Science World Journal Vol. 19(No 1) 2024 https://dx.doi.org/10.4314/swj.v19i1.23
www.scienceworldjournal.org
ISSN: 1597-6343 (Online), ISSN: 2756-391X (Print)
Published by Faculty of Science, Kaduna State University

Full Length Research Article

PREVALENCE AND ANTIMICROBIAL RESISTANT *ESCHERICHIA COLI* AND *KLEBSIELLA* SP AMONG INDIVIDUALS WITH URINARY TRACT INFECTION FROM HOSPITAL AND COMMUNITY SETTINGS IN ADO-EKITI, NIGERIA

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ABSTRACT
The antibiotic resistance of urinary pathogens has been varying over the period of years, in community and healthcare-associated infections. The study provided the current prevalence and antimicrobial-resistant *Escherichia coli* and *Klebsiella* sp among individuals with urinary tract infections from hospital and community settings in Ado-Ekiti, Nigeria. Midstream urine samples were collected and studied using standard microbiological techniques. Information for the factors associated with UTIs was obtained using questionnaires. An agar disc diffusion technique was used to test for antibiotic susceptibility. The chi-square test and Poisson regression was used to express associations among descriptive variables of UTI. The study revealed females are more susceptible to UTIs than males. Bacterial isolates showed a low prevalence of UTI with 122(8.5%). The age-wise distribution shows that the Incidence is more common in age bracket 51-60 and 21to 30 years. Gender and risk factors among the individuals had a significant relationship with UTIs. Overall, the bacterial strains showed the highest resistance to amoxicillin-clavulanate 43(91.5%) and most susceptible to imipenem 40(85.1%). The bacteria isolates also showed high multiple resistance with 0.6 MAR index. Appropriate diagnosis and management of UTI are aimed at treating the acute occurrence as well as preventing recurrences of this infection.

Keywords: Urinary tract infection (UTI), *Escherichia coli, Klebsiella* sp, Antimicrobial Resistant, Prevalence.

INTRODUCTION

The *E. coli* and *Klebsiella* sp is a type of Gram-negative bacteria that can cause different types of healthcare-associated infections including pneumonia, urinary tract infection, bloodstream infections, wound or surgical site infections, and meningitis (Gharavi *et al.,* 2021). Increasingly, *E. coli* and *Klebsiella* sp bacteria have developed antimicrobial resistance, most recently to the class of antibiotics known as carbapenems (Mahony *et al.,* 2020). The bacteria can be spread through person-to-person contact or, less commonly, by contamination of the environment (Guo *et al.,* 2023). These bacteria may affect humans and animals, and the infections they cause are more complex to treat than those caused by non-resistant bacteria (Lee *et al.,* 2020). Antibiotic resistance leads to higher medical costs, abiding hospital stays, and increased mortality. The world needs to change the way antibiotics are prescribes and uses. Despite the development of newer antibiotics, antibiotic resistance is still a global threat. The problem is basically carbapenemase and ESBL producing *E. coli* and *Klebsiella* sp that causes infection that are difficult to treat (Seid *et al.,* 2023). Excessive consumption of antibiotics mainly leads to the development of antibiotics resistance. African especially Nigeria consumes larger amount of antibiotics with a prescription rate twice that recommended by the World Health Organization (WHO) (WHO, 2017) usually seen in both rural areas and urban areas of the country. The majority of people living in Nigeria country are subjected to abject poverty where they cannot afford primary care services. Most physicians in the rural areas have non-degree training yet are allowed to prescribe antibiotics due to personnel shortages. Recent studies in Nigeria have reported a high irrational antibiotics prescription use among primary care physicians and emergence of multidrug-resistant bacterial infections (Abubakar and Tangiisuran, 2020; Ajayi, 2023). The prevalence of MDR (multiple drug-resistant) gram-negative bacilli has impressed practice in every field of medicine. The most gram-negative severe infections occur in healthcare and community settings and are most commonly caused by Enterobacteriaceae (mostly *E. coli*), *Klebsiella pneumoniae*, *Pseudomonas aeruginosa,* and *Acinetobacter*. MDR gram-negative pathogens are also becoming instantly prevalent in the community (Islam *et al.,* 2022). The use of antibiotics in the community as risk for development of drug-resistant pathogens. Other studies in Southwestern part of Nigeria, revealed ESBL and carbapenemase producing *E. coli* and *K. pneumoniae* with multiple resistance to antibiotics (Adekanmbi *et al.,* 2020; Odewale *et al.,* 2023; Olalekan *et al.,* 2023). It is important to understand the antibiotic susceptibility profile of *E. coli* and *Klebsiella* sp which shows inconsistency in different geographical locations, to implement current control actions to prevent the rapid spread of antibiotic resistance in communities. Thus, the study was carried out to provide the current prevalence and antimicrobial-resistant *Escherichia coli* and *Klebsiella* sp among individuals with urinary tract infections from hospital and community settings in Ado-Ekiti, Nigeria.

MATERIALS AND METHODS

Study Design

In the cohort study performed from February to November 2021, to determine the prevalence and antimicrobial resistant *Escherichia coli* and *Klebsiella* species obtained from urine sample hospital and community settings in Ado-Ekiti, Ekiti State Nigeria. Volunteer

subjects were picked from four locations in Ado-Ekiti environ. Standardized questionnaires were used to collect relevant information such as their age, sex, level of education and medical data. Ethical permission was obtained before samples were collected.

Inclusion and exclusion criteria for UTI screening

Individual who gave their informed consent and all age group were included in the study. Those without given consent were not included in the study.

Isolation and identification of bacterial isolates

The midstream urine samples were collected into a clean urine container and sent to the research laboratory for analysis. A sterile wire loop were used to pick 0.01 ml of the mid-stream urine sample and streaked in Cystine Lactose Electrolyte Deficient Agar (CLED), incubated at 37ºC in aerobic condition for 24 hours in confirmation for significant bacterial number. The urinary tract infection was defined as positive urine culture with the significant growth of ≥ 10^5 CFU/mL or more (Bilsen *et al.,* 2023). After incubation, the cultures were sub-cultured on MacConkey agar and Eosin Methylene Blue agar (EMB) for observation and recording. *E. coli and Klebsiella* sp isolates were identified with the use of microscopic appearance, gram reaction, and biochemical testing and the isolates were stored at -70 °C in 40 % glycerol broth medium for further analysis (Cheesborough, 2006).

Antimicrobial susceptibility testing

Antibiotics susceptibility test was carried out on all bacterial isolates according to the CLSI protocol specified by the disk diffusion method (Anosike *et al.,* 2020). The bacteria were grown overnight on sterile Mueller Hinton agar plates. Few colonies were inoculated onto sterile normal saline adjusted to match the 0.5 McFarland turbidity standards, with the help of a sterile swab stick, test strains were streaked as a lawn on the MHA. . The desired antibiotic was aseptically pressed gently down on the surface of the media, ensuring proper lap with the media. The plates were incubated at 37 °C for 24 hours. The zones of inhibition were then measured and recorded (CLSI, 2020). The antimicrobial agents tested were: cefexime (5 µg), ceftazidime (30 µg), cefotaxime (25 µg), imipenem (10 µg), ofloxacin (5 µg), tetracycline (30 µg), amikacin (30 µg), Levofloxacin (5 µg), ciprofloxacin (5µg), ampiclox (µg), amoxicillin clavulanate (20/10 µg), nitrofurantoin (300 µg), meropenem (10 µg), cotrimoxazole (µg) and gentamycin (10 µg) (Oxoid, England). The multiple antibiotic resistance (MAR) bacteria were resistant to at least two antibiotics from each of the following classes: carbapenem, cephalosporins, fluoroquinolones, macrolides, penicillin, tetracycline and aminoglycosides (Sharma, 2011).

Determination of Multiple Antibiotic Resistance Index

The multiple antibiotic resistance index were calculated according to the method described by Osundiya *et al.* (2013) in which the ratio of the number of antibiotics to which the isolates were resistant to the total number of antibiotics against which the isolates were tested (a/b).

Statistical analysis

Qualitative data were described as numbers and percentages using descriptive statistics. The Chi-square test and Poisson Regression was used to show differences on distribution of resistant determinants. Results with $p < 0.05$ were considered significant.

RESULTS

One hundred and twenty-two bacterial isolates were acquired from different locations used in the study. *Escherichia coli* was the most prevalent bacterial uropathogen with 75(61.5%) and *Klebsiella* sp 47(38.5%) are shown in Figure 1. Clinical samples has the highest number of bacterial isolates 87(71.3%) with UTI while community setting that recorded low number of bacterial isolates 35(28.7%) Figure 2. The prevalence of bacterial UTI was highest in age group 51-60 with 40(32.8%) as compared to the lowest value 2(1.6%) in the children age group of 0-10 years in hospital settings. Likewise, in community setting, bacteria UTI was highest in age group 21-30 25(34.7%) with lowest prevalence seen in the children and elderly groups of 0-10 years and 71 above respectively (Table 1). UTI was highest in females with 75(61.5%) and 42(58.3%) as compared to 47(38.5%) and 30(41.7%) in men for hospital and community settings respectively. The study observed the highest prevalence of UTI from the respondents in tertiary level of education 63(51.6%) and 44(61.1%) while respondents in the elementary level of education 10(8.2%) and 0(0%) showed lowest prevalent of UTI in both hospital and community settings in that order. Highest percentage of UTI was found among the civil servants with 38(31.1%) for clinical setting. Likewise, students recorded highest percentage of UTI with 27(37.5%) in community setting (Table 1). The observation on medical history of the respondents and exposures to the risk factors associated with the colonization of UTI were more on 'No answered' than the 'Yes answered' as shown in the Figure 3. The antibiotics susceptibility tests that were carried out on all isolates shown a high resistant to 115 (94.3%) amoxicillin-clavulanate, 98(80.3%) to ampiclox, 87(71.3%) to cotrimoxazole, 83(68.0%) to nitrofurantoin, 82(67.2%) to tetracycline and 62(50.8%) to amikacin (Table 2). The bacterial strains were most susceptible to impenem 93(76.2%), meropenem 84(68.9%), ceftazidime 73(59.8%), levofloxacin 67(54.9%), cefexime 61(50.0%), cefotaxime 53(43.4%) and gentamycin 50(40.9%). *E. coli* strains showed high resistant to 72(59.0%) amoxicillin-clavulanate, 68(55.7%) to ampiclox, 64(52.5%) to nitrofurantoin, 58(47.5%) to tetracycline and 50(41.0%) to cotrimoxazole as shown in Fig 4. Similarly, *Klebsiella sp.* strains were resistant to 43(35.2%) amoxicillin-clavulanate, 37(30.2%) to cotrimoxazole, 30(24.6%) to ampiclox, 24(19.7%) to tetracycline and 22(18.0%) to levofloxacin (Figure 5). The study revealed that highest multidrug resistance occurred in *E. coli* with MAR index of 0.8. The MAR index of *Klebsiella* sp.as shown in Figure 6.

The variables for UTI were subjected to Poisson regression analysis, the following regression values were indicated: Age (Age Group 0-30 and 51-60: Estimate= 1.792e+00, Std. Error= 2.887e-01, z value= 6.207, p < 5.41e-10); Gender (male and female: Estimate=3.5835, Std. Error= 0.1179, z value=30.407, p < 2e-16); Educational level (elementary level: Estimate=2.639e+00, Std. Error=1.890e-01, z value=13.965, p < 2e-16; no education: Estimate=1.211e+00, Std. Error=2.153e-01, z value=5.625, p <1.85e-08; secondary level: Estimate= 1.211e+00, Std. Error=2.153e-01, z value=5.625, p < 1.85e-08); Occupation (entrepreneur: Estimate=0.9555, Std. Error= 0.3038, z value= 3.145, p < 0.00166; farmer: Estimate= 0.8755, Std. Error= 0.3073, z value= 2.849, p < 0.00439; pensioner: Estimate=1.2432, Std. Error=0.2931 4.242 p < 2.22e-05; students: Estimate=0.6931, Std.

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Error= 0.3162, z value= 2.192, p <0.02839; trader: Estimate=1.2040, Std. Error=0.2944, z value=4.090, p < 4.32e-05); Medical history (catheter usage: Estimate=4.70048, Std. Error=0.06742, z value=69.719, p < 2e-16; Hospitalized for above 2 days: Estimate= -0.62294, Std. Error= 0.11410, z value= -5.459, p < 4.78e-08; Pregnancy: Estimate= -0.28768, Std. Error=0.10299, z value= -2.793, p < 0.00522; Used Diaphragm/Birth Control: Estimate= -0.91629, Std. Error=0.12613, z value= -7.265, p< 3.74e-13) were found to be statistically significant relations (p< 0.05) with UTI.

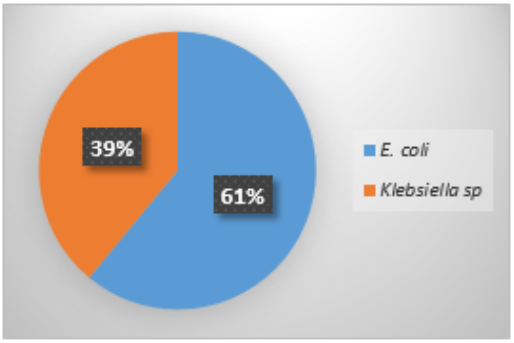

Figure 1: Prevalence of bacterial species

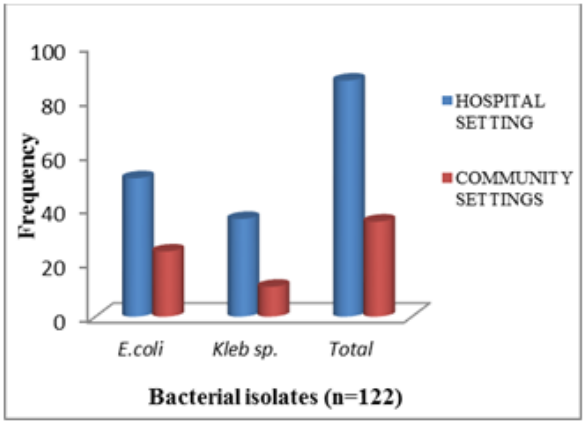

Figure 2: Frequency of bacterial isolates according to Hospital and Community Settings).

Table 1: UTI prevalence on gender, age, level of education and occupation

Factors		*Hospital Settings (%)*		*Community Settings (%)*		
		+ UTI	*- UTI*	*+ UTI*	*- UTI*	*Total*
Gender	Male	47(38.5)	282(46.1)	30(41.7)	265(46.7)	
	Female	75(61.5)	330(53.9)	42(58.3)	303(53.3)	
Age	0-10	2(1.6)	48(7.8)	0(0.0)	0(0.0)	
	11-20	10(8.2)	72(11.8)	16(22.2)	102(18.0)	
	21-30	13(10.7)	140(22.9)	25(34.7)	222(39.1)	
	31-40	18(14.6)	145(23.7)	12(16.7)	175(30.8)	
	41-50	26(21.3)	49(8.0)	10(13.9)	20(3.5)	
	51-60	40(32.8)	80(13.1)	5(6.9)	37(6.5)	
	61-70	8(6.6)	35(5.7)	4(5.6)	12(2.1)	
	71-Above	5(4.1)	43(7.0)	0(0)	0(0.0)	
Level of Education	E Level	10(8.2)	40(6.5)	0(0)	0(0.0)	
	S Level	18(14.6)	74(12.1)	7(9.7)	45(7.9)	
	T Level	63(51.6)	249(40.7)	44(61.1)	254(44.7)	
	No level	31(25.4)	249(40.7)	21(29.2)	269(47.4)	
Occupational level	Farmers	9(7.4)	46(7.5)	5(6.9)	26(4.6)	1374
	Trader	27(22.1)	94(15.4)	11(15.3)	74(13.0)	
	Students	12(9.8)	99(16.2)	27(37.5)	289(50.9)	
	Civil Servants	38(31.1)	122(19.9)	9(12.5)	51(9.0)	
	Entrepreneur	14(11.5)	72(11.8)	12(16.7)	62(10.9)	
	Pensioner	16(13.1)	52(8.5)	6(8.3)	33(5.8)	
	Health Workers	6(7.4)	37(6.0)	2(2.8)	20(3.5)	
Total		122	612	72	568	

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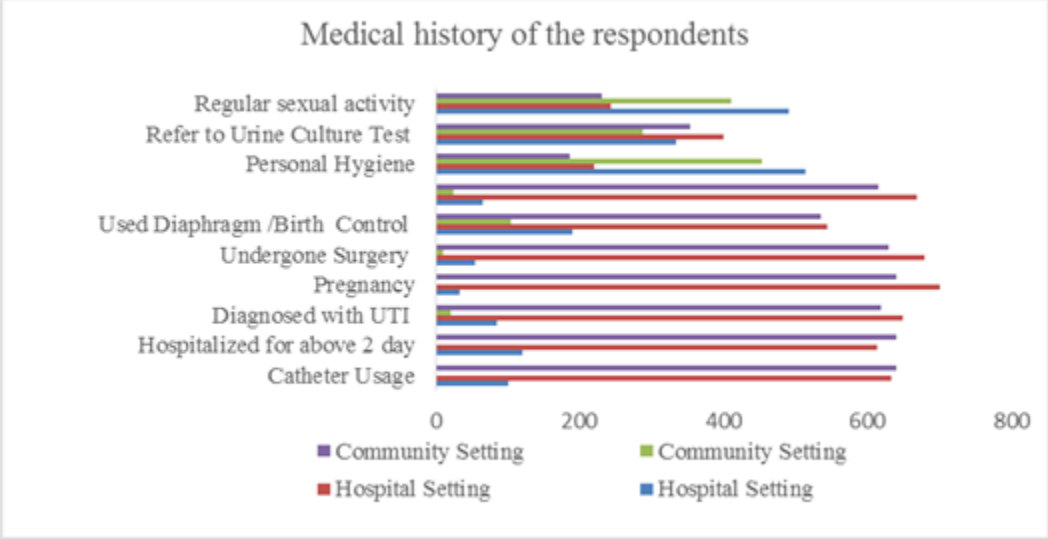

Figure 3: Medical history of the respondents

Table 2: Overall antibiotic resistance on bacterial isolates

Types of Antibiotic	No of Resistant (%) n = 122	No of Intermediate (%) n = 122	No of Sensitive (%) n = 122	Estimated log rate	p-value
Meropenem	27(22.1)	11(9.0)	84(68.8)	-1.018e+00	<2e-16
Imipenem	20(16.4)	9(7.3)	93(76.2)	-2.725e-01	0.00028
Cefexime	32(26.2)	29(23.7)	61(50.0)	-1.343e-16	1.0000
Ceftazidime	29(23.7)	20(16.4)	73(59.8)	-2.852e-16	1.0000
Cefotaxime	32(26.2)	37(30.3)	53(43.4)	-5.270e-01	<2e-16
Ofloxacin	48(39.3)	37(30.3)	37(30.3)	-1.345e-01	1.0000
Ciprofloxacin	45(36.9)	43(35.2)	34(27.9)	-1.344e-01	1.0000
Levofloxacin	40(32.8)	15(12.3)	67(54.9)	-2.725e-01	0.00028
Amikacin	62(50.8)	15(12.3)	45(36.9)	2.413e-16	1.0000
Gentamycin	47(38.5)	25(20.5)	50(41.0)	-1.345e-01	1.0000
Amoxicillin clavulanate	115(94.3)	0(0)	7(5.7)	-2.725e-01	0.00028
Ampiclox	98(80.3)	16(13.1)	8(6.6)	-5.805e-01	<2e-16
Tetracycline	82(67.2)	20(16.4)	20(16.4)	-1.341e-01	1.0000
Nitrofurantoin	83(68.0)	9(7.4)	30(24.6)	2.966e-01	1.0000
Cotrimoxazole	87(71.3)	17(13.9)	18(14.8)	-5.805e-01	<2e-16

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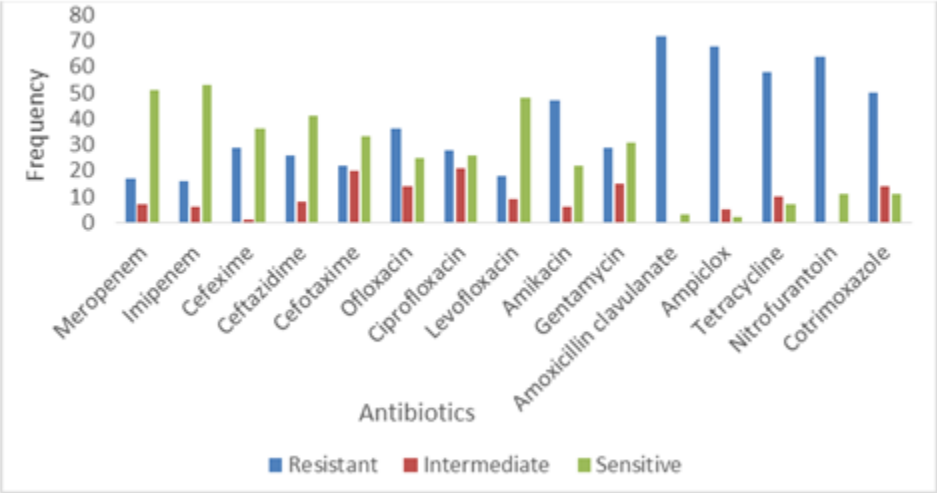

Figure 4: Susceptibility pattern to different antibiotics on *E. coli* isolates (n=75)

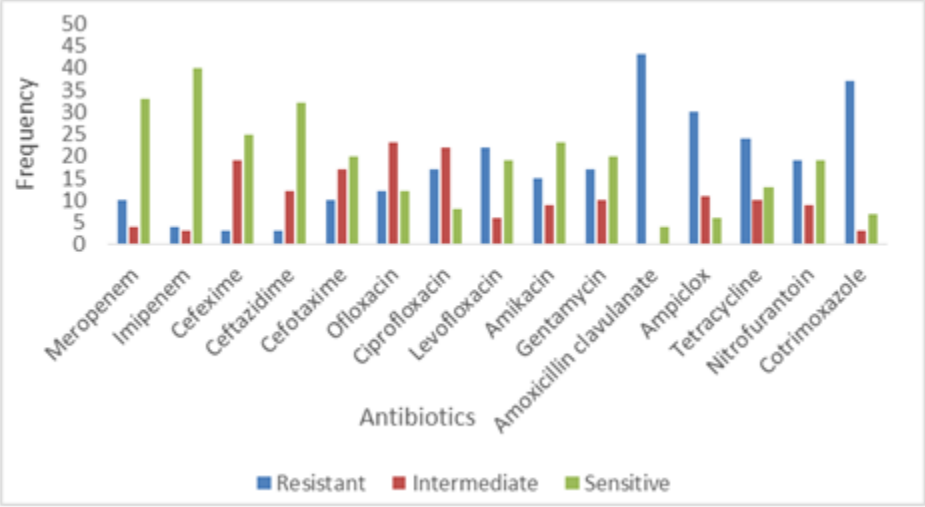

Figure 5: Susceptibility pattern to different antibiotics of *Klebsiella* sp. isolates (n=47)

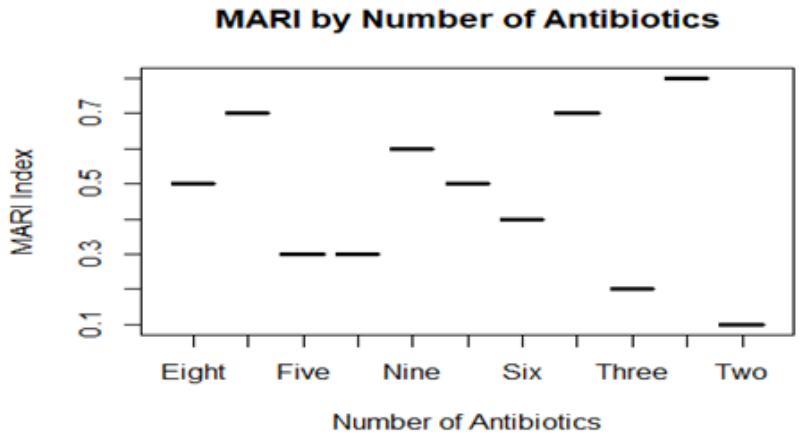

Figure 6: Multiple resistance profile with MAR index

DISCUSSION

The study established that prevalence of bacterial species among UTI patients was fairly low (8.9%).The most common prevalent pathogens in the urine samples were *E. coli*75(61.5%) followed by *Klebsiella* sp 47(38.5%). The results of the present study are roughly consistent with a study in Iraq, showing that the most prevalent bacteria were *E. coli* 82(68.3%) and *K. pneumonia* 38(31.7%), respectively (Jalil, and Naji Al Atbee, 2022). The study shows more number of bacterial isolates 87(71.3%) in clinical samples compared with other related studies. In a previous study conducted in patients attending private clinics in BasrahIraq by Jalil and Naji Al Atbee, a significantly high prevalence of *E. coli* 68.3% and *Klebsiella pneumoniae* 31.7% was reported (Jalil, & Naji Al Atbee, 2022). Likewise, previous related studies from Hospitals in Bushenyi Uganda and Dhaka Bangladesh showed a higher prevalence of *E. coli* 41.9%, *Klebsiella pneumoniae*11.6% and *E. coli* 51.6%, *Klebsiella* sp 12.1% respectively (Odoki *et al.,* 2019; Isalm *et al.,* 2022). Furthermore, community samples showed low number of bacterial isolates 35(28.7%) compared with other related studies which *E. coli* and *Klebsiella* sp were the predominant pathogen isolated from patients with community acquired UTI (Manges *et al.,* 2006; *Isam et al.,* 2022; Guo *et al.,* 2023).The prevalence of this study was low compared with the previous studies possibly due to significant differences in the sample sizes and population variation. It is also possible that with time, tremendous improvements in management of UTIs and community hygiene could have contributed to reduction of the prevalence of *E. coli* and *Klebsiella* sp organisms (Odongo *et al.,* 2020).The members of Enterobacteriaceae family especially *E. coli* and *Klebsiella* sp. are identified as vital causative agents of UTIs as they possess a number of factors including adhesion, pilli, and fimbrae which contribute to the attachment of bacteria to the urothelium (Shrestha *et al.,* 2016).

The study observed that the infection rates in females (61.5%) were higher than in males (38.5%) in clinical and community environment. The findings are similar to the findings reported in hospitals at Bangladesh, Nigeria, and Ethiopia (Isam *et al.,* 2022; Anosike *et al.,* 2020; Fenta *et al.,* 2020).The higher frequency in females has been attributed to the shorter female urethra and the proximity of the gastrointestinal outlet, hence making it easier for enteric flora to colonize the area (Odongo *et al.,* 2020). Other contributory factors may include the use of contraceptives, childbirth and menopause (Gharavi *et al.,* 2021). The intercept represents the estimated log rate of positive UTI for females through the exponentiation of the intercept that gives the baseline rate for females. Males are estimated to have a rate approximately exp (3.5835) times higher than females. Therefore, the results suggest that there is a significant difference in the rate of positive UTI between males and females, with males having a higher estimated rate.

In clinically setting, the prevalence was revealed to be high in the age group of 51 to 60 years, 40(32.8%) compared with other age groups though it was not statistically significant. The findings are similar to the findings reported in Nigeria (Anosike *et al.,* 2020; Erinle *et al.,* 2022).The majority of people in this group are believed to have impaired immunity with conditions such as diabetes mellitus, catheter usage, chronic diseases and other health conditions. In community settings, the study shows that people between the ages of 20 to 30years old 25(34.7%) are the most infected with UTI. These outcomes agree with previous studies in which the incidence of UTIs was higher among students (Erinle *et al.,* 2022; Vati and Prabhakaran, 2020; Jelly *et al.,* 2022). In a previous study conducted in India shows more cases of UTIs were recorded among young and middle aged patients (20-49 years, 51.04%) (Akram *et al.,* 2007). Like-wise, a study conducted in Accra reported more cases of community acquired UTI among adults less than 50 years (70%) (Donkor *et al.,* 2019).The majority of people in this group is adolescence and young adult attributable to risk factor such as toileting practices etc. It is well-known facts that the accumulated residue from sweating, urine or feces, causes irritation and promotes bacterial growth. The direction of cleaning of perineum area from front to back is a correct method that reduces the risk of UTI among female students. Majority of the students practices wrong techniques of perineal wash (Ruiz *et al.,* 2019). The frequency of changing underwears also considered as a part of hygiene practices, as continue wearing same dampened cloth favors the growth of bacteria and increase the risk of infection. Habitual delaying in urination is unhealthy toileting behaviors that are practice by most students (Yaliwal *et al.,* 2020). The results suggest that the rates of positive UTI are significantly different for the "11-20", "21-30", "51-60" and "61-70" age groups. For the other age groups such as "31-40" and "41-50", there is no evidence of a significant difference in UTI prevalence rates.

The results suggest that there is a significant difference in the prevalence rate of UTI between different education levels, with individuals having No Level and Secondary Level of education showing higher estimated rates compared to individuals with Elementary Level of education. The results suggest that there are significant differences in the prevalent rate of UTI between different occupations, with individuals in certain occupations having higher estimated rates compared to individuals in the reference occupation.

The medical history categories such as catheter usage, diagnosed UTI, undergone surgery, diabetes, personal hygiene and regular sexual activity were not statistically significant, as their p-values are higher than the common significance level of 0.05. In the study, 100 patients have catheter usage as compare to Center for disease control reports on 75% of UTIs in the hospital setting are associated with a urinary catheter (CDC, 2015). This is because bacteria can enter the urinary tract when the catheter is being put in or while the catheter remains in the bladder. The study recorded hospitalization of 120 patients, seen to be common among aged people. Long hospital stay can increase the risk of hospital associated infections (HAI) (Osakwe *et al.,* 2019).The study recorded 33 pregnancies among the female patient with suspected UTI. Other finding shows that one in 11 women had a UTI in pregnancy, and half of the cases were asymptomatic (Lee *et al.,* 2020).Urinary tract infections are a common cause of serious infection in pregnant women. In a previous study, 3.5% of ante partum admissions were due to UTI (Storme *et al.,* 2019). The increased size and weight of the uterus may prevent the completely drainage of urine from the bladder, which can make pregnant women more UTI prone. Patients that suffered from kidney disease or diabetes have weakened body's ability to fend off bacteria because these conditions block the normal flow of urine and encourage bacterial growth. Ahmad et al. (2020) recorded high significant difference in sub-optimal glycemic control group in diabetics' patients. Sexual activity is one of the most common lifestyle risk factors for UTIs, particularly for young women who are at the adolescence and adult age. An earlier study

revealed that recent sexual intercourse and frequency of sex more than three times per week (p=0.001) were independent predictors of UTIs (Seid *et al.,* 2023). It is believe that sexual intercourse may transport bacteria from the genitals and anus into the urethra and in turn, lead to infection. For men, unprotected sexual activity involving women with a vaginal infection may increase risk of UTIs. The use of birth control (such as diaphragms and spermicides) raises UTI risk in women. A study revealed a high prevalence of UTI (35.3%) amongst the contraceptive users (Lo *et al.,* 2023). Some personal hygiene habits are considered risk factors for UTIs. These habits includes use of douches and feminine hygiene sprays or powders, wiping from back to front after urinating or having a bowel movement especially for women, and retaining urine for an abnormally prolonged period. A study revealed that bad sexual health hygiene were the most strongly associated with UTI (Badran *et al.,* 2015). The results suggest that there are significant differences in the rate of exposures to the risk factors associated with the colonization of UTI as shown in medical histories, such as catheter usage, hospitalization for more than 2 days, pregnancy, and the use of diaphragm/birth control.

The study revealed the high resistance rates of bacteria stains to overall susceptibility against commonly used antibiotics: Amoxicillin-clavulanate (94.3%), ampiclox (80.3%), cotrimoxazole (71.3%), nitrofurantoin (68.0%) and tetracycline (67.2%) in community and clinical settings; these findings is similar to other studies in Bangladesh, Iran and Uganda (Islam *et al.,* 2022; Gharavi *et al.,* 2021; Odongo *et al.,* 2020). A study conducted in Nigeria showed an increase in the rates of ceftazidime, cefuroxime, ciprofloxacin and Nalidixic acid. However, the bacterial strains showed susceptibility to imipenem, meropenem, ceftazidime, levofloxacin and cefexime in the both settings used in this study. The susceptibility patterns are similar to those observed by Nahala *et al.* (2018) and Ayandele *et al.* (2020). The intercept (1.669e+00) represents log of the expected count when all other predictors are zero. The positive coefficient (which include amoxicillin-clavlanate, ampiclox, and cotrimoxazole) are highly significantly (p-value <2e-16) in hospital and community isolates for resistant category. The positive coefficient (imipenem, meropenem ceftazidime, and levofloxacin) are highly significant in hospital and community isolates for sensitive category. *E. coli* isolates showed high resistant to 72(59.0%) amoxicillin-clavulanate, 68(55.7%) to ampiclox, 64(52.5%) to nitrofurantoin, 58(47.5%) to tetracycline and 50(41.0%) to cotrimoxazole. Lesani *et al.* (2020) in Iran indicated that ampicillin and nitrofurantoin had the highest and lowest resistance rates, whereas in Uganda reported cefuroxime and ciprofloxacin with the highest and lowest resistance rates (Odongo *et al.,* 2020). *Klebsiella* sp. strains were resistant to 43(35.2%) amoxicillin-clavulanate, 37(30.2%) to cotrimoxazole, 30(24.6%) to ampiclox, 24(19.7%) to tetracycline and 22(18.0%) to levofloxacin. A similar study showed high resistance rates against ampicillin (93.3%), sulphamethexazole trimethoprim (93.3%), cefotaxime (86.6%), and ceftazidime (86.6%), and tetracycline (73.3%) for *Klebsiella pneumoniae* (Gebremedhin *et al.,* 2023). The emergence of multi-resistant uropathogens makes the treatment of these infections challenging. In a previous review, emphasize that multi-drug resistant infections are increasingly common in individuals with no history of hospitalization or prior hospitalization (Mahony *et al.,* 2020). The study detected many MDR *E. coli* strains and *K.* sp. The MDR results are similar to those observed by (Ayandele *et al.,* 2020). *E. coli* showed highest MAR index of 0.8 while the MAR index of *Klebsiella* sp. was 0.6.this differs from that of another work (Ayandele *et al.,* 2020) that reported an index of 0.93.

Conclusion

The results indicated that prevalence of bacterial strains among UTI patients was fairly low (8.9%) and the most common prevalent pathogens in the urine isolate was *E. coli.* The female gender are more susceptible to Urinary infection. This study has demonstrated that hospitalization, catheter usage, age, pregnancy, use of birth control and gender are the most important factors associated with UTI. Risk factors need to be considered when accessing patients with UTIs and appropriate preventive measures are the best way to reduce the problem of UTIs.The data showed that bacterial isolates were highly resistant to commonly used antibiotics, except for imipenem, meropenem, ceftazidime, levofloxacin and cefexime with high prevalence of MDR in *E. coli* and *K.* sp isolates from both hospital and community settings. A continuous UTI screening of patients with catheter usage, birth control usage, pregnancy, hospitalized and patients with age group of children, young adult and elderly are recommended. Additional research to identify the genes responsible for resistance in these organisms should be done for easy treatment and control of these infections.

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