



## PREVALENCE AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF E. COLI ISOLATED AMONG PATIENTS WITH URINARY TRACT INFECTION IN A TERTIARY CARE HOSPITAL OF NORTH EAST INDIA

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### ABSTRACT

Urinary tract infection is one of the most common bacterial infections seen in clinical practice particularly in developing countries. The predominance of Gram-negative species, particularly, *Escherichia coli*, remained the principal pathogens causing UTI. The present study shall focus on susceptibility pattern in Urinary Isolates of *E. coli* in a Tertiary Care Hospital in North East India. Samples depicted bacterial growth & sterile are 190 and 95 respectively amongst the 285 analyzed urine samples. Gram negative and gram positive bacteria isolates from urine sample are 150(75%) and 40(25%) respectively. *E. coli* remained the most common isolate 115 (76%). The susceptibility and resistance profile of *E. coli* isolates in this study have shown that Nitrofurantoin (85.21%) possess the high efficacy while Cefazidime (81.73%) possess lower efficacy. This study suggested the need for constant monitoring and susceptibility pattern of specific pathogens in different populations to formulate local antibiotic policies.

**KEYWORDS :** UTI, antimicrobial susceptibility, *E. coli*

**INTRODUCTION:** Urinary tract infections (UTIs) are among the most common bacterial infections encountered in primary health care, and it is among the most common infections with an increasing resistance to antimicrobial agents<sup>1</sup>. UTI has become the most common hospital-acquired infection, accounting for as many as 35% of nosocomial infections, and it is the second most common cause of bacteraemia in hospitalized patients<sup>2</sup>. Though UTI is more common in women than men, symptoms and physical exam findings are usually similar in both sexes. The common organisms causing UTI are *E. coli*, *Klebsiella*, *Proteus*, *Staphylococcus aureus* etc. Extended-spectrum-lactamase (ESBL)-producing *E. coli*-related UTI is an emerging problem in many parts of the world. Increasing multidrug resistance in bacterial uropathogens is an important and emerging public health problem. Pathogens associated with UTI are increasingly changing their features particularly due to self-medication, overuse, and misuse of drugs<sup>3</sup>. Knowledge of the local bacterial etiology and susceptibility patterns is required to trace any change that might have occurred in time so that updated recommendation for optimal empirical therapy of UTI can be made<sup>4</sup>. The study was done to find out the changing trend of antimicrobial resistance pattern of *E. coli*, isolated from suspected cases of urinary tract infections among both inpatients and outpatients department of a tertiary care hospital. To optimize the use of empirical antibiotic therapy for UTI, it is important for clinicians to be aware of the etiological agents and susceptibility patterns of UTI pathogens in their populations. Distribution of uropathogens and their antimicrobial sensitivity patterns may differ regionally so it becomes necessary to study these and compile their data in particular settings<sup>5,6</sup>.

### MATERIAL AND METHODS:

#### Study population

Present study was carried out for a period of six month during 2019-2020. Urine samples (285) were collected from the patient admitted as well as attending outdoor patient department of tertiary care hospital, in north east of India. All patients with signs and symptoms of UTI who voluntarily consented were recruited in the study. Sample Size Determination done by using standard formula.

#### Sample collection and processing

Freshly voided midstream urine samples (10-20 ml) were collected in wide mouth sterile container from suspected UTI patient attending indoor and outdoor patient department and processed within one hour.

#### Culture and Identification

Urine samples were inoculated on Cysteine Lactose Electrolyte Deficient (CLED) agar, MacConkey and Blood agar plates (Hi-Media labs Ltd.) and incubated at 35-37°C for 24 hours using a sterile loop following standard culture procedures. Colony count of 10<sup>5</sup> CFU / ml were taken as significant for midstream urine samples. Gram positive bacteria with lower colony counts were considered significant for

symptomatic and catheterized specimens. Cultures with more than two colonies were considered as contaminants and such samples were discarded. The culture isolates were further identified by their morphologies and biochemical characteristics.

#### Antimicrobial susceptibility testing:

Antibiotic susceptibility tests and interpretations for the bacterial Isolates was done by the Modified Kirby-Bauer disc diffusion method according to the Clinical and Laboratory Standards Institute (CLSI) guidelines<sup>7</sup>. The plates were incubated at 37°C for 24 hours. Diameter zone of clearance around the antibiotic discs were measured after incubation with a ruler and recorded in millimeters. Their sensitivities to antibiotic disc (Hi-Media Lab Ltd, Mumbai) were interpreted according to Clinical laboratory Standards Institute guidelines.

### RESULTS

Samples depicted bacterial growth & sterile are 190 and 95 respectively amongst the 285 analyzed urine samples. Gram negative and gram positive bacteria isolates from urine sample are 150(75%) and 40(25%) respectively. *E. coli* remained the most common isolate 115 (76%) followed by *Klebsiella pneumoniae* 19 (12.6%) as shown in Table 1. *E. coli* isolates reflected maximum sensitivity to Nitrofurantoin (85.21%) followed by Amikacin (82.60%). The resistance rate of urinary *E. coli* isolated was highest for Cefazidime (81.73%) followed by Amoxycylav (80.86%), Cefuroxime (70.43%), Cotrimoxazole (69.56%) as shown in Table 2. As regards gender, females (70.43%) were more commonly infected with *E. coli* as compared to males (29.56%).

**Table 1. Prevalence of *E. coli* and other Gram Negative bacteria among UTI patients**

Isolate	Number of isolates	Percent
<i>E. coli</i>	115	76
<i>K. pneumoniae</i>	19	12.6
<i>P. aeruginosa</i>	8	6.9
<i>Citrobacter spp</i>	5	4.34
<i>Proteus</i>	3	2.6

**Table 2: Antibiogram of *Escherichia coli***

Antibiotic	Sensitive (percentage)	Resistant (percentage)
Cotrimoxazole (1.25/23.75 µg)	35(30.43)	80(69.56)
Nitrofurantoin (300 µg)	98(85.21)	17(14.78)
Amikacin (30 µg)	95(82.60)	20(17.39)
Amoxycylav (20/10 µg)	22(19.13)	93(80.86)
Gentamicin (10 µg)	75(65.21)	40(34.78)
Ciprofloxacin (5 µg)	40(34.78)	75(65.21)

ofloxacin (5µg)	38(33.04)	77(66.95)
Cefuroxime(30µg)	34(29.56)	81(70.43)
Cefotaxime(30 µg)	59(51.30)	56(48.69)
Ceftazidime (30µg)	21(18.26)	94(81.73)

## DISCUSSION:

The present study provided an outlook on isolates and Antimicrobial Susceptibility pattern of *E. coli* isolated in this part of India. While historically it was believed that the causative organism in UTIs differed between men and women, study data has shown that for both sexes the primary causative pathogen is *Escherichia coli*. It was observed that the incidence of UTI is more among female (70.43%) than male(29.56%). This was in agreement with few other studies<sup>18,9,10,11</sup>. *E. coli* (76%) remained the predominate isolated organism which was in comprehension with the findings of similar studies which were by Pallavi *et al*<sup>13</sup>, Manjunath *et al*<sup>14</sup>, Oladeinde B.H *et al*<sup>15</sup>, and Chin *et al*<sup>16</sup>. Majority of *E. coli* isolates were susceptible to Nitrofurantoin (85.21%), with resistant isolates only 14.78%, which is similar to results documented by Shalini *et al*<sup>17</sup>, Kibret M & Abera B<sup>18</sup>, Rijal A *et al*<sup>19</sup>, and Bashir MF *et al*<sup>20</sup>. The resistance rate of urinary *E. coli* isolated was highest for Ceftazidime followed by Amoxycylav, Cefuroxime, Cotrimoxazole. Amikacin (82.60%) and Gentamicin(65.21%) shows high susceptibility *E. coli* isolates which is similar to finding reported by AshaPai KB *et al*<sup>21</sup> & Shalini *et al*<sup>17</sup>.

## CONCLUSION:

There was significantly high resistance to Ceftazidime, Amoxycylav, Cefuroxime and Cotrimoxazole to *E. coli* isolate. In current practice, urinary tract infections are often treated empirically and susceptibility tests are often carried out only when the patient has failed one or more courses of antibiotics. The susceptibility and resistance patterns of urinary pathogens should be considered before starting empirical treatment for UTI. The present study confirms that bacterial resistance would be a greatest problem in this part of country with some commonly used antibacterial agent. There is urgent need of constant monitoring with culture and sensitivity pattern of specific pathogens in different health care centers in our country. Community awareness program should be undertaken for adherence to treatment protocol considering bacterial resistance and emerging multidrug resistant strains. It is necessary to conduct a regional research and formulate local antibiotic policies for the culture and sensitivity patterns of the bacteria.

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