

To Study the Prevalence of Urinary Tract Infection its Bacteriological Profiling and the Drug Resistance Pattern of the patients at a Tertiary Care Centre in Muzaffarpur, Bihar, India

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ABSTRACT

Introduction: Urinary tract infections account for the majority of hospital visits worldwide and are a leading cause of morbidity and comorbidity in patients with underlying illnesses. Urinary tract infections (UTIs) and the spread of antibiotic resistance among uropathogenic bacteria remained major public health concerns. A targeted empirical antibiotic therapy necessitates routine evaluation of the microbiological organisms causing UTIs and their antimicrobial resistance.

Aim and objective: To Study the Prevalence of Urinary Tract Infection its Bacteriological Profiling and the Drug Resistance Pattern of the patients at a Tertiary Care Centre

Material and Methods: This was a Cross sectional study carried out in the Department of Microbiology, at New reliable path lab and Path Diagnostic Laboratory, Muzaffarpur, Bihar for a period of 24 months i.e, between April 2021 to April 2023. A total of 1000 urine freshly voided mid- stream urine sample were collected in a sterile wide mouth container from the individuals preliminary routine urine tests positive for pus cells and albumin. All the urine samples were processed within one hour after the collection for aerobic bacterial culture. If delayed, samples were refrigerated and processed within 4 - 6 hrs. The identification, biochemicals and the AST pattern was done according to the CLSI guidelines 2021.

Results: In the present study total of 1000 urine samples were received in which 450 (45%) urine samples were showing significant growth for UTI. The ratio of females were 284 (63.1%) more as compared to that of the males 166 (36.8%) with the maximum age of 31-40 (44.8%) years of age followed by 21-30 (26.2%) was affected the most. In the age group of 0-10 years and above 71 years was the least affected with the infection. It was observed that the maximum number of isolates were from the *E.coli* 180 (40%) followed by *Klebsiella pneumonia* 120 (26.6%), *Pseudomonas aeruginosa* 55 (12.2%), *Acinetobacter baumannii* 26 (5.6%), and *Staphylococcus aureus* 30 (6.6%) for gram positive followed by *Proteus* 23 (5.1%) least for *Enterococcus* with 3.5%.

The days of catheterization were observed to be the maximum in 4-7 followed by 8-12 days.

It was clear that out of the total samples the comorbidity with diabetes was found to be low (16.4%). It was also observed that patients with hypertension and the kidney disease were observed to be low as compared to the healthy individuals. The maximum number of days with fever was observed to be maximum in 4-7 days, least for 1-3 days and 8-12 days

In the present study the resistant rate for Ampicillin was observed to be 88.8% followed by Co-trimoxazole and cefotaxime with 89.1%. Imipenem and Nitrofurantoin were sensitive with (89.5%).
Conclusion: The cost of UTI prevention can be reduced by doing the routine checks and the strict implementation of the antibiotic stewardship programs. The cost of UTI prevention can be reduced by doing these routine checks.

Keywords: UTI, Bacteriological profiling, Prevalence, Antibiotic sensitivity testing, Associated factors, CLSI

INTRODUCTION

Urinary tract infections (UTIs) are inflammatory conditions caused by microorganisms that grow abnormally in the urinary system [1, 2]. Urinary tract infections are well known to cause permanent kidney scarring as well as short-term morbidities such as fever, dysuria, and lower abdominal pain (LAP) [3, 4].

Urinary tract infections (UTIs) are among the most common illnesses in the world. UTIs have a negative impact on patients' quality of life, as well as a significant clinical and financial burden [5]. UTIs pose a public health risk in both community and hospital settings. It is estimated that half of all adult women will have multiple UTIs in their lifetime [6,7], making it the most common outpatient infection [6].

There are various clinical manifestations of UTI such as cystitis, pyelonephritis, asymptomatic bacteriuria, chronic and recurrent UTIs; of which cystitis is the most frequent presentation affecting the urinary bladder [8]. The bacteria may further ascend in the urinary tract causing infection of the kidney; if timely management is not done [2].

Community-acquired urinary tract infections are defined as the infection of the urinary system that takes place in one's life in the community setting or in the hospital environment with less than 48 hours of admission. Community-acquired UTI is the second most commonly microbial infection in the community setting [8]. Nosocomial urinary tract infections are the infection that occurs after 48 hours of hospital admission [9].

Majority cases of uncomplicated UTI are community-acquired in origin and caused by uropathogenic *E. coli* (UPEC) and *Klebsiella* spp., constituting approximately 75–95% of the total cases [3]. The other less prevalent organisms are *Proteus* spp., *Enterobacter* spp., *Pseudomonas* spp., *Enterococcus faecalis*, *Staphylococcus saprophyticus* and *Staphylococcus aureus* [4]. Diagnosis is made based on the presenting symptoms and significant bacteriuria, i.e. $\geq 10^5$ colony forming units of organism on culture [5]. The outcome of UTI may also depend upon the presence of underlying host factors such as age, diabetes, spinal cord injury and urinary catheterization among various others [6, 7].

The clinical manifestations of urinary tract infections (UTIs) depend on the portion of the urinary tract involved, the etiologic organisms, the severity of the infection, and the patient's capacity to mount an immune response to it. Urinary tract infections can be asymptomatic, acute, chronic, complicated, or uncomplicated. Both silent and symptomatic UTIs constitute a severe risk to public health care, which lowers life expectancy and increases absence from work [10]. The age of the infected person and the

location of the infected urinary tract often affect the symptoms of UTIs, including fever, burning during urinating, LAP, itching, blister and ulcer formation [2].

Several factors such as gender, age, race, circumcision [11, 12], HIV [13-15], diabetes, urinary catheter, genitourinary tract abnormalities [16,17], pregnancy, infants, elderly [18,19] and hospitalization status [20] bear significant risk for recurrent UTI, like *E. coli* followed by *K. pneumoniae*, *Staphylococcus*, *Proteus*, *Pseudomonas*, *Enterococcus*, and *Enterobacter* [21-24]. About 150 million people suffer from UTIs each year globally [25].

Extended-spectrum beta-lactamase (ESBL) producing *E. coli* and *K. pneumoniae* causing CA-UTI has been increasingly reported from many parts of the world including India and are co-resistant to other non-beta-lactam antibiotics [8].

Moreover, the recent emergence of multidrug-resistant (MDR) UPEC isolates in the community have become a major challenge for the clinician to start the empirical therapy. Community-acquired UTI (CA-UTI) makes up a large proportion of infections attending out-patient departments (OPDs) of hospitals and a substantial amount of oral antibiotics are being prescribed for the treatment.

Women are more likely than men to have UTI, and between 40% and 50% of women will experience at least one clinical episode in their lives. Broad-spectrum antibiotics are frequently used to treat UTI, and treatment is initiated empirically without first doing a culture and sensitivity test. Antibiotic resistance in bacteria has grown globally as a result of this careless and inappropriate use of antibiotics, giving rise to multiresistant bacterial pathogen strains [26].

Hence, it is necessary to check the use of antibiotics that lead to the emergence of antimicrobial resistance and most appropriate antibiotics should be opted for first-choice empiric treatment of UTI. The antimicrobial susceptibility pattern among bacteria varies from country to country [27,28].

Therefore, the present study was undertaken to study the prevalence of urinary tract infection its bacteriological profile and the antibiogram of drug resistance pattern of the patients at a tertiary care centre in Bihar.

MATERIAL AND METHODS

This was a Cross sectional study carried out in the Department of Microbiology at New reliable path lab and Path Diagnostic Laboratory, Muzaffarpur, Bihar for a period of 24 months i.e, between April 2021 to April 2023. A total of 1000 freshly voided midstream urine samples from the people whose initial routine urine tests were positive for pus cells and albumin were collected in a sterile wide mouth container. Within an hour of being collected, all urine samples were processed for aerobic bacterial culture. If samples were delayed, they were refrigerated and processed in 4 to 6 hours.

Our study recruited people who appeared to be in good condition and were open to taking part. Patients with any other diseases and those who had not provided their consent for the trial were also excluded from it.

The study contained information on the demographic characteristics of the patients, including age, gender, tribe, place of residence, degree of education, and history of medical issues [29].

SAMPLE SIZE:

In a study by Devanand et al in 2013 prevalence of UTI was 53.82% [30].

Where, **P**=Prevalence

Q= 100-p

L= Allowable error

If the allowable error taken in our study be 5%

$$(n) = \frac{4PQ}{L^2}$$

$$SS (n) = \frac{4 \times 55.8 \times 46.2}{25}$$

$$\text{Sample Size } (n) = \frac{9942}{25} = 397$$

So, in order to cover-up the lost- to-follow-up, drop-out rate and non-response rate the sample size taken in our research study was 450.

Microscopic Study

One of the diagnosis criteria of UTI was based on microscopic findings of more than 10 pus cells/ high power field (40×) in urine were included in the study.

Collection and process of urine samples

Midstream urine samples were collected in a sterile container and processed within two hours of collection. Urine samples were also centrifuged, and the resulting sediment was examined under a microscope for red blood cells (RBCs), leukocytes, epithelial cells, casts, crystals, and parasites. In normal urine sediment, a few RBCs, pus cells (0-5/high power field), and epithelial cells may be present. The number of epithelial cells was reported as "few," "moderate," or "many" per low-power field.

Isolation and Identification of Uropathogens

Using a calibrated (1 L) loop, a urine sample was inoculated onto a standard culture media called Cystine-Lactose- Electrolyte-Deficient (CLED) agar.

For 18 hours, culture plates were incubated in an ambient air incubator at 35–37°C. The culture plates were examined for the presence of bacterial colonies after the allotted time was over. Using the colony count method, their growth was classified as significant or not. By growing isolated colonies on various media, such as MacConkeys agar and blood agar, they were further described based on cultural traits [31].

In cases where culture (growth) was unsuccessful, the plates were incubated at 37°C for an additional 24 and 48 hours. The identification, biochemicals, and AST pattern were completed in accordance with CLSI guidelines for 2022 [32]. All chemicals and reagents required for culture media were purchased from HiMedia Laboratories Pvt Ltd., Mumbai.

Urine culture using the calibrated loop/surface streak method.



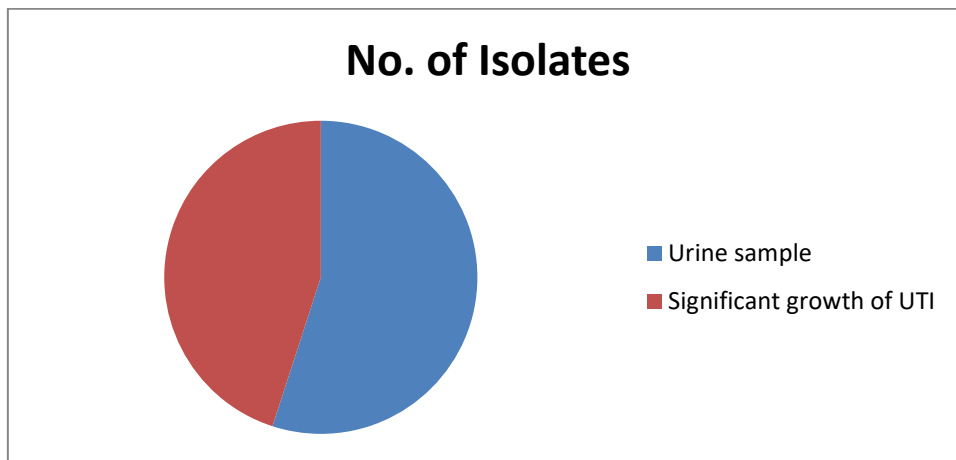
Figure 1: Biochemicals test for (a.) *S.aureus* ; (B.) *Klebsiella pneumonia* ; (c) *Pseudomonas aeruginosa*

RESULTS

Out of 1000 urine samples received in the Microbiology Laboratory 450 urine samples shows significant growth for UTI. Therefore, the prevalence rate of UTI was found to be 45%. The ratio of females 284 (63.1%) were more as compared to that of the males 166 (36.8%) [Table no. 2] .

S.No.	Type of Isolates	Total No. of samples (n=1000)	Percentage
1.	UTI	450	45%
2.	Other Isolates	550	55%

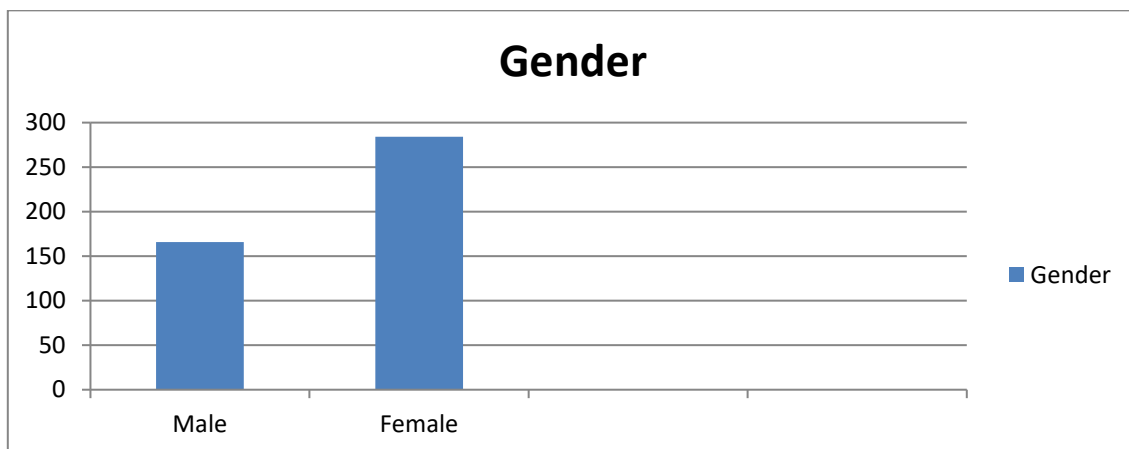
Table No. 1 : Samplewise distribution of the clinical isolates



Graph No. 1: Graphical Representation of Samplewise distribution of the clinical isolates

S.NO.	GENDER	TOTAL NO. OF ISOLATES (N=450)	PERCENTAGE
1.	Male	166	36.8%
2.	Female	284	63.1%

Table No. 2: Genderwise distribution of the Isolates



Graph No. 2: Graphical Representation of the Genderwise distribution

S.NO.	Age	No. of Isolates (n=450)	Percentage
1.	0-10	3	0.6%

2.	11-20	12	2.6%	
3.	21-30	118	26.2 %	
4.	31-40	202	44.8%	
5.	41-50	61	13.5%	
6.	51-60	25	5.5%	
7.	61-70	16	3.5%	
8.	≤ 71	13	2.8 %	

Table No. 3: Agewise distribution of the Isolates

From the present study it was also noted that the age group of 31-40 (44.8%) years of age followed by 21-30 (26.2%) was affected the most. In the age group of 0-10 years and above 71 years was the least affected with the infection.

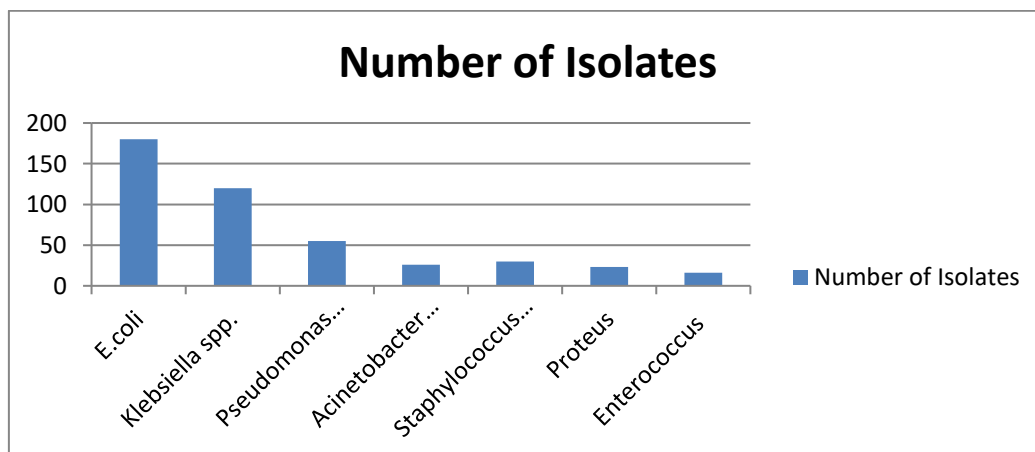
S.No.	Residence	No. of Patients (n=450)	Percentage
1	Muzaffarpur	280	62.2%
2	Other then Muzaffapur	170	37.7%

Table No. 4: Geographical Distribution of the infection.

To study the different Phenotypic Tests For the detection and Identification of: identified by studying colony characteristics, production of pyocyanin pigments, grapelike odour, growth at 42°C, motility test, Gram staining, and biochemicals was performed according to the CLSI guidelines [31].

Type	No. of Isolates	Percentage
<i>E.coli</i>	180	40%
<i>Klebsiella spp.</i>	120	26.6%
<i>Pseudomonas aeruginosa</i>	55	12.2%
<i>Acinetobacter baumannii</i>	26	5.6%
<i>Staphylococcus aureus</i>	30	6.6%
<i>Proteus</i>	23	5.1%
<i>Enterococcus</i>	16	3.5%
Total	450	

Table 5 : Types and Number of isolation of patients studied



Graph No. 3: Graphical Representation of the Types and Number of isolation of patients studied

From the Table No. 5 it was observed that the maximum number of isolates were from the *E.coli* 180 (40%) followed by *Klebsiella pneumonia* 120 (26.6%), *Pseudomonas aeruginosa* 55 (12.2%), *Acinetobacter baumannii* 26 (5.6%) , and *Staphylococcus aureus* 30 (6.6%) for gram positive followed by *Proteus* 23 (5.1%) least for *Enterococcus* with 3.5%.

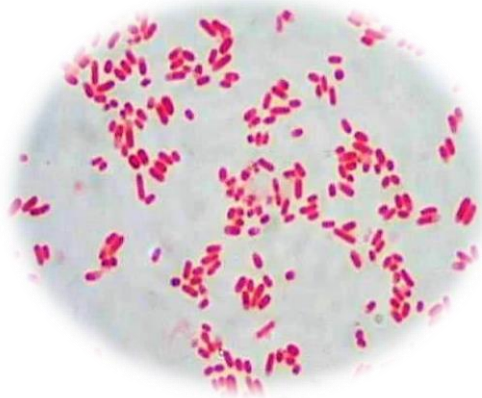


Figure No.2: Microscopic examination of *E.coli*

Days of catheterization	Gender		Total
	Female	Male	
1-3	15 (5.2%)	5 (3.0%)	20(4.4%)
4-7	170 (59.8%)	82(49.3%)	252 (56%)
8-12	96(33.8%)	75 (45.1%)	171 (38)
13-14	3 (1%)	4 (2.4%)	7(1.5%)
Total	284(100%)	166(100%)	450(100%)

Table No. 6 : Days of catheterization- Frequency distribution of patients studied

The days of catheterization were observed to be the maximum in 4-7 followed by 8-12 days [Table No. 6].

Variables	Gender		Total
	Female	Male	
DIABETICS			
• No	240 (84.5%)	136 (81.9%)	376(83.5%)
• Yes	44 (15.4%)	30 (18%)	74 (16.4%)
HYPERTENSION			
• No	215(75.7%)	100 (60.2%)	315(70%)
• Yes	69(24.2%)	66 (39.7%)	135(30%)
KIDNEY DISEASE			
• No	220 (77.4%)	128 (77.1%)	348(77.3%)
• Yes	64 (22.5%)	38(32.7%)	102(22.6%)
Total	284(100%)	166(100%)	450 (100%)

Chi-Square Test/Fisher Exact Test

Table No. 7: COMORBID CONDITIONS- Frequency distribution of patients studied

From the Table 7 it was clear that out of the total samples the comorbidity with diabetes was found to be low (16.4%). It was also observed that patients with hypertension and the kidney disease were observed to be low as compared to the healthy individuals.

Days since Fever	Gender		Total
	Female	Male	
1-3	114(40%)	69 (41.5%)	183(40.6%)
4-7	160(56.3%)	91(54.8%)	251(55.7%)
8-12	10(3.5%)	6(3.6%)	16 (3.5%)
Total	284 (100%)	166(100%)	450(100%)

Table No. 8: Days since Fever (DAYS)- Frequency distribution of patients studied

The maximum number of days with fever was observed to be maximum in 4-7 days, least for 1-3 days - and 8-12 days [Table No. 8].

Variables	Gender		Total
	Female	Male	
DYSURIA			
• No	54(19%)	29 (17.4%)	83 (18.4%)
• Yes	230 (80.9%)	137 (82.5%)	367 (81.5%)
ABDOMINAL PAINS			
• No	76 (26.7%)	45 (27.1%)	121 (26.8 %)
• Yes	208 (73.2%)	121 (26.8%)	329 (73.1%)
CHILLS			
• No	84 (29.5%)	32 (19.2%)	116 (25.7%)
• Yes	200 (70.4%)	134 (80.7%)	334 (74.2%)
Total	284(100%)	166(100%)	450(100%)

Table No. 9 :SIGNS AND SYMPTOMS

From the Table 9 it was observed that dysuria observed in female was 230 (80.9%) in male 137 (82.5%) , the abdominal pain in female 208 (73.2%) as compared to the male with 121 (26.8%) followed by the chills with the same ratio of female 200 (70.4%) and in male with 134 (80.7%).

The Identification of Drug Resistance Pattern : Antibiotic susceptibility testing was performed by Kirby bauer Disk diffusion method as per the CLSI guidelines [31].

Antibiotic susceptibility testing: The antibiotic disks (HiMedia) used were ampicillin (10 µg), piperacillin/tazobactam (100/10 µg), ceftriaxone (30 µg), cefotaxime (30 µg), ciprofloxacin (5 µg), norfloxacin (10 µg), amikacin (30 µg), gentamicin (10 µg), cotrimoxazole (1.25/23.75 µg), cefoperazone + sulbactam (75/30 µg), imipenem (10 µg), meropenem (MRP; 10 µg) and Nitrofuratoin(30 µg) . Antibiotic susceptibility will be determined by using standard Kirby–Bauer disk diffusion method in accordance with Clinical and Laboratory Standards Institute guidelines 2021 [31].

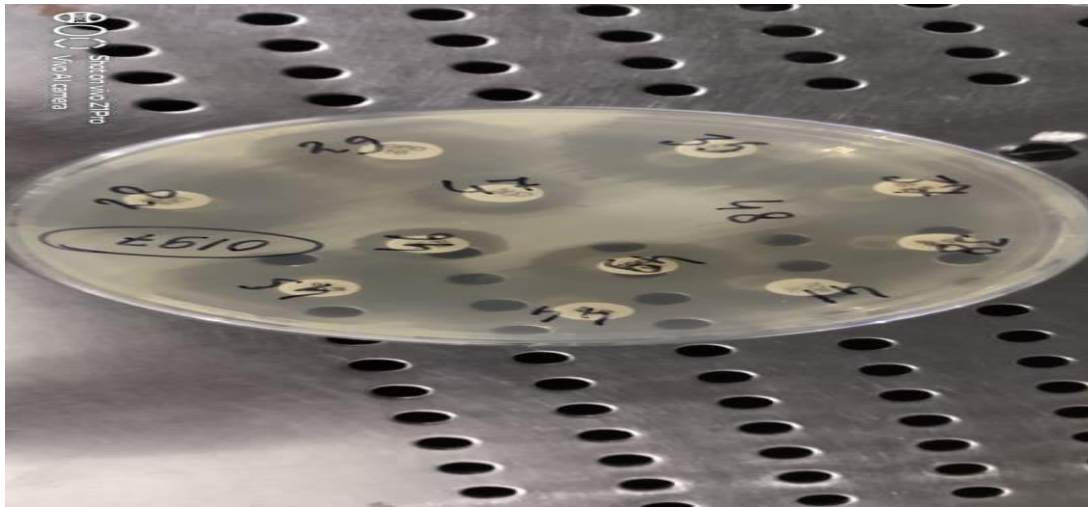


FIGURE 3: ZONE OF INHIBITION OF 18MM OBSERVED

Antibiotic	RESISTANCE N=450	SENSITIVITY N=450
AMP	401 (89.1%)	49 (10.8%)
PTZ	190 (42.2%)	260 (57.7%)
CTR	400 (88.8%)	50(11.1%)
CTX	400 (88.8%)	50(11.1%)
CIP	401(89.1%)	49 (10.8%)
NOR	395(87.7%)	55(12.2%)
AMK	110(24.4%)	340 (75.5%)
GEN	390 (86.6%)	60 (13.3%)
COT	395(87.7%)	49 (10.8%)
CFS	85 (18.8%)	365 (81.1%)
IMP	47 (10.4%)	403 (89.5%)
MERO	98(21.7%)	352(78.2%)
NIT	47 (10.4%)	403 (89.5%)
Total	450(100%)	450 (100%)

Table 10: Antibiotic resistance/Sensitivity pattern of patients studied

In the present study the resistant rate for Ampicillin was observed to be 88.8% followed by Co-trimoxazole and cefotaxime with 89.1%. Imipenem and Nitrofurantoin were sensitive with (89.5%). It was noted that the maximum number of isolates were from the gram negative isolates as compared to the gram positive isolates.



Figure No.4: AST plate for *E.coli*

against Antibiotics ; zones of growth inhibition for Meropenem referred > or = 14 (susceptible), 12-13 (intermediate) and < or = 11 (resistant) mm.

DISCUSSION

Urinary tract infection (UTI) is one of the most common infectious diseases worldwide. It is more prevalent among females with an incidence rate 50-fold higher among the 20–50 years age group. There are various clinical manifestations of UTI such as cystitis, pyelonephritis, asymptomatic bacteriuria, chronic and recurrent UTIs; of which cystitis is the most frequent presentation affecting the urinary bladder [1]

The bacteria that cause UTIs have more aggressive virulence characteristics compared to non-pathogenic bacteria, which improves their host cell adhesion, colonisation, and invasion capacities. Through the use of certain virulence factors, such as pili, capsules, lipopolysaccharides, and other cell surface features, these bacteria are able to avoid evading the host's immune system [3].

One of the most typical infections, particularly among women, is UTI. According to the National Ambulatory Medical Care Survey, UTI alone accounts for up to one million visits to hospital emergency rooms and roughly seven million outpatient department (OPD) visits, leading to approximately 100,000 inpatient stays [32].

In the present study the prevalence of UTI was found to be 45%. This finding was similar to the study performed by the other authors Ahmad S et al and Suhail A. et al., where the prevalence was found to be 20.54% and 32% respectively [33,34].

In the current study the maximum number of isolates were from the Females 284 (63.1%) as compared to that of the males 166 (36.8%). This study was similar to the study by Suhail A. et al, and Martin Odoki et al., in 2019 where the ratio of females was more as compared to the males [34,35].

Higher prevalence of UTI among females is due to various factors that predispose women to UTI [36].

From the present study it was also noted that the age group of 31-40 (44.8%) years of age followed by 21-30 (26.2%) was affected the most. In the age group of 0-10 years and above 71 years was the least affected with the infection. This study was parallel to the study performed by author [35].

It was noted that the maximum number of isolates were from the gram negative isolates as compared to the gram positive isolates. It was observed that the maximum number of isolates were from the *E.coli* 180 (40%) followed by *Klebsiella pneumonia* 120 (26.6%), *Pseudomonas aeruginosa* 55 (12.2%),

Acinetobacter baumannii 26 (5.6%) , and *Staphylococcus aureus* 30 (6.6%) for gram positive followed by *Proteus* 23 (5.1%) least for *Enterococcus* with 3.5%.

Similar study was performed by the other research workers where among 206 bacterial isolates obtained from 417 urine samples, majority of the isolates (99%) were Gram negative bacteria which included *Escherichia coli* (56.79%), *Klebsiella sps* (19.9%), *Pseudomonas sps* (6.3%), *Proteus sps* (5.8%), *Enterobacter sps* (3.8%), *Citrobacter sps* (1.4%), *Enterococcus sps* (0.9%), and other NFGNB (4.8%) [37].

This finding is similar to other reports which suggest that gram negative bacteria, particularly *E. coli* was the commonest pathogens isolated from patients with UTI [38,39,40]. The incidence of *E. coli* in our study was higher when compared with the Nigerian studies reporting 42.10% [41] and 51% [42]. Most of the studies conducted in Africa and Arab countries showed less than 50% isolation of *E coli* from the UTI patients but reported a higher percentage (29%) of *S aureus* as second most frequently isolated bacteria from UTI cases. Reports from other developing or developed countries were the isolation of Gram positive bacteria as uropathogen is very low <10% [43,44]. Similar study was also recorded by the other authors where the rate of *E.coli* was observed to be the maximum followed by *Klebsiella pneumonia* least for *Proteus vulgaris*, *Acinetobacter baumannii*, *Staphylococcus saprophyticus*.

In the present study it was found that antimicrobial resistance was seen both in Gram-positive and Gram-negative bacteria. Multiple resistances were high among the isolated urinary pathogens. Particularly, *E. coli* had a >50% resistance rate to at least five of 20 antimicrobial while *K. pneumoniae* and *P. mirabilis* had <50% and <30% resistance rates, respectively.

In the present study the resistant rate for Ampicillin was observed to be 88.8% followed by Cotrimoxazole and cefotaxime with 89.1%. Imipenem and Nitrofurantoin were sensitive with (89.5%). This resistance is most likely due to the massive use of third-generation cephalosporins and fluoroquinolone antibiotics in UTIs patients.

The high resistance in trimethoprim/sulfamethoxazole susceptibility pattern may be due to non-judicious use and over-the-counter selling of this antibiotic [34].

The antibiotic susceptibility of uropathogenic bacteria is known to change with time and is inconsistent in different regions [20]. Here, we have described the impact of the best antimicrobials with low resistance rate (overall resistance %) against the uropathogens in this study. The best antimicrobials for Gram-negative organisms was meropenem, amikacin , gentamicin , tobramycin , and cefepime and moderate resistance rate were ciprofloxacin , cefotaxime , ceftazidime , norfloxacin , ceftazidime , cefpodoxime , piperacillin/tazobactam , and cefuroxime. It was noteworthy that high resistance rate was found to be against cefuroxime , trimethoprim/sulfamethoxazole , nitrofurantoin (50.6%), amoxicillin/clavulanic acid piperacillin and ampicillin .

In contrast, the antimicrobial sensitivity pattern of antimicrobials for Gram-positive organisms linezolid , teicoplanin , vancomycin , cefalotin screen , moxifloxacin , nitrofurantoin , and levofloxacin ; however, the high resistance rate was found to be against erythromycin , trimethoprim/sulfamethoxazole , gentamicin , tobramycin , fosfomycin , clindamycin , oxacillin (tetracycline and benzylpenicillin (100%) resistance rate. Our finding was in support with study by the other authors [34, 36,44].

Table No. 11: The Comparison of days since fever distribution of the cases with the other studies

S.No.	Study	Place	Year	Results
1.	<u>Eshwarappa M etal.</u> , [45]	India	2011	The maximum number of days since fever was observed in 7-12 days.
2.	Wagenlehner FME., [46]	Germany	2020	The maximum number of days since were lasting >7 days.
3.	BM Lary., [47]	Florida	2022	The maximum number of days since fever was observed in 7-12 days.
4.	In the present study	Om Sterling Global University	2022	Maximum number since days since fever was 4-7 days.

In general, any urinary tract infection that fails to resolve on first-line therapy or in a high-risk patient population should be considered a complicated UTI. Complicated UTI symptoms including fever, chills, flank pain, sepsis from a urological source, cystitis symptoms lasting >7 days, known multiple antibiotic resistance, permanent Foley or suprapubic catheters, acute mental status changes (especially in the elderly) and high-risk patient populations (pregnancy, immunocompromised state, renal transplant, abnormal urinary function as in patients with neurogenic or dysfunctional bladders, immediate post-urological surgery, renal failure, pediatrics, etc.) [46].

In the present study dysuria was the most common in case of UTI with 82.5% being affected with it. There were other studies which were similar to the present study where the common signs and symptoms include fever, dysuria, rigors, lower back pain, suprapubic pain/tenderness [47]. Another study by Wasson M Bono and JM was also in supported to the present study where dysuria was most commonly observed [48,49].

It is essential to correctly identify the pathogen that is causing UTI in order to successfully treat the affected people. Failure to do so will not only cause the patient's illness to worsen and expose them to complications, but it will also encourage bacterial resistance because of the incorrect administration of antibiotics. Here, we've discussed how the top antibiotics with low overall resistance percentage (%R) affected the study's uropathogens. Additionally, community health education programmes should be run to lower disease prevalence and improve the quality of life for patients in low- and middle-income areas. Among the first-line empirical treatments that are frequently used to treat UTIs are ampicillin, gentamicin, and trimethoprim-sulfamethoxazole [50]. Empirical antibiotic treatment commences prior to the urine culture results in nearly all cases of UTIs. Antibiotic resistance among uropathogens is thus increased by the misuse of antibiotic treatment. To address the issue of antibiotic resistance, a number of studies emphasise the necessity of using antibiotics appropriately [51].

In the present study the resistant rate for Ampicillin was observed to be 88.8% followed by Co-trimoxazole and cefotaxime with 89.1%. Imipenem and Nitrofurantoin were sensitive with (89.5%). It was noted that the maximum number of isolates were from the gram negative isolates as compared to the gram positive isolates.

Study by Birkman N et al., [52] stated that *Escherichia coli* was found susceptible to Colistin (100%) followed by Nitrofurantoin (89%), Meropenem (84.6%), Imipenem (79.4%), Ciprofloxacin (66.66%),

whereas Ampicillin and Cefuroxime (74%) were the most resistant drugs followed by Cefepime (71%) and Norfloxacin (69%).

There was another study by Akter T., *et al.*, [53] where susceptibility of *Escherichia coli* was 89.19%, Azithromycin (89.19%), Ciprofloxacin (83.78%), which was higher than our findings and another study conducted by Bhuwan Khatri., *et al.* where found 52.4% susceptibility to Ciprofloxacin [54]. Study by Patel *et al.*, was also similar to the present study where Imipenem 91.69%, Meropenem 91.89%, Nitrofurantoin 72.33%, Piperacillin+Tazobactam 51.77% was observed in *E. coli* [55].

Antimicrobial sensitivity pattern of isolates showed that imipenem (60-100%) and nitrofurantoin (73.2%-88.2%) were the most sensitive antimicrobial agents among GNB. Other antimicrobials including ceftazidime, cefotaxime, cefepime, gentamicin, amikacin, levofloxacin and doxycycline showed moderate to low sensitivity. Ampicillin was found to be least sensitive [56].

The etiology of bacteria causing UTI as well as their susceptibility to antimicrobials continue to vary over time period and it is different among different countries.

Hospitalised, genitourinary tract anomalies, indwelling catheter, diabetic, female gender, and married individuals are recommended to get routine UTI screenings. Regular audits are the key to controlling UTI. Therefore, to tackle this resistance, proper infection control practises, antibiotic stewardship, and hygiene should be implemented.

CONCLUSION

Due to the high level of *E. coli* antibiotic resistance in this area, beta-lactam medications in the current study had limited effects for treating UTI in patients. Due to these linked factors, such as resistance which may result in incorrect antibiotic prescription, which may in turn choose for new resistance genes, the appropriate steps may assist to reduce the risk of infection of UTIs.

It should be highlighted that MDR is progressively becoming more prevalent throughout the world, which is concerning because it means that we are rapidly running out of treatment choices for straightforward bacterial diseases. There should be an effort made to educate practitioners about the significant likelihood of multidrug resistance. Second, managing patients with CAUTI is seriously threatened by the development of MDR that we saw in our study.

Declarations:

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors' contributions: Author equally contributed the work.

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