ORIGINAL ARTICLE

Incidence of Urinary Tract Infections with Bacterial Profile and Current Scenario of Antibiotic Susceptibility Pattern in the South India

G. Venkata Nagaraju[1], P. Saravana Kumar[2], S. Srivardhini[1], B. Krishna Kumari[1], Pinneboina Ruchitha Pavani[1]

[1]Department of Pharmacy Practice, Hindu College of Pharmacy, Guntur, Andhra Pradesh, India, [2]Department of Urology, Lalitha Super Specialty Hospital, Guntur, Andhra Pradesh, India

Abstract

Urinary tract infections (UTIs) are currently emerging as a common infectious disease globally. UTI was commonly seen in women than men and in older people than the young people. Uropathogens such as *Escherichia coli*, *Pseudomonas*, *Klebsiella*, *Citrobacter*, *Acinetobacter*, proteus, *Enterococcus,* and *Staphylococcus* are responsible for the UTI. All these uropathogens developed the resistance to the most of the antibiotics gradually leads to the multidrug resistant UTI. This study aims to determine the current antibiotic susceptibility pattern of uropathogens and prevalence in the south India. Out of 784 samples, 296 samples showed significant growth of the bacteria. This study reveals that the prevalence rate is 37.56%. In samples with significant growth, the male with UTI is 48.90% and the female with UTI is 51.02% ($P = 0.007$). This study shows that major infections are caused by Gram-negative bacteria 88.51% than the Gram-positive bacteria 11.49%. The antibiotic susceptibility pattern ensures that imipenem has the highest sensitivity rate in all uropathogens among all the other antibiotics while penicillin shows the great resistance in all the organisms compared with other antibiotics. The other antibiotics such as linezolid, vancomycin, amikacin, tetracycline, and meropenem are recommended for the treatment. The prevention of development of multidrug resistant organisms by giving the correct treatment and following the hygienic conditions is the best way to prevent the UTI.

Key words: Antibiotic susceptibility pattern, Gram-negative, Gram-positive, incidence, multidrug resistance, urinary tract infections, uropathogens

INTRODUCTION

The most prevalent and serious infectious disease is urinary tract infection (UTI), which requires empirical treatment to decrease the development of multi drug resistance in uropathogens. Any component of the kidneys, bladder, urethra, or urinary system can become infected, resulting in a UTI. Over the world, 150 million people are suffering with UTI every year.[1] Even though both male and female are suffering with UTI, the incidence of UTI in female is 50–60%, while in men is 10–20%, in their life time.[2] The shorter urethra, lack of prostatic secretions, pregnancy, and ease of fecal flora contamination of the tract are the causes of the increased incidence of UTI in females.[3] In pregnant women and post-menopausal women, the changes in the anatomical features of vaginal flora and PH promote the leading growth of bacteria. UTI is defined as the inflammation of urinary tract caused by the colonization of the harmful bacteria.[4] UTI is caused by *Escherichia coli*, *Pseudomonas*, *Streptococcus*, and Proteus. It is classified into both complicated and uncomplicated UTI based on the type and place of the infection. The symptoms of uncomplicated UTI last up to 1 week while the complicated UTI last up to several months. General symptoms include dysuria, flank pain, lower abdominal pain, vomiting, increased frequency,

Address for correspondence:
G. Venkata Nagaraju, Department of Pharmacy Practice, Hindu College of Pharmacy,
Guntur, Andhra Pradesh, India.
E-mail: drnagaraju.gv@gmail.com

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urgency, hesitancy, hematuria, burning micturition, fever with chills, foul smell of urine, nocturia, and kidney damage.[4]

Systematic review and meta-analysis studies show that Gram-negative bacteria cause 90% of urinary tract infections (UTIs), while only 10% of UTIs are caused by Gram-positive bacteria.[5] The early diagnosis UTI will help to know the susceptible antibiotics for that particular pathogen thereby one can treat the patients effectively which reduce the multi-drug resistance.[6] At present, the increasing multi-drug resistance requires further research to propose the empirical treatment for the UTI. This study aims to access the incidence of UTIs with bacterial profile and current scenario of antibiotic susceptibility pattern in correlation with age and gender. At present, therapeutically changing anti-microbial resistance pattern and multi-drug resistance bacteria makes difficult to treat and results in increasing the morbidity and mortality.[7]

Previously, the UTIs treated with the broad-spectrum antibiotics but the increasing multi-drug resistance organisms requires the specific antibiotics for the treatment which will be resolved by testing the urine samples of the each patient. The microbiological culture sensitivity report will determine the organisms causing the UTI and also whether it is resistance or sensitive to the particular antibiotic. The antibiotic susceptibility pattern shows a way to treat that the patients by avoiding misuse are overuse of the antibiotics. The antibiotic susceptibility pattern will be based on the geographical area, uropathogens, gender, age, and other comorbidities.

We decided to carry out this investigation since we had no idea what kind of bacteria was causing UTIs in Guntur, Andhra Pradesh, India, which is in the country's east. Since the antibiogram of microorganisms is constantly changing due to the widespread use of antibiotics, resistant germs have emerged. For this reason, the present study was conducted to analyze the recent antibiotic sensitivity pattern of uropathogens in UTIs.[1,8] The ability of micro-organisms to resist the drug which would normally kill them or inhibit the growth is called as anti-microbial resistance. The increased population of resistant microorganisms is due to using the antimicrobial therapy against the small fraction of naturally resistant bacteria to the susceptible bacteria which giving the chance to increase the resistant organisms by exerting pressure on the susceptible organisms.[8,9-35]

MATERIALS AND METHODS

This investigation was carried out from September 1, 2023, to February 29, 2024, in the microbiology laboratory of the Lalitha super specialty hospital in Guntur. Both hospital inpatients and outpatients (those without catheterization) have urine samples taken. The free Epi online sample size calculator was used to determine the sample size. The urine samples of 784 patients comprised 404 males and 380 females and in the results of microbial culture sensitivity test 145 male patients and 151 female patients showed significant growth of bacteria. The age of the patients included in the study is above 12 years age who are clinically diagnosed with UTI. Pregnant and psychiatry patients were excluded Figure 1. The hospital's microbiology department collected each patient's clean catch midstream urine. The collected sample was incubated overnight after streaking on urochrome and the antibiotic susceptibility pattern testing was conducted. If there were more than 10^5 colony-forming units per milliliter, the sample was deemed positive for UTI.

The standard antibiotic disks used to test the isolates are penicillin (PNC), piperacillin+Tazobactum (PPT), cefoxitin (CFX), cefuroxime (CFR), cefepime, imipenem (IMP), meropenem (MRP), ertapenem (ERP), vancomycin (VNM), high level gentamicin, amikacin (AMK), tetracycline (TTC), azithromycin (AZT), linezolid (LNZ), ciprofloxacin (CIP), cotrimoxazole (COT), amoxyclav (AMX), cefoperazone+Sulbactum (CFS), nitrofurantoin (NTF), ampicillin (AMP), and clindamycin (CLD). The students paired *t*-test, odds ratio (OR), confidence interval (CI), and Chi-square (X2) test were used to analyze the data. The X^2 test was used to compare the male and female patients and determine whether there were any notable differences between the isolated uropathogens. The paired *t*-test was employed to evaluate the differences between uropathogen resistance and sensitivity. For all tests with a 95% CI, $P < 0.05$ was deemed statistically significant. Microsoft Excel and the Statistical Package for the Social Sciences program were used to conduct all statistical tests.

RESULTS

The incidence of UTI in this study was found to be 37.55% in both male and female. Out of 784 samples, 296 samples showed the significant bacterial growth in which males are 48.98% and females are 51.02%. The incidence rate shows that UTI in females are slightly higher than the males. The results of the samples show that 145 members of males showed the significant bacterial growth while 404 male samples are clinically diagnosed with UTI. In females, 151 samples showed significant growth while 380 females are clinically diagnosed with UTI. In male patients, 35.89% showed the significant growth, and in female patients, 39.74% showed the significant growth. The OR, relative risk, and Chi-square value are calculated and *P*-value showed no significant variation between male and female patients. The obtained results are shown in Table 1.

The uropathogens are distributed as Gram-negative organisms and Gram-positive organisms in 296 samples. Out of 296 samples, 88.51% of the isolated uropathogens were Gram-negative, while 11.49% were Gram-positive. The bacterial profile showed that *E. coli* was the most dominant bacteria among all the other uropathogens. The incidence

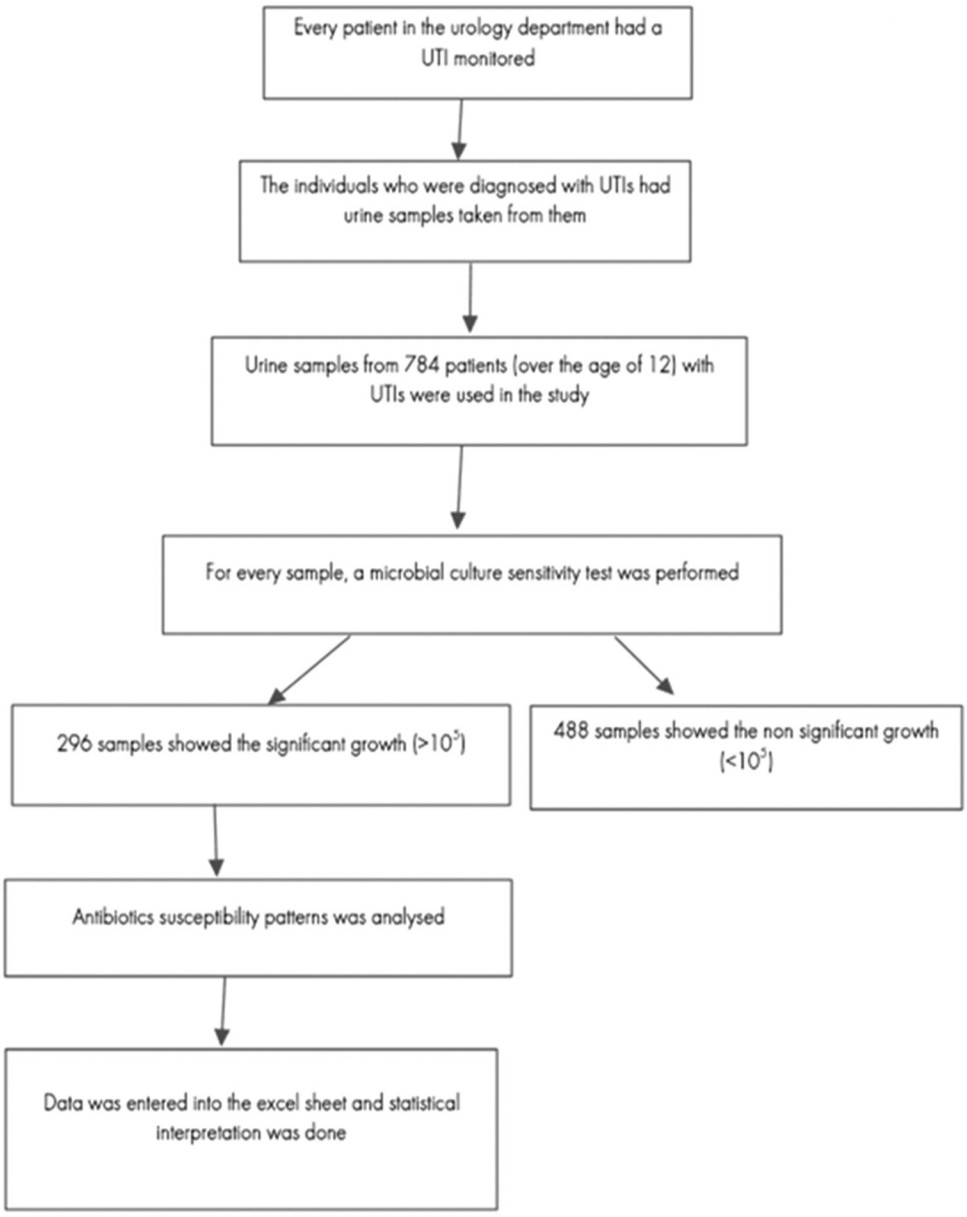

Figure 1: Flow chart of the study procedure from the enrollment to data interpretation

Table 1: Distribution of growth pattern

Gender	Tested	Urine samples				Odds ratio			Relative risk			Pearson Chi-square value	*P*-value
		No significant difference (<10⁵)		Significant difference (>10⁵)		95% confidence interval			95% confidence interval				
		n	%	*n*	%	Value	Lower	Upper	Value	Lower	Upper		
Male	404	259	64.108	145	35.891	0.849	0.635	1.133	0.903	0.754	1.081	1.232	0.266
Female	380	229	60.263	151	39.736								
Total	784	488	62.244	296	37.755								

of the *E. coli* (45.94%), *Klebsiella* (22.29%), *Pseudomonas* (8.44%), *Acinetobacter* (6.75%), *Citrobacter* (3.04%), proteus (2.03%), *Enterococcus* (5.74%) CONS (4.39%), and *Staphylococcus* (1.35%). The highest susceptible age group of patients to UTI was 55–66 years (26.68%), followed by 45–55 years (20.94%), 67–77 years (15.54%), 23–33 years (13.51%), 34–44 years (12.5%), >77 years (5.74%), and 12–22 years (5.06%). Even though 55–66 years, age group

was highest susceptible for the UTI. The uropathogens such as *Acinetobacter*, *Citrobacter*, and CONS infections were observed more in the age group of 45–55 years, while the other uropathogens infections were observed more in the age group of 56–66 years. The Chi-square test should statistically significant variation P (< 0.05) at 95% level of CI for the Gram-positive and Gram-negative male and female patient variables among all age groups.

Out of 262 Gram-negative bacteria, 121 (46.18%) were isolated from males and 141 (53.82%) were isolated from female patients. Only 24 (17.58%) Gram-positive bacteria isolated from male and 10 (29.42%) were isolated from female. For the male and female patients, the Chi-square test values were $X^2 = 7.1727$; degree of freedom = 1, $P = 0.007$ with 95% CI level. The female are more susceptible than the males to the entire uropathogens Table 2.

The *E. coli* susceptibility was 0.0% in male and 1.47% in female in the age group of 12–22 years, 2.20% in male and 8.08% in female in the age group of 23–33 years, 3.67% in male and 11.02% in female in the age group of 34–44 years, 7.35% in male and 17.64% in female in the age group of 45–55 years 12.5% in male and 13.23% in female in the age group of 56–66 years, 11.76% in male and 4.41% in female in the age group of 67–77 years, and 4.41% in male and 2.20% in female in the age group of >77 years; *Klebsiella* susceptibility was 0.0% in male and 9.09% in female in the age group of 12–22 years, 1.51% in male and 10.60% in female in the age group of 23–33 years, 3.03% in male and 6.06% in female in the age group of 34–44 years, 3.03% in male and 7.57% in female in the age group of 45–55 years, 22.72% in male and 12.12% in female in the age group of 56–66 years, 12.12% in male and 6.06% in female in the age group of 67–77 years, and 4.54% in male and 3.03% in female in the age group of >77 years; *Pseudomonas* susceptibility was found to be 0.0% in both male and female in the age group of 12–22 years, 0.0% in male and 4% in female in the age group of 23–33 years, 8% in male and 12% in female in the age group of 34–44 years, 12% in male and 4% in female in the age group of 44–55 years, 20% in male and 4% in female in the age group of 56–66 years 16% in male and 8% in female in the age group of 67–77 years, and 8% in male and 4% in female in the age group of >77 years Table 2.

Table 2: Distribution of uropathogens

Pathogens	Male	Female	X^2 value	*P*-value
Escherichia Coli	41.99	58.08	7.173	0.007
Klebsiella	45.45	54.55		
Pseudomonas	64	36		
Acinetobacter	55	45		
Citrobacter	55.55	44.44		
Proteus	33.33	66.66		
Gram-negative	40.87	47.63		
Enterococcus	82.35	17.64		
CONS	53.84	46.15		
Staphylococcus	75	25		
Gram-positive	8.10	3.37		
Total	48.98	51.01		

Acinetobacter susceptibility was found to be 10% in male and 5% in female in the age group of 12–22 years, 0.0% in male and 25% in female in the age group of 23–33 years, 5% in male and 0.0% in female in the age group of 34–44 years, 15% in male and 10% in female in the age group of 45–55 years, 5% in male and 5% in female in the age group of 56–66 years, 15% in male and 0.0% in female in the age group of 67–77 years, and 5% in male and 0.0% in female the age group of >77 years; *Citrobacter* susceptibility was found to be 11.11% in male and 0.0% in female in the age group of 12–22 years, 0.0% in male and 22.22% in female in the age group of 23–33 years, 0.0% in both male and female in the age group of 34–44 years, 22.22% in male and 11.1% in females in the age group of 45–55 years, 0.0% in male and 11.11% in female in the age group of 56–66 years, 22.2–22% in male and 0.0% in female in the age group of 67–77 years,

Table 3: Distribution of uropathogens in relation to age and gender of patients

Pathogens	12–22		23–33		34–44		45–55		56–66		67–77		>77	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Escherichia coli	0	1.47	2.20	8.08	3.67	11.02	7.35	17.64	12.5	13.23	11.76	4.41	4.41	2.20
Klebsiella	0	9.09	1.51	10.60	3.03	6.06	3.03	7.57	22.72	12.12	12.12	6.06	4.54	3.03
Pseudomonas	0	0	0	4	8	12	12	04	20	04	16	08	08	04
Acinetobacter	10	05	0	25	05	0	15	10	05	05	15	0	05	0
Citrobacter	11.11	0	0	22.22	0	0	22.22	11.11	0	11.11	22.22	0	0	0
Proteus	16.66	0	0	16.66	0	0	0	16.66	0	16.66	16.66	16.66	0	0
Enterococcus	5.88	0	5.88	11.76	5.88	5.88	29.41	0	35.29	0	0	0	0	0
CONS	0	7.69	15.38	15.38	15.38	0	0	23.07	15.38	0	7.69	0	0	0
Staphylococcus	0	0	25	25	25	0	0	0	25	0	0	0	0	0
Total	1.68	3.37	2.70	10.81	4.72	7.77	8.44	12.5	12.5	9.45	11.82	4.39	4.05	2.02

Table 4: Antibiotic susceptibility pattern of Gram-negative bacteria

Antibiotics	*Escherichia coli*		*Klebsiella*		*Pseudomonas*		*Acinetobacter*		*Citrobacter*		Proteus	
	R%	S%	R%	S%	R%	S%	R%	S%	R%	S%	R%	S%
Penicillin	98.86	1.13	100	0	100	0	100	0	100	0	100	0
Piperacillin+ Tazobactum	48.46	51.53	36.92	63.07	21.05	78.94	25	75	37.5	62.5	66.66	33.33
Cefoxitin	92.30	7.69	84.48	15.51	100	0	93.33	6.66	75	25	83.33	16.66
Cefuroxime	93.96	6.03	84.74	15.25	100	0	70.58	29.41	83.33	16.66	100	0
Cefixime	77.09	22.90	64.06	35.93	66.66	33.33	55.55	44.44	66.66	33.33	33.33	66.66
Imipenem	3.84	96.15	3.70	96.29	11.11	88.88	16.66	83.33	0	100	0	100
Meropenem	28.35	79.65	34.84	65.15	56.52	43.47	50	50	22.22	77.77	40	60
Ertapenem	46.93	53.06	60.71	39.28	75	25	92.30	7.69	25	75	40	60
Amikacin	15.38	84.61	18.96	81.03	16	84	33.33	66.66	11.11	88.88	50	50
Azithromycin	34.58	65.41	27.69	72.30	62.5	37.5	30	70	22.22	77.77	50	50
Ciprofloxacin	65.67	34.32	51.56	48.43	28	72	40	60	33.33	66.66	16.66	83.33
Cotrimoxazole	41.77	58.22	39.02	64.06	57.14	42.85	41.66	58.33	14.28	85.71	60	40
Amoxiclav	75	25	66.66	33.33	50	50	75	25	25	75	0	100
Cefoperazole+ Sulbactum	51.85	48.14	49.23	50.76	25	75	25	75	22.22	77.77	60	40
Nitrofurantoin	33.08	66.91	56.06	43.93	96	4	68.42	31.75	33.33	66.66	16.66	83.33
Ampicillin	100	0	90.47	9.52	100	0	100	0	100	80	80	20

Table 5: Antibiotic susceptibility pattern of Gram-positive bacteria

Antibiotics	*Enterococcus*		CONS		*Staphylococcus*	
	R%	S%	R%	S%	R%	S%
Penicillin	100	0	50	50	100	0
Cefoxitin	100	0	88.88	11.11	33.33	66.66
Vancomycin	11.76	88.23	8.33	92.30	25	75
High level gentamycin	43.75	56.25	33.33	66.66	0	100
Tetracycline	40	60	8.33	92.30	25	75
Linezolid	18.75	81.25	8.33	92.30	0	100
Clindamycin	83.33	16.66	37.5	62.5	33.33	66.66
Cotrimoxazole	14.28	85.71	44.44	55.55	0	100
Ampicillin	100	0	100	0	100	0

and 0.0% in both male and female and the age group of >77 years; proteus susceptibility was found to be 16.66% in male and 0.0% in female in the age group of 12–22 years, 0.0 person in male and 16.66% in female in the age group of 23–33 years 0.0% in both male and female in the age group of 34–44 years, 0.0 person in male 16.66% in female in the age group of 45–55 years and 56–66 years, 16.66% in both male and female in the age group of 67–77 years, and 0.0% in both male and female in the age group of >77 years; *Enterococcus* susceptibility was found to be 5.88% in male and 0.0% in female in the age group of 12–22 years, 5.88% in male and 11.76% in female in the age group of 23–33 years 5.88% in both male and female in the age group of 34–44 years, 29.41% in male and 0.0% in female in the age group of 45–55 years, 35.29% in male and 0.0% in female in the age group of 56–66 years, and 0% in 67–77 and >77 years; CONS susceptibility was found to be 0.0% in male and 7.69% in female in the age group of 12–22 years, 15.38% in both male and female in the age group of 23–33 years, 15.38% in male and 0.0% in female in the age group of 34–44 years and 0.0% in male and 23.07% in female in the age group of 45–55 years, 15.38% in male and 0.0% in female in the age group of 56–66 years, 7.69% in male and 0.0% in female in the age group of 67–77 years, and 0.0% in both male and female in the age group of >77 years; *Staphylococcus* susceptibility was found to be 0.0% in 12–22, 45–55, 67–77 and >77 years, 25% in 23-33 years, and 25% in male and 0.0% in female in 34–44 years and 56–66 years.

The results of distribution of Gram-negative and Gram-positive organisms in relation to age and gender of patients reveal that the incidence of Gram-negative bacteria was higher in female then male whereas the incidence of Gram-positive bacteria was higher in male compared with the female. Likewise, the overall susceptibility in different age groups of male and female was found to be 1.68% in male and 3.37% in females in the age group of 12–22 years, 2.7% in male and 10.81% in female in the age group of 23–33 years, 4.72% in male and 7.77% in female in the age group of 34–44 years, 8.44% in male and 1.25% in female in the age group of 45–55 years, 12.5% in male and 9.45% in female in the age group of 56–66 years, 11.82% in male and 4.39% in female in the age group of 67–77 years, and 4.05% in male and 2.02% in female in the age group of >77 years.

The tested uropathogens for antibiotic susceptibility pattern results showed the resistance and susceptibility of the antibiotics. In the tested antibiotics, PNC showed the highest resistance 97.88% in in all uropathogens followed by AMP 97.24%, CFR 90.35%, and CFX 89.53% and the most sensitive drug against all the uropathogens was IMP 95.02%, LNZ 87.87%, VNM 85.71%, and AMK 81.37%. The paired *t*-test results showed that there is non-significant very small difference between sensitive and resistance variables (P − 0.733, T − 0.346, degree of freedom −20) Table 3.

In *E. coli,* the antibiotics which shown the highest resistance are AMP (100%), PNC (98.86%), CFR (93.96%), and CFX (92.30%) and the most sensitivity shown by IMP (96.15%), AMK (84.61%), and MRP (71.64%); in *Klebsiella,* the antibiotics which shown the highest resistance are PNC (100%), AMP (90.47%), CFR (84.74%), and CFX (84.48%) and the most sensitivity shown by IMP (96.29%), AMK (81.03%), and AZT (72.30%); in *Pseudomonas,* the antibiotics which shown the highest resistance are PNC (100%), CFX (100%), CFR (100%), and AMP (100%) and the most sensitivity shown by IMP (88.88%), AMK (84%), and PPT (78.94%); in *Acinetobacter,* the antibiotics which shown the highest resistance are PNC (100%), AMP (100%), CFX (93.33%), and ERP (92.30%) and the most sensitivity shown by IMP (83.33%), CFS (75%), and PPT (75%) Table 4.

Citrobacter the antibiotics which shown the highest resistance are PNC (100%), AMP (100%), CFR (83.33%), and CFX (75%) and the most sensitivity shown by IMP (100%), AMK (88.88%), and COT (85.71%); in proteus, the antibiotics which shown the highest resistance are PNC (100%), CFR (100%), CFX (83.33%), and AMP (80%) and the most sensitivity shown by IMP (100%), AMX (100%), CIP (83.33%), and NTF (83.33%); in *Enterococcus,* the antibiotics which shown the highest resistance are PNC (100%), CFX (100%), AMP (100%), and CLD (83.33%) and the most sensitivity shown by VNM (88.23%), COT (85.71%), and LNZ (81.25%); in CONS, the antibiotics which shown the highest resistance are AMP (100%), and CFX (88.88%) and the most sensitivity shown by VNM (88.23%), TTC (92.30%), and LNZ (92.30%); In *Staphylococcus,* the antibiotics which shown the highest resistance are PNC (100%) and AMP (100%) and the most sensitivity shown by VNM (100%), LNZ (100%), and COT (100%) Table 5.

The results of paired *t*-test showed that there was no statistical significance between *E. coli* resistant versus sensitive variables (P=0.655), *Klebsiella* resistant versus sensitive variables (P = 0.791), *Pseudomonas* resistant versus sensitive variables (P = 0.331), *Acinetobacter* resistance versus sensitive variables (P = 0.619), *Citrobacter* resistance versus sensitive variables (P = 0.119), proteus resistance versus sensitive variables (P = 0.868), *Enterococcus* resistant versus sensitive variables (P = 0.314), and *Staphylococcus* resistant versus sensitive variable (P = 0.169).

DISCUSSION

The data of this study can be used compare resistance and sensitivity of the antibiotics among the uropathogens which helps in providing the empirical treatment. Multidrug resistance in the people was increasing liberally due to the improper usage of the antibiotics. The incidence of UTI in this study was found to be 37.55% and this rate of incidence was comparatively same in the others study which accounts for 33.54%, 36, 38.6% in India. In this study the incidence of uti in females (51.02%) then males(48.98%) where the incidence of uti in females is slightly higher than males, while others studies has higher incidence in females compare to males. Soni et. al, reported the incidence of UTI in female (46.32%) and in male (45.29%).[16]

The shorter urethra in females and its proximity to the rectum facilitate the entry of germs into the urinary tract, leading to a higher prevalence of UTIs, incontinence, and poor hygienic conditions during sexual activity.[23] Males with advanced prostate disease were shown to have a greater incidence of UTI.[18] In this study, the age group of 55–66 years old had the highest incidence of UTI (26.68%), followed by 45–55 years old (20.94%). The study results showed that 88.51% of UTI caused by Gram-negative bacteria while 11.49% of UTI was caused by Gram-positive bacteria. The most of the UTI was caused by *E. coli* (45.94%) followed by *Klebsiella* (22.29%).

The antimicrobial agents which show the highest susceptibility was imipenem (95.02%), LNZ (87.87%), VNM (85.71%), and amikacin (81.37%), whereas the highest resistance was observed in penicillin (97.88%), AMP (97.24%), CFR (90.35%), and cefuroxime (89.53%). Study by Almutawif *et al*. has reported highest susceptibility by gentamicin (92.37%), imipenem (90.2%), and less sensitivity was shown by cefotaxime. Pritam study was reported highest susceptibility by MRP (80.31%), gentamicin (59.58%), NTF (52.91%), and cotrimoxazole (49.49%) and the highest resistance shown by fluoroquinolones (29.79%), amoxicillin (14.20%), and third generation of cephalosporins (29.79%).[11,17]

In the present study, the susceptibility of the uropathogens to the tested antibiotics reveals that *E. coli* showed (53.33%) resistance, *Klebsiella* (51.72%), *Pseudomonas* (58.70%), *Acinetobacter* (53.28%), *Citrobacter* (39.65%), proteus (51.28%), *Enterococcus* (47.57%), CONS (35.80%), and *Staphylococcus* (33.33%). The higher resistance to the antibiotics was shown by *Pseudomonas* 58.70%. In the present study, the antibiotic susceptibility pattern reveals that the overall resistance of Gram-negative bacteria was slightly higher, whereas the sensitivity of the Gram-positive bacteria was higher than the resistance.

Contrary to the UK, USA, Australia, and South Africa, India has a greater rate of antibiotic resistance, despite studies in this field showing comparable levels of sensitivity and resistance to antibiotics. Antibiotic overuse and misuse, self-medication, treatment plan noncompliance, lack of patient counseling, use of antibiotics without a prescription, lack of awareness, poor prescribing practices, inadequate access to health care services, and widespread antibiotic use are some of the factors contributing to this higher rate of resistance in India.[10,24]

Antibiotic usage and patient outcomes can be improved by tailoring antibiotic therapy guidelines based on local antimicrobial susceptibility, which can be achieved through the research of antibiotic susceptibility patterns in various regions. This study's main drawback is that, because direct laboratory data were used, risk factors for drug resistance and complicated UTIs, such as diabetes, compromised immunity, cancer chemotherapy, HIV, recent antibiotic use, incomplete treatment of previous UTIs, urinary tract malformations, and pregnancy, were not taken into consideration.[16,33-35]

CONCLUSION

This is the first study conducted in the Guntur city of the Andhra Pradesh to know the incidence of the UTI and the antibiotic susceptibility pattern which helps to understand the local antimicrobial resistance and also to provide the empirical treatment. This study concludes that the incidence of the UTI was same as in other studies whereas the incidence of female and male was almost same. This study helps to monitor and compare the bacterial profile and current scenario of antibiotics susceptibility pattern in correlation to age and gender.

ETHICAL CONSIDERATIONS

Not required.

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