ORIGINAL ARTICLE

Drug Sensitivity Pattern among Patients With Urinary Tract Infection: Cross Sectional Study

SUMERA KAZMI[1], AMINA NOOR[1], NASMA NOOR[2], SULTAN ZEB KHAN[3], MIR JALAL-UD-DIN[4], UZMA QAYYUM[5], TALHA LAIQUE[6]
[1]Department of Medicine, Abbottabad International Medical Institute, Abbottabad -Pakistan.
[2]Department of Dermatology, PGMI, Peshawar -Pakistan.
[3]Department of Gastroenterology, Abbottabad International Medical College, Abbottabad -Pakistan.
[4]Department of Medicine, Women Medical College, Abbottabad –Pakistan
[5]Department of Medicine, Military Hospital, Rawalpindi –Pakistan
[6]Department of Pharmacology, Allama Iqbal Medical College, Lahore-Pakistan
Correspondence to Dr. Talha Laique, Email: talhalaique51@gmail.com Tel:+92-331-0346682

ABSTRACT

Background: Urinary tract Infection (UTI) is the most common infection suffered by majority of the population. Most cases are treated empirically by various antimicrobial agents without running any urine culture and sensitivity, resulting in resistance to given treatment. Purpose:
Aim: To determine the antibiotic resistance pattern prevailing in our setups in order to avoid unnecessary prescription of antibiotics.
Methodology: Samples of 225 UTI patients were studied. This study was carried from January to July 2020 in the Department of Medicine, Abbottabad International Medical Institute, Abbottabad after the hospital's ethical committee approval. The data was analyzed by using SPSS 25.
Results: Escherichia coli (76%) and Klebsiella pneumoniae (11.1%) were the most common pathological organisms found. The most sensitive antibiotics for all organisms were Nitrofurantoin (96.9%) and Amikacin (86.7%).
Conclusion: We concluded that regular culture and sensitivity should be made a routine as to gather the correct information regarding susceptibility pattern in order to reduce drug resistance in our setups.
Keywords: Urinary tract infection, Antibiotic susceptibility pattern, Drug resistance and Pathological organisms.

INTRODUCTION

Urinary tract infection (UTI) is a common clinical ailment seen in general and gynecological practices[1]. This infection is suffered by majority of the females in our population[2]. Almost 50% of the adult women have an episode of UTI once in their life. Its incidence among women increases by 5% per decade. Females experience it more during pregnancy by about 7%[3].
Literature review shows that UTI is the most common microbial infection globally that infect almost 150 million people each year.[4] Females are the major sufferers than males due to number of reasons.[5,6] Factors causing UTI among females include poor genital hygiene, small urethra, vaginal discharges, use of contraceptive devices as well as unprotected intercourse.[4] UTIs are mainly of two types i.e community acquired or nosocomial. Most common pathological organisms involved in community acquired infection include *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Staphylococcus saprophyticus* or *Enterococcus faecalis* whereas the hospital acquired UTI include *Escherichia coli, Pseudomonas aeruginosa, Proteus sp, Enterobacter sp., Serratia sp.* or *Enterococcus*[1].

It is a disease that present with different signs and symptoms including asymptomatic bacteriuria and symptomatic infection involving urinary tract and bladder resulting in inflammation of both urethra and urinary bladder. Almost 90% of the patients have urinary symptoms like dysuria, increased frequency, itching, vaginal discharge with fever.[3] Roughly one third of the patients present with these symptoms but do not have bacteriuria[5].

In majority of UTI cases, empirical broad-spectrum antibiotics are started without any urine culture report as well as drug sensitivity pattern for the causative agent. It results in antibiotic resistance among uropathogens because of frequently used inappropriate antibiotics for longer duration[7]. Thus increased resistance pattern of bacterial pathogens is a global health issue today. The prevalence of antimicrobial resistance pattern among UTI patients vary with regional location[8]. Due to increasing burden of this disease, we planned the current study to determine the antibiotic resistance pattern prevailing in our setups in-order to avoid unnecessary prescription of antibiotics. This study will help clinicians in prescribing appropriate antimicrobial empirical treatment by knowing pathological agents involved in UTIs and their antimicrobial resistance patterns in our locality.

MATERIAL AND METHODS

A sample of 225 UTI patients were included in this study that was carried from January to December 2020 in the Department of Medicine, Abbottabad International Medical Institute, Abbottabad following the approval by hospital's ethical committee. Written consent was taken. Both genders with signs and symptoms of UTIs were enrolled. The urine samples were sent for culture and sensitivity. The data was analyzed by using SPSS 25. Mean and SD were calculated for age and frequency and percentage for gender, marital status and clinical characteristics. Chi square / Fisher's Exact test was used to compare the

resistance rates of the most frequent urinary tract pathogens against tested antibiotics with a significant p-value ≤ 0.05.

RESULTS

In present study, mean age of patients was 41.5 ± 10.4 years. General characteristic features of all the enrolled subjects are given in Table-1.

Most common causative organism of UTI turned out to be E.Coli (76.0%) followed by Klebsielia (11.1%), Enterococcus (8.95) and Pseudomonas (4.0%) among all the enrolled subjects as depicted in table-2.

The most sensitive antibiotics for all organisms were Nitrofurantoin (96.9) and Amikacin (86.7) as shown by table-3.

Different resistant strains of uropathogens were shown in table-4 against tested antibiotics. Results showed significant resistance of organisms against ampicillin and septran as empirical treatment option.

Table-1: General features of enrolled subjects

Variables	Categories	Frequency	%age
Gender	Males	64	28.4%
	Females	161	71.6%
Marital status	Yes	149	66.2%
	No	76	33.8%
History of UTI	Yes	141	62.7%
	No	84	37.3%
Prescription	GP	141	62.7%
	Specialists	84	37.3%
Mean age ± S.D (years)		41.5 ± 10.4	

Table-2: Causative agents of UTI among subjects

Organisms	Categories	Frequency	%age
Enterococcus	Present	20	8.9%
	Absent	205	91.1%
Klebsiella	Present	25	11.1%
	Absent	200	88.9%
E Coli	Present	171	76.0%
	Absent	54	24.0%
Pseudomonas	Present	9	4.0%
	Absent	219	96.0%

Table-3: Drug sensitivity pattern among UTI patients

Drugs	Frequency	%age
Ampicillin		
Sensitive	46	20.4
Resistant	179	79.6
Septran		
Sensitive	73	32.4
Resistant	152	67.6
Nitrofurantoin		
Sensitive	218	96.9
Resistant	7	3.1
Norfloxacin		
Sensitive	77	34.2
Resistant	148	65.8
Gentamycin		
Sensitive	129	57.3
Resistant	96	42.7
Amikacin		
Sensitive	195	86.7
Resistant	30	13.3
Aztreonam		
Sensitive	74	32.9
Resistant	151	67.1
Ciprofloxacin		
Sensitive	73	32.4
Resistant	152	67.6

Table-4: Resistance rates (%) of urinary tract pathogens against tested antibiotics

Antibiotics	Enterococcus	Klebsiella	E. Coli	Pseudomonas	Overall resistance	p-value
Ampicillin	2(10%)	24(96%)	147(86%)	6(66.7%)	179(79.6%)	< 0.001*
Septran	9(45%)	14(56%)	125(73.1%)	4(44.4%)	152(67.6%)	0.011*
Nitrofurantoin	0	1(4%)	6(3.5%)	0	7(3.1%)	> 0.999
Norfloxacin	15(75%)	13(52%)	115(67.3%)	5(55.6%)	148(65.8%)	0.312
Gentamycin	13(65%)	7(28%)	71(41.5%)	5(55.6%)	96(42.7%)	0.073
Amikacin	8(40%)	3(12%)	15(8.8%)	4(44.4%)	30(13.3%)	0.878
Aztreonam	9(45%)	15(60%)	122(71.3%)	5(55.6%)	151(67.1%)	0.066
Ciprofloxacin	16(80%)	13(52%)	117(68.4%)	6(66.7%)	152(67.6%)	0.245

DISCUSSION

An association between ineffective empirical treatment and therapeutic failure in terms of drug resistance among UTI treated patients globally was shown by many studies but sensitivity to antibiotics by uropathogens among UTI patients remained unclear. In developing countries, spending money on expensive antibiotics as a result of drug resistance pattern is still an issue so the present study was conducted. It was an attempt to determine the antibiotic resistance pattern prevailing in our setups just to avoid unnecessary antibiotic prescription.

It's a documented fact that UTI is primarily a female health issue due to a short urethra and proximity to vestibule and the anal opening. In present study, out of 225 subjects, 141(62.7%) patients had a history of UTI. Over 65% subjects enrolled were married. This showed that married couples suffer more from UTI. Our results were in line with one previous study that showed out of the 139 females studied, 63 45.32%) females were found to be urine culture positive.[1]

In present study, Escherichia coli (76%) and Klebsiella pneumoniae (11.1%) were the most common pathological agents found followed by Enterococcus (8.95) and Pseudomonas (4%) tale-2. These findings agreed with findings of many other reports as shown by literature review[4,9,11]. Escherichia coli (76%) and Klebsiella pneumonia were the most common pathogens involved in UTIs globally.

All isolated causative organisms for UTI were highly sensitive to Nitrofurantoin (96.9%), and Amikacin (86.7%) as observed in present study. Our findings were in line with

one previous study that showed the most effective antibiotic for E.coli and K.Pneumonia was Nitrofurantoin.[1,11]In contrast to one study that showed the highest sensitive drug was Ciprofloxacin (71.2%) for the treatment of UTI.[10]

Limitations: It was a single centered study with a limited resources and time constraints.

CONCLUSION

We concluded that regular monitoring should be made a routine as to gather the correct information regarding susceptibility pattern in order to reduce drug resistance in our setups. The most sensitive antibiotics for all UTI organisms were Nitrofurantoin (96.9) and Amikacin (86.7).

Author's contribution: SK & AN: Overall supervision, write up and literature review. NN & SZK: Statistics application analysis literature review, help in write up. MJUD,UQ and TL: Literature review help in write-up.

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