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PREDOMINANT UROPATHOGENS AND THEIR MULTIDRUG RESISTANCE FROM BETHZATHA ADVANCED LABORATORY, ADDIS ABABA, ETHIOPIA (MAY 2021-JUNE 2025)

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ABSTRACT

Background: Urinary tract infection is predominant in clinical diagnosis and there have been increasing antimicrobial resistant strains of bacterial pathogens from urinary tract infections (UTI). Antimicrobial resistance (AMR) reduces the treatment options and is becoming a global issue. **Objective:** The objective of the present work is to retrospectively analyse three years laboratory record of URO-pathogens and their resistance pattern to commonly available antimicrobial agents tested at Bethezatha Advancd Medical Laboratory. **Method**: Urine samples were sent to Bethzatha Advanced Medical Laboratory from different wards of Bethzatha Hospital and other Health Institutions in Addis Ababa, Ethiopia for culture and antimicrobial susceptibility tests. These were cultured for isolation, identification of bacterial pathogens and testing antimicrobial susceptibility. The cultures were done on conventional culture media. Identification of bacterial pathogens and antimicrobial susceptibility tests were done using Micro Scan Identification Panel method. The panels were read by Micro Scan Auto Scan 4 reader (BeckMan) after incubating for 18 to 24 hours at 35^{o}c aerobically. **Results:** A total of 700 urine samples were bacteriologically processed. Age of patients ranged from 3 to greater than 80 years old and ratio of female to male was 148: 81. Yield of pathogens was 205(29.3%). The most frequently isolated pathogens were *E. coli*, 125(60.9%). The frequency of recovery of *E. ccoli* from female 68(54.4%) and male 30(24%). *Klebsiella species* were isolated from 41(20%). *Other uropatogens isolated in the present study included Pseudomonas spp, Citrobacter spp, Proteus spp, Acinetobacter baumani and Enterobacter spp.* The antimicrobial susceptibility patterns in the present study shows that the most frequent uropathogens were multidrug resistant. Out of 31 uropathogens tested against 21 antimicrobial drugs, 30/31 (96%) were resistant to two or more drugs. There was no isolate susceptible to all antimicrobials tested. Highest multiple resistance of *E. coli*, 88.9%, 76%, 66.7%, 56.3% and 51.9%, cefuroxime, ampicillin, trimethoprim- sulfamethoxazole, ampicillin-sulbactam, ciprofloxacin and nalidixic acid respectively in that order. The present finding shows that the dominant multidrug resistant uropathogens were highly susceptible to imipenem, ertapenem, amikacin, meropenem, nitrofurantoin, gentamicein and tobramycin. Consequently it is important to wisely use these drugs in the treatment of clinically confirmed urinary tract infections.

KEYWORDS: Microscan Panel, uropathogens, Multidrug resistance, antimicrobial susceptibility.

INTRODUCTION

Urinary tract infection (UTI) is a term applied to a variety of clinical conditions ranging from asymptomatic presence of bacteria in the urine to severe form of the kidney with sepsis.[1] Urinary tract infection is predominant in clinical diagnosis and there have been increasing antimicrobial resistant strains of bacterial pathogens from urinary tract infections (UTI). Antimicrobial resistance (AMR) reduces the treatment options and is becoming a global issue. Hence, it negatively impacts the health of a community, healthcare costs and gross domestic products. Globally, the burdens of infections with resistant microbes are increasing.[2] Reports on UTI show that isolates from UTI include both gram negative and gram positive bacteria. The most frequently reported pathogens from among gram negatives include *Escherichia coli*, Klebsiella species, *Pseudomonas specie*, *Proteus species*, *Enterobacter species*, *Acinetobacter baumani and Citrobacter species.*[3] The most commonly reported gram positive bacterial pathogens from UTI is Coagulase positive cocci or *staphylococcus aureus.*[3,4] Although isolation of bacterial pathogens from urinary tract is frequently found in literatures, what necessitates reporting bacterial isolates is their changing resistance to antimicrobial agents commonly available for the treatment of clinical diseases. The most commonly isolated bacterial pathogens have increased their resistance to antimicrobial drugs available, making treatment very difficult. Nowadays, antimicrobial resistance (AMR) is considered as a main public health threat; also AMR bacteria in different hospital wards are increasing significantly. Published study shows that 700,000 deaths are reported annually due to AMR, and it has been predicted that if appropriate control and prevention measures are not taken, AMR would become one of the main reasons of death among hospitalized or non-hospitalized patients in developing and developed countries.[5,6] Proper antibiotic usage and administration are essential for treatment of bacterial infection.[7] Some of the gram negative pathogens such as *E.coli*, *klebsiella* have become notorious producing extended spectrum beta lactamase enzymes making choice of treatment of infections caused by these pathogens difficult.[8] Patients with ESBL-producing organisms are often seriously sick with prolonged hospital stays and invasive medical devices (urinary catheters, endotracheal tubes, central venous lines) are present for a prolonged duration. The median length of hospital stay prior to isolation of an ESBL producer has ranged from 11 to 67 days, depending on the study.[8] Therefore frequent investigation of clinical infections and detecting the etiological agents is very important to prevent and control the spread of these pathogens. The objective of the present work is to retrospectively analyse three years laboratory record of URO-pathogens and their resistance pattern to commonly available antimicrobial agents tested at Bethezatha Advancd Medical Laboratory.

MATERIALS AND METHODS

Specimens and bacteriological culture

Urine samples were sent to Bethzatha Advanced Medical Laboratory from different wards of Bethzatha Hospital and other Health Institutions in Addis Ababa, Ethiopia for culture and antimicrobial susceptibility tests. These were cultured for isolation, identification of bacterial pathogens and testing antimicrobial susceptibility. The cultures were done on conventional culture media such as MacConkey, Blood, Nutrient, and Mannitol salt agars, as recommended by Cheesbrough.[9]

Isolation, Identification and antimicrobial Susceptibility Test of Bacterial Pathogens

Bacterial identification and antimicrobial susceptibility tests were done using Microscan Panel Identification Methods (Beckman Coulter, Brea, CA, USA). Identification of isolated organisms was done using dried positive COMBO Panels. Microscan dried COMBO Panel is a Panel containing both dried biochemical reagents and antimicrobials. In Microscan COMBO Panels methods, identification and susceptibility to different antimicrobials agents was tested by the Minimum Inhibitory Concentration (MIC) methods with break points referenced to CLSI (Clinical and Laboratory Standard Institute) guide line. According to MicroScan Panel identification methods, 3-4 pure bacterial colonies were picked from 18-24 hours' aerobic culture by means of a wand designed for holding bacterial material from primary isolation media mentioned above and inoculated into 30 ml of Prompt inoculation water (Beckman Coulter, Brea, CA, USA). Then the bacterial suspension was transferred into Seed Tray Inoculator D sets (Beckman Coulter, Brea, CA, USA). The COMBO Panel wells' are inoculated from bacterial suspension in the Seed Tray using a device known as Microscan Renok (Beckman Coulter, Brea, CA, USA) which delivers 115 µL of broth suspension to each well. Some wells were overlaid with the mineral oil as instructed by the company before the COMBO incubated. Similarly some reagents recommended by the manufacturer were added to the Panels after incubating for 18 to 24 hours at 35^{o}c aerobically before reading. The Panels were read by MicroScan AutoScan 4 automated reader (Beckman Coulter, Brea, CA, USA). The MicroScan AutoScan 4 automated reader gives the identification for each bacterial biotypes with probability scores. Results with high probability scores (>85%) were considered reliable while results with probability scores (<85%) as "unconfirmed". If the biochemical profile did not much any identification in Program's software database, the result generated was "very rare bio type''. The present report is the retrospective data of recorded Uro-pathogens from May 2021 to June 2025 analysed.

RESULTS

A total of 700 urine samples were bacteriologically processed. Table 1 shows the gender and age rages of patients from whom urine samples yielded pathogens. Age of patients ranged from 3 to greater than 80 years old and ratio of female to male was 148: 81. Some data lacked either gender or age was considered as incomplete. Yield of pathogens was 205(29.3%). The most frequently isolated pathogens were *E. coli*, 125(60.9%). The frequency of recovery of *E. ccoli* from female 68(54.4%) and male 30(24%). *Klebsiella species* were isolated from 41(20%). The predominant 38 (98.7%) of these were *K. pneumonia* and the remaining 3 Klebsiella *species* were, *K. ascorbita*, *K.oxytoca* and *K. schleromatis*. The overall recovery rate of *Klebsiella species* was greater (21/41, 51%) from males patient than its' recovery from female (10/41, 24.4%) (not shown in Table 2) (21/41, 51%). Frequency of isolation of other uropathogens does not show significant difference between genders. *Pseudomonas* and *Citrobacter species* were each isolated from 10(4.9%) (Table2).

Table 1: Gender and Age Rages Of Patients Yielded Uropathogens From 2021 -2025.

2025	**AGE**				
GENDER	**3-21**	**22-50**	**51-79**	**80<**	**total**
F	3	21	13	3	40
M	-	6	11	2	19
TOTAL	3	27	24	5	59
2023-2024 F	3	31	30	3	67
M	7	14	10	1	32
TOTAL	10	45	40	4	99
2021-2022					
GENDER	3-21	AGE 22-50	51-79	80<	TOTAL
F	3	20	14	4	41
M	7	15	7	1	30
TOTAL	10	35	21	5	71

Table 2: Frequent Urinary Tract Isolates From May 2021 to June 2025.

Frequent isolates	**2021-2022**		**2023-2024**		**Januay 2025- July 4, 2025**		**Over all total**	
isolate	**total**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
E.coli	41	74.54	51	49.0	33	71.7	125	60.9
Klebsiella (sp)	7	12.7	28	26.9	6	13.0	41	20
Proteus spp.			4	3.8	1	2.2	5	2.40
Enterobacter			1	1.00	1	2.2	2	0.96
Pseudomonas spp			7	6.7	3	6.5	10	4.9
Acinetobacter baumannii	7	12.7			1	2.2	8	4.3
enterococcus			3	2.9	1	2.2	4	1.9
citrobacter			10	9.6	-	-	10	4.9
Total	55	100	104	99.9	46	100	205	100.06

Out of 31 uropathogens tested against 22 antimicrobial drugs 30/31 (96%) were resistant to two or more drugs. Only two isolates were resistance to one drug. There was no isolate that was susceptible to all antimicrobials tested. The antimicrobial susceptibility patter of E. coli isolates is given in Table 3 and 4. Out of 51 *E. coli* isolated during 2023- 2024, 23 strains were tested against amikacin; of these, 21/23 (91.3%) were susceptible to the same drug. Out of 35 strains tested for tobramycin and gentamicin, 29/35(82.9%), 26/35(74.4%) were respectively susceptible to tobramycin and gentamicin respectively. All 38(100%) strains tested for imipenem were susceptible to the same drug. Most *E. coli* isolated during 2023- 2024 were resistant 35/46(76%), 9/16(56.3%), 16/24(66.7%) respectively to ampicillin, ampicillin-sulbactam, and trimethoprim sulfamethoxazole in that order. Out of 16 *E. coli* isolates 4/16(25%) were producers of extended spectrum beta lactamases (ESBL). Table 4 shows antimicrobial susceptibility patterns of *E. coli* isolated from UTI during 2025. The Predominant URO-pathogens isolated during 2025 were similar to those isolated during 2023-2024; *E. coli*, were most frequent 33/46(71.7%), followed by *Klebsiella sp*, 6/46 (13%) and Pseudomonas species 3/46(6.5%). Antimicrobial susceptibility of *E.coli* isolated during 2025 were most susceptible to imipenem, Ertrapenem, gentamicin, and amikacin, 32/33(96.9), 30/33(90.9), 29/33(87.9%) and 28/33(84.8%) respectively in that order. Out of those *E.coli*, 19/33(57.6%) were ESBL producers.

Table 3: Antimicrobial Susceptibility Pattern of E. coli Isolates From UTI During 2023-2024.

E.coli N=	ANTIMICROBIALS	SUCEPTIBLE	INTERMEDIATE	RESISTANCE	ESBL	TOTAL
	AK	21/23(91.3)		2/23(8.6)		23
	AMOX/CL	8/16(50)	3/16(18.6)	5/16(31.3)		16
	AMP/S	4/16(25)	3/16(18.8)	9/16(56.3)		16
	AMP	8/46(17.4)	3/46 (6.5)	35/46(76)		46
	AZETR	4/16(25)	3/16 (18.8)	5/16(31.3)	4/16(25)	16
	CEFEP	3/10(30)		7/10(31.3)		10
	CEFTA	5/15(33.3)	2/15(13.3)	4/15(26.7)	4/16(25)	15
	CEFTAZ	6/16(37.5)	3/16(18.8)	3/16(18.8)	4/16(25)	16
	CEFUROX	1/9(11.1)		8/9 (88.9)		9
	CIPROFL	9/18(50)	2/18 (11.1)	7/18(38.9)		18
	COLIS	8/10(80)		2/10(20)		10
	ERTAP	9/11(81.8)		2/11(18.2)		11
	GENTA	26/35(74.4)	2/35(5.7)	7/35(20)		35
	IMP	38/38(100)				38
	LEVO	5/11(45.5)		6/11(54.5)		11
	MEROP	9/10(90)	1/10 (10)			10
	PIP/TA	9/11(81.8)	1/11(9.0)	1/11(9.0)		11
	TIGYC	13/13(100)				13
	TOBRA	29/35(82.9)		6/35(17.1)		35
	TRIM/SULF	8/24(33.3)		16/24(66.7)		24
	NAl Acid	10/27(37.0)	3/27(11.1)	14/27(51.9)		27
	NITROF	14/16(87.5)	1/16(6.3)	1/16 (6.3)		16

Abevation of Antimicrobials used :-AK, amikacin; AMOX/CL, amoxicillin/clavulnate; AMP/S, ampicillin-sulbatam, AMP, ampicillin; AZETR, azetromicin, CEFEP, cefepime; CEFTA, ceftataxime; CEFTAZ, ceftazadime; CEFUROX, cefuroxime; CIPROFL, ciprofloxacin; COLIS, colistin; ERTAP, ertapenem; GENTA, gentamicin; IMP, imipenem; LEVO, levofloxacin; MEROP, meropenem; PIP/TA, Piperacillin Tazo; TIGYC, tegicycline; TOBRA, tobramycin, TRIM/SULF, trimethoprimsulfamethoxazole; NAl Acid, nalidixic acid; NITROF, nitrofurantoin.

Table 4: Antimicrobial Susceptibility Pattern Of *E. Coli* Isolates From UTI 2025.

Organism	ANTIMICROBIALS	SUCEPTIBILITY PATTERNS			
E.coli		SUCEPTIBLE	INTERMEDIATE	RESISTANCE	ESBL
	AK	28/33(84.8)	4/33(12.1)	1/33(6.1)	
	AMOX/CL	22/33(66.7)	6/33(18.2)	5/33(15.2)	
	AMP/S	14/33(42.4)	8/33(24.2)	11/33(33.3)	
	AMP	6/33(18.2)		27/33(81.8)	
	AZETR	9/33(27.3)		5/33(15.2)	19/33(57.6)
	CEFEP	11/33(33.3)		22/33(66.7)	
	CEFTA	10/33(30.3)		4/33(12.1)	19/33(57.6)
	CEFTAZ	10/33(30.3)		4/33(12.1)	19/33(57.6)
	CEFUROX	12/33(33.4)		21/33(63.6)	
	CIPROFL	13/33(39.4)	1/33 (3.1)	19/33(57.6)	
	COLIS	28/33(84.8)		5/33(15.2)	
	ERTRAP	30/33(90.9)		3/33(9.1)	
	GENTA	29/33(87.9)		4/33(12.1)	
	IMP	32/33(96.9)		1/33(3.1)	
	LEVO	12/33(33.4)		21/33(63.6)	
	MEROP	30/33(90.9)		3/33(9.1)	
	PIP/TAZ	27/33(81.8)	2/33(6.1)	4/33(12.1)	
	TIGYC	32/33(96.9)		1/33(3.1)	
	TOBRA	26/33(78.8)	2/33(6.1)	5/33(15.2)	
	TRIM/SULF	12/33(33.4)		19/33(57.6)	

The antimicrobial susceptibility pattern of *Klebsiella* isolates from urinary tract samples' is given in Table 5. Out of 28 *Klebsiella species*, 13 were tested for amikacin and 9/13(69.2%) were susceptible to the drug. Similarly, 13/19(68.4%), 16/20(80%) and 9/10(90%) respectively susceptible to gentamicine, imipenem, and nitrofurantoin. Most of the *Klebsiella* species tested, 20/22(90.9), 10/13(76.9), and 10/14(71.4) were resistant to ampicillin, trimethoprim sulfamethoxazolle and ampicillin- sulbactam respectively.

Table 5: Antimicrobial Susceptibility of *Klebsiella spp* from Urine During 2023-2024.

Klebsiella spp. N=41	SUCEPTIBLE	INTERMEDIATE	RESISTANCE	ESBL	TOTAL
AK	9/13(69.2)	1/13(7.7)	3/13(23.0)	-	13
AMOX/CL	2/8(25)	2/8(25)	4/8(50)	-	8
AMP/S	4/14(28.6)		10/14(71.4)		14
AMP	2/22(9.0)	-	20/22(90.9)		22
AZETR	2/11(18.2)	1/11(9.0)	8/11(72.7)		11
CEFEP	½(50)	-	1/2(50)		2
CEFTAZ	2/6(33.3)	1/6(16.7)	3/6(50)		6
CEFUROX	1/6(16.7)	1/6(16.7)	4(/6(66.7)		6
CIPROFL	3/15(20)	3/15(20)	9/15(60)	-	15
COLIS	3/5(60)	-	2/5(40)	-	5
ERTRAP	1/2(50)	-	1/2(50)	-	2
GENTA	13/19(68.4)	-	6/19(31.6)		19
IMP	16/20(80)	1/19(5.0)	3/20(15)	-	20
LEVO	2/4(50)	1/4(25)	1/4(25)	-	4
MEROP	2/6(33.3)	-	4/6(66.7)	-	6
PIP/TA	2/2(100)	-	-	-	2
TIGYC	2/2(100)	-	-	-	2
TOBRA	11/18(61.1)	2/18(11.1)	5/18(27.8)	-	18
TRIM/SULF	3/13(23.0)	-	10/13(76.9)		13
NAl Acid	6/17(35.3)		11/17(64.7)		17
Nitrofura	9/10(90)		1/10(10)		10

Table 6: Antimicrobial Susceptibility of *Klebsiella sp* from Urine Isolated During 2025.

Klebsiella spp. N=6	SUCEPTIBLE	INTERMEDIATE	RESISTANCE	ESBL	TOTAL
AK	6/6(100)			-	6
AMOX/CL	5/6(83.3)	1/6(16.7)		-	6
AMP/S	1/6(16.7)		5/6(83.3)		6
AMP	1/6(16.7)	-	5/6(83.3)		6
AZETR	1/6(16.7)		5/6(83.3)	3/6(50)	6
CEFEP	3/6(50)	-	3/6(50)		6
CEFTAT	3/6(50)			3/6(50)	6
CEFTAZ	2/6(33.3)		1/6(16.7)	3/6(50)	6
CEFUROX	2/6(33.3)		4(/6(66.7)		6
CIPROFL	4/6(66.7)		2/6/ (33.3)	-	6
COLIS	4/6(66.7)	-	2/6(33.3)	-	6
ERTRAP	4/6(66.7)	-	2/6(33.3)	-	6
GENTA	5/6(83.3)	-	1/6(16.7)		6
IMP	6/6(100)			-	6
LEVO	4/6(66.7)	1/6(16.7)	1/6(16.7)	-	6
MEROP	6/6(100)	-		-	6
PIP/TA	6/6(100)	-	-	-	6
TIGYC	5/6(83.3)	-	-	-	6
TOBRA	4/6/ (66.7)		2/6(33.3)	-	6
TRIM/SULF	2/6(33.3)	-	4(66.7)		6

Six species of *Klebsiella* were isolated during the year 2025 (Table 1). Antimicrobial susceptibility of these isolates is depicted on Table 5. The *Klebsiella* strains were most susceptible 6(100%) to each amikacin, meropenem, piperacillin and 5/6(83.3%) to each of amoxacilin/clavulanate and tigecycline respectively. The strains of *Klebsiella* were most resistant to 5/6(83.3%) to each of Ampicillin, Ampicillin-sulbactam, azetromycin and trimethoprim sulfamethoxazole respectively. Out of these *Klebsiella sp*.3/6(50%) was ESBL producers.

Antimicrobial susceptibility of the less frequent isolates (Table1) were also tested against different antimicrobials but not presented in the Tables. All 3 species of *Pseudomonas* tested against 16 antimicrobial agents were resistant except to colistin; out of 6 antimicrobials tested, *Proteus* was susceptible to 2 antimicrobial agents and intermediately susceptible to 3 antimicrobials. One of the strains was multiple resistant to six antimicrobials. *Acinobacter baumani* was resistant to all ten antibiotics tested. The Enterobacter isolate was susceptible to nine antimicrobials out of 22 tested (amikacin, cefpime, ciprofloxacin, ertapenem, gentamicin, imipenem, levofloxacin, meropenem and tobramicin) and resistant to seven antimicrobials (ceftzadime, cefotaxime, tigecycline, ampicillin, ampicillin-sulbactam, amoxicillin /clavulnate, cefuro xime (data not shown in the Tables).

DISCUSSION

The present retrospective data analysis showed that both female and male patients in the age category in the record 21-50 followed by 51-79 yielded uropathogens more frequently and age category 3-21 and 80 or above less frequently. The yield of uropathogens in the present study 205/700(29.3%) is comparable to 28.9% reported by Diriba et al[13] from Nekemte western Ethiopia and 89/273(32.6%) reported by Ahmed et al[10] from Qassim University Saudi Arabia, but higher than 10. 5% reported by Mohammed[11] from diabetic patients attending Hawassa University Comprehensive Specialized Hospital, Hawassa, South Ethiopia and 19% reported by Ku et al[12] but by far lower than 705/774(91%) reported by Saad.[14] The differences could be attributed to the underlying conditions of the patients, sample size and other various factors. However, the most impressing finding is that the dominant uropathogens isolated in the present study agrees with reports from different parts of the world (10; 11; 12, 14, and 15). In our study *Escherichia coli* (*E. coli*) was the most frequent uropathogen which fits to those reported by Mohamed[11], Ahmed *et al*[10] and Ku *et al.*[12] The rate of isolation of *E.coli* (60.9%) in the present work is higher than 30/78 (38.5%) reported by Diriba *et al*, (13,.37.8% reported by Abdalla *et al*,[16], 40% recorded by Farag *et al*[17], and 44.4% of isolation rate by Sime *et al*[18] but lower than 82.1% isolation of *E. coli* reported by Zemer *et al*[15] from Pediatric Community, Israel. The difference in rate of isolation could be due to the size of patients samples' studied, underlying problems and differences in study sites such as whether community or hospital wards. *Klebsiella species* isolated in the present study was the next frequent uropathogen to *E. coli*. The finding agrees with that reported by Diriba *et al*[13], Shaker *et al*[20], Ahmed *et al*[10] and Sime *et al.*[18] On the Other side other researchers (10, 15, and 19) reported that Gram positive cocci such as coagulase negative staphylococci and *S. aureus* to be more frequent than *Klebsiella species*. The dominance of gram positive cocci in those studies may be due to the underlying conditions such as diabetics. The rate of isolation 40/205(20%) of *Klebsiella spp* in the present study is less than the isolation rate, 26/78 (33.3%) reported by Diriba *et al*[13] but greater than 15% recovery by Jahan *et al*[21] from Bangladesh. In the present study next to E.coli, *Klebsiella pneumonia* was dominant among the gram negative uropathogens. Uropathogens in the present study were more frequently recovered from females than males. This may be due to many factors, among these; the primary reasons are a shorter urethra of women, unhygienic sexual activity, menopause, and lack of acidic fluid. The finding matches with those reported by several authors from Ethiopia and elsewhere (10, 18, 19 and 21). Other less common Gram negative uropathogns such as *Pseudomonas* and *Citrobacter spp* each (4. 9 %) and Acinetobacter baumannii (4.5%) isolated in the present study, were comparable to 4.5% reported by Ahmed *et al*[11] but more frequent than those *Pseudomonas spp. Citrobacter spp. and Acinetobacter* spp. 1/103(0.999),. 3/103 (2.91), 2/103 (1.94%) respectively recorded by Adugna et al[21] from patients of Dessie Refereal Hospital. The variation in the isolation rate of the uropathogens may be due to the sample size, method of identification and type of patient community.

The antimicrobial susceptibility patterns in the present study shows that the most frequent uropathogens were multidrug resistant. Out of 31 uropathogens tested against 21 antimicrobial drugs, 30/31 (96%) were resistant to two or more drugs. There was no isolate susceptible to all antimicrobials tested. Highest multiple resistance of *E. coli* during 2023- 2024 were, 88.9%, 76%, 66.7%, 56.3% and 51.9%, cefuroxime, ampicillin, trimethoprim- sulfamethoxazole, ampicillin-sulbactam, ciprofloxacin and nalidixic acid respectively in that order. Similarly, E.coli isolates during 2025 were resistant to ampicillin, cefepime, cefuroxime and levofloxacine respectively. Although there are variations in the rate of resistance of uropathogens, different researchers both from Ethiopia and elsewhere (16, 17, 20, and 23) have documented resistance of bacteria isolated from urinary tracts. Saad et al[14] listed 17 antimicrobials which were found to have resistance rate of more than 50%, including to all B lactams (except cefuroxime). Gena *et al*[23] from Bule Hora University reported 93.1% ampicillin resistance of gram negative uropathogens which is in agreement with our findings. Earlier studies[10] from Qassim University, Saudi Ar*abia reported that the commonly isolated microorganisms, Escherichia coli*, Klebsiella pneumonia, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Enterococcus faecalis* and Staphylococcus saprophyticus were resistant to ampicillin. Ahmed *et al*,[10] further indicated that over all drug resistance in their study was 92%, with most (80%) being resistant to at least two drugs. They observed that antibiotic resistance was commonly in ampicillin(88.3%), piperacillin(72.7%), clindamycin(66.7%), amoxicillin-clavulanicacid (66.2%) and trimethoprimsulfamethoxazole (50%). Overall rate of resistance 30/31 (96%) of uropathogens observed in the present study is relatively higher compared to the previous rate (92%) resistance. *Klebsiella* isolated during 2023-2024 were also resistant to multiple drugs, 90%, 76.%, 72%, and 71% ampicillin, Trimethoprim-sulfamethoxazole, Azetromycin and ampicillin-sulbactam respectively. *Klebsiella species* showed increase resistance to the same drugs during 2025 compared to the previous. The highest rate of multiple resistance of Gram negative uropathogens to antmicrobial agents observed in the present study agrees with that reported by Abdalla *et al.*[16] Abdalla *et al*[16] studied uropathogens and their antimicrobial susceptibility in cross sectional retrospective study in Smart Health Tower, Iraq and has reported that *E. coli* and *Klebsiella* in their study were multidrug resistant which matches with the current observation.

In the present study, highest susceptibility of *E. coli* was observed to imipenem, ertapenem, amikacine, meropenem, nitrofurantoin, gentamicin and tobramycin. Diriba *et al*[13] has reported similarly high-level susceptibility of Gram negative bacteria to amikacin (100%), cefepime (93.3%), and gentamicin (91.0%). However the rate of susceptibility to cefepime does not agree with the present observation. On the other hand the effectiveness of meropenem and nitrofurantoin observed in the present study agrees with that reported by Sime *et al*[18] from Tikur Anbessa Hospital, Addis Ababa. Similarly *Klebsiella* stains in the present study were most susceptible to meropenem, imipenam, piperacyline, nitrofurantoin and amikacin. Sime *et al*[18] studied urinary tract infection in cancer patients and antimicrobial susceptibility of isolates in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, and found that *E.coli*, *Klebsiella pneumonia* and *Citrobacter diversus* isolates were multidrug resistant; meropenem and nitrofurantoin were the most effective antibiotic against MDR isolates in their studies which fits to our finding. Most of the less frequent Gram negative isolates in the present study, *Pseudomonas, citrobacter, Acinetobacter baumani* and *Proteus species* have also showed multiple resistances to antimicrobial agents tested.

Urinary tract infection (UTI*)* is one of the most prevalent and recurrent infectious diseases that can range from moderate to fatal. *Escherichia coli* and *Klebsiella species* are the dominant isolates among Gram negative bacteria in our study and similar reports from Ethiopia and elsewhere have been documented. More worrisome, is that this Gram negative bacteria were multiply resistant to commonly available antimicrobials and makes treatment of urinary tract infection very difficult. Vietinghoff *et al*[24] describes that urinary tract infections (UTIs) are predominantly of a Gram-negative nature and that uropathogens are evolutionarily highly adapted with selected strains having specific virulence factors suggesting common mechanisms how bacterial cells acquire virulence and AMR factors. Accordingly simultaneous increase in antimicrobial resistance and virulence is a complex and context-dependent phenomenon. Extended spectrum β-lactamase (ESBL) production which is observed in the present study is among known AMR mechanisms. A history of antibiotic consumption and the physiology of urinary flow are major factors that shape AMR prevalence.[24]

CONCLUSION AND RECOMMENDATIONS

Specific and selected strains of gram negative bacteria exchange genetic materials of virulence and antimicrobial resistance. Therefor increase in multidrug resistance continues unless preventive and control measures are taken. Promiscuous use of antimicrobial agents and inappropriate prescription of antimicrobials increases the spread of multidrug resistant bacterial strains. The present finding shows that the dominant multidrug resistant uropathogens were highly susceptible to imipenem, ertapenem, amikacin, meropenem, nitrofurantoin, gentamicein and tobramycin. Consequently it is important to confirm antimicrobial susceptibility and wisely use these drugs for empirical treatments of patients.

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