

Prevalence and Antibigram of Escherichia Coli Isolated from Urine Sample of Suspected Male UTI patients in a Tertiary Care Hospital of Southern Bihar

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Running Title: Prevalence and Antibigram of *E. Coli* Isolated from Urine Sample in a TCH

Abstract: Background: Most common cause of Urinary Tract Infection (UTI) is *Escherichia coli*. However, in past many years antibiotic resistance *Escherichia coli* has emerged. Material and Methods: This retrospective study was conducted in the Department of Microbiology in a tertiary care hospital over six months from June 2022 to December 2022. Total 214 urine samples were received to the microbiology department. To identify the possible Bacterial cause from suspected UTI male outdoor patient, from urine sample by culture and biochemical tests. The antibiotic sensitivity test was done on Mueller - Hinton agar by the Kirby - Bauer disc diffusion method. Results: Out of 214 urine samples, 130 (62.00%) yielded significant bacterial growth. Among them *E. coli* was the most predominant bacteria 62 (48%) followed by *Citrobacter spp.* 19 (15%), *Pseudomonas* 14 (10.15%) *Proteus* 10 (9.25%) different Gram - Positive bacteria 16 (12%) and *Acinetobacter* 9 (5.63%). All (100%) *E. coli* were sensitive to imipenem and colistin sulphate and 50% resistant to ciprofloxacin and 100% resistant to Ampicillin. Conclusion: it can be said that antibiotic resistance against commonly using antibiotics is an alarming sign for health care system to treat the outdoor patients for common disease.

Keywords: Prevalence, Antibigram, UTI, *E. coli*

1. Introduction

Urinary Tract Infection (UTIs) is the most common infections occurring worldwide in routine clinical practice at any time in a human life. Urinary tract infection affects in lower urinary tract (bladder and urethra) and upper urinary tract (kidney and ureter) ^[1-2].

The clinical symptoms range from asymptomatic urinary tract infection to severe infection like sepsis leading to death. They are often affected by microbes like bacteria, fungus, and viruses. UTI caused by bacterial infection is predominant compared to the other two microbial infections. Bacteria commonly associated with UTI are Gram Negative organisms like *Escherichia coli*, *Klebsiella* species, *Pseudomonas* species, and *Proteus* species and gram - positive like *Enterococcus* species, *Staphylococcus aureus*, and *Staphylococcus saprophyticus*. Among these organisms, *E. Coli* accounts for the most common organism causing both community - acquired (CA - UTI) as well as hospital - acquired (HA - UTI) UTI ^[3]

Of more concern is increasing incidence of infections caused by strains of *E. coli* that are resistant to commonly used

antimicrobial agents specially to trimethoprim - sulphamethoxazole (TMP/ SMX) and beta lactam antibiotics. ⁴ This multidrug resistance pattern in *E. coli* might be due to the production of extended spectrum beta lactamase enzyme. ⁵

In India, many studies have been done on antimicrobial resistance patterns in *E. coli* isolated from urine sample of male patients which showed high rates of resistance among *E. coli* ^[6]. The present study aims to determine the UTI - causing organisms and determine the prevalence of uropathogenic *E. coli* and its antimicrobial resistance pattern.

2. Material and Methods

This retrospective study was conducted in the Department of Microbiology in a tertiary care hospital over six months from June 2022 to December 2022. Total 214 urine samples were received to the microbiology department for culture and sensitivity from male patients from medicine and urology departments.

Collection and Processing of urine sample:

Volume 12 Issue 7, July 2023

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Clean catch midstream urine specimen was collected from all patients into a wide – mouthed sterile screw - capped container. Urine samples were taken to a bacteriology lab and processed. After receiving to the lab, each specimen was subjected to culture by the semi – quantitative standard loop technique using a 4mm internal diameter loop which collects 0.01 ml of urine sample inoculated on CLED agar. The plates were incubated aerobically at 37⁰ C overnight. According to Kass criteria, a number $\geq 10^5$ colony forming units (CFU) /mL of urine was considered as significant bacteria and colony number $< 10^5$ CFU/mL was considered as insignificant bacteria and correlated with clinicians for the report [7].

Isolation and Identification:

The organisms isolated from urine culture were identified by standard methods like Growth on CLED agar, appearance in Gram's staining and Biochemical reactions [7].

Antibiotic susceptibility testing: The antibiotic sensitivity test was done on Mueller - Hinton agar by the Kirby - Bauer disc diffusion method. Plates were incubated at 37°C overnight, and the inhibition zone was examined as per the recommendations of the Clinical and Laboratory Standards Institute 2022.

The antibiotic disk used in antibiogram for all the Gram - negative bacteria were co - trimoxazole (1.25/23.75 µg), gentamicin (10 µg), ciprofloxacin (5 µg), amoxiclav (20+10 µg), ceftriaxone (30 µg), ceftazidime (30 µg), imipenem (10 µg), amikacin (30µg/disc), colistin sulphate (10µ g/disc), cefixime (30µg/disc), and nitrofurantoin (300µg/disc) and fosfomycin. *Escherichia coli* ATCC 25922 was used for quality control. Pure colonies of isolated organisms were emulsified in normal saline and turbidity was matched with 0.5 McFarland turbidity standards. Selected antibiotic discs were placed on inoculated Mueller Hinton agar media. These plates were incubated at 37°C for 24 hours. Resistant and sensitive bacteria were defined according to CLSI guidelines.⁷

3. Result

Out of 214 urine samples of suspected cases of UTI of outdoor male patient, 130 (65.00%) samples showed significant bacterial growth. (Table: I) Among them, *E. coli* was the most predominant pathogenic bacteria 62 (48%) followed by *Citrobacter* 19 (15 %), *Pseudomonas* 14 (10.15%) *Proteus* 10 (9.25%) different Gram Positive bacteria 16 (12%) and *Acinetobacter* 9 (5.63%)

In our study, maximum resistance is seen with Ampicillin 100% followed by Norfloxacin, ciprofloxacin and cephalosporins 50%, 100 % sensitive is seen with colistin, imipenem and meropenaem, 80% sensitive is seen with nitrofurantoin and fosfomycin.

Table 1: Number and percentage Organisms isolated from Urine samples

Organism isolated	Number	Percentage
<i>Escherichia coli</i>	62	48
<i>Citrobacter spp</i>	19	15
<i>Pseudomonas aeruginosa</i>	14	10.15

<i>Proteus spp</i>	10	9.25
<i>Staphylococcus aureus</i>	16	12
<i>Acinetobacter</i>	9	5.6

Table 2: Antimicrobial susceptibility of *Escherichia coli* isolated from urine sample by Kirby - Bauer disc diffusion method

Antibiotics	Sensitive (%)	Resistant (%)
colistin	62 (100)	00
Imepenem	62 (100)	00
Meropenem	62 (100)	00
Nitrofurantoin	50 (80)	12 (20)
Fosphomycin	50 (80)	12 (20)
Ceftriaxone	31 (50)	31 (50)
Ceftazidime	31 (50)	31 (50)
Ciprofloxacin	31 (50)	31 (50)
Norfloxacin	31 (50)	31 (50)
Co trimoxazole	47 (75)	15 (25)
Ampicillin	00	62 (100)
Amikacin	48 (77)	14 (23)

4. Discussion

In present study, *Escherichia coli* was the most predominant bacteria (48%) found in urine followed by *Citrobacter spp* (15%), *Pseudomonas* (10.15%) and *Proteus* (6.25%) which correlates with the studies conducted in Bangladesh, India and Nepal.^{4, 8, 9} Previous study conducted in India also showed *Escherichia coli* as the most common uropathogens.¹⁰

While coming to antibiotic profile analysis carried using 12 antibiotics in our study, maximum resistance is seen with Ampicillin 100% followed by Norfloxacin, ciprofloxacin 50% and cephalosporins 50% - 100 % sensitive is seen with Colistin, Imepenem and meropenaem, 80% sensitive is seen with Nitrofurantoin and fosfomycin. This is similar to all the other studies conducted by Malik. et. al [11]. And Niranjana et al. [12] Increased level of resistance to the commonly used antibiotics might be due to production of extended spectrum of beta lactamases by Gram negative bacteria.

5. Conclusion

In this study most of the common drugs which are used in outdoor patient treatment for UTI. This is responsible for emergence of drug resistance the practice of inappropriate use of antibiotics is very alarming for healthcare systems.

Source of Support: Nil

Conflicts of Interest: None Declared

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