



ANTIMICROBIAL SUSCEPTIBILITY PROFILE OF PATIENTS OF UTI IN A TERTIARY CARE HOSPITAL

General Medicine

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ABSTRACT

BACKGROUND: Urinary tract infection (UTI) is one of the commonest infection in humans, mainly following instrumentation. Common causative pathogens include E.coli, Pseudomonas, Klebsiella, Proteus etc. Thus, the aim of this study was to determine causative urinary bacteria and assess their in vitro susceptibility pattern to commonly used antimicrobial drugs.

MATERIALANDMETHODS: One sample from each subject was considered. Total of 100 positive urine cultures were taken.

RESULT: E. coli (55%) was the predominant organism followed by K. pneumoniae (15%) and pseudomonas (11%). Resistance of microbes was high towards cefoperazone/ sulbactam, piperacillin/ tazobactam, meropenem.

CONCLUSION: Findings from the study revealed that E.coli is the most predominant etiology of UTIs followed by Klebsiella. The results show that the antimicrobial resistance patterns of the causes of UTI are highly variable. The multi-drug resistance pattern in these bacteria was high. Hence, it becomes essential to treat UTI patients based on microbiological susceptibility results.

KEYWORDS

INTRODUCTION

Urinary tract infection (UTI) is one of the commonest infection in humans, other two common infections being respiratory and gastrointestinal infections¹. The urinary tract is one of the most common site of nosocomial infection^{2,3,4}. Most of these infections follow instrumentation i.e. mainly urinary catheterization causing significant sepsis leading to increased morbidity and mortality.⁵ It occurs in at least 10-15% of hospitalized patients with indwelling urethral catheters. In such cases, the risk of infection is about 3-5% per day of catheterization⁶. Common causative pathogens include E.coli, Pseudomonas, Klebsiella, Proteus, Serratia, Staphylococci, Enterococci, and Candida. The identification of etiology and susceptibility profile could help in providing effective treatment. Thus, the aim of this study was to determine causative urinary bacteria and assess their in vitro susceptibility pattern to commonly used antimicrobial drugs.

MATERIALANDMETHODS

The study was carried out at the Department of General Medicine, SRMS IMS, Bareilly, India for a period of 6 months from January to June, 2021. The study included all the patients who were hospitalized or visited the outpatient department with symptoms of urinary tract infection during the study period and were found to have had positive urine cultures. One sample from each subject was considered. A clean catch midstream urine sample or suprapubic aspirate was collected in a sterile container.

RESULTS

A total of 100 urine culture positive patients were taken. As per the data collected, various bacterial isolates and their frequency is given in Table 1.

Table 1- Bacterial Isolates And Their Frequency. (N= 100)

Bacterial isolates	Frequency (%)
Escherichia coli	55
Klebsiella pneumoniae	15
Pseudomonas	11
Enterococcus faecalis	7
Enterococcus spp	3
Acinetobacter baumannii	2
Acinetobacter spp	2
Proteus vulgaris	2
Proteus mirabilis	2
MSSA	1

In this study, the predominant organism was E. coli (55%) followed by Klebsiella pneumoniae (15%), Pseudomonas (11%) as shown in table-1.

Table 2. Antibiotic Resistance Pattern Among Gram Negative Isolates

Orga nism	AM K	GE N	CIP RO	NO R	NIT RO	CO T	PIP/ TAZ	CEF/ O/ SUL	IMI	ME RO	ERT A
E.Coli N=55	15/ 55	18/ 55	19/ 55	22/ 55	30/ 55	28/ 55	34/ 55	36/ 55	6/ 55	32/ 55	8/ 55
K.pne umoni ae N=15	6/ 15	10/ 15	5/ 15	6/ 15	6/ 15	8/ 15	12/ 15	11/ 15	4/ 15	5/ 15	3/ 15
Pseud omon as N=11	4/ 11	6/ 11	6/ 11	7/ 11	8/ 11	6/ 11	7/ 11	8/ 11	3/ 11	5/ 11	3/ 11
P.vulg aris N=2	0/ 2	1/ 2	0/ 2	1/ 2	1/ 2	0/ 2	2/ 2	1/ 2	0/ 2	0/ 2	0/ 2
P.mira bilis N=2	0/ 2	1/ 2	0/ 2	1/ 2	1/ 2	1/ 2	1/ 2	1/ 2	0/ 2	0/ 2	0/ 2
A.bau manii N=2	0/ 2	1/ 2	1/ 2	1/ 2	1/ 2	0/ 2	1/ 2	2/ 2	1/ 2	0/ 2	0/ 2
A.spp N=2	1/ 2	2/ 2	2/ 2	1/ 2	1/ 2	0/ 2	2/ 2	1/ 2	0/ 2	0/ 2	0/ 2

AMK= Amikacin, GEN= Gentamycin, CIP= Ciprofloxacin, NORF= Norfloxacin, COT= Cotrimoxazole, PIP/TAZ= Piperacillin+ Tazobactam, CEF/ O/ SULB = Cefoperazone +Sulbactam, IMI= Imipenem, MERO= Meropenam, ERTA= Ertapenam

Gram negative microbes show higher resistance against cefoperazone-sulbactam, piperacilli- tazobactam and meropenem as shown in Table-2.

Table 3. Antibiotic Resistance Pattern Among Gram Positive Isolates

Organ ism	AMP	VAN	LINZ	AMX/ CLAV	NITR O	TICA	LEV OF	PIP/T AZ
Entero faecali s N= 7	2/7	3/7	2/7	3/7	3/7	3/7	5/7	4/7
Entero spp N=3	1/3	2/3	1/3	2/3	0/3	1/3	2/3	2/3

MSSA	0/1	0/1	1/1	0/1	0/1	1/1	1/1	0/1
N=1								

Gram positive isolates show high resistance against levofloxacin, piperacillin-tazobactam, vancomycin as shown in table-3.

DISCUSSION

UTI is one of the predominant cause of infections. In this study, the predominant organism was *E. coli* (55%) followed by *Klebsiella pneumoniae* (15%). Other studies which had similar findings includes study by Tajbakhsh et al. where *E. coli* was identified as the predominant cause of UTI (51.70%)⁷ Mandal et al⁸ had also conducted a similar study. Various other studies showed that *E. coli* is the most common causative organism for UTI^{10,11,12}. Other Gram negatives organism isolated were *Pseudomonas* (11%), *Acinetobacter baumannii* (2%), *Acinetobacter* spp (2%), *Proteus vulgaris* (2%), *Proteus mirabilis* (2%).

In this study, *E. coli* showed highest resistance to cefoperazone/sulbactam (65%), piperacillin/ tazobactam (61.8%), meropenam (58.1%) while low resistance against other drugs such as imipenem, ertapenem.

K. pneumoniae showed high resistance to piperacillin-tazobactam (80%), cefoperazone/sulbactam (73.3%) , gentamicin (66.6%), cotrimoxazole (53.3%), while resistance was low to ertapenem (20%), imipenem (26.6%), meropenem (33.3%).

Other organism like *pseudomonas* showed high resistance to cefoperazone / sulbactam (72.7%), nitrofurantoin (72.7%), piperacillin/ tazobactam (63.6%), norfloxacin (63.6%). These are one of the most widely used antibiotics for treating UTIs, even in complicated cases, given their broad-spectrum action, bactericidal potency, excellent oral bioavailability, good tolerance, and marked post antibiotic effect^{13,14}. However, various studies have reported high resistance rates to these antibiotics¹⁵.

E. fecalis showed maximum resistance to levofloxacin (71.45%), piperacillin/tazobactam (57%), vancomycin (42.8%). *Enterococcus* spp showed 66.6% resistance to amoxicillin/ clavulanic acid, levofloxacin, piperacillin/ tazobactam. No resistance was seen against nitrofurantoin. MSSA showed complete resistance (100%) to levofloxacin, linezolid, ticarcillin but no resistance against vancomycin, ampicillin, piperacillin-tazobactam was seen.

Overall, Gram-negative isolates showed higher resistance in the present study. This high antibiotic resistance is mostly due to widespread use of antimicrobials as well as irrational prescription of antimicrobials which are available over-the-counter.

CONCLUSION

The results show variable antimicrobial resistance patterns of the different causative pathogens of UTI. The multi-drug resistance pattern in these bacteria was high. Hence, it becomes essential to treat UTI patients based on microbiological susceptibility results in which will help to reduce emergence as well as spread of multidrug resistant pathogens.

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