	27.8	20	80	100	-	100	-	33.4	66.6	100	-
Nitrofurantoin	93.3	6.7	26.1	73.9	-	100	25	75	50	50	-	100	-	100
Norfloxacin	31.3	68.7	36.2	63.8	8.4	91.6	50	50	40	60	-	100	33.4	66.6
PIT	68.2	31.8	36.7	63.3	42.9	57.1	100	-	25	75	100	-	66.6	33.4

S→Sensitive, R→Resistant, NT→Not Test, AMC→Amoxicillin+clavulanic acid, PIT→Piperacillin+Tazobactam

All antibiotics were sensitive to gram-negative *Citrobacter species* except amikacin (100%), which was entirely resistant. Among them: aztreonam (100%), cefixime (100%), and meropenem (100%) were utterly sensitive; the rest of them, other antibiotics were mild to moderately resistant. All antibiotic was resistance to gram-negative *Acinetobacter species* except colistin and piperacillin + tazobactam which means these were wholly sensitive (100%); among all antibiotic cefixime, cotrimoxazole, cefotaxime, gentamicin, Nitrofurantoin, and Norfloxacin were completely resistance (100%), and rest of other antibiotics were moderately sensitive and resistance. All antibiotics were sensitive to gram-negative *Enterobacter species* except amoxicillin + clavulanic acid, colistin and nitrofurantoin which mean these were entirely resistance (100%); among all antibiotic amikacin, cefixime, cotrimoxazole, gentamicin, imipenem, and meropenem were absolutely sensitive (100%); rest of others antibiotic were mildly and moderately sensitive and resistance. However, aztreonam and ciprofloxacin were not tested in these two organisms, *i.e.*, *Acinetobacter species* and *Enterobacter species*.

Antimicrobial Susceptibility Status in Isolated Gram-Positive Uropathogens:

TABLE 10: *IN-VITRO* ANTIBIOTIC SENSITIVITY IN ISOLATED GRAM POSITIVE UROPATHOGENS

ANTIBIOTICS	GRAM POSITIVE ORGANISM ISOLATED (n = 18)					
	Coagulase Negative Staphylococcus		*Enterococcus spp.*		*Streptococcus spp.*	
	S%	R%	S%	R%	S%	R%
AMC	50	50	62.5	37.5	100	-
Cefixime	-	100	50	50	100	-
Ciprofloxacin	66.6	33.4	50	50	NT	NT
Cotrimoxazole	77.8	22.2	55.5	44.5	-	100
Cefotaxime	33.4	66.6	50	50	-	100
Gentamicin	88.9	11.1	55.5	44.5	100	-
Linezolid	100	-	100	-	100	-
Nitrofurantoin	88.9	11.1	100	-	100	-
Norfloxacin	66.7	33.3	12.5	87.5	-	100
PIT	57.1	42.9	50	50	100	-
Vancomycin	100	-	100	-	100	-

S→Sensitive, R→Resistant, NT→NotTest, AMC→Amoxicillin+clavulanic acid, PIT→Piperacillin+Tazobactam

In the case of a gram-positive strain of Coagulase-negative staphylococcus: linezolid and vancomycin were totally sensitive (100%); cefixime was completely resistant (100%); the rest of the others antibiotic were mild to moderately sensitive and resistant. Nitrofurantoin, linezolid, and vancomycin were fully sensitive (100%), whereas the rest of others antibiotics were mildly too moderately sensitive and resistant with a gram-positive isolate of *Enterococcus species*. In *Streptococcus* isolate: cotrimoxazole, cefotaxime, and norfloxacin were completely resistant (100%), whereas the rest of the other antibiotics were wholly resistant except ciprofloxacin, which was not tested.

CONCLUSION: The findings of this study have revealed common uropathogens & antibiotic resistance patterns associated with urinary tract infection. Most common isolated uropathogens in Gram negative bacilli and Gram-positive cocci were *E. coli* (52.2%) and *Enterococcus* (4.8%), respectively. The most common etiological organism of urinary tract infection isolated were *Escherichia coli* (52.5%) followed by *Klebsiella species* (24.4%), *Pseudomonas aeruginosa* (5.7%), Enterococcus species (4.8%), Coagulase Negative Staphylococcus (4.3%), Acinetobacter species (1.9%), *Proteus species* (1.9%), *Enterobacter species* (1.4%) and *Streptococcus*species (0.5%).

In conclusion, the data obtained from this study suggest that urinary tract infection causing Gram-positive *Enterococcus* species are still highly sensitive to the linezolid (100%), vancomycin (100%), and nitrofurantoin (100%).

It is concluded that Gram-negative bacilli (91.4%) were responsible for the majority of urinary tract infections. The most common isolated bacteria from urinary tract infection was *Escherichia coli* (52.2%), most effective antimicrobial agents against Gram-negative bacilli were nitrofurantoin (93.3%), meropenem (92.9%), and colistin (82.3%). A very high rate of resistance was seen against amikacin (75%), nalidixic acid (68.7%), and cotrimoxazole (63.9%) in Gram-negative bacilli isolates of *E. coli*.

The sensitivity pattern of uropathogens to a particular antibiotic may vary from time to time and across different geographic areas. To reduce the incidence of resistance, empirical antibiotic selection in the treatment of urinary tract infection must be based on the knowledge of the local prevalence of causative uropathogens and their respective antimicrobial sensitivities rather than on universal guidelines. Promiscuous prescription and use of antibiotics must be discouraged in both hospital and community settings by continuous public awareness and education on rational antibiotic use as well as the adoption of a strict national antibiotic policy to regulate the prescription, sale, and use of antibiotics.

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CONFLICTS OF INTEREST: Nil

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